



Edited by
Thea van der Westhuizen

Innovative Pedagogies for Entrepreneurship Education

Insights and Reflections
from South Africa

OPEN ACCESS

palgrave
macmillan

Innovative Pedagogies for Entrepreneurship Education

Thea van der Westhuizen
Editor

Innovative Pedagogies for Entrepreneurship Education

Insights and Reflections from South
Africa



UNIVERSITIES
SOUTH AFRICA



palgrave
macmillan

Editor

Thea van der Westhuizen
University of KwaZulu-Natal
Durban, South Africa



ISBN 978-3-032-07203-0 ISBN 978-3-032-07204-7 (eBook)
<https://doi.org/10.1007/978-3-032-07204-7>

This work was supported by Universities South Africa.

© Universities South Africa 2026. This book is an open access publication.

Open Access This book is licensed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits any noncommercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if you modified the licensed material. You do not have permission under this license to share adapted material derived from this book or parts of it.

The images or other third party material in this book are included in the book's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the book's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

This work is subject to copyright. All commercial rights are reserved by the author(s), whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed. Regarding these commercial rights a non-exclusive license has been granted to the publisher.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Palgrave Macmillan imprint is published by the registered company Springer Nature Switzerland AG

The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

If disposing of this product, please recycle the paper.

Foreword

It is with great pleasure that I introduce the scholarly book “*Innovative Pedagogies for Entrepreneurship Education: Insights and Reflections from South Africa*”, a collection of outstanding case studies that highlight the ingenuity and dedication of our higher education institutions in fostering entrepreneurship across South Africa. This book stands as a testament to the innovative spirit within our universities, especially within the realms of learning and teaching. In recent years, entrepreneurship has become a key focus within higher education, not only as a subject to be taught but as a practice to be nurtured and embodied. As we strive to build an inclusive and sustainable economy, the role of universities in cultivating entrepreneurial mindsets has never been more crucial.

By developing platforms for students and academics to explore entrepreneurship, we are equipping future generations with the skills to create solutions that address the many challenges faced by our country and continent. The Entrepreneurship Development in Higher Education (EDHE) programme continues to be a driving force in this mission. This book is a culmination of the efforts of dedicated educators, who, through their exceptional work, were recognised in the EDHE Learning

and Teaching Excellence Awards of 2022 and 2023. These case studies are reflective of the pioneering pedagogies and methodologies being implemented to inspire a new wave of entrepreneurs from within our universities. They showcase how innovative teaching approaches can transform traditional learning spaces into incubators of creativity and action.

As we move forward in building entrepreneurial ecosystems within our higher education sector, I hope that this book will serve as both an inspiration and a guide to educators, students, and university leaders alike. I believe that the insights and experiences shared here will contribute to the development of robust entrepreneurial ecosystems in South African universities and beyond, ultimately contributing to our national and global developmental goals.

In closing, I wish to extend my deepest gratitude to the contributors of this book for their valuable work. Their dedication to advancing entrepreneurship education is helping to shape a brighter future for all. I would also like to thank the EDHE team for their continued leadership and vision in fostering entrepreneurial growth within our universities.

Together, let us continue to inspire, support, and empower the next generation of South African entrepreneurs.

Sincerely,

Dr. Phethiwe Matutu
The Chief Executive Officer
Universities South Africa (USAf)
Pretoria, South Africa

Preface

As the editor of “*Innovative Pedagogies for Entrepreneurship Education: Insights and Reflections from South Africa*” we are honoured to present this collection of exemplary case studies that highlight the best practices in entrepreneurship education within the South African higher education context. This collection showcases the innovative and impactful efforts of educators, support personnel, administrators, and institutions dedicated to fostering entrepreneurial mindsets and capabilities among students.

The 22 case studies featured in this anthology represent a diverse array of institutions and initiatives, each bringing a unique perspective and approach to entrepreneurship education. Their contributions have been rigorously evaluated through an international triple-blind peer review process, ensuring the highest standards of academic integrity and quality. This meticulous selection process underscores the credibility and significance of the case studies included in this volume. Top case studies were recognised and awarded at the EDHE Awards.

The purpose of this collection is to demonstrate the transformative potential of entrepreneurship education and to provide valuable insights and practical strategies for educators, students, policymakers, and private

sector stakeholders. By sharing these best practices, we aim to inspire and inform the broader higher education community, fostering a culture of innovation and entrepreneurship that is vital for the development and prosperity of our society.

Each case study is structured to provide comprehensive background information, detailing the specific problems addressed, the targeted young entrepreneurs, and the sustainability issues tackled. The case studies also explore the criteria for participant selection, strategies for promoting diversity, and the support infrastructure provided by the institutions. Additionally, the descriptions of the entrepreneurial ecosystems, performance evaluations, and challenges encountered offer a holistic view of each initiative's impact and effectiveness.

This book is not just a compilation of successful programmes and initiatives but a testament to the dedication and creativity of South African educators who are committed to nurturing the next generation of entrepreneurs. It is our hope that this work will serve as a valuable resource for those engaged in entrepreneurship education and as a catalyst for further innovation and collaboration in this vital field.

We extend our heartfelt gratitude to all the contributors, reviewers, and supporters of this anthology. Your commitment to excellence and your passion for entrepreneurship education are truly inspiring.

Acknowledgement: the scholarly conceptualisation of the EDHE Learning and Teaching awards and the anthology was supported in part by the National Research Foundation of South Africa (Grant Number: 122002-Shape).

Durban, South Africa

Prof. Thea van der Westhuizen

Acknowledgements

Gratitude is extended to the *Entrepreneurship Development in Higher Education (EDHE)* for their pivotal role in making the *EDHE Learning and Teaching Excellence* initiative possible. Their leadership and support have been instrumental in advancing excellence in entrepreneurship education across higher education institutions. Appreciation is also extended to the *Entrepreneurship Development in Higher Education Community of Practice: Learning and Teaching* task team members for their valuable contributions to the process and their efforts in steering the peer-review process with professionalism and dedication. Their work has greatly contributed to the success of this initiative.

Contents

1	Bridging Gaps and Charting Directions: Innovative Pedagogies in South African Entrepreneurship Education	1
	<i>Thea van der Westhuizen</i>	
Part I Entrepreneurial Ecosystems in Higher Education		
2	Empowering Youth Through Entrepreneurship Education: The Dut-Ngodini Bunduz Project	27
	<i>Thulile Promise Mofokeng and Nyane Ezekiel Macdonald Mofokeng</i>	
3	Cultivating Innovative Entrepreneurial Mindsets Beyond the Books	49
	<i>Johan Gouws</i>	
4	Fostering Entrepreneurial Mindsets in Medical Laboratory Science Through Work-Integrated Learning	75
	<i>Nokukhanya Thembane</i>	

5	The UCT Genesis Project—Building Entrepreneurs for Africa	99
	<i>Stuart Hendry</i>	
6	Innovative Pedagogies for Developing Creativity in Business	115
	<i>David Priilaid</i>	
7	An Innovative Approach to Entrepreneurship Development at UWC	129
	<i>Vivienne Lawack and Jacob Cloete</i>	
Part II Innovative Pedagogies in Entrepreneurship Education		
8	The Structured MEM: A Model for Innovative Engineering Entrepreneurship Education	155
	<i>Taryn Bond-Barnard</i>	
9	Nurturing Entrepreneurial Minds: Exploring Innovative Pedagogies in South African Hospitality Education	179
	<i>N. C. Seabi</i>	
10	Preparing South African Science Students as Innovators and Entrepreneurs	201
	<i>Karin Jacobs and Hanelie Adendorff</i>	
11	Transformative Learning in Correctional Education: Fostering Economic Inclusion Through Entrepreneurship	225
	<i>Juan Ontong and Sher-Lee Fourie</i>	
12	Youth Entrepreneurship Development Through Design Thinking and Business Model Innovation	249
	<i>D. A. J. (Dawie) Bornman</i>	
13	Innovative Teaching in Food Product Development and Entrepreneurship for Student Success	263
	<i>Maricel Krügel</i>	

14	Innovative Pedagogies for Entrepreneurship Education: Insights and Reflections from South Africa	287
	<i>Onica Thandi Matsheke</i>	
 Part III Entrepreneurship for Social And Economic Transformation		
15	Cultivating Entrepreneurial and Other Related Critical Skills in Agriscience Students	309
	<i>Albert E. Strever</i>	
16	Entrepreneurship Education for Sustainable Production of Bio-Based Products: A Case Study	337
	<i>Vhuhwavho Tshavhungwe</i>	
17	Cultivating Change Agents: An Experiential Pedagogy for Social Entrepreneurship	361
	<i>Ruenda Loots</i>	
18	Effectiveness of Entrepreneurial Programmes as a Mitigating Strategy to Curb Unemployment: A Case Study of University of Limpopo Graduates	381
	<i>Kgahliso Maoto</i>	
 Part IV Leadership, Governance, and Policy in Entrepreneurial Universities		
19	Bridging the Gap: Mapping Project Management Education to Graduate Employability and Entrepreneurship at the University of Cape Town (UCT)	409
	<i>Niall Naidoo and Alison Catherine Meadows</i>	
20	Entrepreneurship Education in South Africa: Innovative Pedagogies for Sustainability and Grand Challenges	469
	<i>Karen Stander, Kagiso Mashego, and Adedotun Adetunla</i>	

Part V	Framing the Future of Entrepreneurship Education	
21	Leading Entrepreneurship Ecosystems in Higher Education: A Case of Universities South Africa's EDHE as an Ecosystem Coordinator and Enabler	497
	<i>Edwell Gumbo and Thea van der Westhuizen</i>	
22	Innovative Pedagogies Showcasing Excellence in University Entrepreneurship Learning and Teaching	527
	<i>Thea van der Westhuizen</i>	
Index		555

Notes on Contributors

Dr. Hanelie Adendorff, a senior advisor at Stellenbosch University, holds a Ph.D. in Chemistry. Active in professional development since 2002, her focus includes blended learning, assessment, collaborative learning, science education, and AI-driven pedagogy. She serves on CriSTaL's editorial board and publishes in professional development and curriculum decolonisation.

Dr. Adedotun Adetunla holds a Ph.D. in Mechanical Engineering and is currently a Postdoctoral Fellow in the Department of Business Management at UNISA. His research interests include automation, blockchain, and AI applications.

Prof. Taryn Bond-Barnard is an Associate Professor in the Department of Industrial Engineering at the University of Stellenbosch and she is responsible for the structured Master's in Engineering Management Programme. Her research interests include the Human Aspects of Project Management, Agile and Project Management Education. She is certified PMP, PRINCE2, and an ECSA-registered engineer.

Dr. D. A. J. (Dawie) Bornman is a senior lecturer, postgraduate supervisor and researcher in the Department of Business Management at the University of Pretoria, South Africa. He focuses on Entrepreneurial Creativity, Business Management Innovation, and Leadership Communication, and has presented his research at numerous international conferences, doctoral seminars, and personal development workshops. Apart from the academic landscape, Dr. Bornman is also an ‘artpreneur’ focusing on talent development, management and entertainment industry consulting which have taken him on nationwide and international tours in order to assist with building a stronger South African creative sector.

Dr. Jacob Cloete is a filmmaker, researcher, entrepreneur, and community development practitioner. He graduated from the University of the Western Cape with his Ph.D. in Political Science. His scholarly work feeds into scholarship on the politics of belonging, the Khoekhoe, San, and the problematic “coloured” identity in South Africa.

Sher-Lee Fourie is a lecturer at the School of Accountancy at Stellenbosch University. Sher-Lee has a keen interest in conducting accounting education research projects to inform her teaching and learning practice. Further academic interests include curriculum reform and redesign, inclusive education, and student success.

Johan Gouws is a Lecturer at North-West University with expertise in Entrepreneurship, Strategic Management, and Business Ethics. He has many years of teaching experience and is passionate about empowering students through transformative learning. His work focuses on developing ethically grounded, future-ready business leaders who can navigate complexity with purpose and integrity.

Dr. Edwell Gumbo is currently serving as the Director of Entrepreneurship (EDHE) at Universities South Africa (USAf). He plays a pivotal role in shaping entrepreneurship development and support structures within South Africa’s higher education sector. Dr. Gumbo holds a Ph.D. in Entrepreneurship from the University of Pretoria, an MBA from

Nelson Mandela University, and an MPhil in Entrepreneurship from the University of Pretoria.

Stuart Hendry has been building entrepreneurs at the University of Cape Town (UCT) since 1999. He has won two CHED Awards for Outstanding Collaborative Pedagogy (2009 and 2013), an International Award for Distinguished Research in Entrepreneurial Leadership (2010), the UCT Vice Chancellors Award for Social Responsiveness (2014), and two UCT Merit Awards for Teaching and Public Service (2012 and 2014). In 2022 he received the National Entrepreneurship Development in Higher Education (EDHE) Award for Entrepreneurship Teaching Excellence. In his spare time, Stuart is a serial entrepreneur and venture capitalist and serves on the boards of several NGOs.

Prof. Karin Jacobs, a microbiologist with a Ph.D. from the University of Pretoria, is a professor at Stellenbosch University. She's an award-winning researcher in soil microbiology and fungal taxonomy, supervising numerous postgrads and publishing widely. She co-founded Sporotec, a service at Stellenbosch University, specialising in soil microbial community analysis.

Dr. Maricel Krügel is an accomplished academic in Food Science education and research, and recognised for her contributions to teaching, curriculum design, and product development. A recipient of Stellenbosch University's Scholarship of Educational Leadership with merit, she integrates theory with practice, mentor's students, and enhances employability through innovative, globally recognised educational strategies. <http://www.linkedin.com/in/maricel-kr%FBgel>.

Prof. Vivienne Lawack is a Law Professor in the Department of Mercantile and Labour Law at UWC. She holds an LLD from UNISA and is a non-practicing advocate of the High Court of South Africa. She specialises in Fintech Law and Regulation at both international and South African levels.

Dr. Ruenda Loots is passionate about creating learning experiences that inspire students to become agents of change. She believes in the power of transformative learning, where curiosity and creativity come together to imagine a hopeful future. In 2022, Ruenda was recognised for her contribution to Entrepreneurship Learning and Teaching in South Africa's Higher Education sector.

Kgahliso Maoto is a dedicated academic professional currently serving as a lecturer and Head of the Department of Business Management at the University of Limpopo. With over ten years of teaching experience, she specialises in supply chain management, e-business, and strategic project management. She holds a Master of Commerce in Entrepreneurship and has successfully supervised more than ten honours students to completion. Throughout his academic journey, Maoto has demonstrated a commitment to both research and student development, having published four scholarly articles and participated in three conference proceedings. She has also received several accolades, including the Best Overall Teacher Award in 2021 and the Best Faculty Advisor for Enactus students in 2023. Beyond teaching, Kgahliso is actively involved in various university structures and national programmes. She is a member of the SWEEP programme, a representative in the ULWASA organisation, faculty advisor EnactusUL, and serves as a Cop member in Entrepreneurship Development in Higher Education (EDHE) for the University of Limpopo. Her professional growth is further reflected in his participation in numerous training and certification programmes, such as postgraduate supervision, outcome-based assessment, mentorship, women in leadership, RPL, and research writing. With a passion for entrepreneurship and academic excellence, Kgahliso Maoto continues to play a pivotal role in advancing the university's vision while contributing meaningfully to the empowerment of South African youth.

Kagiso Mashego is a Lecturer in the Department of Business Management at UNISA, teaching a Research project in Business Management. He holds an MCom degree and is currently completing Ph.D. at UNISA. His research interests are disruptive innovation, competitive intelligence, and business model innovation, particularly in the context

of SMEs. He is passionate about teaching students how to identify and solve societal problems through entrepreneurship, empowering them to be solutionists that contribute positively to the community.

Onica Thandi Matsheke is from Mpumalanga province in South Africa. She started higher education studies in the former Pretoria Technikon for two years, then finished the diploma in personnel management at the Vaal Technikon in 1999. She continued with her studies at Vaal University of Technology where she obtained a master's in business administration. Currently she is pursuing a Ph.D. in business administration.

Alison Catherine Meadows is a Senior Lecturer in the School of Management Studies and programme convenor of the B.Com. in Management Studies at UCT. Her key interests are in responsible management practice across various organisational areas and industries, events management, and strategic thinking. Alison is well known for her innovative teaching and assessment practice and for her deep investment in student success.

Nyane Ezekiel Macdonald Mofokeng is a lecturer in the Department of Applied Management at the Durban University of Technology (DUT). He is currently a Ph.D. candidate at DUT with research interest in the fields of blockchain technology, local economic development, tourism, and conservation.

Dr. Thulile Promise Mofokeng is a lecturer in the Department of Entrepreneurial Studies and Management at the Durban University of Technology (DUT). Her expertise includes work-integrated learning, entrepreneurship development, and ecotourism. She is passionate about innovative teaching approaches that equip students with practical skills for sustainable business practices.

Niall Naidoo is the current New Venture Support Manager and lecturer at The University of Cape Town. He is currently responsible for providing support services to the university's spin-out companies

regarding compliance, consulting services, strategy, and transactions. His teaching and research focuses around innovation management, corporate finance, strategy, and project management.

Juan Ontong is financial accounting senior lecturer within the School of Accountancy at Stellenbosch University. He has an interest in accounting education, with specific reference to enhancing teaching and learning practices, as well as policy surrounding these practices.

Prof. David Priilaid, Associate Professor at the University of Cape Town's School of Management Studies, has over 30 years of experience specialising in wine-food econometrics, consumer behaviour, and creativity. His research is featured in leading journals, including *British Food Journal*, *Food Quality and Preference*, *Frontiers in Psychology*, the *International Journal of Wine Business Research*, and the *Journal of Wine Research*. He is the author of "*Creativity Explained – From Music and Art to Innovation in Business*" (2023).

N. C. Seabi is a Consumer Science department lecturer, specialising in Hospitality, with qualifications in Food Science, currently pursuing a Ph.D. in Hospitality, leading an entrepreneurship programme within the department, driven by a passion for fostering innovation and dedicated to enhancing entrepreneurship education in South Africa.

Dr. Karen Stander, coordinates UNISA's Global Sustainability degrees and leads research in AI, GIS, and Strategy-as-Practice for sustainability. Founder of the Cattellog Project, she integrates entrepreneurship and sustainability. She is awarded for teaching and research, advancing business innovation while supporting accessibility through student funding and global academic collaborations.

Dr. Albert E. Strever is a Senior Lecturer and Chair of the Department of Viticulture and Oenology at Stellenbosch University. He coordinates innovation and entrepreneurship activities in the AgriSciences Faculty and is also a teaching fellow, specialising in entrepreneurship and artificial

intelligence incorporation into the University's Teaching, Learning, and Assessment activities.

Nokukhanya Thembane is a Senior Lecturer, a HPCSA certified Medical Laboratory Scientist with an MBA and MTech in Biomedical Sciences. She is passionate about advancing student success through education for social reform. Her work empowers students from disenfranchised backgrounds, fosters research and innovation, and enhances professional development in healthcare.

Vhuhwavho Tshavhungwe is an nGAP lecturer at the University of Venda under the Forestry Department. She obtained an MSc in Forestry and Wood Science and is currently pursuing a Ph.D. in Engineering Management with a focus on competitiveness in the wood processing industry. Her research interests are in production, operations, and knowledge management.

Prof. Thea van der Westhuizen is an Academic Leader in the School of Commerce at the University of KwaZulu-Natal. From 2017 to 2023, she served as Chair of the Entrepreneurship Development in Higher Education (EDHE) Community of Practice for Academic Entrepreneurship, Learning and Teaching. In 2024, she was elected Country Lead for South Africa within the British Council's Innovation for African Universities Community of Practice, where she also serves on the Sub-Saharan Leadership Council. She is the founder of SHAPE and has authored two books published by Springer Nature. Professor van der Westhuizen collaborates in several multinational, interdisciplinary research initiatives.

Abbreviations

AI	Artificial Intelligence
AR	Augmented Reality
AU	African Union
BCI	Black, Coloured, Indian
BMC	Business Model Canvas
BNA	Business Needs Analysis
CCP	Critical Control Point
CEO	Chief Executive Officer
CIB	Creativity in Business
COVID	Corona Virus Disease
CPD	Continuing Professional Development
CURE	Course-Based Undergraduate Research Experience
CV	Curriculum Vitae
DDEE	Design-Driven Entrepreneurial Education
DHET	Department of Higher Education and Training
DT	Design Thinking
DTP	Design Thinking Process
DUT	Durban University of Technology
DVC	Deputy Vice-Chancellor
EE	Entrepreneurship Education

EI	Entrepreneurial Intention
ELT	Experiential Learning Theory
EM	Engineering Management
EY	Ernst and Young
GBV	Gender-Based Violence
GDP	Gross Domestic Product
GE	General Electric
HACCP	Hazard Analysis Critical Control Point
HEQSF	Higher Education Qualifications Sub-Framework
HPCSA	Health Professions Council of South Africa
HR	Human Resources
ICT	Information and Communication Technology
IDT	Innovation Diffusion Theory
IFR	Institute of Futures Research
IJR	Institution for Justice and Reconciliation
IPMA	International Project Management Association
IT	Information Technology
MEM	Masters in Engineering Management
MLS	Medical Laboratory Science
MVP	Minimum Viable Product
NPC	Non-Profit Company
NPD	New Product Development
NPO	Non-Profit Organisation
NSC	National Senior Certificate
OECD	Organisation for Economic Co-operation and Development
PBC	Perceived Behavioural Control
PBL/PJBL	Problem-Based Learning
PDE	Postgraduate Diploma in Entrepreneurship
PRP	Pre-Requisite Programme
RPL	Recognition of Prior Learning
SA	South Africa
SAQA	South African Quality Authority
SCT	Social Cognitive Career Theory
SD	Sustainable Development
SDG	Sustainable Development Goals
SDT	Self-Determination Theory
SE	Social Entrepreneurship
SEDA	Small Enterprise Development Agency
SES	Student Entrepreneurship Support

SEW	Student Entrepreneurship Week
SHAPE	Shifting Hope, Activating Potential Entrepreneurship
STEM	Science, Technology, Engineering and Mathematics
STEP	Student Training for Entrepreneurial Promotion
STI	Science, Technology and Innovation
SU	Stellenbosch University
SWEEP	Student Women Economic Empowerment Programme
TAM	Technology Acceptance Model
TBL	Triple Bottom Line
THENSA	Technological Higher Education Network South Africa
TIA	Technology Innovation Agency
TMU	Toronto Metropolitan University
TPACK	Technological Pedagogical Content Knowledge
TTO	Technology Transfer Office
UBC	University Business Challenge
UCDP	University Capacity Development Programme
UCT	University of Cape Town
UK	United Kingdom
UKZN	University of KwaZulu-Natal
UN	United Nations
UNDP	United Nations Development Program
UNECA	United Nations Economic Commission for Africa
UNISA	University of South Africa
URE	Undergraduate Research Experience
USAf	Universities South Africa
UWC	University of the Western Cape
VPUU	Violence Prevention Through Urban Upgrading
VR	Virtual Reality
VUCA	Volatile, Uncertain, Complex, and Ambiguous
WBS	Work Breakdown Structures
WEF	World Economic Forum
XR	Extended Reality

List of Figures

Chapter 1

Fig. 1	6Cs framework	3
Fig. 2	Contribution	6
Fig. 3	Overview of the book	11
Fig. 4	Practical implications	15

Chapter 2

Fig. 1	DUT's ENVISION2030 strategy map (<i>Source</i> Durban University of Technology, 2023)	32
Fig. 2	Advanced diploma and postgraduate students engaging with Ngodini local entrepreneurs during the Business Needs Analysis session (<i>Source</i> DUT-Ngodini Bunduz Project Team)	34
Fig. 3	During the PBL workshop, both advanced diploma and postgraduate students were exposed to the 'brain writing 6-3-5 technique' (<i>Source</i> DUT-Ngodini Bunduz Project Team)	35

Fig. 4	The capacity-building and business skills session with DUT staff, Ms Nozipho Ndlovu as the chief facilitator and the Siyaphakama Ngodini Business Forum (<i>Source</i> DUT-Ngodini Bunduz Project Team)	37
Fig. 5	The Siyaphakama Ngodini Business Forum during the certificate awarding ceremony with DUT staff from Applied Management as well as Entrepreneurial Studies and Management departments (<i>Source</i> DUT-Ngodini Bunduz Project Team)	38
Fig. 6	The team from the Department of Ecotourism collaborated with their students to set up visitor signage at Ngodini. During this process, students underwent on-site assessment, contributing to an immersive and interactive teaching and learning encounter (<i>Source</i> DUT-Ngodini Bunduz Project Team)	39
Fig. 7	The staff members from the Department of Horticulture with their work-integrated learning (WIL) students install QR-coded tree tags at Ngodini to enhance the visitor experience, with on-site assessments fostering authentic teaching and learning (<i>Source</i> DUT-Ngodini Bunduz Project Team and Mthokozisi Dlamini, MTP Gallery, Ngodini Bunduz)	40
Fig. 8	The Siyaphakama Ngodini Business Forum sourcing bamboo and other materials from the local uMhlathuze River to construct a formal market structure onsite at Ngodini Bunduz (<i>Source</i> DUT-Ngodini Bunduz Project Team)	42
Fig. 9	The Siyaphakama Ngodini Business Forum during the Annual Ngodini Bundu Games selling a wide variety of products at their recently constructed market structure (<i>Source</i> DUT-Ngodini Bunduz Project Team)	43

Chapter 4

Fig. 1	SWOT analysis of Work-Integrated Learning (WIL) for Medical Laboratory Science Students: identifying strengths, weaknesses, opportunities, and threats in integrating entrepreneurial thinking into WIL experiences	88
--------	---	----

Chapter 5

Fig. 1	Factors rated as important to entrepreneurial success	108
Fig. 2	Genesis learnings that helped the most	109

Chapter 7

Fig. 1	Green student entrepreneurs	137
Fig. 2	Benchmarking at Middelpoos	139
Fig. 3	Dr. Lorato Mokwena teaching in Douglas	143
Fig. 4	Some of Platfontein participants	146

Chapter 10

Fig. 1	Layout of the practical course, with the main skills development at each phase	206
Fig. 2	Student's perceptions on the overall experience of the practical	211
Fig. 3	Student perceptions on their learning outcomes	212
Fig. 4	Overall experience of students on the practical course	215
Fig. 5	Skills value rated by alumni	217

Chapter 13

Figure 1	Students must integrate and apply all the knowledge and practical skills they have learned in the first, second, third, and fourth year to research and develop food products during the capstone module	265
Figure 2	All the different skill sets and stakeholders the students are exposed to during the year module Trial Design and New Product Development	268
Figure 3	Examples of the newly developed products in 2022	273

Chapter 14

Fig. 1	Design thinking process (<i>Source</i> Stanford University Institute of Design [2016])	289
Fig. 2	The triple helix model (<i>Source</i> Etzkowitz et al. [2007])	295
Fig. 3	Sustainability (<i>Source</i> Aleixo et al. [2020])	298

Chapter 15

Fig. 1	Schematic of a current food and agricultural system, also depicting external impacts (<i>Source</i> Jones et al., 2021)	316
Fig. 2	A circular bioeconomy view of the Agri-Food system (<i>Source</i> Fassio & Tecco, 2019)	317
Fig. 3	Initial (2021/2022) final-year module “Future of grapes and wine” presented over a 6-week period	323
Fig. 4	Modified (2023) capstone entrepreneurship project approach (outcomes/assessments are shown on the right-hand side). <i>Note</i> It runs over a total of three years (the first number in the module code constitutes the year of study). The internship happens in the first semester of year four	324

Chapter 16

Fig. 1	Entrepreneurship environment framework (<i>Source</i> Adapted from Paradis, 2023)	338
Fig. 2	Identified themes from reviewed literature	343
Fig. 3	Sustainable economic setting (Adapted from Kardung et al., 2021)	344
Fig. 4	Examples of products that can be made from forest-based products	345
Fig. 5	Aims of the FOREST21 project and links to sustainable development goals	349
Fig. 6	Steps followed to make and sell the different forest-based products	352

Chapter 17

Fig. 1	Illustration of horizontal and vertical alignment through the progression of SE, leadership, communication skills, and other competencies (<i>Source</i> Adapted from Loots, 2025)	369
--------	---	-----

Chapter 19

Fig. 1	Heat map of curriculum design variables across assessments	429
Fig. 2	Entrepreneurship variables coverage across the assessments	431
Fig. 3	Curriculum design variable ratings across assessments	433
Fig. 4	Frequency of Entrepreneurship Variables in Student Comments	435
Fig. 5	Frequency of employability variables in student feedback	438
Fig. 6	Frequency of Entrepreneurship Variables in Student Comments	441

Chapter 20

Fig. 1	Entrepreneurial resilience framework	488
--------	--------------------------------------	-----

List of Tables

Chapter 4

Table 1	Demographic profiles of the participants	83
Table 2	Data from WIL participants on experience activities across concrete experience, reflective experience, abstract conceptualisation, and active experimentation	84

Chapter 13

Table 1	The various specific and general learning outcomes for the 4th year capstone module Trial Design and New Product Development	267
Table 2	The NPD module aligns well with various United Nations, Sustainable Development Goals	270

Chapter 15

Table 1	Case studies and characteristics in two different departments/disciplines in the AgriSciences Faculty	314
---------	---	-----

Chapter 17

Table 1	Graduate attributes and learning outcomes, as expressed by students	364
Table 2	Thematic learning across three academic years (Loots, 2025)	367

Chapter 19

Table 1	Summary of key project management variables that drive employability	421
Table 2	Summary of key project management variables that drive entrepreneurship	423
Table 3	Table summarising key attributes from Underdahl et al. (2023) to improve employability in HE course design	425

Chapter 20

Table 1	Dimensions of phenomenology and artefact-based learning	477
---------	---	-----



1

Bridging Gaps and Charting Directions: Innovative Pedagogies in South African Entrepreneurship Education

Thea van der Westhuizen 

1 Introduction

This book provides fresh insights into entrepreneurship pedagogy by foregrounding innovative pedagogical practices emerging from the uniquely diverse landscape of South African higher education. Through detailed South African case studies, this book captures practical insights that extend beyond local relevance to inform and inspire educators across Africa and the broader Global South. The chapters span multiple academic disciplines and institutional contexts, offering interdisciplinary approaches that are adaptable across varied educational settings. Importantly, the pedagogical innovations showcased align with key global imperatives, particularly the United Nations Sustainable Development Goals (SDGs) related to quality education (SDG 4), decent work and economic growth (SDG 8), and reduced inequalities (SDG 10). As such, this volume serves not only as a scholarly resource but also as

T. van der Westhuizen (✉)

University of KwaZulu-Natal, Durban, South Africa

e-mail: vanderwesthuizent@ukzn.ac.za

a strategic tool for institutions and policymakers committed to these global objectives. Structured to foreground clear teaching strategies, grounded examples, and actionable methodologies, this book addresses the practical needs of academics, trainers, and curriculum designers. Its educational orientation ensures that the insights provided are readily translatable into classroom practice and professional learning contexts, connecting theoretical insights with classroom practice in entrepreneurship education.

2 Gaps in Theoria and Praxis

Nieuwenhuizen et al. (2016) highlight the purpose of introducing comprehensive and effective entrepreneurship education initiatives is to empower students and to transform the institutions and communities they serve. These objectives may be realised by employing the 6C's framework to design, develop, and sustain entrepreneurship programmes as described in Fig. 1.

Their research underscores the importance of aligning curriculum with both entrepreneurial competencies and contextual realities. This further affirms the need for evidence-based, locally relevant pedagogical frameworks. Entrepreneurship education must actively cultivate competencies such as envisioning and constructing to prepare students for complex socioeconomic challenges. Pedagogical approaches that emphasise creativity, reflexivity, and applied learning can build transformative entrepreneurial capacity, as demonstrated by Schachtebeck and Tselepis (2023). This aligns with the broader call for competency-based and contextually grounded teaching strategies in African higher education. Targeted training interventions have been shown to significantly influence key entrepreneurial factors such as confidence, self-efficacy, and intention formation. This is particularly evident in the case of female entrepreneurs, where contextually tailored programmes have yielded measurable outcomes (Meyer & Hamilton, 2020). Such findings reinforce the need for inclusive, evidence-based pedagogies in entrepreneurship education across developing contexts. Lecturer competency and curriculum design are critical determinants of student entrepreneurial

6Cs Framework for 21st-Century African Entrepreneurship Education



Fig. 1 6Cs framework

intention. As Iwu et al. (2021) demonstrate, entrepreneurship education is most effective when educators possess both content knowledge and pedagogical skills, supported by a responsive curriculum. This underscores the need for ongoing faculty development and curriculum reform within South African higher education institutions, as well as embedding approaches to youth entrepreneurship within a larger ecosystem of youth entrepreneurship networks (Gumbo and Moos, 2024; Van der Westhuizen, 2018, 2023).

Despite the growing body of work on entrepreneurship education, significant gaps persist in the scholarship. These gaps are both conceptual (in understanding how and what to teach) and contextual (in addressing diverse educational settings, particularly in the Global South) (EDHE, 2021, 2025). Recognising these gaps provides a point of departure for this volume's contributions. Scholars note that there is no single agreed pedagogy for entrepreneurship education. For example, Chiromo et al. (2023) observe that "there is no consensus on the best pedagogical approach" in entrepreneurship education. Similarly, Bux and Van Vuuren (2019) report a lack of agreement on what an ideal entrepreneurship education curriculum should include. These findings highlight the unsettled debate over teaching methods in the field.

Research highlights a weak link between theory and practice in entrepreneurship education. Nyamunda and Van der Westhuizen (2020) observe that South African academic entrepreneurship education in higher education programmes is "mostly theoretical" and rarely uses practical fieldwork like internships. Likewise, Makwara et al. (2024) emphasise blending theory with hands-on learning and urge institutions to invest in training educators, suggesting that more experiential learning is needed to make theory useful in practice.

Critics argue that entrepreneurship education in a Global North context often ignores African realities. Omodan et al. (2024) show that the current entrepreneurship education models remain "aligned with colonial legacies" and fail to reflect local socioeconomic contexts. They call for curricula tailored to African conditions and Indigenous knowledge. This gap implies that local culture, case studies, and business practices should be integrated into entrepreneurship education content.

South African researchers, for example, the Entrepreneurship Development in Higher Education's Community of Practice for Entrepreneurship Learning and Teaching, emphasise that entrepreneurship education curricula must be reimagined for a postcolonial context. Omodan et al. (2024) state that decolonisation means "redefining the very essence of entrepreneurship education in an African context" rather than small adjustments to content. In practice, this requires replacing Eurocentric theories and examples with African philosophies, success stories, and multilingual materials. Without such reform, entrepreneurship education risks remaining dominated by Western paradigms.

Many entrepreneurship education instructors lack specialised training. Makwara et al. (2024) emphasise the importance of qualified lecturers who combine academic and practical expertise, and they urge institutions to invest in dedicated faculty development programmes. Universities should offer workshops and mentorship (for example, EDHE "train-the-trainer" courses) so that educators gain the pedagogical and entrepreneurial skills needed for effective teaching.

With its subtitle, *Insights and Reflections from South Africa*, this volume addresses the gaps outlined above by providing African case studies and viewpoints. The chapters bring in African scholars and practitioners as voices, ensuring that the discourse on pedagogy includes on-the-ground experiences from South African universities. By doing so, this book enriches the global knowledge base with contextually grounded insight, for instance, how concepts like effectuation or lean startup are interpreted by South African students or how entrepreneurship is taught in a township university versus an urban research university.

The gaps in the current scholarship and practice of entrepreneurship education regarding the lack of consensus on the pedagogical approach, insufficient linking of theory to outcomes, underrepresentation of non-Western contexts, the need for decolonised content, and faculty development challenges set the stage for why a volume like this is both necessary and timely. Each gap identified is addressed in some way by the contributions gathered in the volume. Collectively, the chapters in this book offer progress on these fronts: they showcase contextually innovative pedagogies (addressing the consensus gap by offering tested examples), they blend theory with practical reflection (addressing the

theory–practice gap), and they bring African perspectives to the fore (addressing the contextual and decolonisation gaps).

3 Contribution of the Volume

This edited volume makes a significant and multifaceted contribution to the field of entrepreneurship education, particularly by shining a light on innovative pedagogical practices within the South African (and broader African) context. Its contributions can be understood along several dimensions as illustrated in Fig. 2.

1. Bringing African Perspectives and Contextual Richness: A paramount contribution of this book is that it amplifies African scholarly and practitioner voices in the global conversation on entrepreneurship pedagogy. By focusing on South Africa, this volume offers insights rooted in an African reality marked by economic inequality,

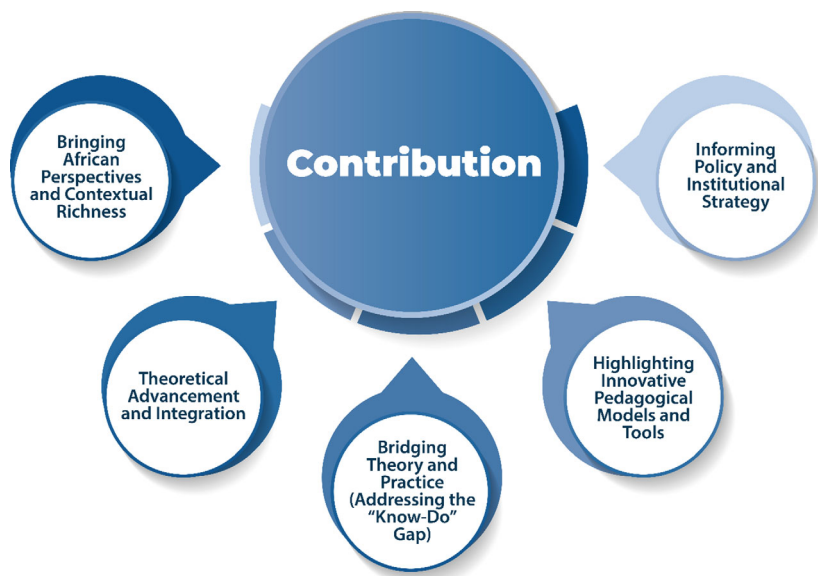


Fig. 2 Contribution

cultural diversity, and institutional transformation post-apartheid. These perspectives have been scarce in published literature, meaning educators and researchers have often had to rely on studies from vastly different contexts. This volume fills that void by providing home-grown case studies and reflections. For instance, readers will find chapters detailing how a rural university incorporated community entrepreneurship projects to engage students with local economic challenges or how historically disadvantaged institutions are cultivating entrepreneurial mindsets among first-generation students. Such accounts are rich with context-specific lessons; for example, how to teach effectuation theory in a context where students may have limited resources and exposure or how to scaffold entrepreneurial learning when foundational business knowledge cannot be assumed. The contribution here is original empirical knowledge from South Africa that can inform both local policy and international theory. It underlines that context matters: the pedagogies that emerge in this volume are often innovative precisely because they were created in response to contextual constraints or opportunities (such as high unemployment, cultural norms around collectivism, or institutional mandates for transformation). Thus, the volume not only adds African cases to the literature but also challenges some conventional wisdom and expands theoretical frameworks to be more globally inclusive. This is a novel contribution in line with recent calls for decolonising the curriculum and ensuring that management and entrepreneurship theories reflect diverse realities.

2. **Theoretical Advancement and Integration:** While deeply rooted in practical examples, this volume also strengthens the theoretical foundation of entrepreneurship education by integrating it with practice. Each chapter in the book is grounded in relevant scholarly literature, linking the authors' on-the-ground experiences with existing theories of learning, pedagogy, and entrepreneurship. As a result, the volume contributes to theory by testing and extending it. For example, if Kolb's experiential learning theory suggests a particular cycle of learning, chapters in this book might illustrate how that cycle plays out (or needs modification) in an entrepreneurship course setting. In one chapter, authors may propose extending experiential

learning by adding an explicit best-practice-with-lessons learnt phase, thereby adding nuance to Kolb's model based on their findings with student entrepreneurs. Another chapter might blend constructivist pedagogy with Indigenous knowledge systems, implicitly suggesting a theoretical hybrid that researchers could explore. The volume also contributes by clearly articulating the scholarly gaps it addresses; for instance, one section might explicitly discuss how little research exists on entrepreneurship teaching in non-business faculties and then present a study that addresses that gap. Doing so not only provides immediate insights but also lays out an agenda for future research, pointing other scholars to fertile areas for inquiry.

3. Bridging Theory and Practice (Addressing the "Know-Do" Gap): One of the recurring challenges in academia is translating research into practice. This volume stands out by virtue of being an edited collection from educators who are themselves scholar-practitioners. Many contributors are the very lecturers who designed and delivered the innovative pedagogies they describe, and thus, they occupy a dual position of knowing the theory and implementing the practice. Their chapters often reflect on the messy reality of applying pedagogical concepts in classrooms and then circle back to theory to interpret outcomes. This reflective praxis approach is invaluable because it provides concrete guidance to other educators: The book not only advocates for certain pedagogical principles (like problem-based learning or mentorship) but also shows how they were executed and what happened as a result. For example, a chapter might reveal that a theoretically promising approach (say, peer-to-peer venture coaching) encountered unforeseen obstacles in practice (such as peer coaches lacking sufficient expertise), and the authors then modified the approach (perhaps by training the peer coaches better or combining them with external mentors) to achieve the desired learning outcomes. Such candid lessons learnt contribute to the practice of teaching and help others avoid reinventing the wheel or making the same mistakes, thereby accelerating improvement in entrepreneurship education broadly. In bridging theory and practice, this volume also demonstrates the value of scholarly reflection on practice, which is an approach that could be emulated in other

contexts. It exemplifies how educators can systematically assess their pedagogical innovations, measure student responses (qualitatively or quantitatively), and feed that data back into scholarly conclusions about teaching effectiveness. This approach strengthens the feedback loop between research and practice.

4. **Highlighting Innovative Pedagogical Models and Tools:** A very tangible contribution of this book is its showcase of innovative pedagogies. Educators reading this volume can expect to come away with new ideas for their own teaching. The chapters cover a wide range of pedagogical interventions, from using hackathons as a teaching tool to flipped classroom models in entrepreneurship, incorporating social media or digital simulations, and interdisciplinary collaborations where business students team up with engineering students to create prototypes. Importantly, each pedagogical innovation is not just described but also contextualised and critiqued. The contributors examine what worked, what did not, and why. This critical lens ensures that the volume's contribution is not just a celebratory listing of innovations but a thoughtful analysis of them. Readers can discern principles of success; for instance, one might notice across chapters that student engagement peaked when an assessment was linked to actual entrepreneurial outcomes rather than exams or that collaborations with external partners enriched learning significantly. These cross-cutting insights effectively form guidelines or considerations for effective pedagogy. Additionally, because this book is structured around thematic sections (discussed in the next part of this chapter), it provides a coherent narrative on how different innovations address different facets of the entrepreneurship education challenge (for example, curriculum design, experiential learning, and ecosystem engagement). Overall, by documenting these pedagogical models, this volume contributes to knowledge transfer among educators and institutions, something particularly beneficial for those in developing countries who seek proven methods tailored to similar challenges.
5. **Informing Policy and Institutional Strategy:** Beyond individual classroom practice, the insights from this book have implications for higher education policy and institutional leadership. The discussion of practical implications (addressed in a dedicated section later in the

chapter) speaks to questions like: How should universities support faculty in implementing innovative pedagogies? What investments (in incubators, training, industry partnerships) yield the best educational returns? What policies might encourage more entrepreneurship among students (such as allowing academic credit for startup projects or having gap years for venture development)? By drawing on the successes and hurdles encountered in South African universities, this volume offers evidence-based suggestions, contributing to the field by moving the conversation beyond the classroom to the organisational and systemic level. For instance, if multiple chapters indicate that flexible curriculum structures (such as elective modules open to all students or minor programmes in entrepreneurship) increase participation, that is a useful insight for academic planners. Suppose the book highlights certain institutional cultures (like reward systems valuing teaching innovation or failure-tolerant environments) as key enablers; this would provide a roadmap for other institutions to emulate. In a sense, the volume can inform not only those who teach entrepreneurship but also those who design the architecture in which it is taught (department chairs, deans, policymakers). This broader applicability enhances the contribution and originality of the work by positioning entrepreneurship education not as a niche concern of a few enthusiasts but as a strategic imperative that requires alignment at multiple levels of the higher education system.

The value and originality of this volume lie in its holistic treatment of entrepreneurship education pedagogy through an African lens. It contributes new empirical cases, enriches theory with practice-based evidence, introduces and evaluates innovative teaching methods, and provides guidance for both educators and decision-makers. Prior to this book, one would have been hard-pressed to find a single source combining internal reflections from South African educators with external literature in such a structured, scholarly way on this topic. That synthesis is itself an original contribution. This volume is not only intended to add to academic libraries but also to be actively used in workshops, faculty training, and curriculum design sessions as entrepreneurship education continues to evolve. Having outlined the

contribution of the volume in general terms, a more detailed overview of its contents, describing how this book is structured and what each section offers, follows next.

4 Overview of the Book

The book is organised into four parts as illustrated in Fig. 3, each comprising several chapters collectively addressing different dimensions of innovative pedagogy in entrepreneurship education. This structure is designed to take the reader on a logical journey from broad foundational issues to specific practical interventions and, finally, to wider reflections and future pathways. Each of the four sections and a brief overview of the chapters within them are introduced below, highlighting how they relate to one another and the book's overall objectives.

Part I: Entrepreneurial Ecosystems in Higher Education: The first chapter, Empowering Youth through Entrepreneurship Education: A Case of the DUT-Ngodini Bunduz Project, illustrates how targeted

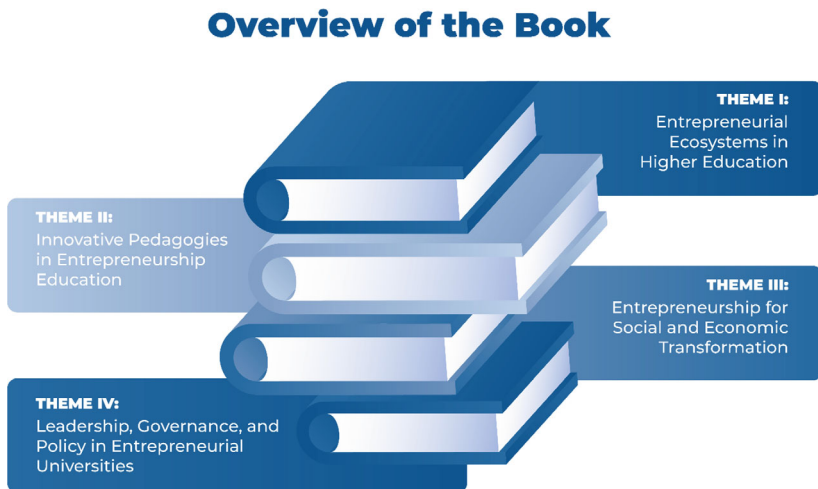


Fig. 3 Overview of the book

educational initiatives can empower young people through entrepreneurship training, aligning with entrepreneurial ecosystem theory by bridging university resources with community needs. The second chapter, *Cultivating Innovative Entrepreneurial Mindsets Beyond Textbooks*, emphasises experiential learning beyond traditional curricula to nurture innovation and entrepreneurial mindsets among students. Similarly, *Fostering Entrepreneurial Mindsets in Medical Laboratory Science through Work-Integrated Learning* demonstrates the integration of work-based experiential learning to instil entrepreneurial thinking even in specialised fields. *Building Entrepreneurs for Africa* situates entrepreneurial education in a broader African context, highlighting how higher education can produce graduates equipped to drive development and innovation in local ecosystems. Finally, *Innovative Pedagogies for Developing Creativity in Business* underscores creativity as a critical outcome of entrepreneurship pedagogy, showcasing innovative teaching methods to foster creative capacities.

These chapters are collectively framed by theories of entrepreneurial ecosystems, experiential learning, and mindset development in higher education, offering a scholarly synthesis of how supportive educational environments and active learning strategies cultivate entrepreneurial capabilities. This introductory section lays the conceptual groundwork for the more focused pedagogical innovations explored in this book's subsequent sections.

Part II: *Innovative Pedagogies in Entrepreneurship Education*: Building on the foundational insights of Part I, Part II deepens the exploration of entrepreneurship pedagogy through experimental and interdisciplinary methods. Comprising five chapters, each illustrates a pedagogical innovation. The first, *The Structured MEM: A Model for Innovative Engineering Entrepreneurship Education*, presents a structured model for integrating entrepreneurship into engineering education. The second, *Nurturing Entrepreneurial Minds: Exploring Innovative Pedagogies in South African Hospitality Education*, extends this discourse into the hospitality sector, highlighting strategies that foster innovation and problem-solving in a service context. The third, *The Ex-Cell Workshop: Teaching Business Acumen in Youth Offender Rehabilitation*, demonstrates how transformative learning principles empower marginalised

youth, using entrepreneurship training as a vehicle for personal and socioeconomic change. The fourth, Youth Entrepreneurship Development through Design Thinking and Business Model Innovation, showcases how design thinking and business model innovation engage youth in creative venture development. The fifth, Innovative Teaching in Food Product Development and Entrepreneurship for Student Success, underscores an interdisciplinary, project-based approach blending technical and entrepreneurial learning to prepare students for real-world success. Finally, this part concludes with insights and reflections on innovative pedagogies for entrepreneurship education.

Collectively, these contributions reflect the evolution of entrepreneurship pedagogy towards experiential, transformative, and cross-disciplinary learning, underscoring how innovative teaching practices nurture entrepreneurial mindsets in diverse contexts.

Part III: Entrepreneurship for Social and Economic Transformation: Building on earlier parts' emphasis on pedagogical innovation (Part I) and contextual engagement (Part II), Part III broadens the focus to how entrepreneurship education addresses wider societal and economic objectives in South Africa. The first chapter, Cultivating Entrepreneurial Critical Skills in AgriScience Students, examines how critical entrepreneurial competencies are fostered among agricultural science students, linking academic learning to innovation in the agricultural sector. The second chapter, Entrepreneurship Education for Sustainable Production of Bio-Based Products: A Case Study, demonstrates sustainability-oriented entrepreneurship pedagogy by engaging students in developing bio-based products that balance economic viability with environmental responsibility. In Cultivating Change Agents: An Experiential Pedagogy for Social Entrepreneurship, experiential learning strategies empower students as social entrepreneurs who address community challenges, reflecting the social entrepreneurship conceptual framework. Finally, Effectiveness of Entrepreneurial Programmes as a Mitigating Strategy to Curb Unemployment: A Case Study of University of Limpopo Graduates evaluates structured entrepreneurship programmes as a transformative strategy to combat graduate unemployment.

Together, these chapters underscore the role of social entrepreneurship, sustainability, and transformative education within entrepreneurship pedagogy, illustrating how innovative pedagogies produce change agents and foster inclusive socioeconomic development.

Part IV: Leadership, Governance, and Policy in Entrepreneurial Universities: As the volume transitions from exploring innovative classroom pedagogies to addressing systemic change at institutional and policy levels, Part IV examines how institutional leadership and enabling policies cultivate a thriving entrepreneurial culture. It encompasses chapters titled “Leading Entrepreneurship Ecosystems in Higher Education: A Case of EDHE as an Ecosystem Coordinator and Enabler”, “Entrepreneurship Education in South Africa: Innovative Pedagogies for Sustainability and Grand Challenges”, and “Innovative Pedagogies Showcasing Excellence in University Entrepreneurship Learning and Teaching”. Drawing on entrepreneurial university theory and innovation policy frameworks, these chapters highlight the importance of strategic leadership in higher education for orchestrating entrepreneurship ecosystems. The role of a national initiative like South Africa’s EDHE is explored as a catalyst for coordinating multi-institutional efforts, illustrating how governance structures, supportive policy frameworks, and collaborative networks can embed entrepreneurship in universities. Additionally, aligning entrepreneurship education with sustainability and grand societal challenges underscores a broadened vision for innovation beyond commercial outcomes.

By showcasing pedagogical excellence and institutional best practices, Part IV demonstrates how high-level leadership and supportive policy not only reinforce classroom innovations but also shape an environment where entrepreneurial learning and teaching can flourish at scale.

5 Practical Implications

The insights gleaned from this volume carry significant practical implications for various stakeholders in entrepreneurship education, including educators, university administrators, policymakers, and funding bodies as depicted in Fig. 4.

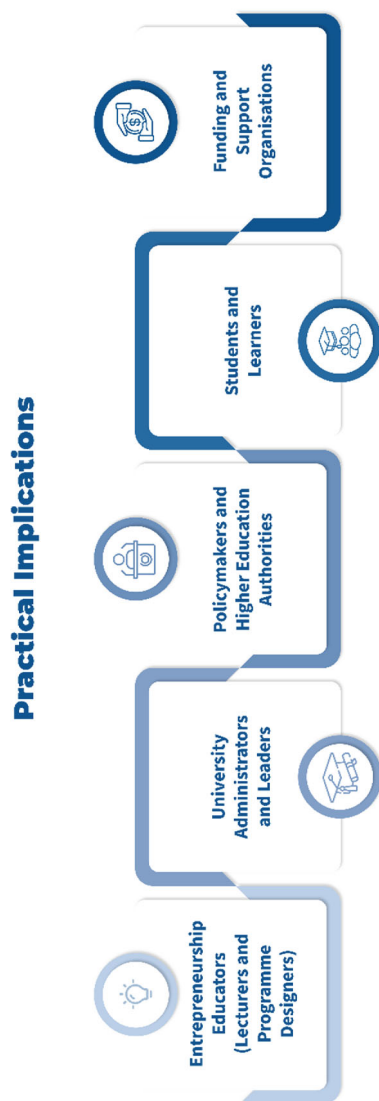


Fig. 4 Practical implications

Some of the key implications and recommendations that emerge from the collective contributions of the chapters, translating scholarly reflections into actionable guidance, include:

For Entrepreneurship Educators (Lecturers and Programme Designers): Perhaps the most apparent implication is the affirmation that how we teach is as important as what we teach in entrepreneurship. Educators are encouraged to adopt student-centred, experiential approaches in their courses, moving away from a heavy emphasis on theory in isolation. This means designing curricula that incorporate live projects, internships, competitions, and other experiential elements at their core (not just add-ons). The cases in this book demonstrate that even within the constraints of a semester, students can be tasked with starting a small venture, solving a community problem entrepreneurially, or working with a startup, and such experiences yield richer learning (in terms of skills and mindset) than traditional assignments. Educators should thus seek to become facilitators of learning experiences: for example, instead of lecturing about marketing, have students develop and execute a marketing plan for a campus venture; instead of reading about negotiation, have them participate in a negotiation role-play with local entrepreneurs. Moreover, educators should utilise a combination of pedagogical techniques to address different learning outcomes, such as using case studies or simulations to build analytical skills, but also reflective journals to build self-awareness, and field work to build practical know-how.

Another practical point is the importance of assessment alignment. Traditional exams may not adequately capture what students learn in entrepreneurial tasks. The book's chapters offer alternatives like portfolio assessments, oral pitches, prototype demonstrations, and reflection essays. Educators are advised to align their assessment methods with the learning goals of entrepreneurship education (creativity, problem-solving, and resilience, among others), which often means valuing the process and learning from setbacks, not just the end product of a venture idea. For instance, a grading rubric might award points for evidence of iteration and pivoting a business concept, thereby signalling to students that learning from failure is recognised; this aligns with the pedagogical goal of building resilience.

The volume highlights that educators may require upskilling and support to implement these innovative methods. A practical implication is that educators should engage in professional development, such as attending training on case method teaching, joining communities of practice like the EDHE Entrepreneurship Learning Community, or even partnering with industry coaches to deliver specific modules jointly. The collaborative examples in this book (where lecturers teamed up with entrepreneurs or used alumni as co-instructors) suggest a model that can be replicated: educators do not have to possess all expertise themselves but can curate a learning network for their students. This approach mitigates the common challenge of lecturers feeling they lack entrepreneurial experience; by bringing in external voices and adopting a facilitator role, they can still guide effective learning without having started a business themselves. The implication is a mindset shift for educators—from being the sage on the stage to the guide on the side—and the practical step of building that network of mentors, guest speakers, and partners.

For University Administrators and Leaders: The book's findings imply that institutional support is crucial for sustaining innovative pedagogies. University leaders should recognise that entrepreneurship education often requires more flexibility and resources than conventional courses. For instance, small class sizes or co-teaching arrangements can make experiential activities more manageable; therefore, administrators might need to allocate additional teaching assistants or reduce student-to-teacher ratios for key entrepreneurship modules. Investment in infrastructure like incubator spaces, innovation labs, or even just adaptable classrooms (with moveable furniture for group work, areas for simulations, and other such amenities) can greatly facilitate the active learning approaches described in this volume. Additionally, institutions should consider incentives and recognition for faculty who innovate in their teaching. For example, creating an Entrepreneurship Educator of the Year award or considering pedagogical innovation as a positive factor in promotion and tenure decisions would encourage more lecturers to experiment and dedicate effort to improving their teaching practice. Since one barrier to faculty involvement can be time and the risk of lower student evaluations when trying new methods, a supportive leadership stance that values long-term impact over short-term perfection

can embolden educators to adopt the novel approaches suggested in this book.

Administrators should also note the cross-departmental nature of entrepreneurship education. A practical implication is to foster inter-faculty collaboration. Entrepreneurship should not reside only in the business school; this volume shows successful examples of engineering-business collaborations or humanities-business course combinations that have enriched learning for all. University timetabling and credit structures should be flexible enough to allow students from different faculties to take courses together or to allow team-teaching across departments. Some chapters illustrate how bureaucratic hurdles (like rigid curriculum rules or credit attributions) can stifle interdisciplinary offerings. Leaders might thus work to streamline those processes, perhaps establishing a central office or coordinator for entrepreneurship education who works across faculties to integrate efforts. Furthermore, supporting student entrepreneurship clubs and societies as partners in learning can extend the reach of pedagogies beyond the classroom. University management can empower such student-led initiatives to create a vibrant culture of entrepreneurship on campus (for example, through modest funding, space, or linking students with academic programmes for credit).

For Policymakers and Higher Education Authorities: At the policy level, the implications point towards creating enabling frameworks and possibly funding support for innovative entrepreneurship education. Government and higher education authorities (like the Department of Higher Education and Training and bodies like Universities South Africa (USAf)) should continue and expand programmes akin to EDHE that provide seed funding, grants, or professional development opportunities focused on curriculum innovation. The successes noted in this volume could justify further investment in pilot programmes at universities to pilot new pedagogical models, for example, funding a national programme for universities to implement community-based entrepreneurship projects or technology incubators tied to coursework. Policymakers should also look at the regulatory environment to encourage universities to allow more nimble curriculum updates in

entrepreneurship or to accredit short courses/certificates in entrepreneurship that can be taken alongside any degree, as such initiatives would mainstream entrepreneurial learning.

Another policy implication is in the area of monitoring and evaluation. Given the NDP 2030 goals and the emphasis on entrepreneurship for development, education authorities might want to track metrics such as the number of entrepreneurship courses offered, student enrolments in such courses, the number of startups launched by students, and so on, as key performance indicators for institutions. Making these metrics visible and part of the conversation (without being punitive) signals the national importance of the agenda. Additionally, policies that connect academia with industry, such as incentives for businesses to sponsor university entrepreneurship programmes or to offer internships, can strengthen the practical exposure aspect, which this volume identifies as vital. Since one recurring challenge is resource constraints, public–private partnerships can be a pragmatic solution: companies could provide case study material, mentorship, or technological tools for student use, benefiting from the innovative ideas students generate while enhancing educational quality.

For Students and Learners: Although not the primary audience of a scholarly volume, the ultimate beneficiaries of these pedagogical improvements are the students. A practical implication for students is that they should embrace the opportunities presented by these innovative pedagogies. The book's chapters indicate that when students engage fully, for example, treating a class startup project as seriously as they would a real business, the learning they extract is far more profound. Therefore, students should be encouraged (and perhaps explicitly oriented at the start of courses) to adopt an entrepreneurial attitude towards their own learning by being willing to take risks, collaborate, and learn from failure within the safe environment that the university provides. This shift from passive to active, responsible learning is a cultural change for some students who are used to rote methods. Universities might use the lessons from this book to design student onboarding or workshops that prepare students to maximise these learning experiences (for example, how to work effectively in teams, how to manage an open-ended project, and how to reflect on experiences).

For Funding and Support Organisations: Entities like development agencies, non-profit organisations (NGOs), or foundations focusing on education and entrepreneurship can derive from this volume the importance of supporting not just entrepreneurs but also those who teach entrepreneurs. Funding could be channelled towards capacity-building programmes for lecturers, such as an Entrepreneurship Teaching Fellowship that enables educators to spend time in an industry or abroad learning new methods. The volume shows that even small grants (such as for developing a new course, purchasing simulation software, or running a student innovation challenge) can dramatically impact student engagement and success. Support organisations might also leverage the research to advocate for policy changes or greater budget allocation to experiential learning in higher education.

The practical takeaway proposed is that innovative pedagogies in entrepreneurship education yield tangible benefits but require a support ecosystem to be effective. Educators must be bold and student-focused; institutions must be flexible and resourceful; and policymakers must be encouraging and facilitative. The chapters in this book, through their discussions of both successes and challenges, provide best-practice cases of strategies. Implementing these strategies can lead to more graduates who are not only academically trained but also entrepreneurial in skill and spirit, which, in the South African context, translates to a cadre of young people better equipped to generate economic and social value in their communities. The implications extend beyond universities, as other countries in Africa and the Global South face similar youth unemployment and development issues, and the lessons and models from South Africa's experience can inform broader initiatives in those contexts. By putting into practice the insights shared in this volume, stakeholders can make meaningful strides towards an education system that truly empowers the next generation of entrepreneurs.

6 Conclusion

This introductory chapter frames the journey this book undertakes—a journey through theory, context, innovation, and reflection in the realm of entrepreneurship education in South Africa. In doing so, it underscores several key messages that resonate throughout the volume.

First, entrepreneurship education matters, perhaps now more than ever, as societies worldwide, particularly South Africa, grapple with economic uncertainties, high unemployment, and the need for innovative solutions. The pressing challenges of our time demand entrepreneurial thinkers and doers, and higher education is pivotal in cultivating those individuals. However, as argued above, cultivating entrepreneurs in the classroom requires going beyond traditional pedagogies; it calls for innovative, experience-rich, and contextually relevant teaching methods that can equip students with not just knowledge but also the mindset and skills to act on that knowledge.

Second, context is not a backdrop but a determinant in shaping effective pedagogy. The South African context provides both the impetus and the testing ground for pedagogical innovation as it has a unique blend of urgency (high youth unemployment, calls for transformation) and constraints (resource disparities, diverse student bodies). What emerges from the chapters in this book is a portrait of educators and institutions responding creatively to these local realities and, in the process, contributing insights of global significance. By paying attention to African perspectives and experiences, this volume enriches the global discourse on entrepreneurship education, reminding us that there is no one-size-fits-all model and that innovation often thrives at the margins or under conditions of necessity.

Third, this volume addresses the identified gaps in scholarship and practice, from the lack of consensus on teaching methods to the paucity of African voices in literature, from the often separate spheres of theory and practice to the need for supporting educators themselves. A clear understanding of these gaps not only justifies the focus of this book but also provides a roadmap for future research. As the introduction of a scholarly book, this chapter also serves as a call to action for researchers to build on the contributions here by conducting further

studies—perhaps comparative work across different African countries, longitudinal tracking of student outcomes, or deeper dives into the psychology of entrepreneurial learning. The field of entrepreneurship education is still evolving, and it is hoped that this volume propels it forward by inspiring both practical experimentation and academic inquiry.

In concluding this chapter, it is worth highlighting the value and originality of what follows. Each chapter in the book offers something novel, be it an innovative course design, a fresh evaluation of pedagogy, or a nuanced reflection linking theory with the author's own teaching journey. Collectively, these chapters demonstrate originality in both thought and action; they do not merely repeat well-worn ideas but test and adapt them or invent new approaches altogether. The value of this volume lies in its ability to capture these innovations in a scholarly manner, ensuring that they are recorded, critiqued, and made available for others to learn from. In that sense, this book contributes to the community practice of entrepreneurship education. It creates a conversation across chapters, one between a lecturer at a rural South African university and a reader who might be an educator in Kenya, India, or Brazil facing similar challenges or between a South African policy analyst and a global scholar interested in education reform. The volume ensures that the conversation is rigorous and impactful by situating specific insights within a broader academic context.

In closing, it must be reiterated that the ultimate goal of innovative pedagogies in entrepreneurship education is to bridge gaps: the gap between theoretical ideals and classroom realities, the gap between university and the outside world, and most importantly, the gap between students' potential and their achievement. The book's subtitle, *Insights and Reflections from South Africa*, suggests a sharing of learned lessons. It is believed that the insights gleaned from the South African experience, as presented in this volume, will reflect outward and resonate with the international audience, offering lessons that, while locally born, have global relevance. Furthermore, it is hoped that these reflections will spark further innovation.

In conclusion, there is great optimism that through scholarly yet practical efforts such as the works in this volume, entrepreneurship education

will continue to evolve and rise to the challenges of our times, both in South Africa and around the world.

References

- Bux, S., & Van Vuuren, J. J. (2019). The effect of entrepreneurship education programmes on the development of self-efficacy, entrepreneurial intention and predictions for entrepreneurial activity. *Acta Commercii*, 19(2), a615.
- Chiromo, S. J., Khosa, R. M., & Kalitanyi, V. (2023). Online entrepreneurship teaching and learning approaches: A South African conceptual perspective. *Journal of Education*, 93, 163–180.
- EDHE. (2021). United nations economic commission for Africa study on advancing entrepreneurial universities in Africa. [Online]. Available at: <https://edhe.co.za/wp-content/uploads/UNECA-Report.pdf>. Accessed 20 January 2026.
- EDHE. (2025). Impact Report 2024. [Online]. Available at: https://edhe.co.za/wp-content/uploads/EDHE_ENTREPRENEURSHIPDEVELOPMENT-LANDSCAPE.pdf. Accessed 20 January 2026.
- Gumbo, E. & Moos, M. (2024). Integrating ecosystems: The synergistic effects of digital innovation hubs on start-up growth. *Southern African Journal of Entrepreneurship and Small Business Management*, 16(1), 1–11.
- Iwu, C. G., Opute, P. A., Nchu, R., Eresia-Eke, C., Tengeh, R. K., Jaiyeoba, O., & Aliyu, O. A. (2021). Entrepreneurship education, curriculum and lecturer-competency as antecedents of student entrepreneurial intention. *The International Journal of Management Education*, 19(1), Article 100295.
- Makwara, T., Iwu, C. G., Sibanda, L., & Maziriri, E. T. (2024). Unpacking the entrepreneurship education conundrum: Lecturer competency, curriculum, and pedagogy. *Administrative Sciences*, 15(1), 2.
- Meyer, N., & Hamilton, L. (2020). Female entrepreneurs' business training and its effect on various entrepreneurial factors: Evidence from a developing country. *International Journal of Economics and Finance Studies*, 12(1), 135–151.
- Nieuwenhuizen, C., Groenewald, D., Davids, J., & Schachtebeck, C. (2016). Best practice in entrepreneurship education. *Problems and Perspectives in Management*, 14(3, Contin. 2), 528–536.

- Nyamunda, J., & Van der Westhuizen, T. (2020). Developing entrepreneurial self-efficacy: A transformative learning theory approach. *Journal of Contemporary Management*, 17(Special), 1–18.
- Omodan, B. I., Manquma, N., & Mafunda, A. (2024). Decolonising minds, empowering futures: Rethinking entrepreneurial education for university students in Africa. *Journal of Curriculum Studies Research*, 6(2), 1–19.
- Schachtebeck, C., & Tselepis, T. J. (2023). Developing the competencies of envisioning and constructing through entrepreneurship education. In *Delivering entrepreneurship education in Africa: New perspectives* (pp. 77–119). Emerald Publishing Limited.
- Van der Westhuizen, T. (2018). The SHAPE project: Shifting hope, activating potential entrepreneurship. In *Incubators for young entrepreneurs—20 case histories* (pp. 225–244). Reading: Academic Conferences and Publishing International Limited.
- Van der Westhuizen, T. (2023). *Youth entrepreneurship: An ecosystem theory for young entrepreneurs in South Africa and beyond*. Springer Nature.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits any noncommercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if you modified the licensed material. You do not have permission under this license to share adapted material derived from this chapter or parts of it.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.



Part I

Entrepreneurial Ecosystems in Higher Education

2

Empowering Youth Through Entrepreneurship Education: The Dut-Ngodini Bunduz Project

Thulile Promise Mofokeng 
and Nyane Ezekiel Macdonald Mofokeng 

1 Introduction

In rural communities, where economic opportunities were frequently limited, youth entrepreneurship has emerged as a beacon of hope in addressing the pervasive challenges of poverty, unemployment, and social exclusion. The youth unemployment crisis in South Africa was severe, with over 60% of individuals under the age of 25 unable to secure employment. Graduate unemployment accounted for 9.8% of the total unemployed population, which was within the national rate of 32% (Statistics South Africa, 2024). This phenomenon was especially stark in rural regions like Ngodini and KwaZulu-Natal, where structural impediments, such as insufficient infrastructure, inadequate access to education, and dependence on informal sectors, exacerbated the issue. Against this

T. P. Mofokeng · N. E. M. Mofokeng (✉)
Durban University of Technology, Durban, South Africa
e-mail: nyanem@dut.ac.za

T. P. Mofokeng
e-mail: thulilen1@dut.ac.za

backdrop, the DUT-Ngodini Bunduz Entrepreneurship Advancement Project, led by the Durban University of Technology (DUT), emerged as a transformative initiative. Launched within the ambit of DUT's ENVISION2030 vision, the project sought to empower both local entrepreneurs and students by fostering a sustainable entrepreneurial ecosystem that aligned with multiple Sustainable Development Goals (SDGs), including decent work and economic growth (SDG 8), sustainable cities and communities (SDG 11), and life on land (SDG 15).

The genesis of this initiative rested in a visionary commitment to bridge the gap between academic theory and real-world impact, a mission deeply rooted in the concept of living labs. Living labs, as an innovative pedagogical and research framework, positioned communities as co-creation spaces where students, academics, and local stakeholders collaboratively tackled real challenges (Ballon & Schuurman, 2015). For the DUT-Ngodini project, this concept served as the original inspiration, aiming to transform Ngodini into a dynamic laboratory where academic entrepreneurship flourished. By embedding an entrepreneurial mindset within students through hands-on, community-engaged learning, the project sought to not only address immediate economic needs but also to cultivate a generation of problem-solvers equipped to drive sustainable change. This approach mirrored DUT's broader ambition to redefine higher education's role in society, resonating with global calls for universities to serve as agents of sustainable development (UNESCO, 2024).

The project pursued a dual focus, equipping local entrepreneurs with practical skills and providing students with experiential learning opportunities, thereby tackling systemic barriers to economic participation while embedding sustainability principles. For local entrepreneurs, this translated into targeted capacity-building that enhanced their ability to navigate economic challenges, supporting SDG 8's emphasis on decent work. For students, the experiential learning component, centred on the living labs concept, transcended traditional classroom education. It immersed them in Ngodini's socio-economic and environmental context, fostering an entrepreneurial mindset through academic entrepreneurship. This involved students acting as consultants, applying design thinking

and project-based learning (PBL) to co-develop solutions with community members, thereby internalising entrepreneurial competencies such as innovation, adaptability, and resilience. The living labs approach, as the project's foundational inspiration, leveraged Ngodini as a real-world testing ground, where students' academic pursuits directly contributed to sustainable community outcomes, aligning with SDG 4's goal of quality education and SDG 17's focus on partnerships.

Sustainability theory, which promoted the integration of economic, social, and environmental dimensions, the triple bottom line (TBL), to guarantee long-term sustainability, served as the foundation for this dual focus (Elkington, 1997). By equipping entrepreneurs with skills and fostering student-led innovation within a living labs framework, the project addressed economic participation barriers while embedding principles of social equity and environmental stewardship.

This chapter aimed to: (i) analyse the project's design and implementation, with particular attention to its living labs foundation; (ii) evaluate its outcomes and challenges; and (iii) situate it within the broader discourse on youth entrepreneurship and sustainability, drawing on Van der Westhuizen's (2023a, 2023b, 2024) frameworks of practical tools and entrepreneurial ecosystems. The chapter provides a model that has the potential for replication in similar contexts, thereby offering insights into how university-led initiatives, inspired by academic entrepreneurship, catalyse sustainable development in marginalised rural settings.

2 Theoretical Framework

Entrepreneurial ecosystem framework provided a robust lens through which the DUT-Ngodini project was examined, positing that entrepreneurship thrived within interconnected networks of actors, resources, and institutions. Van der Westhuizen (2023b) characterised these ecosystems as dynamic systems where success depended on the synergy of education, policy, community support, and access to capital. This framework resonated with sustainability theory's triple bottom line (TBL) concept, which demanded a balance between economic

viability ('profit'), social equity ('people'), and environmental stewardship ('planet') (Elkington, 1997). In the context of South Africa's rural communities, where historical inequalities continue to exist, such ecosystems necessitate adaptation to local challenges, which is consistent with SDG 17's emphasis on partnerships for sustainable development.

Complementing this systemic perspective, Van der Westhuizen's (2023a) Practical Tools for Youth Entrepreneurs highlighted actionable strategies, such as business planning, financial literacy, and problem-solving skills, that are invaluable and sought after by individuals within these ecosystems. These tools directly supported SDG 4 (Quality Education) by enhancing skills development, a critical pillar of sustainable livelihoods. These practical tools, when embedded within an ecosystem, aligned with sustainability theory's emphasis on long-term resilience, ensuring that economic advancements did not compromise social or environmental integrity (Elkington, 1997; UNESCO, 2024). The DUT-Ngodini project operationalised these theories by constructing a localised ecosystem and delivering practical tools, offering a case study of how TBL principles and SDGs were integrated.

The living labs paradigm, which underpinned the project's design, augmented this theoretical scaffold by positioning Ngodini as a co-creation space where academic and community stakeholders collaboratively tested and refined entrepreneurial solutions (Ballon & Schuurman, 2015). This approach echoed Van der Westhuizen's SHAPE model, which bridged internal entrepreneurial attributes (e.g., mindset) with external support structures (e.g., forums), fostering a holistic developmental process. Together, these frameworks illuminated the project's dual commitment to immediate impact and enduring sustainability.

3 Context and Background

Ngodini, situated within the uMhlathuze municipality near Eshowe, KwaZulu-Natal, exemplified both the economic potential and persistent challenges of rural South Africa. The establishment of Ngodini Bunduz by Mr. Thokozani Mabaso transformed the village into a burgeoning recreational hub, featuring a campsite, picnic site, wedding venue, 4 ×

4 track, and culturally significant events such as the Annual Ngodini Bundu Games. Despite this progress, Ngodini grappled with high unemployment, limited infrastructure, and a reliance on informal economies, conditions reflective of broader rural trends (World Bank, 2021). These challenges underscored the relevance of SDG 1 (no poverty) and SDG 8 (decent work and economic growth) as critical imperatives for the region.

The DUT-Ngodini Bunduz Entrepreneurship Advancement Project was initiated under DUT's ENVISION2030 strategy, which commenced in 2015 to position the university as a leader in innovation, entrepreneurship, and societal impact. The Strategy Map of ENVISION 2030 (Fig. 1) articulated four key perspectives: stewardship, systems and processes, sustainability, and society, anchored in a people-centric ethos (DUT, 2023). The project aligned with these pillars by leveraging academic resources for community engagement and promoting sustainable development, thereby supporting SDG 11's vision of resilient communities. It pursued three primary objectives: (i) to spearhead community engagement through skills and research; (ii) to enhance student competencies using design thinking and project-based learning (PBL); and (iii) to capacitate Ngodini entrepreneurs with business skills to establish a sustainable economic ecosystem.

4 Methodology and Implementation

This chapter adopted a reflective design, employing narrative inquiry—a qualitative research approach that explored lived experiences through storytelling, serving both as a phenomenon and a method to provide a contextualised understanding of the project's design and implementation (Delmas & Giles, 2022; Sztukowski-Crowley & Funk, 2020).

The participant selection process was meticulously crafted to support advanced diploma and postgraduate diploma students comprehensively. Students were chosen based on (i) their prior knowledge of entrepreneurship and (ii) enrolment in modules with practical components relevant to the project's scope, ensuring alignment with its experiential objectives. The project centred on local entrepreneurs in the rural village of Ngodini, with no exclusion criteria applied; all existing businesses and

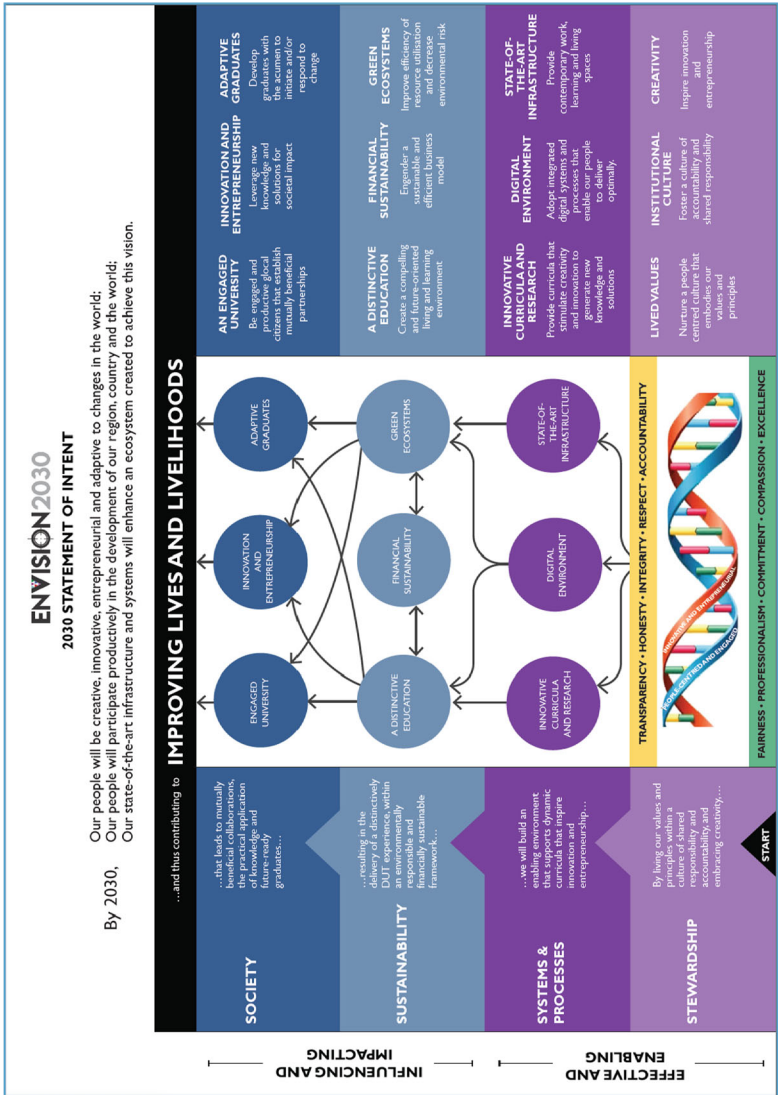


Fig. 1 DUT's ENVISION2030 strategy map (Source Durban University of Technology, 2023)

aspirants in the area could participate voluntarily. The entrepreneurial cohort displayed a balanced mix of age, gender, and socio-economic diversity, enhancing the initiative's inclusivity (SDG 10).

The implementation of the proposed plans rested on two interconnected pillars: entrepreneurship advancement and environmental education, executed through a multi-disciplinary, experiential approach that embedded sustainability principles and aligned with multiple SDGs.

4.1 Pillar 1: Entrepreneurship Advancement

This pillar aimed to empower Ngodini entrepreneurs and students, supporting SDG 8 (Decent Work and Economic Growth) and SDG 4 (Quality Education). It unfolded across four distinct phases:

Phase 1: Engagement and Networking (12 May 2022): Advanced Diploma and Postgraduate students from Public Relations and Business Administration conducted a Business Needs Analysis (BNA) with local entrepreneurs. This exercise pinpointed critical needs such as financial literacy and marketing skills, fostering a DUT-community partnership that exemplified SDG 17's collaborative ethos (Fig. 2).

Phase 2: Project-Based Learning (PBL) Workshop (25–27 May 2022): PBL, an educational framework, enhanced student motivation and learning outcomes through active involvement and problem-solving (Nurhayati et al., 2023; Pratiwi et al., 2025). Students synthesised BNA data using PBL and design thinking, employing the 'brain writing 6-3-5' technique to devise tailored solutions for Ngodini entrepreneurs. Integrated into the curricula, this phase bolstered educational quality (SDG 4) and concluded with an awards ceremony that recognised student efforts, amplifying the project's visibility. These solutions directly informed the subsequent capacity-building phase, shaping its focus and structure (Fig. 3).

Phase 3: Capacity Building Workshop (25–29 July 2022): Held at Inyathi Primary School Hall and facilitated by Ms. Nozipho Ndlovu of Azmon Nimrod Consulting, this five-day programme emerged from the student-generated solutions of the PBL Workshop. Grounded



Fig. 2 Advanced diploma and postgraduate students engaging with Ngodini local entrepreneurs during the Business Needs Analysis session (Source DUT-Ngodini Bunduz Project Team)

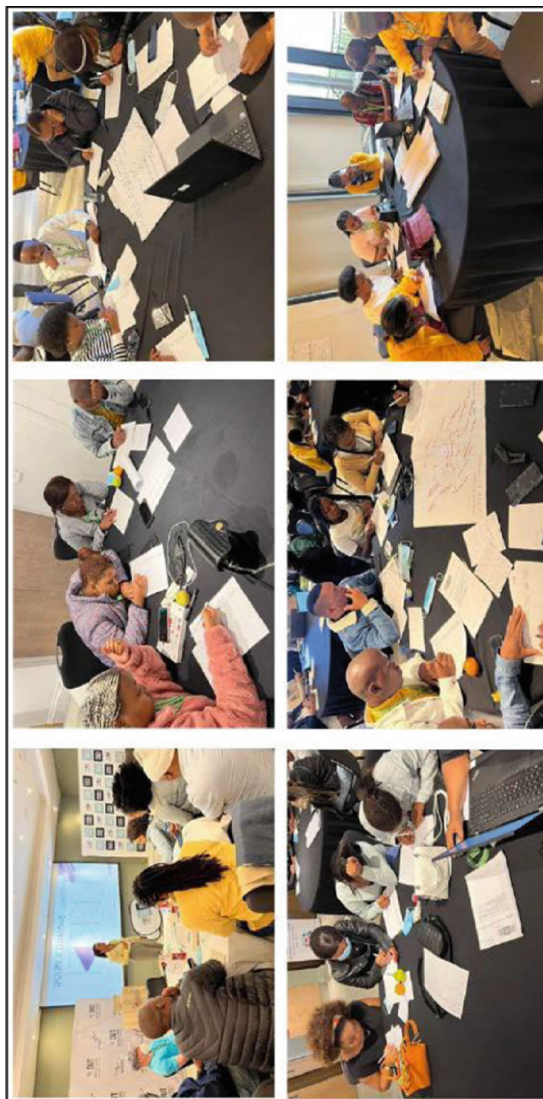


Fig. 3 During the PBL workshop, both advanced diploma and postgraduate students were exposed to the 'brain writing 6-3-5 technique' (Source DUT-Ngodini Bunduz Project Team)

in design thinking an iterative, user-centred methodology tracing its roots to 1960s architectural and engineering practices (Jedidi & Houarbi, 2025; Kelley, 2016), it addressed creative thinking, problem-solving, and financial skills. Reflecting the BNA-identified needs, it culminated in the formation of the Siyaphakama Ngodini Business Forum ('we rise'), operationalising student contributions into tangible economic impact (SDG 8) (Fig. 4).

Phase 4: Certificate Presentation and Logo Unveiling: Entrepreneurs received accredited certificates, enhancing their funding prospects amid South Africa's challenging entrepreneurial finance landscape (GEM, 2023/2024), and unveiled a logo featuring the aloe plant, symbolising local identity and resilience (SDG 11). The Global Entrepreneurship Monitor (GEM) 2023/2024 report highlighted persistent funding barriers, noting that necessity-driven entrepreneurship dominated, underscoring the certificates' strategic value (Fig. 5).

4.2 Pillar 2: Environmental Education and Sustainability

Led by the Ecotourism and Horticulture departments, this pillar advanced SDG 15 (Life on Land) and SDG 12 (Responsible Consumption and Production) through two phases:

Phase 1: Mapping and Signage (2022): The Ecotourism department oversaw the mapping of Ngodini Bunduz, while students installed signage at key locations to enhance visitor education and promote sustainable tourism. Signage, encompassing informational and interpretive forms, deepened ecological understanding and encouraged responsible behaviour (Cook, 2024), aligning with experiential learning goals (Fig. 6).

Phase 2: Plant Identification and Tagging (3 June and 25 July 2022): Horticulture students tagged vegetation with QR-coded labels and eradicated invasive species, strengthening biodiversity and supporting SDG 15's terrestrial focus. These efforts enriched visitor experiences



Fig. 4 The capacity-building and business skills session with DUT staff, Ms Nozipho Ndlovu as the chief facilitator and the Siyaphakama Ngodini Business Forum (Source DUT-Ngodini Bunduz Project Team)



Fig. 5 The Siyaphakama Ngodini Business Forum during the certificate awarding ceremony with DUT staff from Applied Management as well as Entrepreneurial Studies and Management departments (Source DUT-Ngodini Bunduz Project Team)



Fig. 6 The team from the Department of Ecotourism collaborated with their students to set up visitor signage at Ngodini. During this process, students underwent on-site assessment, contributing to an immersive and interactive teaching and learning encounter (Source DUT-Ngodini Bunduz Project Team)

by providing interactive access to ecological data, reinforcing the educational and sustainability objectives (Cook, 2024; Fig. 7).



Fig. 7 The staff members from the Department of Horticulture with their work-integrated learning (WIL) students install QR-coded tree tags at Ngodini to enhance the visitor experience, with on-site assessments fostering authentic teaching and learning (Source DUT-Ngodini Bunduz Project Team and Mthokozisi Dlamini, MTP Gallery, Ngodini Bunduz)

5 Outcomes and Impact

The project delivered measurable outcomes across economic, educational, and environmental domains, aligning with multiple SDGs:

- **Educational Gains:** Students developed critical thinking, communication, and cultural awareness through PBL, with participant feedback highlighting enhanced adaptability and innovation (SDG 4).
- **Environmental Sustainability:** QR-coded tags and signage enriched visitor experiences, while invasive plant removal strengthened biodiversity (SDG 15). The campus extension furthered ecological education, aligning with SDG 12's focus on sustainable consumption.
- **Economic Empowerment:** The Siyaphakama Ngodini Business Forum constructed a bamboo market structure using local resources, enabling entrepreneurs to sell diverse products during the Annual Ngodini Bundu Games. This initiative reduced urban migration and boosted local income, supporting decent work and economic growth (SDG 8) and sustainable cities and communities (SDG 11).

These outcomes reflected DUT's ENVISION2030 goals and the TBL framework, demonstrating a balanced approach to sustainable progress (Figs. 8 and 9).

6 Challenges and Lessons Learnt

The project encountered significant hurdles that offered insights into sustainability challenges:

- **Resource Constraints:** Limited funding necessitated personal contributions (e.g., meal provisions), impeding monitoring efforts and underscoring SDG 1's poverty challenge.
- **Skills Gaps:** Entrepreneurs' lack of foundational skills required intensive training, highlighting the importance of quality education (SDG 4).



Fig. 8 The Siyaphakama Ngodini Business Forum sourcing bamboo and other materials from the local uMhlathuze River to construct a formal market structure onsite at Ngodini Bunduz (Source DUT-Ngodini Bunduz Project Team)



Fig. 9 The Siyaphakama Ngodini Business Forum during the Annual Ngodini Bundu Games selling a wide variety of products at their recently constructed market structure (Source DUT-Ngodini Bunduz Project Team)

- Infrastructure Barriers: Poor technological access and logistical difficulties in Ngodini constrained scalability, a common sustainability issue in rural settings.
- Sustainability Concerns: Inadequate post-workshop support revealed gaps in long-term resilience, as per sustainability theory.

Lessons learnt included the critical need for sustainable funding, echoing Van der Westhuizen's (2023a) resource mobilisation tools, and the value of partnerships (SDG 17). The provision of certificates mitigated funding access barriers, offering a practical solution aligned with TBL principles.

7 Discussion

The DUT-Ngodini project embodied Van der Westhuizen's (2023b) entrepreneurial ecosystem theory by integrating academia, community, and environmental stakeholders, reflecting SDG 17's partnership ethos and the vision of Entrepreneurship Development in Higher Education (EDHE) for South Africa's Higher Education landscape (EDHE, 2025). Its multi-disciplinary approach aligned with sustainability theory's systemic perspective, fostering a self-sustaining cycle of empowerment. The deployment of PBL, BNAs, and capacity-building workshops mirrored Practical Tools for Youth Entrepreneurs (Van der Westhuizen, 2023a), supporting SDG 4 through structured skill development. The market structure exemplified resourcefulness, a TBL principle in a resource-scarce context.

The project's rural focus and environmental integration aligned with SDG 15 (life on land) and extended beyond typical entrepreneurship models. However, the lack of ongoing support exposed vulnerabilities in ecosystem resilience, a critique applicable to both Van der Westhuizen's frameworks and sustainability theory's emphasis on longevity. This case study enriched the literature by demonstrating how SDGs and sustainability principles enhanced entrepreneurial initiatives, while identifying areas for improvement.

8 Conclusion and Recommendations

The DUT-Ngodini Bunduz Entrepreneurship Advancement Project illustrated how youth entrepreneurship in marginalised rural settings can be driven through integrated ecosystems and practical tools, embedding SDGs and sustainability theory. Its success in fostering economic activity, student development, and environmental stewardship offered a replicable model, though challenges such as funding underscored the need for sustained effort.

Recommendations include:

- Sustainable Funding: Pursuing public–private partnerships and grants (SDG 17), as advocated by Van der Westhuizen (2023a).
- Digital Integration: Leveraging e-learning platforms for training and e-commerce (SDG 9), enhancing accessibility.
- Monitoring Framework: Establishing robust evaluation mechanisms to track impacts (SDG 12), ensuring long-term sustainability.
- Global Collaboration: Partnering with international institutions for knowledge exchange (SDG 17), enriching the ecosystem.

This chapter sought to advance the discourse on youth entrepreneurship by highlighting the transformative potential of sustainability-driven, university-led initiatives while calling for strategies to ensure their enduring impact.

References

- Ballon, P., & Schuurman, D. (2015). Living labs: Concepts, tools and cases. *Info*, 17(4), 1–11.
- Cook, G. (2024). *The planning, design, and delivery of environmental education and interpretation in ecotourism: A case study of Tiritiri Matangi Island*. Auckland University of Technology.
- Delmas, P. M., & Giles, R. L. (2022). Qualitative research approaches and their application in education. In *International encyclopedia of education* (4th ed., pp. 24–32). Elsevier.

- Durban University of Technology. (2023). *ENVISION2030 strategy map*. DUT. Retrieved from <https://www.dut.ac.za/wp-content/uploads/2020/03/Envision-2030-strategy-map.pdf>. Accessed 19 January 2026.
- EDHE. (2025). Impact Report 2024. [Online]. Available at: https://edhe.co.za/wp-content/uploads/EDHE_ENTREPRENEURSHIPDEVELOPMENT-LANDSCAPE.pdf. Accessed 20 January 2026.
- Elkington, J. (1997). *Cannibals with forks: The triple bottom line of 21st century business*. Capstone.
- Jedidi, I., & Houarbi, S. (2025). Teaching in design thinking mode. *Afak for Science Journal*, 10(1), 27–45.
- Kelley, D. (2016). From thinking to design thinking at Stanford and IDEO. *She Ji: The Journal of Design, Economics, and Innovation*, 2(1), 88–101.
- Nurhayati, B., Jamaluddin, F. J., Daud, F., Saenab, S., Hadis, A., & Hadis, N. I. R. (2023). An extraordinary duet: Integration of PjBL and STEM to promote student's motivation, scientific literacy skills, and students learning outcomes. *European Journal of Education and Pedagogy*, 4(3), 42–47.
- Pratiwi, D. T., Zahratunnisa, F., & Rahmawan, S. (2025). The impact of Project-Based Learning (PjBL) on students' motivation and learning outcomes: A literature review. *ASEAN Journal for Science Education*, 4(1), 53–58.
- Statistics South Africa. (2024). *Quarterly Labour Force Survey*. Stats SA. Retrieved from <https://www.statssa.gov.za/publications/P0211/Presentation%20QLFS%20Q3%202024.pdf>. Accessed 19 January 2026.
- Sztukowski-Crowley, C. A., & Funk, D. R. (2020). Personal narratives. In B. J. Carducci, C. S. Nave, J. S. Mio, & R. E. Riggio (Eds.), *The Wiley encyclopedia of personality and individual differences* (Vol. II). Measurement and Assessment. Wiley-Blackwell.
- UNESCO. (2024). *What you need to know about education for sustainable development*. Retrieved from <https://www.unesco.org/en/sustainable-development/education/need-know>. Accessed 19 January 2026.
- Van der Westhuizen, T. (2023a). Youth Entrepreneur Ecosystem. In *Youth Entrepreneurship* (pp. 57–111). https://doi.org/10.1007/978-3-031-44339-8_3
- Van der Westhuizen, T. (2023b). *Youth entrepreneurship: An ecosystem theory for young entrepreneurs in South Africa and beyond*. Springer Nature.
- Van der Westhuizen, T. (2024). *Practical tools for youth entrepreneurs: An applied approach for South Africa and beyond*. Springer Nature.

World Bank. (2021). *South Africa economic update, Edition 13: Building back better from COVID-19 with a special focus on jobs*. World Bank. Retrieved from <http://hdl.handle.net/10986/35987>. Accessed 19 January 2026.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits any noncommercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if you modified the licensed material. You do not have permission under this license to share adapted material derived from this chapter or parts of it.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.





3

Cultivating Innovative Entrepreneurial Mindsets Beyond the Books

Johan Gouws 

1 Introduction

Entrepreneurship is not a concept that can be mastered through textbooks alone. While theoretical knowledge lays the foundation, true entrepreneurial ability is forged in the unpredictable, high-pressure realities of the business world. Entrepreneurs are truly made in moments of uncertainty (when the perfect plan unravels, when a last-minute critical change is needed, and when real customers demand real solutions).

In today's rapidly evolving economy, where traditional career paths are often no longer guaranteed, it is not only an advantage to cultivate an entrepreneurial mindset, but it is a necessity. But how do we teach entrepreneurship in an authentic, immersive, and reflective way of real-world challenges?

This chapter reflects my personal journey to explore different pedagogical approaches to teaching entrepreneurship. Approaches that move

J. Gouws (✉)

North-West University, Potchefstroom, South Africa

e-mail: Johan.Gouws@nwu.ac.za

beyond passive learning into active lived experience. One such approach, the Campus Market Day Initiative, has proven to be a transformative experience for students in the undergraduate Entrepreneurship module I teach. It serves as an introduction to the realities of business ownership and is not only restricted to serving as a formative assessment.

Rather than simply studying concepts like market strategies, financial planning, and business operations from a distance, students live the entrepreneurial process. They enter an unpredictable marketplace where they must make quick decisions, adapt to challenges, and engage directly with customers. It is a high-stakes, high-reward learning experience that demands resilience, creativity, and bold action.

What makes this initiative particularly powerful is its unpredictability. Unlike traditional assessments with clear guidelines and predictable outcomes, the campus market day did not offer safety nets. Students received minimal instructions that challenged them to think critically, solve problems on the spot, and take ownership of their success or failure. This mirrors the essence of entrepreneurship, where uncertainty is the norm and those who embrace it usually thrive.

Experiential entrepreneurship education is becoming increasingly vital as universities worldwide grapple with equipping students for an uncertain job market. This chapter delves into the successes, challenges, and key takeaways of the campus market day initiative and illustrates how it bridges the gap between academic theory and entrepreneurial reality. It also critically examines areas for improvement, such as integrating sustainability, fostering inclusivity in entrepreneurship, and strengthening university-led entrepreneurial ecosystems.

But beyond evaluation, this chapter contributes to a broader conversation: How can we, as educators, cultivate a generation of entrepreneurs who are not just knowledgeable, but fearless? How can we create learning environments that challenge students to think, act, and lead with conviction?

The goal is not just to produce graduates. It is to shape future business leaders. Leaders who can innovate, adapt, and thrive in an ever-changing world.

Let the journey begin.

2 Pedagogical Approach Behind the Campus Market Day

The Entrepreneurship module is a third-year undergraduate module designed to equip undergraduate students with practical entrepreneurial skills and prepare them for real-world business environments. Students must complete various formative and summative assessments that contribute to their overall module mark as part of their academic requirements. The campus market day is a valuable experiential learning initiative among these assessments.

Students must sell a product or service on campus. What makes this experience particularly unique and challenging is that students must rely on their creativity, problem-solving skills, and strategic thinking to execute their operations successfully.

The initiative encompasses various phases to ensure a comprehensive entrepreneurial learning experience for undergraduate students. As a formative assessment, it not only evaluates students' knowledge of entrepreneurship, but also cultivates critical skills such as sales techniques, customer engagement, financial management, and teamwork. By participating in this initiative, students learn to bridge and understand the gap between theory and practice. It increases your confidence, business acumen, and ability to navigate real-world business challenges.

The initiative is aligned with Kolb's experiential learning theory (ELT). It was first introduced in 1984 by David A. Kolb. Rooted in the work of scholars such as John Dewey, Jean Piaget, and Kurt Lewin, this theory emphasizes that learning is most effective when individuals actively engage in experiences, reflect on them, conceptualize their insights, and apply them in new situations (Kolb, 1984). Kolb (1984) argues that knowledge is continuously shaped through experience, making learning a dynamic, cyclical process rather than a one-time event.

Kolb's model consists of four interrelated learning phases: Concrete experience, reflective observation, abstract conceptualization, and active experimentation (Burke, 2020). Each of these phases plays a crucial role in the campus market day initiative.

2.1 Concrete Experience

Learning begins when students actively participate in the campus market day, running their own small business ventures. This hands-on experience includes the following:

- Managing a stall, handling product sales and ensuring stock availability.
- Interacting with real customers, understanding their needs and responding to inquiries.
- Managing challenges such as competition, pricing issues, or unexpected logistical problems.

Through direct involvement, students experience the realities of running a business, facing both successes and obstacles in a dynamic environment.

2.2 Reflective Observation

After the market day, students critically reflect on their experiences, evaluating their performance by considering the following.

- What aspects of your business strategy were successful?
- What challenges did they face and how did they respond?
- How did their pricing, product placement, and promotional efforts influence sales?
- What customer feedback did they receive and how could they improve?

This phase encourages students to move beyond their immediate experiences and consider the broader implications of their actions.

2.3 Abstract Conceptualization

Students relate their reflections to business concepts and theoretical models in this stage. They analyze their experience through key business principles such as:

- Market strategy: Assessing the effectiveness of their pricing, promotions, and customer engagement.
- Financial planning: Evaluating profit margins, cost management, and revenue generation.
- Consumer behavior: Understanding how customer preferences influence buying decisions.
- Risk management: Identifying unforeseen challenges and formulating strategies to mitigate them in future endeavors.

By connecting practical experience with academic knowledge, students gain a deeper understanding of business management principles.

2.4 Active Experimentation

The final stage involves applying the learned lessons to improve future entrepreneurial efforts. Students develop new strategies to enhance their business operations based on their reflections and theoretical insights. This could involve:

- Adjusting pricing strategies to maximize profits.
- Marketing techniques to attract more customers.
- Improving operational efficiency to reduce costs.
- Developing contingency plans to handle unexpected challenges more effectively.

This stage ensures that learning is not just an isolated event, but a continuous cycle of improvement and innovation.

Kleinheksel et al. (2023) are of the opinion that Kolb's theory is particularly relevant to the education of entrepreneurs, where adaptability, resilience, and problem-solving are essential. By cycling through

the four stages of Kolb, students actively construct knowledge rather than passively absorbing information (Wijnen-Meijer et al., 2022).

3 The Campus Market Day Process

The campus market day unfolds in several distinct phases:

The structured learning process of the campus market day initiative is grounded in multiple educational and entrepreneurial theories to ensure that students transition from passive theoretical understanding to active, hands-on entrepreneurial engagement. Each phase of the initiative aligns with a specific learning theory or entrepreneurship framework that reinforced how students developed key competencies such as creativity, problem-solving, adaptability, and business acumen.

3.1 Idea Generation: Constructivist Learning Theory

The initial phase of the initiative reflects constructivist learning theory, particularly the work of Jean Piaget (1950s) and Lev Vygotsky (1978). Constructivism posits that learners build knowledge through active exploration and interaction with their environment rather than passively receiving information from instructors (Chand, 2024). In entrepreneurship education, students engage with the dynamics of the real-world market to generate ideas based on their observations and research.

In this phase, students explore emerging market trends, consumer needs, and industry gaps, employing frameworks such as Osterwalder's Business Model Canvas (2010) and Blue Ocean Strategy (Kim & Mauborgne, 2005) to refine their business ideas. They participate in brainstorming workshops and feasibility analysis exercises, fostering independent critical thinking and opportunity recognition, which are crucial in entrepreneurial decision-making (Mason & Arshed, 2013).

3.2 Product Ideation: Effectuation Theory

As students refine their business concepts, they transition into product ideation, aligning with the effectuation theory developed by Saras Sarasvathy. The effectuation theory challenges traditional causation-based entrepreneurship, which assumes entrepreneurs start with a clear goal and develop a structured business plan (Henninger et al., 2019). Instead, Coudounaris and Arvidsson (2021) argue that entrepreneurs start with their available means, which include their skills, resources, and networks, and adapt their strategies as opportunities arise.

In this phase, students create low-fidelity prototypes of their product or service while considering factors such as material costs, target audience preferences, and scalability. Instead of rigidly following business plans, they experiment, iterate, and refine their concepts based on feasibility and market potential. This mirrors how real-world entrepreneurs operate in uncertain environments and leverage available resources rather than waiting for ideal conditions.

3.3 Pitch Training Through Simulation: Active Experimentation in Experimental Learning Theory

To prepare for market day, students participate in business simulations and pitch training, an application of Kolb's experimental learning theory (1984). Specifically, this phase aligns with Kolb's Active Experimentation stage, where learners apply theoretical knowledge in simulated environments before engaging in real-world application (Akella, 2010).

Students participate in simulated pitch competitions in which they present their business ideas to peers and lecturers in a risk-free but high-engagement setting. This simulation process helps students refine their presentation skills, business model clarity, persuasive communication, critical skills for securing funding, and stakeholder support in the entrepreneurial world. Feedback from these simulations further strengthens decision-making abilities by prompting students to critically assess and modify their business strategies before the day of the market.

3.4 Market Day Sales: The Triple Helix Model

The market day experience itself represents an entrepreneurial ecosystem, aligning with the triple helix model. The Triple Helix framework emphasizes the interaction between university, industry, and society to promote innovation and entrepreneurship (Etzkowitz & Zhou, 2017).

On market day, students transition from conceptual learning to direct business engagement, where they set up stalls and sell products to a diverse audience, including students, faculty, and local community members. This phase immerses students in real-time business operations, allowing them to apply marketing strategies, customer relationship management, and financial decision-making. Through direct interactions with customers, they experience first-hand the challenges of entrepreneurship, such as pricing decisions, inventory management, and competition.

Moreover, this phase contributes to entrepreneurial ecosystems within universities, reinforcing the importance of academic institutions as incubators for future business leaders (Guerrero et al., 2021). By bridging academic learning with real-world business activity, the day of the market day strengthens students' confidence, adaptability, and entrepreneurial resilience.

3.5 Reflection and Presentation: The Role of Reflective Observation in Learning

The final phase involves post-event reflection. Here, students analyze their successes, failures, and learning experiences, a fundamental component of Kolb's experiential learning theory (1984). This also aligns with reflective observation, where learners make sense of their experiences by critically assessing their actions and outcomes (Machost & Stains, 2023).

Students submit reflective reports and participate in group discussions in which they evaluate what strategies were effective, what challenges they faced, and how they would refine their approaches in future entrepreneurial ventures. Research in entrepreneurial education (Knox,

2022) highlights that structured reflection improves problem-solving skills, helping students internalize lessons beyond the classroom.

4 Sustainability and Practical Entrepreneurship Education

4.1 Why Does Sustainability Matter in Entrepreneurship Education?

Sustainability in entrepreneurship education is not just about teaching students how to start and run a business. It ensures that the businesses they create contribute positively to society, the environment, and the economy. The significance of this cannot be overstated. Without entrepreneurs who are conscious about sustainability, we risk perpetuating unsustainable business models that deplete resources, widen social inequalities, and contribute to economic instability (Schaltegger & Wagner, 2011).

Traditionally, entrepreneurship education has focused primarily on economic success, often neglecting the long-term social and environmental impacts of business activities (Nabi et al., 2017). However, the Sustainable Development Goals (SDGs) of the United Nations emphasize that entrepreneurship should drive inclusive and sustainable growth (Saxena et al., 2021). This initiative embeds sustainability at the core of entrepreneurial education, encouraging students to move beyond short-term profitability and develop, where possible, business ideas that align with responsible, long-term economic, and environmental strategies.

4.2 Entrepreneurship Education and the SDGs

This initiative actively contributes to several Sustainable Development Goals (SDGs) by fostering entrepreneurialism that drives sustainability.

- SDG 4: Quality Education—Traditional business education often lacks practical, real-world applications, making it difficult for students

to apply theoretical knowledge in dynamic business environments. By integrating experiential learning, this initiative ensures that students understand and actively apply entrepreneurial concepts, bridging the gap between theory and practice (Heinze, 2020).

- SDG 8: Decent Work and Economic Growth—With youth unemployment rates rising globally, entrepreneurship is increasingly viewed as a solution rather than just a career choice (Li, 2022). However, fostering entrepreneurship requires more than just technical skills; it requires resilience, adaptability, and a sustainability mindset (Global Entrepreneurship Monitor, 2025). This initiative prepares students to create their own opportunities by building sustainable, future-oriented business ideas.
- SDG 9: Industry, Innovation and Infrastructure—In an economy that is rapidly evolving due to digitalization and automation, innovation is critical for business survival (Vărzaru & Bocean, 2024). This initiative encourages students to identify market gaps, leverage emerging technologies, and develop innovative and scalable business models, ensuring that their ventures remain competitive and relevant in an era of rapid industrial change.
- SDG 12: Responsible Consumption and Production—Businesses are among the largest contributors to environmental degradation (Bocken & Short, 2021). Students may unknowingly replicate outdated, harmful models without explicit education on sustainable business practices. This initiative challenges students to think beyond profit by embedding eco-friendly production, ethical sourcing, and sustainable waste management into their business ideas.

4.3 Theoretical Grounding: The Triple Bottom Line Approach

From a sustainability perspective, this initiative aligns with John Elkington's (1997) Triple Bottom Line (TBL) framework, which emphasizes that businesses must balance three key dimensions (Correia, 2019):

1. People (social impact)—Businesses should contribute positively to communities, ensuring fair labor practices, diversity, and ethical business operations.
2. Planet (Environmental Responsibility)—Companies must minimize their ecological footprint, promoting sustainable resource use, waste reduction, and eco-conscious production.
3. Profit (economic viability)—While financial success remains critical, long-term profitability should not come at the expense of environmental or social sustainability.

By integrating the triple bottom line approach into entrepreneurship education, students gain a holistic understanding of business impact, reinforcing that success is measured in financial terms and social and environmental contributions (Nogueira et al., [2025](#)).

4.4 Challenges in Implementing Sustainability in Entrepreneurship Education

Although sustainability principles were introduced in the campus market day initiative, many students struggled to integrate them into their business ideas meaningfully. This is understandable given the small-scale nature of the market day, where profitability and market responsiveness are the immediate priorities. The initiative is not designed to transform businesses overnight, but to expose students to real-world entrepreneurial challenges.

However, this raises an important question. How can sustainability be better incorporated into entrepreneurial education? Research suggests that without structured reinforcement, sustainability concepts may remain abstract rather than actionable (Rosário & Raimundo, [2023](#)).

4.5 Strategies for Enhancing Sustainability Integration

To ensure that sustainability becomes a core component of entrepreneurial education, the following pedagogical enhancements could be introduced:

1. Sustainability pitch requirement—Students should explicitly justify how their business aligns with SDG 12 (Responsible Consumption and Production). This could involve local sourcing, waste reduction, or sustainable packaging, ensuring that sustainability is integrated from the ideation phase rather than as an afterthought.
2. Sustainability assessment criteria—A portion of student grades could be allocated to their ability to integrate sustainable business practices into their models. Research suggests that grading sustainability performance encourages deeper engagement and accountability.
3. Sustainability awards—Recognition could be given to teams that demonstrate innovative approaches to ethical business practices, reinforcing the importance of sustainability beyond financial gain. Studies on behavioral incentives (Ryan & Deci, 2020) indicate that recognition fosters intrinsic motivation, which could encourage long-term sustainable thinking among students.

5 Entrepreneurship for All by Fostering Inclusivity Without Limits

Since this initiative is part of an undergraduate module, all undergraduate students enrolled in the module automatically participated in the campus market day. There was no competitive selection process, ensuring that all students, regardless of background, previous entrepreneurial experience, or academic performance, have equal access to this learning opportunity. This inclusivity guarantees that every student is exposed to the practical realities of entrepreneurship.

A core strength of the campus market day initiative is its ability to foster inclusivity while allowing students to exercise their academic freedom. Encouraging diversity in the education of entrepreneurs is not just an ethical imperative, but a practical necessity (Omodan et al., 2024). A diverse entrepreneurial landscape brings new ideas, varied cultural influences, and broader market perspectives (Audretsch et al., 2021). However, fostering inclusivity requires intentional design that ensures that every student, regardless of gender, socioeconomic background, cultural identity, or ability, has the same opportunity to thrive.

To promote diversity, the initiative incorporates the following strategies:

- Cultural sensitivity and representation: The campus market day is structured to accommodate various religious and cultural practices. For example, dietary restrictions and cultural observances are considered when allocating space and resources for food-based business ideas. In addition, case studies of successful entrepreneurs from underrepresented groups are included in the classes to provide relatable role models and broaden students' entrepreneurial mindsets.
- Accessible learning materials and support: Recognizing that students come from varying educational backgrounds, the module provides structured support systems, such as workshops, mentorship programs, and peer learning activities, to ensure all students start on a level playing field. Additional resources, such as translation support for non-native speakers or adaptive learning technologies for students with disabilities, are provided by the North-West University to enhance inclusivity.
- Freedom in business selection: Students have the academic freedom to develop business ideas that reflect their personal interests, cultural background, and values. There are no themes or restrictions imposed on business concepts (other than ethical and legal constraints communicated by university management). This ensures that students can explore ideas that are authentic to their identity and lived experiences, rather than being confined to predetermined categories.

- Encourage interdisciplinary collaboration: Entrepreneurship thrives on the integration of different perspectives. The initiative encourages students from different academic backgrounds, whether business management or consumer science, to collaborate in creating business ideas. This multidisciplinary approach fosters innovative problem-solving and broadens entrepreneurial thinking.
- Student-led feedback for continuous improvement: Inclusivity is not a static goal, but an evolving process. The initiative collects regular student feedback on their experiences and any challenges they face in participating. These insights are used to improve future iterations of campus market day, ensuring that it remains an inclusive and empowering experience for all students.

The campus market day initiative was designed to be an inclusive event, ensuring that all students could participate in entrepreneurship. However, inclusivity in practice is often more complex than it appears. A critical challenge was to ensure that students from different economic backgrounds had equal access to resources.

Students were responsible for procuring their own materials and funding their market day projects, which meant that those with financial constraints may have been disadvantaged compared to students with access to greater financial resources. Additionally, not all students had the same level of prior business exposure, which may have created a knowledge gap in execution.

To address these challenges of inclusivity, several strategies could be implemented.

- Seed funding for startups: Small grants or micro-loans could be provided to students who need financial assistance to launch their business ideas.
- **Business resource sharing:** Encouraging collaboration between students who may not have the means to develop a business independently can ensure that all participants have equal access to opportunities.

- Pre-market day training on cost-effective business ideas: Hosting a preparatory session to teach students how to launch low-cost, high-impact ventures can reduce disparities in business success rates.

By embedding inclusivity into the fabric of the initiative, the campus market day not only nurtures diverse entrepreneurial talent, but also ensures that every student can engage in meaningful real-world business learning. This structured inclusivity and academic freedom allows students to express their creativity, take ownership of their learning journey, and prepare for entrepreneurship's diverse and ever-evolving landscape (Osman et al., [2023](#)).

6 Entrepreneurial Ecosystems: How Universities Shape the Next Generation of Entrepreneurs

Today, universities do much more than transfer knowledge. They are hubs of innovation and entrepreneurship that help students turn ideas into real businesses. But for students to succeed as entrepreneurs, they need more than just business theory. They need a support system that connects them with mentors, funding, and opportunities. This is where entrepreneurial ecosystems come in.

The entrepreneurial ecosystem of a university is not just about hosting events or offering business courses. It is a structured environment that brings together students, faculty, industry leaders, investors, and policy makers to create a network where businesses can grow. As Van der Westhuizen ([2023](#), [2024a](#), [2024b](#)) explains, a strong entrepreneurial ecosystem guides students from idea generation to full-scale business operations, providing the resources and networks they need to succeed.

6.1 What Makes a University's Entrepreneurial Ecosystem Strong?

A well-functioning entrepreneurial ecosystem does three important things (Leonard, 2010).

It Moves Students from Ideas to Real Businesses

Great business ideas mean nothing if they never get past the classroom. Many students have ideas but struggle to take the next step without the right guidance. A strong entrepreneurial ecosystem provides clear pathways for students to test, refine, and launch their businesses. Without this structured support, student businesses often fail before they even begin. Universities that offer mentoring, funding, and business incubation create real opportunities for students to go beyond theory and take action.

Create a Culture Where Entrepreneurship Is the Norm

In some universities entrepreneurship is treated like an optional extra—something only business students pursue. But in the strongest ecosystems, entrepreneurship is woven into the culture of the university, including all faculty and disciplines.

This means:

- Professors actively support student startups in business schools and in engineering, design, and technology fields.
- Students from different disciplines collaborate, bringing diverse ideas into business innovation.
- The university encourages risk taking and problem-solving, helping students develop the confidence to start businesses.

When students see entrepreneurship as a real career option, they think differently. They do not just study to get a job; they study to create jobs.

It Offers Long-Term Support

One of the universities' biggest mistakes is treating entrepreneurship as a one-time event. Hosting a business competition or market day is great, but if there is no follow-up support, most students will abandon their ideas once the event ends.

A strong ecosystem keeps students engaged beyond the classroom by:

- Providing post-graduation incubators so student businesses can continue growing with university support.
- Connecting students with alumni entrepreneurs who can offer mentorship and funding.
- Partnering with investors and industry leaders provides students with real-world business opportunities.

The Next Step: Digital Entrepreneurial Ecosystems

Universities are expanding their ecosystems online, using technology to reach more students and offer new kinds of support (Zhao, 2024). Some of the most promising developments include (Alenezi, 2023):

- Online mentorship platforms—Connecting students with business experts worldwide.
- AI-driven business tools—Provide instant feedback on business models and strategies.
- Virtual accelerators—Giving students access to resources no matter where they are.

These innovations make it possible for more students to participate in entrepreneurship, even if they are not on campus or do not have access to traditional business networks.

7 Critical Reflections and Inspirations

Reflecting on the campus market day initiative, several key insights emerge regarding its effectiveness as an experiential learning approach in entrepreneurship education. The initiative has undoubtedly improved student learning, equipping participants with essential entrepreneurial competencies. However, it has also revealed areas for further development and refinement to maximize its long-term impact.

7.1 The Power of Experiential Learning and Student Performance

One of the most significant takeaways from this initiative is the transformative impact of experiential learning. Entrepreneurship cannot be effectively taught through traditional lectures alone. Practical exposure, risk taking, and real-time problem-solving are essential to entrepreneurial education. The campus market day allowed students to engage directly with customers, test pricing strategies, and manage live business operations, deepening their understanding of real-world business dynamics.

The success of this initiative is evident in several measurable outcomes. The module achieved an impressive 98% pass rate, suggesting that students could apply their learning effectively. Additionally, the initiative gained visibility beyond the classroom, receiving media attention within the university and on social media platforms, which increased student engagement. Furthermore, the lecturer who led the module received the highest lecturer evaluation score in recent years, further validating the educational impact of the initiative.

However, while experiential learning fosters engagement and practical competence, it also presents challenges. Some students struggled with the uncertainty and unpredictability of running a business in a dynamic environment. Balancing academic commitments with the demands of entrepreneurial decision-making was challenging for some, requiring additional support and structured pre-event training. Furthermore, since the event occurred outdoors, the weather conditions introduced additional risks, reinforcing the need for adaptive problem-solving skills.

These challenges highlight the importance of preparing students for uncertainty, equipping them with risk management strategies, adaptability techniques, and resilience building exercises before engaging in practical entrepreneurial activities.

7.2 Bridging Theory and Practice in Entrepreneurship Education

Integrating entrepreneurial ecosystems into the initiative has reinforced the importance of academic-industry collaboration in entrepreneurship education. The campus market day demonstrated that universities could play an active role in fostering entrepreneurship. However, the challenge remains: How can we effectively bridge the gap between theory and practice?

Although students were introduced to theoretical frameworks such as effectuation theory, the triple helix model, and the triple bottom line (Elkington, 1997), many struggled to apply these concepts in the fast-paced, high-pressure setting of the campus market day. This highlights the need for a more integrated approach, where theoretical instruction is reinforced through ongoing practical application rather than being confined to isolated events.

To address this, entrepreneurship education should extend beyond market day by incorporating:

- Ongoing business incubator programs allow students to further develop their ventures beyond the classroom.
- Structured mentoring schemes that pair students with experienced entrepreneurs, alumni, and industry professionals.
- After event reflection activities, students critically analyze how theoretical concepts shaped their decision-making during Market Day.
- Expanded industry partnerships, creating opportunities for students to engage with real-world business professionals, reinforcing the practical application of entrepreneurial theory.

In addition, it is essential to ensure inclusivity and diversity in the education of entrepreneurs. Future iterations of the initiative should actively support students from diverse backgrounds, fostering a learning environment where different perspectives and entrepreneurial approaches are encouraged and valued.

7.3 Sustainability and Entrepreneurial Responsibility

A key insight from this initiative is the underwhelming integration of sustainability principles in student business ideas. While the initiative emphasized market responsiveness and profit generation, many students did not actively incorporate sustainability considerations into their decision-making. This raises concerns about whether young entrepreneurs internalize ethical business practices, resource efficiency, and social responsibility when developing ventures.

Moving forward, sustainability must be an explicit component of entrepreneurship education. The campus market day should incorporate sustainability challenges, requiring students to align their business models with SDG 12: Responsible Consumption and Production and the Triple Bottom Line approach.

8 Conclusion

Entrepreneurship is not only theory, it is something you do, something you live. The campus market day initiative was never just about selling products or making a profit. It was about stepping into uncertainty, taking risks, and learning to trust your instincts. It was about that rush of excitement when a customer buys from you, the frustration when a strategy does not work, and the resilience to pivot and try again.

This initiative has truly revealed that entrepreneurial thinking is not reserved for those dreaming of starting businesses. It is a mindset that approaches the world with curiosity, adaptability, and the courage to

act. In an increasingly unpredictable world, these qualities are not only valuable, but also priceless.

But perhaps the greatest lesson is that entrepreneurship is not just about individuals. It is about ecosystems, networks, and shared experiences. The connections students formed during this initiative, the insights gained from real-world engagement, and the lessons learned through trial and error will extend far beyond a single market day. These are the foundations for future businesses, careers, and innovations that may one day shape industries and communities.

So, the challenge is clear: How do we go further? How do we ensure that entrepreneurship education not only prepares students for a job, but empowers them to create opportunities, build solutions, and shape the future? The answer lies in pushing boundaries, embracing failure as part of growth, and fostering a culture where learning by doing is the norm, not the exception.

To every student who took part, showed up, took the leap, and put themselves out there: you are already ahead! You are already thinking, creating, and moving toward something greater. Keep this momentum. Keep challenging yourself. The world needs more entrepreneurs, problem solvers and bold thinkers willing to turn ideas into impact.

References

- Akella, D. (2010). Learning together: Kolb's experiential theory and its application. *Journal of Management & Organization*, 16(1), 100–112. <https://doi.org/10.5172/jmo.16.1.100>
- Alenezi, M. (2023). Digital learning and digital institution in higher education. *Education Sciences*, 13(1), 88. <https://doi.org/10.3390/educsci13010088>
- Audretsch, D. B., Belitski, M., & Korosteleva, J. (2021). Cultural diversity and knowledge in explaining entrepreneurship in European cities. *Small Business Economics*, 56(1), 593–611. <https://doi.org/10.1007/s11187-019-00191-4>
- Bocken, N. M. P., & Short, S. W. (2021). Unsustainable business models—Recognising and resolving institutionalised social and environmental harm. *Journal of Cleaner Production*, 312(1), 1–14. <https://doi.org/10.1016/j.jclepro.2021.127828>

- Burke, D. (2020). *How doctors think and learn*. Springer Nature.
- Chand, S. (2024). Constructivism in education: Exploring the contributions of Piaget, Vygotsky, and Bruner. *International Journal of Science and Research*, 12(7), 274–278. <https://doi.org/10.21275/SR23630021800>
- Correia, M. (2019). Sustainability: An overview of the Triple Bottom Line and sustainability implementation. *International Journal of Strategic Engineering*, 2(1), 29–38. <https://doi.org/10.4018/IJoSE.2019010103>
- Coudounaris, D. N., & Arvidsson, H. G. S. (2021). Relationships between the Big-5 model and effectuation versus causation logics of entrepreneurs in new ventures: The Estonian IT sector. *Administrative Sciences*, 11(4), 106. <https://doi.org/10.3390/admsci11040106>
- EDHE. (2025). Impact Report 2024. [Online]. Available at: https://edhe.co.za/wp-content/uploads/EDHE_ENTREPRENEURSHIPDEVELOPMENT-LANDSCAPE.pdf. Accessed 20 January 2026.
- Elkington, J., (1997). The triple bottom line. *Environmental management: Readings and cases*, 2(1997), 49–66.
- Ertzkowitz, H., & Zhou, C. (2017). *The Triple Helix: University–industry–government innovation and entrepreneurship*. Routledge.
- Global Entrepreneurship Monitor. (2025). <https://www.gemconsortium.org/reports/latest-global-report>
- Guerrero, M., Liñán, F., & Cáceres-Carrasco, F. R. (2021). The influence of ecosystems on the entrepreneurship process: A comparison across developed and developing economies. *Small Business Economics*, 57(1), 1733–1759. <https://doi.org/10.1007/s11187-020-00392-2>
- Heinze, A. (2020). How entrepreneurship can be learned through experiential learning formats, especially through training firms. *International Journal of Management and Applied Research*, 7(4), 471–481. <https://doi.org/10.18646/2056.74.20-033>
- Henninger, P., Brem, A., Giones, F., Bican, P., & Wimschneider, C. (2019). Effectuation vs. causation: Can established firms use start-up decision-making principles to stay innovative? *International Journal of Innovation Management*, 24(1), 1–32. <https://doi.org/10.1142/S1363919620500024>
- Kim, W. C., & Mauborgne, R. (2005). *Blue ocean strategy: How to create uncontested market space and make the competition irrelevant*. Harvard Business School Press.
- Kleinheksel, A. J., Chen, W., Rudd, M. J., Drowos, J., Gupta, S., Minor, S., & Bailey, J. M. (2023). Putting reflection back into practice: Kolb's theory of experiential learning as a theoretical framework for just-in-time faculty

- development. *SN Social Sciences*, 3(59), 1–7. <https://doi.org/10.1007/s43545-023-00649-z>
- Knox, S. (2022). Fostering student engagement in virtual entrepreneurship education environments. *The International Journal of Management Education*, 20(3), 1–12. <https://doi.org/10.1016/j.ijme.2022.100705>
- Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Prentice Hall.
- Leonard, A. (2010). *The story of stuff: How our obsession with stuff is trashing the planet, our communities, and our health—And a vision for change*. Free Press.
- Li, L. (2022). Reskilling and upskilling the future-ready workforce for Industry 4.0 and beyond. *Information Systems Frontiers*, 26(1), 1–16. <https://doi.org/10.1007/s10796-022-10308-y>
- Machost, H., & Stains, M. (2023). Reflective practices in education: A primer for practitioners. *CBE Life Sciences Education*, 22(2), 1–11. <https://doi.org/10.1187/cbe.22-07-0148>
- Mason, C., & Arshed, N. (2013). Teaching entrepreneurship to university students through experiential learning. *Industry & Higher Education*, 27(6), 449–463. <https://doi.org/10.5367/ihe.2013.0180>
- Nabi, G., Liñán, F., Alain, F., Krueger, N., & Walmsley, A. (2017). The impact of entrepreneurship education in higher education: A systematic review and research agenda. *Academy of Management Learning & Education*, 16(2), 277–299. <https://doi.org/10.5465/amle.2015.0026>
- Nogueira, E., Gomes, S., & Lopes, J. M. (2025). Unveiling triple bottom line's influence on business performance. *Discover Sustainability*, 6(43). <https://doi.org/10.1007/s43621-025-00804-x>
- Omodan, B. I., Manquma, N., & Mafunda, A. (2024). Decolonising minds, empowering futures: Rethinking entrepreneurial education for university students in Africa. *Journal of Curriculum Studies Research*, 6(2), 1–19. <https://doi.org/10.46303/jcsr.2024.8>
- Osman, S., Emole, E., & Onu, E. (2023). Assessing the role of formal education in promoting entrepreneurship. *International Journal of Entrepreneurial Knowledge*, 11(2), 89–108. <https://doi.org/10.37335/ijek.v11i2.197>
- Osterwalder, A. (2010). *Business model generation*. Wiley.
- Rosário, A., & Raimundo, R. (2023). *Sustainable entrepreneurship education: A literature review*. Preprints, pp. 1–21. <https://doi.org/10.20944/preprints202304.1205.v1>
- Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and

- future directions. *Contemporary Educational Psychology*, 61(1), 1–11. <https://doi.org/10.1016/j.cedpsych.2020.101860>
- Saxena, A., Ramaswamy, M., Beale, J., Marciniuk, D., & Smith, P. (2021). Striving for the United Nations (UN) Sustainable Development Goals (SDGs): What will it take? *Discover Sustainability*, 2(20). <https://doi.org/10.1007/s43621-021-00029-8>
- Schaltegger, S., & Wagner, M. (2011). Sustainable entrepreneurship and sustainability innovation: Categories and interactions. *Business Strategy and the Environment*, 20(4), 222–237. <https://doi.org/10.1002/bse.682>
- Van der Westhuizen, T. (2023). Youth Entrepreneur Ecosystem. In *Youth Entrepreneurship* (pp. 57–111). https://doi.org/10.1007/978-3-031-44339-8_3
- Van der Westhuizen, T. (2024a). Youth entrepreneur ecosystem. In: *Practical tools for youth entrepreneurs: An applied approach for South Africa and beyond* (pp. 57–114). Springer Nature Switzerland.
- Van der Westhuizen, T. (2024b). *Practical tools for youth entrepreneurs: An applied approach for South Africa and beyond* (p. 223). Springer Nature Switzerland.
- Vărzaru, A. B., & Bocean, C. G. (2024). Digital transformation and innovation: The influence of digital technologies on turnover from innovation activities and types of innovation. *Systems*, 12(9), 359. <https://doi.org/10.3390/systems12090359>
- Wijnen-Meijer, M., Brandhuber, T., Schneider, A., & Berberat, P. O. (2022). Implementing Kolb's Experiential Learning Cycle by linking real experience, case-based discussion and simulation. *Journal of Medical Education and Curricular Development*, 9(1), 1–5. <https://doi.org/10.1177/23821205221091511>
- Zhao, H. (2024). Digital platforms in higher education: Opportunities, challenges, and strategies. *Advances in Economics, Management and Political Sciences*, 116(1), 118–122. <https://doi.org/10.54254/2754-1169/116/20242447>

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits any noncommercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if you modified the licensed material. You do not have permission under this license to share adapted material derived from this chapter or parts of it.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.



4

Fostering Entrepreneurial Mindsets in Medical Laboratory Science Through Work-Integrated Learning

Nokukhanya Thembane 

1 Introduction

In the evolving educational landscape, there is a growing mismatch between traditional training models and the increasingly dynamic demands of the workforce, particularly in specialized fields like medical laboratory science (Waheed et al., 2023). While technical expertise remains essential, there is a growing recognition that integrating entrepreneurial thinking is crucial for preparing students to meet the challenges of a rapidly changing global economy and healthcare landscape (Suryavanshi et al., 2020).

Entrepreneurial thinking in medical laboratory science education is often tied to the concept of social entrepreneurship, which emphasizes the identification of innovative solutions to societal challenges. The integration of entrepreneurial thinking can be framed within Schumpeter's theory of innovation (Alsafadi & Aljuhmani, 2024), which highlights

N. Thembane (✉)

Mangosuthu University of Technology, Durban, South Africa

e-mail: thembane@mut.ac.za

the role of entrepreneurs in driving economic development through new technologies and business models. Additionally, Ajzen's Theory of Planned Behavior suggests that entrepreneurial intentions are influenced by individual attitudes, subjective norms, and perceived behavioral control (Nessel et al., 2024). By incorporating these frameworks into Work-Integrated Learning (WIL), students can cultivate not only technical expertise but also the mindset and behaviors necessary to become innovative entrepreneurs in the healthcare sector.

Despite possessing critical scientific knowledge, medical laboratory scientists often face barriers in fully utilizing their potential to drive social change and innovation. Research shows that, while these professionals play a vital role in healthcare systems, their ability to foster entrepreneurship and address global health challenges remains underdeveloped within current educational frameworks (Subhaktiyasa et al., 2024; Suryavanshi et al., 2020). This gap highlights the need for curriculum reform, especially in the area of WIL, to ensure that students acquire not only technical competencies but also the entrepreneurial skills needed to tackle complex healthcare challenges in diverse settings. This research aims to explore how the integration of entrepreneurial skills can empower medical laboratory scientists to confront pressing global health issues, while also enhancing their employability. The central research question guiding this inquiry is: How can the existing Work-Integrated Learning (WIL) be reimaged to foster entrepreneurship among medical laboratory scientists in South Africa, thus promoting both professional development and societal impact?

2 Global, National, and Local Context

The integration of entrepreneurial competencies into technical fields like medical laboratory science has far-reaching implications at local, national, and global levels (Glover et al., 2024). Globally, healthcare systems are grappling with significant challenges, including both communicable diseases like the COVID-19 pandemic and non-communicable diseases such as diabetes and hypertension (Goswami,

2024). These challenges have accentuated the urgent need for innovative solutions in diagnostics and healthcare delivery (Obi et al., 2024). In sub-Saharan Africa, the situation is even more dire, with a shortage of skilled medical laboratory professionals and outdated curricula that fail to prepare students for entrepreneurial roles in healthcare (Mtolo et al., 2024; Schneidman et al., 2014; Smith, 2020).

At a national level, South Africa faces high graduate unemployment, a situation exacerbated by a lack of entrepreneurial skills necessary for fostering innovation in healthcare, diagnostics, research, and technology (Ajani et al., 2023; Mseleku, 2022a, 2022b). These skills gap not only limits career prospects for graduates but also hampers the broader healthcare ecosystem from benefiting from essential innovation. The South African government has recognized the need for skills development to align with Sustainable Development Goal (SDG) 8: Decent Work and Economic Growth, which aims to promote sustainable economic growth, decent employment, and innovation. By embedding entrepreneurial competencies into medical laboratory science education, students can not only enhance their own career development but also contribute significantly to the national healthcare ecosystem, advancing both health and economic growth in line with the SDGs. As technological advancements continue to reshape the healthcare sector, the demand for professionals who can harness these changes to address complex global health crises is becoming more urgent (Stoumpos et al., 2023).

3 The Role of Work-Integrated Learning in Professional Development

Work-Integrated Learning (WIL) is a cornerstone of higher education curricula, designed to provide students with practical, real-world experience that complements their academic training (Ferns et al., 2024). In medical laboratory science, WIL is a mandatory component of the curriculum, as stipulated by the Health Professions Council of South Africa (HPCSA) and other regulatory bodies (Thembane, 2022). This framework enables students to apply their theoretical knowledge in real-world settings, gaining valuable insights under the mentorship of

industry professionals (Thembane, 2022). Grounded in Kolb's Experiential Learning Theory (1984), WIL emphasizes active engagement and reflection as integral aspects of the learning process (Kolb, 1984). While the model has proven effective in enhancing technical skills, its potential to cultivate entrepreneurial thinking remains underexplored. Incorporating entrepreneurial principles into WIL could be guided by Shane's theory of entrepreneurial behavior (2003), which emphasizes the importance of environmental factors in shaping entrepreneurial intentions (Shane, 2003). By adapting WIL to include entrepreneurial elements, students would be better equipped to reflect on and address real-world healthcare challenges, developing innovative solutions that extend beyond the traditional scope of medical laboratory science. This research seeks to evaluate the current experiences of medical laboratory science and technology students within the WIL framework, exploring how it can be adapted to foster entrepreneurial thinking and enhance students' capacity for social impact in healthcare. Integrating entrepreneurship into WIL could not only produce graduates with strong technical expertise but also entrepreneurial mindsets, enabling them to contribute meaningfully to SDG 3 (Good Health and Well-Being) and SDG 8 (Decent Work and Economic Growth) (Pereira et al., 2024). The ability to innovate and address healthcare challenges aligns with the need for sustainable solutions, particularly in underserved areas. Additionally, by cultivating an entrepreneurial mindset, medical laboratory science students can contribute to the advancement of sustainable healthcare practices, playing a vital role in ensuring the long-term sustainability of health systems worldwide.

4 Social Entrepreneurship in Healthcare: A Growing Necessity

The relevance of social entrepreneurship within the healthcare sector has only grown more pronounced over the past few decades (Mthembu & Barnard, 2019). Since the 1980s, healthcare systems worldwide have been increasingly burdened by the twin challenges of an aging population and the rising prevalence of chronic diseases, both of which demand

innovative solutions in healthcare delivery (Daviaud et al., 2019). More recently, global health emergencies, such as the COVID-19 pandemic, have further highlighted the vulnerabilities of healthcare systems (Khatri et al., 2023). They have also emphasized the need for healthcare professionals who possess not only technical expertise but also the ability to innovate and adapt to unforeseen challenges (Lyng et al., 2021). In South Africa, these issues are compounded by socio-economic disparities, limited access to quality healthcare, and a shortage of skilled professionals capable of addressing these systemic challenges (de Villiers, 2021; Maphumulo & Bhengu, 2019). Considering these factors, the integration of entrepreneurial thinking into medical laboratory science education is critical, as it will equip future healthcare professionals with the skills necessary to drive innovation and contribute meaningfully to the advancement of healthcare delivery.

5 The Need for Curriculum Reform in Work-Integrated Learning

Despite the clear necessity for combining technical training with entrepreneurial skills, many educational programs, including those in South Africa, have yet to adequately incorporate entrepreneurship into their curricula (Ogunsanya et al., 2024). This gap has become increasingly apparent in global and local discussions regarding the future of higher education and the need for curriculum reforms. Research suggests that while traditional educational models are effective in imparting technical proficiency, they fall short in preparing graduates to be adaptive, innovative, and entrepreneurial in the workplace (de Villiers Scheepers et al., 2018; Jackson & Dean, 2023; Jackson et al., 2022; Ncube, 2025). This ongoing discourse has led to calls for curriculum reform across various sectors, particularly in health professions education, where the demand for both technical expertise and entrepreneurial thinking is growing (Lynch et al., 2021; McLaughlin et al., 2019). Yet, despite these conversations, the specific role of WIL in cultivating entrepreneurial competencies in medical laboratory science students has received insufficient attention. This study aims to explore how WIL can be adapted to

foster an entrepreneurial mindset in students, thus preparing them for the challenges and opportunities of the future healthcare landscape.

6 Statistical Context and Employment Challenges

The urgency of integrating entrepreneurship into medical laboratory science education is underscored by stark statistical evidence. In South Africa, more than 50% of graduates from higher education struggle to secure employment (MacGinty, 2024). Previously, it was found that fields such as Health and Education offered a relative employment advantage, but this has since changed, with health-related graduates in varied disciplines, particularly vulnerable to this trend, even post-internship training (Hlayisi, 2022; MacGinty, 2024; Meyer & Mncayi, 2021; Mseleku, 2022a, 2022b). The global shortage of medical laboratory scientists is also reaching critical levels (Dignos et al., 2023; Halstead & Sautter, 2023; Knezevic et al., 2022; Schneidman et al., 2014), with estimates predicting a shortfall of 10 million healthcare professionals worldwide by 2030 (Boniol et al., 2022). These figures not only emphasize the personal employment challenges faced by graduates but also highlight the broader implications for global healthcare systems. By addressing these challenges through the incorporation of entrepreneurship into WIL, this research can contribute to closing the skills gap and fostering the innovative solutions necessary to address the growing demand for healthcare professionals.

This study seeks to evaluate the current experiences of medical laboratory science students within the WIL framework in South Africa and explore how we can use these insights in the strategic integration of entrepreneurial skills can enhance their professional development and societal impact. By reimagining WIL to include an emphasis on entrepreneurship, the program can better prepare students to contribute to innovative healthcare solutions, meet the challenges of global health crises, and fill critical gaps in the healthcare workforce. As the demand for both technical expertise and entrepreneurial thinking continues to rise, this research aims to offer valuable insights into how WIL can be

leveraged as a platform for fostering an entrepreneurial mindset, thus ensuring that future medical laboratory scientists are equipped to address both local and global health challenges effectively.

7 Methodology

7.1 Participant Selection Criteria

The sample for this study was derived from a population of 76 students enrolled in the Work-Integrated Learning (WIL) module as part of their qualifications at the Department of Biomedical Sciences. These students were pursuing either the Diploma in Biomedical Technology or the Bachelor of Health Sciences (BHSc) degree in Medical Laboratory Sciences. A survey was distributed electronically to the full cohort, and responses were collected within the specified time frame. Out of the 76 students, 65 returned completed surveys, yielding a response rate of 85.5%. This high response rate indicates a good level of participation, ensuring the reliability and relevance of the data collected for analysis.

7.2 Data Collection Instrument

The study used a five-point Likert scale questionnaire, based on the university's policies and WIL module materials, to gather data. Ranging from 1 ("Strongly Disagree") to 5 ("Strongly Agree"), the scale allowed participants to express their agreement with statements. This method facilitated quantitative analysis and identified patterns in students' experiences. The questionnaire was administered electronically for efficiency and to meet time constraints.

7.3 Data Analysis

Data collected from the five-point Likert scale were analyzed using Microsoft Excel's built-in data analysis tools. The responses were grouped and analyzed according to the phases of Kolb's experiential learning

theory (Kolb & Kolb, 2018), which guided the conceptual framework of the study. The responses were categorized into four key phases: (1) Concrete Experience, (2) Reflective Observation, (3) Abstract Conceptualization, and (4) Active Experimentation. These four stages form the cyclical process by which individuals engage in learning, providing a structured approach to examining how students experience and reflect on their WIL placements. The data were presented in graphical format to enhance clarity and allow for easy interpretation of the findings.

8 Theoretical Framework: Kolb's Experiential Learning Theory

The theoretical framework that underpins the current study is Kolb's Experiential Learning Theory, which posits that learning is a process that involves a cycle of concrete experiences, reflective observation, abstract conceptualization, and active experimentation. According to Kolb, people learn effectively when they engage in direct experiences and then reflect on those experiences to develop new understandings, which they then apply in future situations (Kolb & Kolb, 2018). In the context of WIL, this framework is particularly relevant because it emphasizes the importance of integrating theory and practice, with students learning not just through theoretical instruction but also through hands-on engagement and critical reflection on their experiences in real-world settings. The study thus used Kolb's framework to guide the analysis of student responses, enabling the identification of key areas where WIL could be enhanced to foster greater entrepreneurial thinking and professional development.

9 Ethical Considerations

This study adhered to ethical guidelines throughout the research process. Participation in the study was entirely voluntary, and all participants were fully informed of the purpose of the research and their role in it. Prior to participation, informed consent was obtained from all respondents,

Table 1 Demographic profiles of the participants

Demographics	Category	Frequency	%
Gender	Male	17	26.20
	Female	48	73.80
Qualification	Diploma Biomedical Technology	38	59.40
	BHSc Medical Laboratory Sciences	26	40.50

ensuring that they understood the nature of the study, the voluntary nature of their involvement, and the confidentiality of their responses. Ethical approval was granted by the university's research ethics committee to ensure that the study complied with the ethical standards required for conducting research involving human participants.

10 Results

Table 1 Gender and Program Distribution of Survey Participants ($n = 65$). A total of 65 valid questionnaires were returned from 76 students, resulting in a response rate of 85.52%. The majority of respondents were female ($n = 48$, 73.8%). Most participants were enrolled in the third year of the Diploma in Biomedical Technology program ($n = 38$, 59.4%)

11 WIL Experiences

Table 2 provides an overview of participant engagement across various stages of Work-Integrated Learning (WIL), highlighting key activities in each phase. The data reflects differing levels of involvement in activities related to concrete experience, reflection, conceptualization, and experimentation. These stages play a role in both academic and professional development, contributing to the overall learning experience.

Table 2 Data from WIL participants on experience activities across concrete experience, reflective experience, abstract conceptualisation, and active experimentation

Activity type	Activity	Number of participants (n)	Percentage (%)
Concrete experience	Problem-solving projects	44	67.7
	Team building and communication	16	24.6
	Presentations	5	7.7
Reflective experience	Receiving feedback and clarification	64	98.5
	Guidance from laboratory supervisors	59	90.6
	Workbook reporting of work done	56	85.9
Abstract conceptualization	Knowledge sharing opportunities	65	100
	Curriculum alignment and practice	62	95.3%
	Reflection on WIL students' learning	60	92.3
Active experimentation	WIL for future employability	64	98.5
	WIL training for skills transfer	44	67.7

12 Discussion

This study aimed to explore the integration of entrepreneurial thinking into Work-Integrated Learning (WIL) for Medical Laboratory Science (MLS) students, with a focus on preparing them for the evolving healthcare landscape. As the global healthcare sector faces complex challenges, such as rising communicable and non-communicable diseases, the need for innovative solutions in diagnostics and treatment has grown. These solutions often arise from individuals with entrepreneurial thinking, which combines creativity, adaptability, and problem-solving skills. The findings suggest that while MLS students possess strong technical competencies, expanding their entrepreneurial skills through enriched WIL experiences could better equip them for this changing environment.

The study sample ($n = 65$) revealed a significant gender imbalance, with 73.8% female respondents, reflecting broader trends in healthcare, particularly in medical laboratory sciences. The increasing presence of women in medical professions, including laboratory technology, is reshaping healthcare. Female medical laboratory technology students in Saudi Arabia report high levels of satisfaction with their career choice (Bashawri, 2005). The majority of students were in their third year (59.4%), indicating substantial exposure to WIL activities and a strong understanding of their role in professional development.

13 Concrete Experience

The most frequent concrete experience was problem-solving projects (67.7%), followed by team building and communication activities (24.6%). These problem-solving tasks are essential for fostering critical thinking and technical skills necessary to navigate the evolving healthcare landscape. Figueiredo et al. (2022) emphasize that learning through experience requires transforming knowledge, and addressing the diverse learning styles of health professionals is key to promoting professional development.

However, the low engagement in team building and communication activities suggests that students may not be receiving enough opportunities to develop collaborative and networking skills. The lack of these opportunities can hinder students' ability to develop essential skills for entrepreneurial thinking, as highlighted by studies on the impact of team building on organizational performance and productivity. MLS programs should prioritize increasing such opportunities to better prepare students for leadership and entrepreneurial roles (Krawczyk-Bryłka et al., 2020; Ozigbo et al., 2020).

14 Reflective Experience

Reflective activities were highly valued by students, with 98.5% participating in feedback sessions and 90.6% receiving guidance from supervisors. These reflections allow students to critically assess their work, identify areas for improvement, and recognize opportunities for innovation. Visser and Beckett (2024) state that combining reflection, feedback, and debriefing into a single reflective event is a novel concept. The role of workbook reporting (85.9%) in tracking learning further emphasizes the importance of reflection in fostering an entrepreneurial mindset. A study by Lundmark et al. (2019) showed that reflection and previous startup experience positively impact Perceived Behavioural Control (PBC). Encouraging structured reflection during WIL can enhance students' ability to identify gaps and innovate in the healthcare context.

15 Abstract Conceptualization

In the abstract conceptualization phase, students demonstrated high engagement with knowledge-sharing activities (100%) and curriculum alignment (95.3%). These experiences highlight the importance of connecting theoretical knowledge with real-world scenarios. However, there was limited exposure to entrepreneurial frameworks, such as Effectuation Theory and The Lean Startup Method, in the curriculum. To better prepare students for an entrepreneurial healthcare environment, integrating these frameworks into the MLS curriculum would help bridge the gap between theory and practice, enabling students to innovate and address healthcare challenges.

16 Active Experimentation

The study showed that 98.5% of students expressed confidence in applying their skills to future employment. This finding is like that of Moloney et al. (2022) among final year nursing students. However, there was a need for more emphasis on entrepreneurial experimentation,

such as engaging in health technology innovation or exploring social entrepreneurship within WIL. By encouraging students to test and refine entrepreneurial ideas, MLS programs can help build resilience and adaptability in response to the evolving healthcare landscape. The collaborative and experimental nature of the previously mentioned Theory U-inspired initiative shows how experimentation can be supported by a network of mentors and peers. However, barriers such as limited funding or access to industry-specific tools can hinder active experimentation. On the other hand, access to a strong entrepreneurial ecosystem, as seen in the UKZN initiative, is a key enabler (van der Westhuizen, [2023a](#), [2023b](#)).

17 Strengths, Weaknesses, Opportunities, and Threats (Swot) Analysis of WIL for MLS Students

A SWOT analysis was conducted based on the results to recommend a framework for implementing entrepreneurial thinking in MLS students' WIL experiences (Fig. 1).

As a strategic move, the university can leverage Work-Integrated Learning (WIL) as a transformative platform to foster entrepreneurial thinking among Medical Laboratory Science (MLS) students. The SWOT analysis of the current WIL framework identifies key opportunities and challenges in embedding entrepreneurial principles within the curriculum. By strengthening hands-on learning experiences, particularly those focused on problem-solving and reflective practices, the university can simultaneously develop students' technical expertise and entrepreneurial competencies. However, a notable gap exists in the limited exposure to entrepreneurial ecosystems and the absence of critical frameworks such as Effectuation Theory and The Lean Startup Method. To address this, the university can expand hybrid WIL models, build industry partnerships, and incorporate entrepreneurial theories into the curriculum. These strategic initiatives would enrich students' learning experiences, better preparing them to drive innovation in healthcare and beyond. This move positions the university to cultivate a generation

STRENGTHS	WEAKNESSES
Hands-on Learning Opportunities: WIL offers practical, real-world problem-solving activities, fostering technical skill development. Strong Reflective Practices: High engagement in feedback and self-assessment supports critical thinking and growth in both technical and entrepreneurial areas.	Limited Exposure to Entrepreneurial Ecosystems: Students have insufficient interaction with startups, health tech, and social entrepreneurship. Lack of Integration of Entrepreneurial Theories: The current curriculum does not adequately incorporate entrepreneurial frameworks.
OPPORTUNITIES	THREATS
Broadening Career Paths: Integrating entrepreneurial elements into WIL can prepare students for non-traditional roles in healthcare innovation and leadership. Expanding Hybrid WIL Models: Hybrid models provide flexibility and expand access to entrepreneurial learning environments. Mentorship and Industry Partnerships: Collaborating with healthcare innovators and startups can offer students real-world entrepreneurial exposure and networking opportunities.	Resistance to Change: Traditional educational models may resist incorporating entrepreneurial principles, favouring technical skill development. Resource Constraints: Expanding WIL to include entrepreneurial experiences requires additional resources, such as funding and industry connections.

Fig. 1 SWOT analysis of Work-Integrated Learning (WIL) for Medical Laboratory Science Students: identifying strengths, weaknesses, opportunities, and threats in integrating entrepreneurial thinking into WIL experiences

of adaptable, entrepreneurial professionals capable of leading systemic change in the rapidly evolving healthcare landscape.

18 **Recommended Framework
for Integrating Entrepreneurial Thinking
into MLS Education Through WIL**

Building on the study’s findings, the following framework proposes a comprehensive approach to integrating entrepreneurial thinking into MLS students’ WIL experiences. This framework incorporates Kolb’s Experiential Learning Cycle along with entrepreneurial theories such as Effectuation Theory, Opportunity Recognition, and The Lean Startup Method.

1. Concrete Experience: Entrepreneurial Engagement in Real-World Challenges

Problem-solving activities were the most cited concrete experience. To enhance entrepreneurial learning, MLS programs should offer students opportunities to collaborate with healthcare startups and health technology companies. This will enable students to identify healthcare gaps and develop innovative solutions. Entrepreneurship-focused curriculum modules would further equip students with the tools to address these challenges. A strong example of such engagement is the Theory U-inspired initiative at the University of KwaZulu-Natal, where students co-initiated, co-sensed, co-inspired, and co-created with mentors and peers, forming an ecosystem of support and collaboration that sparked entrepreneurial innovation (van der Westhuizen, 2023a, 2023b).

2. Reflective Observation: Building Critical Entrepreneurial Mindsets

Reflective practices are key to fostering both technical and entrepreneurial growth. By integrating structured reflection into WIL, MLS programs can help students assess their approaches, critique their problem-solving strategies, and recognize opportunities for innovation. Reflection nurtures entrepreneurial skills like opportunity recognition and risk-taking, encouraging students to critically evaluate their journey and continuously improve their approach to entrepreneurship as articulated by Hlubi (2018) and Obaje (2024).

3. Abstract Conceptualization: Connecting Theory with Entrepreneurial Practice

High levels of engagement with knowledge-sharing and curriculum alignment demonstrate that students value the connection between theory and practice. To strengthen this connection, MLS programs should integrate entrepreneurial theories into the curriculum, such as The Lean Startup Method and Effectuation Theory (Scheuenstuhl et al., 2021). This integration would enable students to apply entrepreneurial frameworks to real-world healthcare problems, effectively bridging the gap between academic knowledge and practical entrepreneurial application. Supporting this, a study by Kirkwood et al. (2014) found that students gained increased confidence, insights into the feasibility of their ventures, and enhanced entrepreneurship skills.

4. Active Experimentation: Testing and Refining Entrepreneurial Ideas

MLS students showed confidence in applying their skills, but there is an opportunity to focus more on entrepreneurial experimentation. Students should be encouraged to prototype, test, and refine healthcare solutions, particularly in health technology and social entrepreneurship. This hands-on experimentation will help students apply innovative ideas and build resilience through real-world trials, empowering them to continually adapt and improve their entrepreneurial efforts.

5. Supporting Infrastructure: Industry Partnerships and Mentorship

Industry partnerships and mentorship programs are essential for exposing students to the entrepreneurial landscape (Lein, 2024; Obaje, 2024). Collaborations with healthcare innovators, startup founders, and thought leaders provide students with guidance and opportunities for prototyping and experimentation. These interactions enable students to better understand the entrepreneurial process, build their networks, and gain valuable insights into the realities of starting and growing a business.

6. Hybrid WIL Models: Hybrid WIL models, combining remote and in-person learning, can expand students' exposure to entrepreneurial environments (Wood et al., 2020). These models offer flexibility for mentorship programs and industry partnerships, ensuring broad access to entrepreneurial experiences. By incorporating hybrid models, MLS programs can support diverse learning styles and broaden the scope of entrepreneurial engagement, allowing students to access opportunities that they might otherwise miss.

19 Limitations and Future Directions

While the study offers valuable insights, it is limited by the focus on a single institution, which may not reflect broader trends. Future studies should explore the impact of WIL on entrepreneurial thinking across multiple institutions to better understand its potential. Additionally, the small sample size warrants further research with larger cohorts to

draw more robust conclusions about the integration of entrepreneurial thinking into WIL.

20 Conclusion

This study highlights the need for integrating entrepreneurial thinking into Work-Integrated Learning (WIL) for Medical Laboratory Science (MLS) students in South Africa. The research identifies a significant gap in the current WIL model, which predominantly focuses on technical competencies while overlooking entrepreneurial development. By incorporating entrepreneurial frameworks such as Effectuation Theory, Opportunity Recognition, and The Lean Startup Method within Kolb's Experiential Learning Cycle, MLS students can develop both technical expertise and entrepreneurial acumen, preparing them to address evolving healthcare challenges. Reflective practices, including feedback and self-assessment, were found to be crucial in fostering an entrepreneurial mindset. Structured reflection in WIL placements can enhance students' ability to innovate and adapt. Furthermore, integrating entrepreneurial theories into WIL allows students to apply theoretical knowledge to real-world healthcare challenges, solidifying their problem-solving and creative thinking abilities. Ultimately, the study demonstrates that reimagining WIL to include entrepreneurial thinking will not only enhance MLS students' professional development but also equip them to drive healthcare innovation and societal impact. This framework provides a clear pathway for preparing MLS students to contribute meaningfully to both the healthcare sector and broader entrepreneurial ecosystems, aligning.

References

- Ajani, O. A., Khumatake, M. R., & Gamede, B. T. (2023). A systematic review of entrepreneurship education in higher education as panacea to unemployment reduction in South African graduates. *International Journal of Research in Business and Social Science*, 12(9), 392–404.
- Alsafadi, Y., & Aljuhmani, H. Y. (2024). The influence of entrepreneurial innovations in building competitive advantage: The mediating role of entrepreneurial thinking. *Kybernetes*, 53(11), 4051–4073.
- Bashawri, L. (2005). Professional attitudes and career choices of female medical laboratory technology students and graduates: Experience from Eastern Saudi Arabia. *Journal of Family & Community Medicine*, 12, 149–155.
- Boniol, M., Kunjumen, T., Nair, T. S., Siyam, A., Campbell, J., & Diallo, K. (2022). The global health workforce stock and distribution in 2020 and 2030: A threat to equity and ‘universal’ health coverage? *BMJ Global Health*, 7(6), e009316.
- de Villiers Scheepers, M. J., Barnes, R., Clements, M., & Stubbs, A. J. (2018). Preparing future-ready graduates through experiential entrepreneurship. *Education+ Training*, 60(4), 303–317.
- Daviaud, E., Kelly, G., Cornell, J., Geffen, L., & Solanki, G. (2019). Population ageing in South Africa: Trends, impact, and challenges for the health sector. *South African Health Review*, 2019(1), 175–182.
- De Villiers, K. (2021). Bridging the health inequality gap: An examination of South Africa’s social innovation in health landscape. *Infectious Diseases of Poverty*, 10, 1–7.
- Dignos, P. N., Khan, A., Gardiner-Davis, M., Papadopoulos, A., Nowrouzi-Kia, B., Sivanthan, M., & Gohar, B. (2023, October). Hidden and understaffed: exploring Canadian medical laboratory technologists’ pandemic stressors and lessons learned. *Healthcare* 11(20), 2736.
- Ferns, S. J., Zegwaard, K. E., Pretti, T. J., & Rowe, A. D. (2024). Defining and designing work-integrated learning curriculum. *Higher Education Research & Development*, 44, 371–385.
- Figueiredo, L. D. F. D., Silva, N. C. D., & Prado, M. L. D. (2022). Primary care nurses’ learning styles in the light of David Kolb. *Revista Brasileira de Enfermagem*, 75(06), e20210986.
- Glover, W. J., Crocker, A., & Brush, C. G. (2024). Healthcare entrepreneurship: An integrative framework for future research. *Journal of Business Venturing Insights*, 22, e00476.

- Goswami, N. (2024). A dual burden dilemma: Navigating the global impact of communicable and non-communicable diseases and the way forward. *International Journal of Medical Research*, 12(3), 65–77.
- Halstead, D. C., & Sautter, R. L. (2023). A literature review on how we can address medical laboratory scientist staffing shortages. *Laboratory Medicine*, 54(1), e31–e36.
- Hlayisi, V. G. (2022). Increasing unemployment rate amongst health professionals: Will there be jobs for newly graduated South African audiologists post-COVID-19? *South African Journal of Communication Disorders*, 69(2), 909.
- Hlubi, Z. C. (2018). *The influence of work integrated learning on students studying at a University of Technology in Kwa-Zulu Natal* (Doctoral dissertation).
- Jackson, D., & Dean, B. A. (2023). The contribution of different types of work-integrated learning to graduate employability. *Higher Education Research & Development*, 42(1), 93–110.
- Jackson, D., Shan, H., & Meek, S. (2022). Enhancing graduates' enterprise capabilities through work-integrated learning in co-working spaces. *Higher Education*, 84(1), 101–120.
- Khatri, R. B., Endalamaw, A., Erku, D., Wolka, E., Nigatu, F., Zewdie, A., & Assefa, Y. (2023). Preparedness, impacts, and responses of public health emergencies towards health security: Qualitative synthesis of evidence. *Archives of Public Health*, 81(1), 208.
- Kirkwood, J., Dwyer, K., & Gray, B. (2014). Students' reflections on the value of an entrepreneurship education. *The International Journal of Management Education*, 12(3), 307–316.
- Knezevic, C. E., Das, B., El-Khoury, J. M., Jannetto, P. J., Lacbawan, F., & Winter, W. E. (2022). Rising to the challenge: Shortages in laboratory medicine. *Clinical Chemistry*, 68(12), 1486–1492.
- Kolb, A., & Kolb, D. (2018). Eight important things to know about the experiential learning cycle. *Australian Educational Leader*, 40(3), 8–14.
- Kolb, D. A. (1984). *Experiential learning* (Vol. 5, pp. 1–12). Prentice Hall.
- Krawczyk-Bryłka, B., Stankiewicz, K., Ziemiański, P., & Tomczak, M. T. (2020). Effective collaboration of entrepreneurial teams—implications for entrepreneurial education. *Education Sciences*, 10(12), 364.
- Lein, S. (2024). The role of mentorship in entrepreneurship education: Building bridges between classroom and industry. *Journal of Entrepreneurship Education*, 27(S6), 1–3.

- Lundmark, E., Tayar, M., Qin, K., & Bilsland, C. (2019). Does reflection help students to develop entrepreneurial capabilities? *Journal of Small Business Management*, 57(3), 1157–1171.
- Lynch, M., Kamovich, U., Longva, K. K., & Steinert, M. (2021). Combining technology and entrepreneurial education through design thinking: Students' reflections on the learning process. *Technological Forecasting and Social Change*, 164, 119689.
- Lyng, H. B., Macrae, C., Guise, V., Haraldseid-Driftland, C., Fagerdal, B., Schibevaag, L., ... Wiig, S. (2021). Balancing adaptation and innovation for resilience in healthcare—A metasynthesis of narratives. *BMC Health Services Research*, 21, 1–13.
- MacGinty, H. (2024). *Graduate unemployment in South Africa* (Unpublished Research Report). Labour Market Intelligence.
- Maphumulo, W. T., & Bhengu, B. R. (2019). Challenges of quality improvement in the healthcare of South Africa post-apartheid: A critical review. *Curationis*, 42(1), 1–9.
- McLaughlin, J. E., Wolcott, M. D., Hubbard, D., Umstead, K., & Rider, T. R. (2019). A qualitative review of the design thinking framework in health professions education. *BMC Medical Education*, 19, 1–8.
- Meyer, D. F., & Mncayi, P. (2021). An analysis of underemployment among young graduates: The case of a higher education institution in South Africa. *Economies*, 9(4), 196.
- Moloney, M., Murphy, L., Kingston, L., Markey, K., Hennessy, T., Mesckell, P., ... Doody, O. (2022). Final year undergraduate nursing and midwifery students' perspectives on simulation-based education: A cross-sectional study. *BMC nursing*, 21(1), 299.
- Mseleku, Z. (2022a). From workplace to joblessness: The determinants of post-internship graduate unemployment in South Africa. *Academic Journal of Interdisciplinary Studies*, 11(2), 330–330.
- Mseleku, Z. (2022b). Youth high unemployment/unemployability in South Africa: The unemployed graduates' perspectives. *Higher Education, Skills and Work-Based Learning*, 12(4), 775–790.
- Mthembu, A., & Barnard, B. (2019). Social entrepreneurship: Objectives, innovation, implementation and impact on entrepreneurship. *Expert Journal of Business and Management*, 7(1), 147–177.
- Mtolo, K., Ncanywa, T., & Mokgantsang, O. (2024). Prospects on the role of entrepreneurial skills on curriculum transformation: A case of one university in the Eastern Cape Province. In B. Iqbal (Ed.), *Sustainable development and contemporary issues in society and education* (p. 175). Batalea Publishers.

- Ncube, T. R. (2025). Assessing the impact and challenges of entrepreneurship education in a university of technology in South Africa. *African Journal of Inter Multidisciplinary Studies*, 7(2), 1–11. Retrieved from <https://www.ojs.sabinet.co.za/index.php/ajims/article/view/3585>
- Nessel, K., Kościółek, S., & Leśniak, A. (2024). Role of subjective norms in shaping entrepreneurial intentions among students. *Economics and Business Review*, 10(4), 80–100.
- Obaje, T. A. (2024). Leveraging covert curriculum in the nurturing of entrepreneurial mindsets among higher education students. *African Journal of Inter/multidisciplinary Studies*, 6(1), 1–12.
- Obi, C. L., Olowoyo, J. O., Malevu, T. D., Mugivhisa, L. L., Hungwe, T., Ogunrombi, M. O., & Mkolo, N. M. (2024). Impact of artificial intelligence and digital technology-based diagnostic tools for communicable and non-communicable diseases in Africa. *African Journal of Laboratory Medicine*, 13(1), 2516.
- Ogunsanya, O., Anwana, E., & Mthembu, N. (2024). University entrepreneurship programmes and their implications for youth development in South Africa's developmental agenda: Case studies from KwaZulu Natal. *African Journal of Inter/multidisciplinary Studies*, 6(si2), 1–14.
- Ozigbo, A. M., Idegbesor, M., Ngige, C. D., & Nwakoby, N. P. (2020). Team building and performance in organizations: An exploration of issues. *International Journal of Management and Entrepreneurship*, 2(1), 184–199.
- Pereira, J., Rodrigues, R. G., & Veiga, P. M. (2024). Entrepreneurship among social workers: Implications for the Sustainable Development Goals. *Sustainability*, 16(3), 996.
- Scheuenstuhl, F., Bican, P. M., & Brem, A. (2021). How can the lean startup approach improve the innovation process of established companies? An experimental approach. *International Journal of Innovation Management*, 25(03), 2150029.
- Schneidman, M., Dacombe, R. J., & Carter, J. (2014). *Laboratory professionals in Africa: The backbone of quality diagnostics*. World Bank.
- Shane, S. A. (2003). *A general theory of entrepreneurship: The individual-opportunity nexus*. Edward Elgar Publishing.
- Smith, E. (2020). *Developing entrepreneurial skills in environmental health at The Central University of Technology, Free State through a novel challenge-oriented pedagogic approach* (Doctoral dissertation). Central University of Technology, Free State.

- Stoumpos, A. I., Kitsios, F., & Talias, M. A. (2023). Digital transformation in healthcare: Technology acceptance and its applications. *International Journal of Environmental Research and Public Health*, 20(4), 3407.
- Subhaktiyasa, P. G., Sutrisna, I. G. P. A. F., Sumaryani, N. P., & Sunita, N. W. (2024). Entrepreneurial intentions among medical laboratory technology students: Effect of education and self-efficacy. *Journal of Education and Learning (EduLearn)*, 18(3), 719–726.
- Suryavanshi, T., Lambert, S., Lal, S., Chin, A., & Chan, T. M. (2020). Entrepreneurship and innovation in health sciences education: A scoping review. *Medical Science Educator*, 30, 1797–1809.
- Thembane, N. (2022). Work-integrated learning in medical laboratory science and medical technology during COVID-19. *Scholarship of Teaching and Learning in the South (SOTL) in the South*, 6(3), 162–174.
- Van der Westhuizen, T. (2023a). Applying theory U through SHAPE to develop student's individual entrepreneurial orientation in a university ecosystem. In *Youth entrepreneurship: An ecosystem theory for young entrepreneurs in South Africa and beyond* (pp. 177–217). Springer Nature.
- Van der Westhuizen, T. (2023b). Youth entrepreneur ecosystems: Barriers and enablers relating to personal systems, educational institutes and communities. In *Youth entrepreneurship: An ecosystem theory for young entrepreneurs in South Africa and beyond* (pp. 273–296). Springer Nature.
- Visser, L., & Beckett, N. (2024). The integrated reflective feedback tool: Experiential learning in resource limited settings. *African Journal of Primary Health Care & Family Medicine*, 16(1), 4394.
- Waheed, U., Ahmad, M., Wazeer, A., Saeed, M., Saba, N., & Rasheed, F. (2023). Medical laboratory science education; shaping competent and skilled healthcare professionals. *Mirpur Journal of Medical Sciences*, 1(1), 58–63.
- Wood, Y. I., Zegwaard, K. E., & Fox-Turnbull, W. (2020). Conventional, remote, virtual and simulated work-integrated learning: A meta-analysis of existing practice. *International Journal of Work-Integrated Learning*, 21(4), 331–354.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits any noncommercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if you modified the licensed material. You do not have permission under this license to share adapted material derived from this chapter or parts of it.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.





5

The UCT Genesis Project—Building Entrepreneurs for Africa

Stuart Hendry 

1 Introduction

A global first in 1996, the UCT Genesis Project has seen more than 1700 students from seventeen countries across the world graduate with the competencies essential to becoming successful entrepreneurs. The Genesis Project is the core course and venture creation component of the Postgraduate Diploma in Entrepreneurship (PDE) offered by the Faculty of Commerce at the University of Cape Town (UCT). The PDE is an Honours-level (NQF 8) qualification, with a clear mandate ‘to develop outstanding entrepreneurial leaders who will go on to take their Genesis businesses forward at the end of the year or start their own new venture’. To graduate with a PDE, students are required to complete eight Honours-level courses, as well as their Genesis Project, which is in itself a credit-bearing course. This course builds on scholarship of Aulet (2013), Isenberg (2010) and Veltman, Van Keulen and Voogt (2019).

S. Hendry (✉)

University of Cape Town, Cape Town, South Africa

e-mail: Stuart.hendry@uct.ac.za

The Genesis Project runs over one academic year (twenty-six academic weeks). Students are required to network with their class and, in so doing, form Genesis groups of six or seven students. Groups must reflect the class demographic and then spend the rest of the year learning what it takes to hone this group into a hard-working team capable of achieving stated business objectives.

Each Genesis Group works closely with a Board of Directors, chosen from industry, and all with a minimum of five years of director-level experience. Students convene and chair six board meetings per annum and this includes generating six board meeting agendas, board meeting minutes and board reports. The members of the Board of Directors all have a track record of proven entrepreneurship success and thus a deep understanding of the challenges of building a start-up venture from scratch. Four of the six board meetings are evaluated by the directors, with evaluations counting 20% towards the final Genesis Group mark. Genesis directors volunteer their time and over 60% of the Genesis Boards now consist of Genesis alumni.

Each Genesis business is required to develop either a physical product or a platform—never seen before in South Africa—and their product or platform must be sustainable. In the context of Genesis, this means that all students, as the shareholders of their business, are assessed on (a) their level of innovation, (b) social impact, and (c) the environmental impact made as they solve a ‘wicked’ customer problem.

Example: A Genesis business from the 2022 cohort developed a water security solution for citizens living in informal settlements across South Africa. Their portable water-filtration pump recycles grey water, thus alleviating the daily pressure on poor and vulnerable people to find clean water. At the same time, this reduces the need to purchase potable water, thus saving scarce water resources.

2 Participant Profile

The ideal participant profile for the Genesis Project encompasses individuals with an undergraduate degree who can demonstrate leadership acumen and entrepreneurial potential rather than prior business education. The programme intentionally diversifies its intake, drawing participants from fields as varied as the culinary arts, drama, engineering, fashion design, film and media studies, music, and science.

Candidates are assessed on their ability to navigate and excel in leadership roles across diverse domains, including academic institutions, sports and community organisations, and social impact initiatives. The selection process identifies the applicant's history of addressing complex challenges, goal-oriented behaviour, responsiveness to entrepreneurial stimuli, and risk tolerance.

Admission to the PDE is a multi-tiered process, requiring candidates to first meet the general entry criteria of the UCT, followed by acceptance into the Faculty of Commerce and, ultimately, final selection into the programme. This rigorous selection mechanism ensures a cohort of high-calibre entrepreneurial candidates, with an annual intake of approximately fifty students from a highly competitive pool normally exceeding 300 applicants.

Designed explicitly for postgraduate student entrepreneurs, the programme selects individuals who:

- seek to acquire a systematic, experiential understanding of venture creation, encompassing the full lifecycle of start-up development and management;
- aim to tackle critical socio-economic challenges such as poverty, unemployment and educational deficits, particularly within the context of ecological degradation and environmental sustainability;
- are committed to developing strategic leadership and resource optimisation capabilities, particularly in navigating the complexities of South Africa's resource-constrained start-up ecosystem; and
- envision themselves as intrapreneurs, aiming to drive entrepreneurial innovation within established enterprises, leveraging entrepreneurial methodologies to enhance corporate agility and growth.

The overall objective of the Genesis Project is for students to master a set of core entrepreneurial competencies and build the right entrepreneurial mindset. They do so by learning how to lead and manage the setting up and running of an actual start-up business in a highly resource-constrained environment. This overall objective can be broken down into four key objectives:

Objective 1 (Academic): Genesis students are required to apply themselves to the core academic components of the course. They must engage with the business leadership and entrepreneurship theories taught to them in the classroom and then test these theories and techniques in their Genesis boardroom. Their experience in the boardroom should serve to enrich their learnings in the classroom, in what we call a virtuous learning loop.

Objective 2 (Innovative Business): Genesis students are required to apply the principles of design thinking to develop and deliver an innovative start-up business. They do so by developing a product or platform ‘never before seen in South Africa’ and then continue to innovate throughout their production process, marketing, and sales strategy.

Objective 3 (Sustainable Business): Genesis students are required to develop and deliver a sustainable start-up business that aims to solve a ‘wicked’ problem for society, applies the principles of triple-bottom-line accounting, and can remain competitive in a transparent and green economy.

Objective 4 (Successful Business): Genesis students are required to build a successful, well-run start-up business with effective leadership, sound management systems, and high levels of group accountability. A critical measure of success will be to what extent the group ensures that their Genesis legacy continues, either by running the business themselves after graduation or by negotiating a successful exit.

By integrating entrepreneurial education, innovation, and sustainability on an action-learning framework or model and then combining that with an actual venture creation process, the UCT Genesis Project aligns

closely with several United Nations Sustainable Development Goals (SDGs).

SDG 4 (Quality Education) is addressed through its rigorous academic framework, fostering a virtuous learning cycle that blends theoretical foundations with practical application. The emphasis on SDG 8 (Decent Work and Economic Growth) ensures that students develop the competencies required to establish and sustain enterprises, thereby driving job creation and economic resilience. By embedding SDG 9 (Industry, Innovation, and Infrastructure) through design thinking and product development, the initiative cultivates disruptive business solutions tailored to emerging markets. Furthermore, SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action) are central to its sustainable business mandate, emphasising triple-bottom-line accounting and ethical resource management. The programme's focus on long-term business viability contributes to SDG 17 (Partnerships for the Goals) by fostering industry collaborations and alumni networks that perpetuate the Genesis legacy.

Collectively, the project serves as a transformative model for entrepreneurship education, equipping students with the tools to drive economic, social, and environmental change within resource-constrained ecosystems.

The Genesis action-learning experience places a tremendous value on diversity. Whether it be educational focus or race, gender, cultural background, or a lived values system, Genesis outcomes have consistently proven that having a diverse team exponentially improves group decision-making.

One international student remembers from Genesis how difficult it was to reach a decision when diverse individuals had totally different approaches to problems. But now, after running his own business for a number of years, he sees just how beneficial it was to persist. His comments serve to confirm the value of diversity in achieving optimum outcomes.

Before Genesis, I would always have partnered up with someone who is a copy of me. But now I've learned how wrong that is! How good it is

to have someone with a completely different mindset on your team, and this has definitely helped.

This 'proof of concept' led the course convenor to require each Genesis business to reflect the class demographic. The class demographic has steadily changed from 32% female in 2009 to 49% in 2022, from 17% black in 2009 to 43% in 2022, and from 5% international students in 2009 to 15% in 2022.

The UCT Genesis Project is strategically aligned with Bill Aulet's principles of disciplined entrepreneurship.

The disciplined nature of the programme is reflected in the academic calendar, with each of the two, ten week, teaching semesters dedicated as follows: Semester one focuses on group to team transformation, fundraising, product ideation, and prototyping. The second semester focuses on production, marketing, and hard sales.

Genesis teams meet with their course convenor once a week for thirty minutes. These highly structured meetings, which are chaired by a team member on a rotational basis, mean that the teams effectively sprint from week to week. It also means that they are very agile, fail often and fast, and adapt on the run.

3 Institutional Support

The UCT gives Genesis students the standard offering available to all students, but its support mechanisms are very helpful. They can also receive support from the UCT Enactus Society and the EDHE Programme.

A Standard Offering: No special infrastructure is made available for implementing Genesis. This confirms that learning during the programme does not require extra infrastructure or support but is a direct consequence of the action-learning model on which the Genesis venture creation process is designed.

Support Mechanisms: Of particular value, however, are the ecosystem support mechanisms provided by UCT that may often be overlooked or taken for granted but are critical in the context of running a

Genesis business. These include making uncapped Wi-Fi and appropriate meeting spaces available for each business to interact, which became crucial during the recent COVID pandemic when online interaction was utilised almost 100% of the time.

Two further crucial supports are (a) allowing the businesses to trade on campus in order to fundraise their start-up capital and (b) providing a venue for the major annual Genesis Product Launch and Exhibition event (Expo) where each business has the opportunity to pitch their product or platform to potential investors.

Enactus: The convenor of the Genesis Project also serves as the Faculty Advisor for the UCT Enactus Society. Enactus is an internationally recognised, student-led organisation stretching over 2064 universities in thirty-three countries, and enables entrepreneurial action through community engagement. Every year, Genesis students are encouraged to sign up with Enactus and the Enactus students are invited to attend many of the Genesis ideation sessions and even some of the lectures.

The Entrepreneurship Development in Higher Education Programme: The UCT collaboration with the EDHE Programme is managed by the UCT Careers Office and there is a close connection to the Genesis Project. For example in 2021, Genesis Business *Venture and Co* came second in the EDHE National Student Entrepreneur of the Year Competition for their ‘vertical gardening’ business and received R25,000 in prize money.

This unique collaborative pedagogy in the context of entrepreneurship development has won several competitive awards, both within the academic institution and nationally. In 2022, the UCT Genesis Project was acknowledged as an example of existing national best practice when it won the EDHE Award for Entrepreneurship Learning and Teaching Excellence.

The Genesis/Enactus and Genesis/EDHE partnerships facilitate a healthy network of knowledge sharing and access to scarce resources.

Bursary Scheme: The UCT Faculty of Commerce has developed a competitive bursary scheme for postgraduate students who struggle to meet their financial commitments during the year. Every year, Genesis businesses have to pay 10% tax on their taxable income. This is an

important real-world learning curve, and the Genesis tax contributes to the postgraduate bursary scheme in another virtuous loop.

4 The Entrepreneurial Ecosystem

With Isenberg's classical model of six ecosystem domains as a point of reference, it is clear that the Genesis Project functions within a well-developed ecosystem that provides support in all of his domains:

Culture: The external Board of Directors, guest lecturers, and stakeholders listed above provide many success stories. Added to this is the ethos of the programme. It is offered within a 'safe space' of risk tolerance where mistakes and failure are viewed as part of the creative innovation process. Two of the most important tenets of the Genesis Project are 'a mistake is only a mistake if you make it twice' and 'if you are going to fail, then fail fast, learn faster and keep going'.

Finance: Students are not only trained in how to raise their own seed capital, they are also introduced to a number of angel investors and venture capitalists during the programme and are afforded opportunities to pitch to them during the iteration process, as well as at the annual expo event. This has often led to joint ventures between the students who decide to take their Genesis business forward at the end of the academic year and funders looking for innovative opportunities.

Human Capital: The programme is housed within a solid business education environment at UCT's Faculty of Commerce, and is complemented by highly experienced external stakeholders consisting of successful entrepreneurs, angel investors, venture capitalists, and corporates investing in small business development as part of their social impact commitment.

Markets: Students have access to a wide variety of relevant networks that are proactively facilitated by the course convenor, as well as the chosen external directors. These always involve a corps of early adopters for product/platform proof-of-concept who have substantial expertise in 'commercialising' ideas.

Support Systems: Students are offered a number of ecosystem supports, which include:

- internal pitching competitions and an annual expo event that creates the opportunity to present products and platforms to potential investors. They can also participate in external entrepreneur-friendly events such as the national EDHE Student Awards and Enactus Competitions;
- value-for-money services that range from website design and hosting to advice on shareholder agreements and legal documentation; and
- infrastructure availability that includes 24/7 connectivity, remote online library access, free student transport to a wide variety of urban hubs, and readily available meeting spaces.

5 The Performance of the Genesis Project So Far (Including Participant Ratings)

The Genesis Project remains unique among the numerous postgraduate entrepreneurship programmes offered around the world. This is manifest in how the 1700 students since 1996 have responded as they became submersed in the programme. The workload is daunting: Students are required to complete eight honours-level (NQF 8) academic courses while building their start-up businesses! Yet more than 96% of students say they would recommend the course.

Over the years, siblings from more than thirty families have graduated from Genesis.

Participant ratings of Genesis range from those given in response to established university course evaluations to more in-depth evaluations given in response to surveys by alumni from the past 15 years. In their university course evaluations, the 2024 cohort rated Genesis as 89% effective (a score of 4.45 out of 5.0).

Continuous in-depth surveys are conducted with alumni who have either taken their Genesis businesses forward or have started a separate new venture. As illustrated in Fig. 1, the top five contributors to the alumni's success over the years have been (a) personal factors, (b) the Genesis Project, (c) networking and mentoring, (d) academic studies, and (e) access to funding.

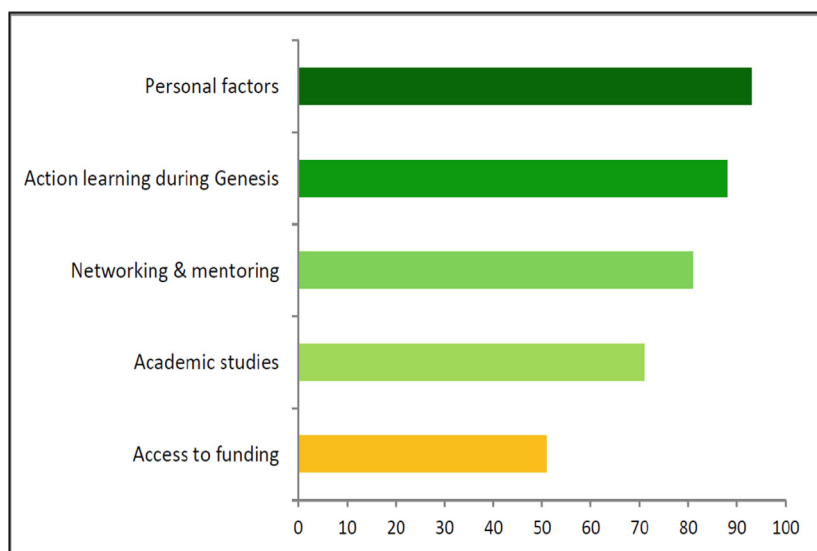


Fig. 1 Factors rated as important to entrepreneurial success

Unpacking these responses further confirms that alumni who responded to a 2022 survey rated action learning during Genesis as 24% more important to their success than their academic studies.

Alumni are also asked to provide a rating of the learnings from the Genesis Project that prepared them the best for the world of work. These are shown below in Fig. 2.

Responses that were very similar have been consolidated to arrive at a manageable list of key learnings for Fig. 2. For example, ‘group work’ and ‘group formation’ form part of ‘working in a team’, and ‘product innovation’ and ‘idea generation’ form part of ‘innovation and creativity’. Verbatim comments from the Genesis alumni surveyed emphasise how the Genesis Project has helped to prepare alumni for the world of work. Some examples are:

Genesis allowed me to grow immensely. It is designed to push one beyond their comfort zone. I managed to see the other skills I never knew I had, like being a leader in a group with strong individuals.

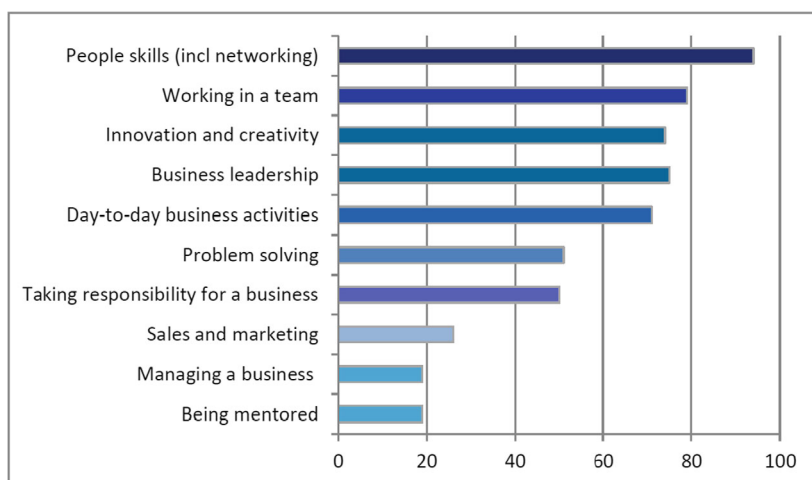


Fig. 2 Genesis learnings that helped the most

Genesis helped me define my personal vision, mission and values in order to determine what it means to be an entrepreneur.

Genesis inspired me and I have used many aspects of it throughout my professional life – from ideation to shareholder agreements. It really prepared me for running a company.

Starting our own Genesis business gave me an understanding of the entire business spectrum, not just one element.

Learning through Genesis that you could start a business with R20 using a basic concept and then taking little, incremental steps, you can create something far bigger. “Not having enough” is never an excuse!

Directors’ meetings were a great introduction to formal reviews. The structured feedback sessions and meeting style were great experience-builders for real-world scenarios.

The exposure to a board of directors taught me accountability.

Finally, and most importantly, there is clear evidence of entrepreneurial success directly because of the Genesis Project. In 2023, four of the eight Genesis businesses continued running after graduation. (The course average is that one in every four Genesis businesses [25%] continues after graduation.) Added to this, although individual graduates may seek a variety of work opportunities, research indicates that, conservatively,

one in three Genesis graduates (33%) either sets up and runs their own start-up, or joins a start-up after graduation.

6 Challenges That Have Been Encountered in Sustaining the Genesis Project

The internal challenges that have been encountered fall under two main themes (a) differing student values, work ethic, and approaches to conflict resolution and (b) irritation with team members who do not contribute to the operations of a Genesis business and do not prepare for board meetings. A verbatim example is:

There were team members who were not on the same page and didn't want to achieve a similar level of success or who weren't willing to sacrifice other aspects of their lives. The most frustrating element was when they would verbally commit but then fail to live up to their commitments.

Fortunately, responding alumni who have become successful business owners learned from these challenges and applied their learning within their businesses. An example is:

Managing different opinions and dealing with conflict is one of the most difficult things I've come across and, in Genesis, we had to learn how to manage people fast – a skill that I continue exercising to this day.

Externally, the major challenge has been one of insufficient understanding of the value of the Genesis Project, not only to the university but to the country as a whole.

In a country where 'business-ready' entrepreneurs are so badly needed to kickstart economic growth and create essential jobs, the Genesis Project could be an invaluable contributor to building entrepreneurs. Currently, a scalable platform for the Genesis Project is in development, with the aim of replicating its entrepreneurial template not only across various faculties at UCT, including Engineering and Humanities, but also throughout higher education institutions in South Africa and

beyond. This expansion is feasible without altering existing courses or qualifications, leveraging the Genesis Project's unique process-oriented approach to fostering venture creation.

In 2023–2024 alone, in collaboration with experts in sustainable development, UCT faculty have successfully adapted the academic-based Genesis model for application in a South African township environment. This adaptation has empowered two back-to-back cohorts of thirty female survivors of gender-based violence in Soweto to successfully launch eleven start-ups in two years, with six start-ups already having secured funding.

Appendix: Learning Outcomes

The Genesis Project (BUS4049W)

On completion of this course, students should be able to demonstrate the following learning outcomes:

1. Networking: Network with their class to form a Genesis Group of 6/7 students, which reflects the class demographic.
2. Teamwork: Lead and manage the transformation of their group into a hard-working team capable of achieving their stated business objectives.
3. Fundraising: Fundraise their own start-up capital.
4. Identification: Apply the principles of Design Thinking to identify a challenging and substantial societal problem and then ideate an innovative 'never before seen in South Africa' solution to that problem.
5. Research: Develop their solution into a working prototype and then use the Lean start-up methodology to build a minimum viable product (MVP) and conduct market research until they achieve a 'product/market' fit.
6. Planning: Apply the principles of Disciplined Entrepreneurship and Agile Project Management in order to produce their product or platform locally and then take it to market.

7. Marketing: Develop and deliver an innovative marketing campaign around their product or platform, including company brand, tagline, marketing strategy, and target market.
8. Sales: Develop and deliver an effective sales strategy for their product or platform, including sales targets, sales pipeline, sales incentives, and sales competition.
9. Key Documents: Draw up key documents essential to the running of a successful start-up, such as Shareholders Agreement, Business Plan, Marketing Strategy, and Sales Reports.
10. Board Meetings: Convene and chair a meeting of the Genesis Board of Directors, including generating meeting agendas, meeting minutes and board reports.

References

- Aulet, B. (2013). *Disciplined entrepreneurship: 24 steps to a successful startup*. Wiley.
- Isenberg, Daniel. (2010, June). The big idea: How to start an entrepreneurial revolution. *Harvard Business Review*.
- Veltman, M. E., Van Keulen, J., & Voogt, J. M. (2019). Design principles for addressing wicked problems through boundary crossing in higher professional education. *Journal of Education and Work*, 32(2), 135–155. <https://doi.org/10.1080/13639080.2019.1610165>

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits any noncommercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if you modified the licensed material. You do not have permission under this license to share adapted material derived from this chapter or parts of it.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.



6

Innovative Pedagogies for Developing Creativity in Business

David Priilaid 

1 The Title of the Course, Including the Targeted Entrepreneurs

Creativity in Business (BUS4090F) (CIB for short).

Target: students enrolled in UCT's Postgraduate Diploma in Entrepreneurship (PDE).

2 What Sustainability Problem(s) Is CIB Trying to Address?

Main Problem: The chronic lack of creativity and its consequences.

Rationale: Within the span of a generation, the world has changed irrevocably and it is changing still. The change is relentless, dangerous even, seeking to overthrow all before it. Never before has business and

D. Priilaid (✉)

University of Cape Town, Cape Town, South Africa

e-mail: david.priilaid@uct.ac.za

civil society been so challenged to deal with the problems of change. For so many reasons, however, we are failing in this task. Though we see and sometimes comprehend the threats of change, corporately and individually, many seem unable to adapt to the times, incapable of reinvigoration.

Take business, for example. In the last decade, concepts such as imagination, creativity, innovation and inspiration have become commercial buzz-words. Ironically, while advertisements employ these hot-button terms to the point of hyperbole, most so-called cutting-edge products and services are merely incremental repeats riding out the S curve. This is not creativity. Confounded by the problems of our age, in many cases, corporate innovation appears incapable of producing anything more than bigger screens and larger hard drives. This problem has nothing to do with money. The great corporations are sitting on piles of investment cash. New ideas are simply not happening fast enough and in the right areas. Innovation in the US is “somewhere between dire straits and dead,” said Peter Thiel, co-founder of PayPal and the first external investor in Facebook. Citing transport as an example, Thiel pointed out that travel speeds peaked with the Concorde in the '70s but since then have declined to norms reminiscent of the '60s. “If you look outside the computer and the internet, there has been 40 years of stagnation,” he concluded. While anticipating some Elon Musk- driven advances in solar energy and space travel, in this our “second Renaissance” of intellectual endeavour, we remain beset by problems imposed by the overshoot of the earth’s carrying capacity. These include population expansion, food and water security, global warming, animal extinctions, pollution, health care, and poverty. Spurred by waves of refugee migration, racial prejudice and religious intolerance are on the rise. Conflict and war are rife, replete with an expanding arsenal of sophisticated weaponry. Computer technology has increased exponentially, advancing to the second half of the so-called chessboard and driving concerns around data security, cyber warfare and artificial intelligence. The list goes on. With so many problems, it seems there are no meaningful means of solving them; this despite all the cash, R&D departments and corporate goodwill capitalism can muster. What is going on?

Four main factors explain this dynamic: (1) outmoded organisational practices, (2) relentless technological change, (3) compliance-driven work competencies, and (4) a debasement of art and creativity disciplines in schools and universities. Each is briefly examined below.

2.1 Outmoded Business Practices

For more than a hundred years the structures and practices of business have been designed to protect and entrench existing business models. Unchecked, business will therefore naturally gravitate towards areas of monopoly and do whatever it can to drive out competition. Rightly or wrongly, capital's instinct is to seek out exclusive zones of profit and to extract margin as efficiently as possible. With the proficiency of mass production, management techniques developed around the time of Henry Ford excelled at maintaining optimum rates of output. As part of a mechanistic mindset, a culture of compliance prevails, along with a zero tolerance of failure. All this has worked incredibly well for a long time. But no longer.

2.2 Seditious Change

Since World War II, the changes wrought through technology have rocked the status quo. This is clearly witnessed in the ever-decreasing shelf life of companies listed on the S&P 500. According to a 2012 study, in 1958, firms listed on this index could expect to remain there for 61 years. Shooting forward 22 years, by 1980 this figure had declined to approximately 25 years and, by 2012, to just 18. At this rate, the study concluded, 75 per cent of those companies on the 2012 list could expect to be replaced by 2027. The lesson offered by these statistics is clear: business models are increasingly under threat from gales of "creative destruction" that wipe out the old to make room for the new. Predictive techniques aimed at mitigating the storms of change have proven impotent. The incidence and impact of random so-called "black swan" events is increasing, with scholars such as Nassim Taleb suggesting that

history will increasingly pivot on such moments of random havoc. This is no longer business as usual.

2.3 Work Competencies

To survive in a changing world, existing businesses must therefore reinvent their ways of being, seeking to supplement and replace outmoded revenue streams before it is too late. “Imagination!” is now the clarion call, “creativity!” the catchword. With the hunt for new ideas now truly on, increasingly, innovation consultants are summoned, creativity workshops convened, and new brainstorming techniques developed. Despite the incessant busyness, studies indicate that the majority of the workforce remains bored, unfulfilled and indifferent. In a 2017 study of 1300 white-collar professionals, 74% of those canvassed declared their work boring. Those in desk jobs seem to find imagination and creativity elusive and, arguably, the cause is the very organisational practices prescribed by business in the first place. For as much as top-down authoritarian structures have bred compliance, competence, and a modicum of intelligence, they have also stultified more desirable qualities, such as passion, initiative, creativity, and vocation—the very skills required right now. In short, the traditional practice of business has effectively suffocated any possibility of free thought and imagination.

2.4 Debasement of Art in Education

Business is not solely responsible for this destruction of creative instinct. Education systems must share the blame. Collectively, junior, secondary, and tertiary institutions of education have connived to systematically devalue the creative arts in favour of the sciences. While not denying the power of the so-called STEM (science, technology, engineering and mathematics) disciplines, this debasement has dispossessed young people of their creative faculties. SpaceX and Tesla CEO Elon Musk agrees, saying: “I think there are probably too many smart people pursuing internet stuff, and law. That is part of the reason why we haven’t seen as much innovation.”

In the light of the issues laid out above, Creativity in Business deals with the importance of creativity and imagination as a means of addressing contemporary problems as they impact on business.

At its foundation CIB argues that the reimagination of business may best be achieved through an analysis of how genuinely creative individuals develop big ideas.

Placing the fundamental tenets of creativity within a business context, CIB functions to enable students to see commercial problems differently and to develop innovative business ideas and solutions.

3 The Criteria Used to Screen Applicants/ Youth Entrepreneurs

The course is a prerequisite for all PDE students (2022: n = 75).

4 Strategies to Encourage the Inclusion of Diverse Candidates

The course mirrors UCT's racial and gender diversity, attracting students from various backgrounds including engineering, law, humanities, and commerce.

5 The Infrastructure/Support Provided by the Institution

Since the 2012 inception of Creativity in Business, the university has provided considerable capital and institutional goodwill in attracting top faculty and been open to the experimental philosophy underpinning the course.

6 Links to Other Entrepreneurship Activities Within the Institution

Vested in the Commerce Faculty, this CIB course forms part of the architecture of the Postgraduate Diploma in Entrepreneurship (PDE). Since 1993, the PDE has delivered an innovative curriculum seeking to equip young graduates with the skills requisite of a changing and challenging business environment. With an explicit focus on entrepreneurship, the PDE employs an action-learning based curriculum, the core thrust of which is to challenge the orthodox view that entrepreneurship is mostly about spreadsheets, business plans, and projections of discounted cash flows.

Instead, the PDE encourages students to see themselves as change-agents, artists, creators, and visionaries in a year-long learning process whereby student-groups learn to start and run their own businesses, and so doing take control of their own lives.

The PDE starts in the first week of February and concludes at the end of October. It is designed along two parallel tracks.

- The first component is the full-year action-learning programme known as the Genesis Project (BUS 4049W). Here groups of roughly six or seven students must come up with a business idea, prototype it, manufacture it, market it, and sell it. So-doing, any money made is theirs to keep. The Genesis group record stands at over a million rand in profit in one year. But money is not the driver here. It is learning. Specifically, through the practice of “learning-as-you-go,” through a cycle of action and reflection, whereby students hold up theoretical constructs and test their applicability in real time with real people and real money. Each Genesis group reports monthly to a board of four directors. These directors are old alumni as well as other business men and women. While the Genesis programme is the jewel in the crown of the PDE, the strength and elegance of the PDE lies also in the self-reinforcing and interconnected relationship between Genesis and numerous theoretical courses across PDE, including CIB (Total credits: 36).

- The second component is the suite of afore-mentioned functional theory courses that make up the body of the PDE. There are eight such courses on the PDE, each carrying a weighting of 18 credits. Some are unique to the PDE, some are typical of any commerce or even MBA-type degrees. These courses are taught on a semester basis and are aimed at assisting students in the practice of better running their Genesis businesses. These theory courses include: CIB (as featured here), Entrepreneurial Strategies, Management Theory in Practice, Business Research and Communication, as well as various marketing, HR and socially engaged electives (Total credits: $8 \times 18 = 144$).
- In all, the total PDE diploma-course weighting is 180 credits.

The annual diploma intake is approximately 55 students.

To apply students must have an undergraduate degree (but not a BBusSc). Individuals from different countries, and even different continents, from social science, arts, science, medicine, music, engineering, and architecture have benefited from this course.

Our graduates operate in different industries across the world. They can think on their feet, work well with each other and apply their knowledge in almost any situation.

In 2011 the convenor of the PDE, (myself), shared UCT's Centre for Higher Education award for Innovative Teaching with my colleague, Stuart Hendry, the convenor of the Genesis Project.

The PDE enjoys strong links with the Hasso Plattner School for Design Thinking at UCT. At the start of each year the Design School assists in developing group processes aimed at kickstarting the Genesis group formation process.

Within the governing architecture of the PDE, the CIB course runs concurrently with the first semester section of the Genesis Project and is designed to support students with the development of innovative and alternative business ideas, concepts, and solutions. As such CIB seeks to challenge existing silo-based thought patterns and to assist students in their transition to developing a creative working life.

7 A Description of the Ecosystem of CIB

The Creativity in Business course is 36 lectures long and is divided into two sections:

- 1. The first is a focus on the underpinning mindset and governing disciplines of creative writers, painters, and musicians. (See learning objectives in Annexure A below). Aim: to learn about the artistic principles to be applied as would-be entrepreneurs. Duration: 20 lectures.
- 2. The second is a range of practical electives. Students must choose two of the available four options: mindfulness, creative life writing, poetry, and song recording. Duration: 8 hours per elective: 16 hours total.

Lectures are provided three times weekly.

The foundational text is provided through the book: Creativity Explained: From Music and Art to Innovation in Business (2018, Priilaid).

8 The Performance of the CIB So Far, Including Any Ratings by Participants

The course has gone from strength to strength. See below for some metrics.

	Cares about his subject		Knowledgeable about subject		Teaching is well structured	
	2021	2022	2021	2022	2021	2022
Weighted score	1.12	1.00	1.08	1.06	1.38	1.26
1. Strongly agree %	88	100	92	94	54	79
2. Agree %	12	0	8	6	25	18
3. Neutral %	0	0	0	0	17	0
4. Disagree %	0	0	0	0	4	3
5. Strongly disagree %	0	0	0	0	0	0

No relevant teaching evaluations in 2020 due to COVID.

- *“I liked the freedom of expression and an environment that allowed me to be myself and explore my creative self. It challenged me to dig in deep and find my voice” (Participant A, 2022).*
- *“I really enjoyed how David taught this course, using his book as content. The presentation was fun to do as I truly saw how creativity can be expressed in business” (Participant B, 2022).*
- *“I have learnt so much about myself and the people around me” (Participant C, 2022).*
- *“A completely fresh perspective taught. Very relevant” (Participant D, 2022).*

9 The Challenges That Were Encountered

The key challenges were:

1. Providing a 50/50 balance of meaningful theory and practice.
2. Sourcing creative professionals willing and able to provide practical insight into their respective disciplines within the confines of the timetable and allowing students meaningful access to these disciplines.
3. Coordinating the various moving parts of this course to form one coherent whole.
4. Dealing with an online version during COVID.

Over 10 years the course has gradually adapted to these challenges and is now at the top of its game.

10 Plans to Further Develop and Improve CIB

The practical component of the course works best when students have two or more consolidated hours on contact. In the past, the writing component has, for example, been carried out during weekends. For various reasons this has not been ideal. For 2023 the timetable has been reconfigured to introduce a single lecture on a Monday, and a double practice-based slot on a Friday. This should yield better results all round.

More broadly I strongly believe that our teaching model can and should be replicated across other faculties to teach graduates how to operate creatively in the world of work. UCT's DVC for Teaching and Learning is currently considering how this model can be rolled out across other faculties.

Annexure A: Learning Objectives

Creativity in Business Course Outline

Course component	Hand-in assignments	Exam question
Term assignment (Compulsory)	20%	
The creativity of a business: <i>an evaluation of two restaurants</i> Write up a report explaining how they conform to the artistic mindset and disciplines described in Priilaid (2018). Is there room for artistic improvement? Explain how and where		
Electives: chose two of the below...	30%	–
1. Participant A—Mindfulness (15%)		
2. Participant B—Writing (15%)		
3. Participant C—Art (15%)		
4. Participant D—Poetry (15%)		
Exam: set by course convenor, David Priilaid		50%
Total	50%	50%

Key theoretical components to CIB

Course theory	
<i>Artistic mindset</i>	
1. Determination	1. The strength to persevere coupled with the ability to push on regardless of the odds, and 2. Moral integrity. The chapter closes with a look at the relationship of grit to the potentially compromising influences of political and economic power
2. Love	Examines how passion expresses itself through creativity and thereby acts as a catalyst of art. Considered are the questions of “artistic vocation” and the romantic concept of “bārakā” or the lightning strike of supernatural inspiration many refer to as “the muse”
3. Suffering	Two aspects explored here: 1. The Exiled Child—chapter explores the concept of the “inner child”; a sense of self characterised by innocence, simplicity and a willingness to make mistakes. These qualities are not typically adult because they are split off and exiled at an early age 2. Depression, Madness & Addiction—these markers of suffering have been shown to correlate significantly with creative output. Along with artists, some of the great entrepreneur-businessmen also appear to exhibit traits of instability and pathology
<i>Artistic discipline</i>	
1. Proactivity	Aim: why proactivity is the engine of productivity and creative energy, and which factors may serve to undermine it. Through the lives of Steve Jobs, Marvin Gaye, Sting and James Taylor, the chapter reviews the debilitating influence of genetic disposition, psychological make-up and the social environment
2. Practice	Examines the contentious role of practice in the development of art, reviewing the 10,000-hour rule—the practice time required to attain a level of world-class mastery
3. Perspective	Looks at perspective and its contribution to artistic invention, examining also why good artists resist forced interpretation through the use of multiple perspectives

(continued)

(continued)

Course theory	
4. The muse	Two components: 1. The spotlight is on the role of the unconscious, examining how artists tend to approach their work instinctively, exploring the concept of the muse through looking at intuitive aspects that framed certain artistic greats 2. The importance of an unhurried life, demonstrating that the best artists act on ideas from a space of "less hurry", so as to "control the burn", as a musician once put it. Many creative insights have emerged from periods of sleep or quiet contemplation; this chapter lists a few to illustrate

Final Personal Comment

While I have qualified with a PhD in econometrics, my background as a lover of music, an English teacher, and a poet and writer has made me increasingly suspicious of business, its mechanistic mindset, its droll acceptance of the status quo, and its inability to see past the next quarter's set of results.

It was this artistic background and these initial insights that led to the rationale for this course.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits any noncommercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if you modified the licensed material. You do not have permission under this license to share adapted material derived from this chapter or parts of it.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.





7

An Innovative Approach to Entrepreneurship Development at UWC

Vivienne Lawack[✉] and Jacob Cloete[✉]

1 Introduction

The world is rapidly changing, and developing countries like South Africa need innovative approaches to keep up with global developmental trends. Like many African countries, South Africa finds itself in a unique situation. Apart from keeping up with global developmental trends, it also has to pay attention to the legacies of colonialism and apartheid. For example, colonialism created an economy mainly used for raw materials. Raw materials were exported to the Global North, where technologies and industries were developed. Colonies like South Africa were not developed (Mbeki, 2009). The result was that countries in the Global South were underdeveloped.

V. Lawack (✉) · J. Cloete

University of the Western Cape, Cape Town, South Africa

e-mail: vlawack@uwc.ac.za

J. Cloete

e-mail: jjcloete@uwc.ac.za

South Africa, in addition to colonialism, also has to deal with the legacy of apartheid. Apartheid in South Africa created a system of racial discrimination in which Black, Coloured, and Indian people were further underdeveloped socio-economically, creating a bifurcated society (Mamdani, 1996). In this bifurcated society, class is racialised, creating a world in which Black, Coloured, and Indian South Africans are battling extreme levels of poverty and wealth inequality (Magubane, 2001). In addition, the education system in apartheid South Africa was also racialised. This racialised education system created a society in which white learners and students were early exposed to information technology whilst Black, Coloured, and Indian students did not have the same exposure (Mkuzo & Govender, 2024).

The effect of this type of discrimination was later felt as “digital apartheid.” According to Barnard-Ashton et al. (2018, p. 20), digital apartheid refers “to the systematic exclusion of certain communities from digital access and experience through political and business policies and practices.” Digital apartheid created a digital divide between urban and rural populations. Owing to its historical origins, this digital divide affected the rural black majority more than their white counterparts.

During apartheid, South Africa was internationally sanctioned for its discrimination against Black, Coloured and Indian people. They were cut off from the rest of the world, and whilst they were cut off, the world entered the third industrial revolution. The third industrial revolution was characterised by “the implementation of electronics and information technology to automate” (Xu et al., 2018, p. 90). It became apparent at the end of apartheid that most South Africans were not exposed to information technology and were missing out on opportunities in the third industrial revolution (Mkuzo & Govender, 2024). This challenge was exacerbated because most South Africans did not have electricity and other basic services such as water and sanitation.

The world is now in the Fourth Industrial Revolution, and at the heart of this revolution are artificial intelligence, the Internet of Things, and quantum computing. It is also changing the world of finance. For example, the Fourth Industrial Revolution ushered in blockchain, which led to the emergence of cryptocurrencies (Philbeck & Davis, 2018). Seeing all the latest developments in finance, computing, and artificial

intelligence, South Africa has yet to bridge the digital gap. This inability to bridge the gap again leaves South Africa behind the rest of the world.

2 The Fourth Industrial Revolution and the Changing World of Work

The Fourth Industrial Revolution is changing the world of work. For example, The Future of Jobs Report of the World Economic Forum (WEF) in 2018 predicted that specific jobs will become redundant and have to make way for new jobs. The WEF predicted that jobs such as financial analysts, accounting, bookkeeping, and payroll clerks, accountants and auditors, lawyers, statistical, finance, and insurance clerks would become redundant in the future (World Economic Forum, 2018, p. 9). The 2018 the Future of Jobs Report also predicted that roles such as “Data Analysts and Scientists, Software and Applications Developers, and E-commerce and Social Media Specialists are roles that are significantly based on and enhanced by the use of technology,” would become in more demand (World Economic Forum, 2018, p. viii).

Furthermore, the report also found extensive evidence of accelerating demand for various new specialist roles related to the latest emerging technologies. For example, emerging technologies, such as Artificial Intelligence and Machine Learning, are creating a demand for Data Specialists, Process Automation Experts, Information Security Analysts, User Experience and Human-Machine Interaction Designers, Robotics Engineers, and Blockchain Specialists (World Economic Forum, 2018, p. viii). Artificial Intelligence (AI) and Machine Learning have become major players in the Fourth Industrial Revolution. For example, Poba-Nzaou et al. (2021, pp. 62–63) found that AI will affect jobs, especially individuals with low-skilled jobs. Individuals who are highly educated are less likely to be impacted by new technologies.

This new reality poses a significant challenge for a country such as South Africa. According to Khuluvhe and Ganyaupfu (2022, p. 4), “only less than 6% of South African adults had a degree as their highest level of educational attainment in 2021.” It is also clear that the apartheid legacy of education persists. Khuluvhe and Ganyaupfu (2022, p. 7)

found that in 2021, “over 88% of the White population had completed matric, followed by 74% Indians/Asians, 42% Black Africans and 39% Coloureds.” Even though Black, Coloured, and Indian people make up the majority of South African society, they still play catch-up with their white counterparts. Therefore, the reality for Black, Coloured, and Indian people is that they will be affected more adversely by the Fourth Industrial Revolution compared to white people.

Moreover, the Future of Jobs Report 2020 indicated that one of the emerging jobs worldwide is that of a Social Media Specialist (World Economic Forum, 2020). This report also shows that online learning and training are on the rise, and working professionals place “a larger emphasis on personal development courses, which have seen 88% growth among that population. In addition, those who are unemployed have placed greater emphasis on learning digital skills, such as data analysis, computer science and information technology” (World Economic Forum, 2020, p. 6). Considering the findings of these reports, professionals need to upskill.

3 The Birth of ZoneLearning@UWC

The University of the Western Cape applied for an HDI grant in 2016. The aim was to strategically position the University within the realms of entrepreneurship, social innovation, and inclusivity. The main focus was to address youth unemployment and skilling young people for the work environment. The university hoped that it would stimulate an entrepreneurial spirit and know-how among its students and that such a project would facilitate collaboration with the surrounding communities, corporate businesses, and Small and Medium Enterprises (SMEs). The project wanted to co-design and co-develop innovative solutions aimed at the socio-economic issues South Africa is facing. The project wanted a new era for UWC and its students, marked with resilience and a pioneering spirit, accompanied by innovation, problem-solving, and entrepreneurial skills.

From the onset, the approach for establishing a project like Zone-Learning@UWC was embedded in Paulo Freire’s “problem-posing”

education. Freire's "problem-posing" education breaks the barriers of traditional vertical teacher and student relationships. Instead of seeing the student as an empty vessel that needs depositing, "problem-posing" education recognises the strengths of students and encourages dialogue between students and teachers. Thus, they "become jointly responsible for a process in which all grow" (Freire, 2005, p. 80). This approach makes education a shared activity. This approach recognises that people teach each other and that it is mediated by the world (Freire, 2005). UWC recognised this shared activity and wanted to ensure that there would be constant dialogue between students, communities, and the university, solving many of the problems that affect them.

However, given UWC's history, it was important not to position it as an "entrepreneurial university." UWC has a long and cherished history with communities, and its ideological approach was set by one of the most impactful rectors of UWC: Jakes Gerwel. Jakes Gerwel, in his inaugural lecture in 1987, made the following observation: "Universities, and education in general, reproduce the social order; but it can, alternatively, educate towards and for a changed society" (Gerwel, 1987, June 5). Thus, he warned against an education that would reproduce the racialised social order or, as he puts it, "apartheid in any of its mutations" (Gerwel, *ibid.*). In true Freire fashion, Gerwel recognised that it "is through our students and the community from which they come that we are presented with [our] ideological formation" (Gerwel, *ibid.*). For Gerwel, UWC had to be a university that had to be aligned to the struggle and thus the ideological formation of its students, which has been maintained since (Cloete, 2023).

When UWC received the grant in 2017, a benchmarking initiative was undertaken. One of the universities that had great appeal for a project on entrepreneurship, social innovation, and inclusivity was the Toronto Metropolitan University (previous Ryerson University). Toronto Metropolitan University (TMU) had an interesting model called Zone Learning. Zone Learning focuses on preparing students for the twenty-first-century workplace, focusing on innovation and entrepreneurship (Toronto Metropolitan University, 2025, March 21). To achieve this, they had 10 zones, each with a specific industry focus. For example, they have a Fashion Zone, Science Discovery Zone, Legal Innovation Zone,

Transmedia Zone, Biomedical Zone, etc. UWC expressed its interest in adopting the Zone Learning model, and an agreement was established between TMU and UWC to implement Zone Learning as a project focused on entrepreneurship, social innovation, and inclusivity in South Africa. Hence, ZoneLearning@UWC was born.

ZoneLearning@UWC's mandate was to equip students with entrepreneurial skills and develop socially responsive graduates who drive entrepreneurial activities in their communities. Unique to this project is that it was embedded in the university curriculum. ZoneLearning@UWC brought UWC students into contact with communities and communities into contact with the university. Hence, it has a strong community engagement element, which is at the heart of UWC's legacy.

Furthermore, ZoneLearning@UWC focused on an inclusive model for education. For UWC, an inclusive education model involves utilising digital social innovation to tackle poverty, gender-based violence, and climate change while fostering sustainable communities in rural and urban areas. In this context, inclusivity was guided by the sustainable development goals (SDGs). ZoneLearning@UWC identified the following SDGs for implementation: (1) No Poverty; (2) Zero Hunger; (4) Quality Education; (9) Industry, Innovation and Infrastructure; (11) Sustainable Cities and Communities; and (13) Climate Action. ZoneLearning@UWC believed that digital social innovation aimed at inclusion meant solving problems with communities and students; problems that the Fourth Industrial Revolution more and more presented.

ZoneLearning@UWC created three entities: The New Media and Transmedia Clinic, the Entrepreneurial Law Clinic, and the Green Incubator (previously Small Business Clinic). These entities had to be experiential learning and incubation spaces for UWC students and communities. Instead of telling students and communities the problems, problem-solving was encouraged. Each entity has this at the heart of its offering. Below, two of the ZoneLearning@UWC programmes will be discussed.

4 The Green Incubator

The Green Incubator recognises that the world faces complex problems and needs innovative and forward-thinking solutions. The first Earth Summit, held in Stockholm, Sweden, from 5 to 16 June 1972, 51 years ago, aimed to develop several principles for the sustainable development of the human future. The summit adopted 26 principles, 22 of which focused on protecting the environment (UN, 1792). However, since 1970, there has been a 69 per cent decline in species populations. Latin America, the Caribbean, Africa, and Asia Pacific are the regions that have been hit the hardest. Latin America and the Caribbean have seen a 94% decline in species, and Africa has had a 66% decline since the 1970s (WWF, 2022). These two regions are also some of the poorest in the world and have been affected by colonialism.

Before colonialism, the species populations of Africa, Latin America, Asia Pacific, and The Caribbean thrived. Colonisation introduced devastating farming and mining technologies that exterminated plant and animal life. For example, before colonialism in Africa, there was no need to preserve plant and animal life. The indigenous populations lived harmoniously with the natural environment for thousands of years. Within 200 years of colonisation, there was a need to conserve the natural resources in South Africa (Cloete, 2023; Gewalf et al., 2019). However, this extermination of plant and animal life did not stop and continued into the twentieth and twenty-first centuries.

Since the first Earth Summit, many conferences have focused on improving the natural environment and stopping the decline in species populations. In 2021, it was striking that COP26 reiterated the same issues raised in 1972. However, things seem to worsen, and no end is in sight. Needless to say, humans have a broken relationship with nature. Destroying the planet destroys the human. Thus, as a global community, there is an urgent need to improve human relationships with the natural environment for a sustainable existence. Humans cannot continue consuming and destroying at the current rate and scale.

With this in mind, the Green Incubator was established to promote the SDGs of (1) No Poverty, (2) Zero Hunger, (11) Sustainable Cities and Communities, and (13) Climate Action. It was created to assist in

creating and refining business ideas conceptualised by students within the university community and the wider community. Thus far, there are two initiatives in the Green Incubator—one for university students and another for communities.

4.1 Student Entrepreneurship Competition

The initiative for university students focuses on the ideation and incubation of business ideas that focus on greening the economy and sustainable development. In 2022, ZoneLearning@UWC applied for funding from the BankSETA. The aim was to assist 30 student entrepreneurs in establishing green economy businesses. The application was successful, and the funding was received in 2023. After receiving the funding, ZoneLearning@UWC announced a business competition for UWC students. Five students with the best business ideas for greening the economy would win a cash prize for starting their businesses. Seventy-two (72) students applied, and thirty-two (32) were accepted into the programme (Fig. 1).

The students had interesting business ideas. Their ideas covered a range of industries. For example, some ideas focused on textiles and fashion, agriculture, education, e-commerce, health and wellness, real estate, construction, the environment, cosmetics, food and beverage, technology, and entertainment. The 32 students worked with two coaches. The first coach used a business simulator programme to help students generate business ideas. The simulator allowed them to determine whether their ideas could be potentially successful. When they completed the incubation, they worked with another coach who refined their business ideas.

Once they underwent the necessary ideation training, the 32 students were invited to a pitching competition. The five best business ideas would compete for a cash prize of R30,000. In March 2023, 24 students participated in a pitching competition. An independent panel of business and industry experts listened to every pitch and scored each business idea. Business ideas were, amongst others, scored according to the following criteria. Firstly, is this an “innovative green business idea”?



Fig. 1 Green student entrepreneurs

Secondly, how innovative and unique is the New Business approach? Thirdly, characteristics of the market and description of its customers. Fourthly, what are the specifics of the product or service? Fifthly, how will sales be achieved? There were ten scoring points, and the total pitch was scored out of 100.

The five students with the highest scores were selected to participate in the incubation phase of the final round. ZoneLearning@UWC paid for their business registration and appointed a business coach to help students refine their business plans and implement their businesses. During the final round of the competition, students were judged by how successful their businesses had been over six months. Refematla Koapa was the programme's overall winner and is currently running a successful photography business.

4.2 Food Security and Reforesting

The second Green Incubator initiative is a food security project in Clarkson in the Eastern Cape. Clarkson was carefully chosen as a site, and various phases of community engagement were conducted before the project was initiated. During the first phases of community engagement, it became apparent that Clarkson had a rich agriculture and food security history. It started as a Moravian mission station in 1839. Agriculture was introduced very early, and people were given enough land to produce their own food (Uithaler, 2021). From its early conception, Clarkson was conceptualised as a self-sustaining community. For many years, Clarkson was a self-sustaining community.

However, the advent of a modern, global education and economic system focussing on mass production saw many people leave Clarkson to find work and opportunities elsewhere. Over the past 40 years, there has been a steady economic and social decline in Clarkson. The once self-sustaining community is now a shadow of itself (Cloete, 2023). Knowing the rich history and availability of resources in Clarkson, we decided to do a benchmarking exercise and a community readiness assessment to ascertain whether a Green Incubator would work at Clarkson.

Before implementing the project in Clarkson, we did a benchmarking exercise. We identified the Middelpoos farm, which Ingrid Lestrade managed. The ZoneLearning@UWC team visited it in the first half of 2023. The Middelpoos farming project rested on two pillars: social development and creating an alternative economy (Fig. 2).

At Middelpoos, they realised early on that it would fail if no attention were paid to social development. According to Lestrade, there were four other partners before she took over the project, but they did not succeed. Lestrade shared that this was due to a range of factors. She questioned: How can individuals reach their full potential in marginalised communities? She narrowed the answer down to three components of social development: preparation, education, and mental wellness.

Lestrade also pointed out that the current business model that most conventional (commercial) farmers use is agricultural intensification. For commercial farmers, agricultural intensification yields better results and has proven to maximise their economic output. However, agricultural



Fig. 2 Benchmarking at Middelpos

intensification based on agrochemical inputs “is associated with severe losses of biodiversity and ecosystem services, even in neighbouring nature reserves” (Tscharncke et al., 2021, p. 919). Even though agricultural intensification based on agrochemical inputs increases yields, it leads to environmental issues and is not sustainable.

The Green Incubator focuses on greening the economy. According to the UNEP, “a green economy is defined as a low carbon, resource efficient, and socially inclusive” (UNEP, n.d.). Therefore, entrepreneurship and agricultural ventures must contribute to greening the economy and sustainable development goals.

One of the biggest challenges for the Middelpos farming project is to compete with commercial farmers. Since they are farming organically, they cannot compete with commercial farmers in the market. They also did not receive a fair price from the market. This resulted in many of their products not selling. This challenge forced them to opt for an alternative business model. They decided to lean on the existing skills of the community. They now produce jams, olive oils, and corporate gift bags. They also decided to do away with plastic packaging and made their own bags. As a result, they now own most of the economic value chain, creating and stimulating an alternative economy. ZoneLearning@UWC’s

benchmarking showed that a community food security project focused on creating an alternative economy could succeed in Clarkson.

ZoneLearning@UWC needed to develop a tool to identify a community's strengths and weaknesses. The tool was adopted from the Violence Prevention Through Urban Upgrading (VPUU) community participation model. The VPUU model draws on John Turner's Housing model of 1976 and Abbot's model of community participation. The aim of the VPUU model is that the community must take charge of most of the planning, implementation, and, most importantly, management of the intervention (Cloete, 2013). The VPUU model starts with a baseline survey and then interacts with community-based organisations, from which they form a Reference Group, which helps develop and implement the developmental intervention.

However, the VPUU model has weaknesses. Cloete (2013) found no public participation in the early stages of the developmental intervention. Hence, the community readiness assessment tool was developed. It is a top-down process where the broader community is excluded from the Reference Group, which comprises community-based organisations and funders. This top-down process leads to political gatekeeping and pseudo-participation. Another weakness is pedagogical. The VPUU model speaks to empowerment, but no education has been built into the model. The community's problems were identified through the baseline survey, and community-based organisations were co-opted to address these problems.

The ZoneLearning@UWC community readiness tool addressed some of the shortcomings of the VPUU tool. For ZoneLearning@UWC, problem-solving with the community was at the heart of the approach. This approach recognises the community as an equal and valuable partner in tackling the problems they are facing as a community. The tool also examines the community's economic drivers and whether that aligns with its skills. It looks at the socio-economic issues that could hamper any developmental intervention.

In the ZoneLearning@UWC model, there are five steps to any community readiness assessment. The first step is to have an initial meeting with the community. In this meeting, the community would identify socio-economic issues and find ways to address them. The

second step is to build the community's feedback into the community readiness survey. The third step is conducting the survey and analysing and processing the data. The fourth step is to meet with experts and key internal and external stakeholders regarding the findings. This step aligned with the suggestions from the initial community meeting. The final step is to have a community meeting to present the findings to the community. Actional programmes are identified, and a steering committee are selected to implement some of the interventions.

From the Clarkson community readiness assessment, it was clear that the community's strengths were in agriculture and forestry. Hence, the community wanted a food security and reforestation project in Clarkson. In 2024, ZoneLearning@UWC applied for funding from UNOPS for a food security and forestry project. The application was successful, and in 2024, the pilot Green Incubator community project started.

5 New Media and Transmedia Clinic

The New Media and Transmedia Clinic was established to promote SDGs (4) Quality Education and (9) Industry, Innovation and Infrastructure. The Clinic focuses on embedding transmedia storytelling in the learning and teaching approaches of the Arts and Humanities Faculty. Besides its learning and teaching potential, transmedia storytelling is also a great way to introduce students to entrepreneurship and innovation. Transmedia storytelling at ZoneLearning@UWC responds to the changing world of work and the emerging jobs created in the content production cluster. They include podcasting, vlogging, websites, blogging, social media, gaming, artificial intelligence and augmented reality, and music and television streaming services.

The New Media and Transmedia Clinic identified two strategic priorities. First, it wants to create entrepreneurial opportunities for students, content creators, and unemployed youth in the new media and transmedia sector. Second, it wants to help marginalised communities to create media that speaks to social justice and community engagement. To achieve the strategic priorities, ZoneLearning@UWC developed two programmes. The first is a continuous education course for content

creators, unemployed youth, and working professionals. The second is to help marginalised communities to tell their stories from their points of view.

5.1 Transmedia for the Creative Economy

The first transmedia programme is a continuous education course that ZoneLearning@UWC created with the Arts and Humanities Faculty. The planning for the course started in 2020. The specific focus was transmedia storytelling. Transmedia storytelling is “stories told across multiple media” (Robison et al., 2009, p. 86). ZoneLearning@UWC recognised the entrepreneurial opportunities for content creators if they create elaborate story worlds and tell parts of that story through multiple media. Knowing the monetisation strategies of various social media platforms and streaming services, content creators could earn multiple income streams from various platforms.

In 2022, the course was registered and is titled Transmedia for the Creative Economy. Anyone with a National Senior Certificate or an NFAQ Level 4 equivalent qualification could apply for the course. The course focuses on “new media” and transmedia storytelling. The course incorporated podcasting, vlogging, blogging, social media, videography, and photography into its offering (Cloete & Mokwena, 2022). It also helps participants to create a story world and tell parts of the story across multiple media.

ZoneLearning@UWC also applied for funding and, in 2022, received a Sibusiso Bengu Grant for the implementation and rollout of the course. ZoneLearning@UWC decided to implement and roll out the course in three phases. Each phase focuses on troubleshooting a specific area of South African society. The first phase focuses on rural communities, the second on peri-urban communities, and the third on cities.

The first phase of the course kicked off in February 2023. ZoneLearning@UWC identified three rural sites: Calitzdorp and Bitterfontein in the Western Cape and Douglas in the Northern Cape. ZoneLearning@UWC chose to start with rural sites because rural communities do not get the same opportunities in terms of education as

peri-urban, urban, and metropolitan areas. The target group was rural youth, especially those who could not attend university. During this phase, ZoneLearning@UWC also partnered with the Institution for Justice and Reconciliation (IJR), especially since they have worked in Calitzdorp and Douglas for a while (Fig. 3).

ZoneLearning@UWC decided on a blended learning and teaching approach: 60 hours were dedicated to in-person training and 60 hours were dedicated to students working independently. The staff of ZoneLearning@UWC and the facilitators had to travel to these three sites from Cape Town for in-person training. Since there was not a big enough venue with proper conferencing facilities in Calitzdorp, the first training workshop was in Oudtshoorn. The same challenge was not experienced in Douglas and Bitterfontein. For example, in Douglas, enough conferencing facilities were available, and in Bitterfontein, the community hall was used. However, in Calitzdorp, the community hall was damaged by a storm, and the Kannaland Municipality did not have enough money to fix it. The community hall is now in a derelict state and would cost millions to repair.

The training in each community lasted days, and the following methodology was used: group work, class presentations, practical training (with the camera and sound equipment), icebreakers, and breaks



Fig. 3 Dr. Lorato Mokwena teaching in Douglas

that included food. ZoneLearning@UWC made it a point to break the traditional classroom environment, and one of the key features was teaching classes in the native languages of the community. For example, most participants in Calitzdorp, Douglas, and Bitterfontein speak Afrikaans. Even though in Douglas, the two main languages are Afrikaans and isiXhosa, the lingua franca. Hence, most of the class training was conducted in Afrikaans supplemented with English. As a result of teaching in the local lingua franca, ZoneLearning@UWC found that student-in-class engagement was higher than what they were used to at classes in traditional universities.

The training covered the six key themes of the course: trans-media storytelling, new media, ethics and legal considerations, digital marketing, content production, and monetisation and distribution. Students were tasked with telling new and future stories about their communities and envisioning a future beyond their daily challenges. They received photography, videography, and podcasting training and had to produce and direct their short films by the end of the week. Their films focused on many issues their communities face and solutions to fixing them.

After the in-person training, students had to complete eight (8) weekly assignments. To assist students with ZoneLearning@UWC, each student received a monthly data bundle to complete their assignments. Finally, after 12 weeks of training, students had to do a final in-person training and submit a portfolio of evidence. The University of the Western Cape issued students who completed the course with an NQF level 5 Trans-media for the Creative Economy Certificate. Certificates were given at a certificate ceremony where students could bring a parent, guardian or significant other to share the moment with them. The top five (5) students of each cohort went on to make documentary shorts and specialised training in video editing and film-making.

ZoneLearning@UWC completed the peri-urban phase in Kokstad in Kwa-Zulu Natal in 2024, and the metropolitan phase will be launched in Cape Town in 2025. In Kokstad, the same methodology was used as with the first phase. However, there is one difference. Students in Kokstad did not receive data bundles to do their assignments since they had plenty of public facilities. The data bundles were a necessary

intervention in rural areas since there were few public amenities with free Wi-Fi to do their assignments. Rolling the first phase out in rural areas, ZoneLearning@UWC first hand experienced “digital apartheid.” For example, in areas such as Bitterfontein, a few places have 4G reception, and most surrounding areas have 3G reception. In some places, there are no receptions, and students have to travel to the nearest town or ask the local schools to assist them in connecting to the internet to do their assignments.

Despite the challenges, there are early signs of success in Calitzdorp and Bitterfontein. The Calitzdorp cohort has started a community podcast called Feite Oppie Tafel that focuses on repairing, healing, and changing the narrative of their community. In Bitterfontein, two participants took up photography as a career, and five of the top five students in Bitterfontein are working towards entering university; two started this year at the Cape Peninsula University of Technology.

5.2 Community Workshops and Documentary Shorts

The second transmedia programme focuses on community workshops and documentary shorts. When ZoneLearning@UWC applied for the Sibusiso Bengu Grant, they also applied for funding for community transmedia workshops and the development of documentary short films. The rationale behind the workshops was to help marginalised communities to develop their own stories. Cloete (2023) explains that many documentary films made of marginalised communities subject these communities to voyeurism and strip Indigenous people of their agency. Cloete (2023) suggests that documentary filmmakers give attention to the three limitations of documentary filmmakers. If documentary filmmakers can resolve these three limitations, they will present marginalised communities as more empowered and dignified.

Thus, when the SanVision Foundation invited ZoneLearning@UWC to do film training in Paltfontein in the Northern Cape in November 2022, it was decided to pilot the community workshop programme

amongst the San community in Platfontein. In March 2023, Zone-Learning@UWC conducted the first community transmedia workshop in Kimberley for the San community in Platfontein. Zone-Learning@UWC aimed to introduce sustainable storytelling mediums and help the San tell their stories from their vantage point—a vantage point in which they are empowered subjects (Fig. 4).

Since Platfontein did not have the facilities to conduct conferencing and media training, the training took place in Kimberley. Participants were transported from Platfontein to Kimberley daily. The workshop also focused on problem-solving and was divided into two phases: the theoretical component and the practical component. It followed the same methodology as the transmedia course. It focused on the six key themes: transmedia storytelling, new media, ethics and legal considerations, digital marketing, content production, and monetisation and distribution. During this phase, students were asked to identify some of the stories in their community that changed the narrative about San people and Platfontein in general.

Once the theoretical component was completed, practical training was introduced. An interactive training component commenced where students were shown how to use the camera and sound equipment to



Fig. 4 Some of Platfontein participants

bring their stories to life. With their stories of empowerment as their bedrock, students were tasked with making their short films. Their stories were filmed in Platfontein and their native languages: !Xûn and Kwedam. The ZoneLearning@UWC merely observed the process and provided some technical advice when asked. At the end of the training, students each received a certificate of participation in recognition of their ability to tell complex stories with basic film equipment.

ZoneLearning@UWC decided to keep the film in the !Xûn and Kwedam languages. These languages are threatened, and it was the University's way of drawing attention to them. Hence, to make the film accessible to a broader audience, ZoneLearning@UWC asked members of the San Vision Foundation to translate the film into English. The film was launched in November 2023, and the first screening took place at the Desmond & Leah Tutu Legacy Foundation. One of the producers attended the screening, which was a milestone for her. She mentioned that the San people were often film subjects, and they rarely are recognised as producers. In addition, the film was also screened at the Mbawula Youth Film Festival in Kimberley in 2023 and the UBUNTU Festival in Cape Town in 2024.

6 Conclusion

Developing countries like South Africa need innovative approaches to keep up with global developmental trends in a rapidly changing world. As a developing country, South Africa also has to deal with the legacies of colonialism and apartheid. Colonialism and apartheid created a bifurcated society where class is racialised, creating a world in which Black, Coloured, and Indian South Africans are battling extreme levels of poverty and wealth inequality. The legacy of a racialised education system created a South African society in which white learners and students were early exposed to information technology, creating "digital apartheid." This digital apartheid created a digital divide between urban and rural populations. South Africa has yet to bridge the digital gap in a world increasingly reliant on the Fourth Industrial Revolution. This inability to bridge the gap again leaves South Africa behind the rest of the world.

ZoneLearning@UWC was created to equip students with entrepreneurial skills and develop socially responsive graduates. Socially responsive graduates with entrepreneurial training will drive entrepreneurial activities in their communities. Unique to this project is ZoneLearning@UWC's drive towards an inclusive model for education. At UWC, an inclusive education model involves tackling problems relating to poverty, gender-based violence, and climate change. This also means that education must be tailor-made to address the problems of any community. The Green Incubator and the New Media and Transmedia Clinic use innovative pedagogies for entrepreneurship education to address the problems some communities are experiencing.

From the cases presented here, it is clear that communities are empowered to solve many of their problems if a university makes education a shared activity. For example, the Green Incubator shows that with an education based on "problem-posing," students can develop innovative entrepreneurial solutions to fix these problems. The Green Incubator has also shown that a community is considered an equal and valuable partner in tackling its problems. Communities can design a developmental intervention, with the help of experts, that is aligned with its strengths. The New Media and Transmedia Clinic showed that matriculants who were not accepted into university are as competent as any other university student. They can solve problems at the university level and create films that could be screened at film festivals. Therefore, it is important for universities to solve problems with communities and not for the communities. Solving problems with communities recognises that problem-solving is educational and mutually beneficial for both.

References

- Barnard-Ashton, P., Adams, F., Rothberg, A., & McInerney, P. (2018). Digital apartheid and the effect of mobile technology during rural fieldwork. *South African Journal of Occupational Therapy*, 48(2), 20–25.
- Cloete, J. (2013). *Public participation, political representation and accountability: The case of violence prevention through urban upgrading (VPUU) in Harare*

- Khayelitsha, in Cape Town* (Master's Dissertation). University of the Western Cape.
- Cloete, J. (2023). *The attempted erasure of the Khoekhoe and San*. African Sun Media.
- Freire, P. (2005). *The pedagogy of the oppressed* (30th Anniversary Edition). Translated by Myra Bergman Ramos with an Introduction by Donaldo Macedo. The Continuum International Publishing Group Inc.
- Gerwel, J. (1987, June 5). *Inaugural address*. University of the Western Cape.
- Gewalf, J.B., Spierenburg, M., & Wels, H. (2019). *Nature conservation in Southern Africa. Morality and marginality: Towards sentient conservation?* Koninklijke Brill.
- Khuluvhe, M., & Ganyaupfu, E. M. (2022). *Highest level of educational attainment in South Africa*. Department of Higher Education and Training, Pretoria.
- Magubane, B. (2001, September). Social construction of race and citizenship in South Africa. In *United Nations Research Institute for Social Development (UNRISD) Conference on Racism and Public Policy, September, Durban, South Africa*.
- Mamdani, M. (1996). *Citizen and subject: Contemporary Africa and the legacy of late colonialism*. Fountain Publishers.
- Mbeki, M. (2009). *Architects of poverty: Why African capitalism needs changing*. Picador.
- Mkuzo, L., & Govender, I. (2024). The quest for social justice through ICT access and inclusion for rural schools and communities: The South African case of Urglobal. *African Journal of Science Technology Innovation and Development*, 1–13. <https://doi.org/10.1080/20421338.2024.2416576>
- Philbeck, T., & Davis, N. (2018). The fourth industrial revolution. *Journal of International Affairs*, 72(1), 17–22.
- Poba-Nzaou, P., Galani, M., Uwizeyemungu, S., & Ceric, A. (2021). The impacts of artificial intelligence (AI) on jobs: An industry perspective. *Strategic HR Review*, 20(2), 60–65.
- Robison, A. J., Clinton, K., Weigel, M., Purushotma, R., & Jenkins, H. (2009). *Confronting the challenges of participatory culture: Media education for the 21st century* (The John D. and Catherine T. MacArthur Foundation Reports on Digital Media and Learning).
- Toronto Metropolitan University. (2025, March 21). *Zone learning*. <https://www.torontomu.ca/zone-learning/>

- Tscharntke, T., Grass, I., Wanger, T. C., Westphal, C., & Batáry, P. (2021). Beyond organic farming—harnessing biodiversity-friendly landscapes. *Trends in Ecology & Evolution*, 36(10), 919–930. <https://doi.org/10.1016/j.tree.2021.06.010>
- Uithaler, E. (2021). Historiese vertelling. In V. Lawack (Ed.), *Stemme van Clarkson: ryke en kleurvolle stories, sketse en ervarings vanuit Clarkson*. African Sun Media.
- United Nations (UN). (1972). *Report of the United Nations Conference on the Human Environment*. United Nations.
- World Economic Forum. (2018). *The future of jobs report 2018*. Switzerland. <https://www.weforum.org/publications/series/>
- World Economic Forum. (2020). *The future of jobs report 2020*. Switzerland. <https://www.weforum.org/publications/series/>
- WWF. (2022). *Living Planet Report 2022—Building a nature positive society*. R. E. A. Almond, M. Grooten, D. Juffe Bignoli & T. Petersen (Eds.). WWF, Gland, Switzerland.
- Xu, M., David, J. M., & Kim, S. H. (2018). The fourth industrial revolution: Opportunities and challenges. *International Journal of Financial Research*, 9(2), 90–95.

Documentary Film

- Lawack, V. (Producer) & Cloete, J. (Director). (2023). *Stemme van Clarkson* [Video]. YouTube. <https://www.youtube.com/watch?v=HeCAucBlri8>

Courses

- Cloete, J., & Mokwena, L. (2022). *Transmedia for the creative economy* [Course]. University of the Western Cape.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits any noncommercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if you modified the licensed material. You do not have permission under this license to share adapted material derived from this chapter or parts of it.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.



Part II

Innovative Pedagogies in Entrepreneurship Education



8

The Structured MEM: A Model for Innovative Engineering Entrepreneurship Education

Taryn Bond-Barnard

1 Introduction

This case study presents an innovative approach to postgraduate education through the structured Masters in Engineering Management (SUMEM) programme at Stellenbosch University. The programme is designed as a hybrid online learning experience, combining synchronous and asynchronous teaching to create a flexible and modern learning environment. The programme is designed for early to mid-career engineers and scientists who want to pursue their postgraduate studies while they work, no matter their location in the world.

A key feature of the programme is its strong emphasis on entrepreneurship, particularly in the Technological Entrepreneurship module. In this module, students are guided through the entrepreneurial journey using an innovation-driven problem-solving approach based on

T. Bond-Barnard (✉)

Department of Industrial Engineering, Stellenbosch University, Stellenbosch, South Africa

e-mail: tarynbarnard@sun.ac.za

Cope's (2005) Entrepreneurial Learning Theory. They are also required to pitch their own technology-based startup or corporate venture business model idea to actual venture capitalists.

This case study examines the mandate of the MEM programme, the sustainability challenges it seeks to address, and the criteria used to select applicants. It also explores the programme's strategies for promoting diversity and inclusion, the institutional support provided, and its connections to broader entrepreneurship initiatives within Stellenbosch University. Additionally, it delves into the programme's ecosystem, its performance to date, the challenges encountered, and the plans for future enhancements.

While the MEM programme has a strong international presence, it remains deeply anchored in South Africa, where Stellenbosch University plays a pivotal role in fostering entrepreneurship and innovation within the local higher education and business landscape.

2 The Mandate of the Programme

The structured Master's degree in Engineering Management (MEM) Programme at Stellenbosch University is a newly established degree, with its first intake in 2022. Now in its fourth year, the programme's growing applications and enrolments reflect its popularity and success in preparing innovative, future-focused leaders to tackle the world's complex sociotechnical challenges.

In 2021, before the programme's launch, an initial enrolment of 30 students was anticipated for 2022. However, the team was pleasantly surprised when 84 students began their MEM studies that year, followed by 105 and 120 students in 2023 and 2024 respectively. Interest and applications for 2025 continue to be strong.

We propose that this new MEM degree not only prepares early to mid-career engineers (and scientists) to be better engineers—specifically by emphasising entrepreneurial and related thinking and practice throughout the programme, but that the degree itself can be viewed as an entrepreneurial venture.

The structured master's degree in engineering management is a post-graduate qualification on NQF Level 9, with a weight of 180 credits. It requires students to complete eight academic modules (15 credits each) as well as a Research Assignment (60 credits). The degree is aimed primarily at early to mid-career engineers and scientists. They are all working professionals and pursue the MEM as part-time students. As such, they enrol for 2 modules per semester (with two semesters/year) for the first two years (60 credits/year) and the Research Assignment in the third year.

The entire academic content of the MEM is delivered in a hybrid online mode, and students are not required to attend or participate in academic activities in person on the University campus or any other physical site. The "hybrid" element implies that students engage with some of the content in a synchronous mode and some of it in an asynchronous mode. The synchronous "real-time" elements include scheduled live webinars on Saturdays, discussions with group members, ad hoc individual/small group discussions with lecturers, individual discussions with research supervisors and weekly virtual admin hour with the programme coordinators should the student be experiencing any academic or administrative challenges. Asynchronous activities are academic tasks that students complete independently, including watching weekly lectures, completing readings, writing lecture reflections, and working on individual assignments.

The MEM degree's learning philosophy embodies several principles which map onto the specific characteristics of the degree, viz.

- It is a postgraduate master's degree on NQF Level 9.
- It is delivered in a hybrid online mode. No physical attendance is required for any academic activities.
- Students are all employed full-time and study part-time.
- The target cohort is early to mid-career engineers and scientists, mindful that many more mature engineers and scientists also enrol and benefit from the programme. Students come from diverse backgrounds, which include all engineering disciplines and many science-related fields (including metallurgy, the built environment, food science, and physics, for example).

- Students hail from and/or are based in countries across the globe, as are the universities and academic institutions where they obtained their qualifications.
- Prior to enrolling for the MEM, the demographics of our 2022 and 2023 student cohort indicated that our students are based in/come from South Africa, Botswana, Namibia, Zimbabwe, Tanzania, Cameroon, eSwatini, Malawi, Mauritius, Lesotho, Rwanda, New Zealand, Australia, Saudi Arabia, United Arab Emirates, Ireland, UK, France, Netherlands, Germany, Austria, Switzerland, the United States, and Canada.
- The major objective of the MEM is to prepare early to mid-career engineers to excel at the “job of the engineer”, i.e. make them better engineers. It is important to understand that the “job of the engineer” in the real world of work entails much more than what is covered in an undergraduate engineering or science degree, as explained below. By its nature, the MEM is hence industry-focused to serve the graduate throughout his/her career.

2.1 The Target Cohort: Early to Mid-Career Engineers and Scientists

During their undergraduate years, engineering (and science) students spend the bulk of their time and effort studying material which is in essence governed by the (ordered) Laws of Nature (the “beautiful things in life”). These include physical and mathematical sciences, as well as basic and advanced engineering. In the process, they also develop an “engineering mindset”, which influences the way in which they approach problem-solving and decision-making as well as what is “the truth” and how it is proved.

The “job of the engineer” however, requires the engineer to possess and apply a multitude of other (types of) knowledge and skills as well, many of which are not governed by the Laws of Nature, but are instead subject to the Laws of Man. These knowledge and skills are governed by social norms, organisational cultures, legal statutes, professional charters and conventions, whims du jour and such. The job-of-the-engineer

inherently requires the “management” of things, including projects, budgets, technology and innovation, facilities, strategy, clients, suppliers and other stakeholders (in essence professional relationships) and of course, people—to name but a few. Moreover, a future-focused engineering leader is required to be entrepreneurial in his/her approach to managing the interaction between humans and technology embedded in the various sociotechnical systems that characterise the modern job-of-the-engineer and organisation. The integration of both technical (engineering, technology management) and social (teamwork, leadership) aspects of professional work is indicative of sociotechnical systems theory (Trist, 1981).

The objective of the MEM programme is to develop well-rounded engineers by equipping them with a broad set of knowledge, skills, and techniques essential for performing engineering roles—particularly those involving management responsibilities. Unlike a traditional undergraduate engineering degree, which primarily focuses on technical expertise, the MEM programme addresses key aspects of engineering management that are often overlooked at the undergraduate level. In this way, the MEM serves as a specialised alternative to an MBA, which is primarily designed to develop general management professionals.

2.2 The Nature of the MEM (Vis-À-Vis the Undergraduate Engineering Degree)

The “world of the MEM” differs in many respects substantially from the “world of the undergraduate engineering degree”, just as the real job-of-the-engineer differs substantially from the “textbook” applications of what was learnt during the undergraduate degree. The nature of material, knowledge, and skills to be mastered is “something completely different”, as is the nature and presentation of the lectures, the self-study components, the group work, and particularly also the expectations of performance.

MEM students are initially taken aback and bewildered by the amount of reading that is required, and they take some time to master and benefit from skim reading and related techniques. They need to explain

in succinct and coherent language why they argue the way they do. This needs to be underpinned by stated assumptions and sanitised of cognitive biases. This requirement differs substantially from their embedded practice of expressing thoughts and results in familiar mathematical expressions. The latter is a finely honed skill cultivated during the “undergraduate years”. The work is generally much more qualitative than quantitative and requires much more argued reasoning and critical thinking, rather than solving mathematical equations.

The MEM degree is designed to prepare the student for the real world of work, and hence the learning experiences simulate many real-world situations. Problems are presented in an unstructured manner, where all the information required to solve the problem is not necessarily provided (sometimes with unnecessary and conflicting information just to confuse the issue even more). Students work in groups with people they have never met before, typically from very different backgrounds, based in different parts of the world and with very different work and study experiences, approaches and habits. The MEM degree aims to not only prepare and equip the student for his/her current “job-to-be-done”, but also to lay the foundation and inculcate valuable principles that will serve the student well in the future. In addition to exposing the student to academic content packaged in a work-relevant format, the MEM degree aims to equip the student for a career that will span a professional lifetime.

2.3 An Entrepreneurial Focus

By its very nature the “job of the engineer” is underpinned by entrepreneurial principles, in the sense that “something new must be created” (or continuously improved) and delivering this in/to a market for adoption, that is typically resource constrained. This resonates with the MEM’s working description of innovation, i.e.

$$\text{Innovation} = (\text{Invention component} + \text{Market adoption component}) \\ \times \text{Organisational fit}$$

In all the modules of the MEM this principle and variations on the theme are emphasised in one way or another. For example:

- The innovation principle referred to above is explored in detail in the Innovation Management module, where it is emphasised that innovation is not only about the new product/technology but also about discovering and addressing market needs. The emphasis on innovation and technology commercialisation aligns with Innovation Diffusion Theory (IDT) which explains how new ideas spread within industries (Rogers, 2003). Moreover, the discussion on disruptive innovation in the module explains how startup companies can use emerging technologies with new business models to create viable new products and markets that will eventually displace/disrupt mature technologies and companies.
- A new module entitled “Technological Entrepreneurship” was developed for the MEM, specifically for students who are keen to establish technology-based companies or new entrepreneurial ventures in existing organisations. The module draws on the latest research and best practices regarding technological entrepreneurship. As the semester progresses, the students are guided through all aspects of the entrepreneurial journey. Harvard Business Publishing cases are used to engage with and learn from real-world examples. Students are also required to complete a Clifton Strengths Finder assessment at the start of the module, so that they can learn more about their own entrepreneurial strengths and inclinations. In their final assignment, students present a case for a new venture, which is adjudicated by a panel of real venture capitalists.

3 What Sustainability Problem (s) Is This Initiative Trying to Address?

The MEM programme is designed to align with several Sustainable Development Goals (SDGs). Its flexible and inclusive format promotes SDG 4: Quality Education by ensuring students have equal access to affordable and high-quality tertiary education.

Moreover, the programme’s emphasis on developing entrepreneurial and management skills in engineers and scientists supports SDG 8:

Decent Work and Economic Growth by influencing economic growth through diversification, technological advancements and innovation. The most credit heavy module in the programme—a 60-credit research project—strengthens SDG 9: Industry, Innovation and Infrastructure by increasing and improving scientific research and enhancing the technological capabilities of South Africa's industrial sector.

In addition, sustainable engineering practices are integrated in many of the technical modules, often being reinforced through guest lectures by industry experts. This approach not only contextualises responsible engineering management for the students, but it facilitates collaboration between academia and industry, an important factor for advancing SDG 17: Partnerships for the Goals.

The MEM's sustainability challenges fall primarily into the following categories:

- One of the main goals of the MEM programme is to ensure that early to mid-career engineers and scientists acquire professional skills that will benefit them throughout their careers. Continuous lifelong learning is also a central tenant of the programme. The reason for this is that based on the Human Capital Theory, acquiring important information and skills through higher education improves a person's productivity and career prospects (Rospigliosi et al., 2014). The MEM programme increases students' long-term employability and economic impact by giving them advanced engineering management skills that help them adjust to changing industry demands.
- Furthermore, the curriculum is in line with Signalling Theory, which acknowledges that a postgraduate degree communicates to employers a person's competence, ambition, and dedication (Rospigliosi et al., 2014). This signal is strengthened by the MEM's organised learning and research components, which show that graduates have the leadership skills and technical know-how needed for positions at a higher level. In addition to improving individual career paths, this helps the industry by developing a workforce capable of spearheading innovation and strategic decision-making.
- An introductory module guides the students to develop a Personal Learning Strategy, not only for their MEM studies but to serve

them throughout their careers (as well as a Personal Decision-Making Strategy and an Engineering Management (EM) “Toolbox” which needs to be continuously replenished). This focus on personal learning strategies and career-long knowledge acquisition aligns with lifelong learning theories (Mezirow, 1991).

- Sensitising early to mid-career engineers and scientists to the importance of sustainable engineering practices, including the ethical aspects; and encouraging them to promote sustainability in their professional practice.
- The MEM programme itself contributes in a minor way by operating in a paperless manner and requiring no travel. All study materials (including textbooks) and submitted assignments are submitted (and marked) electronically.

4 The Criteria Used to Screen Applicants for Participation in the Programme

As is the case with masters degrees offered on an NQF Level 9, applicants require an NQF Level 8 qualification, such as a BEng or a BSc (Hons) degree in any discipline or a B.Eng.Tech (Hons) degree from a South African university of technology (or the international equivalents) or a suitable PGDip. Mindful of the engineering nature of the programme, students need to have an engineering or science-related undergraduate background.

To maximise students’ learning experience, it is also necessary for them to have sufficient work experience before enrolling/while enrolled for the MEM. Ideally, students are employed full-time. The programme is hence offered on a part-time basis only, and the schedule is specifically designed to accommodate busy working professionals.

Prospective students are required to demonstrate why and how they will benefit from this programme in the short and longer term, as well as their commitment towards their studies. It is explained to them that the programme will make significant demands on their time (mindful

of already full schedules) and effort and will require resilience and “sacrifice”—but that the rewards will be significant as well, not only in the short term but as an investment in their careers. The student needs to persuade us as to his/her drive to achieve, commitment, determination to succeed, and ambition to “shape the future”. In addition to a letter of intent and commitment from the student, a letter of support from the student’s employer is recommended.

5 Strategies to Encourage the Inclusion of Diverse Candidates

The programme not only encourages diversity of candidates but actively emphasises diversity as one of its strengths. At present SU MEM students represent a wide range of engineering disciplines as well as science-related fields (including architecture, quantity surveying, metallurgy, food science, and physics). Candidates from all over the world are encouraged to apply for the programme. As indicated above, during the first two years (2022, 2023), the degree has enrolled students who hail from/are based in South Africa, Botswana, Namibia, Zimbabwe, Tanzania, Cameroon, eSwatini, Malawi, Mauritius, Lesotho, Rwanda, New Zealand, Australia, Saudi Arabia, United Arab Emirates, Ireland, UK, France, Netherlands, Germany, Austria, Switzerland, the United States, and Canada. They typically attain undergraduate and other qualifications in their home countries and hence represent a wide spectrum of educational institutions and backgrounds. A limited number of students with other qualifications can also be considered under the University’s Recognition of Prior Learning (RPL) regulations.

6 The Support Provided by the Institution

The structured MEM programme at Stellenbosch University’s Faculty of Engineering stands out for its unique approach. A key feature is its online hybrid delivery mode, providing flexibility for working professionals. More importantly, the programme is designed to equip early- to

mid-career engineers and scientists with the skills to take on the full scope of engineering responsibilities. Emphasising lifelong learning as a career objective, the MEM aims to prepare graduates to actively contribute to shaping a better future.

The University, and particularly the leadership at the institutional, faculty, and departmental levels, has been very supportive of the MEM and its educational thrust. High-level support and active encouragement from the University's leadership is crucially important for new ventures, particularly those that are entrepreneurial and innovative, i.e. those programmes that address new markets with new product offerings underpinned by new business models. It is common cause that initiatives which are not "business as usual" and challenge mainstream procedures, processes and "admin" (which is notorious in any university) trigger a corporate immune response. To overcome these "challenges" and move forward, timely (and assertive) interventions from very senior managers and leaders are often required.

The first intake of students was in the 2021 academic year. As was expected and anticipated, many "challenges" started presenting themselves, mainly symptomatic of the different requirements of residential students vis-à-vis part-time postgraduate students based across the globe with a bespoke academic schedule and with intense online requirements. The University cooperated to resolve these as they appeared, but the inevitable "interim periods of frustration" were definitely "learning experiences".

During the COVID-19 pandemic, many universities had to convert and deliver curricula that were designed for in-person delivery into online delivery modes overnight. This presented students, lecturers, administrators, and particularly the technology infrastructure in universities with immense challenges. Mindful that the MEM is a new degree, the curriculum was designed from the outset for a hybrid online delivery mode (only), rather than "converting a curriculum designed for in-person delivery to an online mode".

Many lessons were learnt during this period, which were incorporated into the design of the SU MEM. The nature of the academic content, student learning, and interaction as well as assessment were designed from the onset to be aligned with the hybrid online mode, particularly

for students who work full-time and study part-time. The University made a grant available, with the specific purpose of supporting the development of academic material for the hybrid online delivery mode. This included helpful support from the University's dedicated Hybrid Learning Team.

It was evident, however, that the programme would require dedicated resources specifically to support the online delivery mode. Funding was made available to appoint such specialists. Mindful that the students are based across the globe and mainly interact with the lecturers, other students and "the University" in an online mode, the programme also benefitted tremendously by having a dedicated, "student- friendly" administrator who became their "one-stop" interface for application and general "hassle resolution". This has proven to be a "game changer" with regard to the success of the programme and the high quality of student experience.

In summary, it is important to highlight the fact that the University, on the organisational, faculty, and departmental levels, recognised the significant potential impact of the MEM programme and supported its development and delivery from the onset. In many respects, the programme is pioneering in terms of its focus and objectives, but also regarding how its delivery model is enabling students across the world to access this type of programme—something which they are quick to tell us would not have been available to them otherwise. The University is very aware of this aspect of the MEM and the way it is opening new and diverse educational markets and is ensuring that the lessons learnt from the MEM experience can also benefit other programmes in the University. Moreover, the SU MEM also benefits from strong industry support, particularly with regard to guest lectures and supervisors for research projects.

7 Links to Other Entrepreneurship Activities Within the Institution

Stellenbosch University values and encourages the notion of entrepreneurship across the institution. The Faculty of Engineering, in particular, not only lends itself to this but is actively promoting entrepreneurship, *inter alia* through the MEM and its related activities.

The academic material developed for the MEM is selectively used in other postgraduate programmes as well, notably the modules “Advanced Topics in Engineering Management” and “Industrial Management”, which are offered to postgraduate students enrolled for other master’s degrees in the Faculty. Patent lawyers have been invited as guest lecturers, to encourage entrepreneurship. Students are also exposed to the University’s technology incubator, the Launch Lab, to further encourage their entrepreneurial aspirations.

8 A Description of the Ecosystem of the Initiative

The MEM programme is not envisioned, nor marketed or offered as a “one-off, isolated degree”. Instead, it is designed as an early to mid-career educational intervention from which the student will gain direct benefit not only in the short term but throughout his/her career. The learning experience is embedded in an ecosystem with a multitude of actors, all of which contribute to the enhancement of the student’s career.

MEM students are employed full-time and study part-time. As such, their employers are viewed as important role players. A specific effort is made to explain the nature and benefits of the MEM to employers and how an engineer/scientist with an SU MEM degree can contribute further to his/her employer. Employers are urged to not only encourage their employees to enrol for the MEM, but also to make time available for their studies and ideally also provide financial assistance. Students are encouraged to include a letter of support from their employer in

their application, which also serves to formally engage the employer as an “academic partner”.

Many of the students’ assignments focus on applications in their work environment. Several students have commented that they have “already” applied the knowledge and/or techniques learnt during a module, often before the module has even finished.

Invariably this is recognised and appreciated by the employer. Students are also encouraged to select the topic of their Research Assignment (which counts for 60 of the 180 credits) to address a problem that is of interest to the employer.

The MEM website has a special section addressed to employers and the Academic Leads offer to discuss the programme with employers. A number have done so, and many have become keen supporters who have sponsored several students on the programme.

In addition to employers, the MEM Programme coordinator and lecturers regularly engage with the broader “industry” in several ways. This includes advice and inputs on the curriculum, as guest lecturers for entire modules or specialist lectures, supervisors for students’ Research Assignments as well as external moderators. Invariably they become enthusiastic supporters and ambassadors of the SU MEM. Industry is invited to in-person MEM social functions, where these industry representatives engage with their own employees but also with other students. As “industry experts”, their professional views and guidance are highly valued.

MEM students recognise the importance of professional networks and benefit from engaging with peers from a range of engineering, science-related disciplines, and international backgrounds. The diversity of perspectives within the programme contributes to a broader professional network, which many graduates find valuable in their careers.

A special effort is hence made to build the MEM network, where students are encouraged to build professional relationships with their fellow students and cultivate these throughout their careers. A dedicated “MyMEM” website was created so that students can share their details, interests, current place of employment, and related information—with their cohort as well as other MEM cohorts. This has evolved in “work exchange” where details of job opportunities are shared. Many bonds are

formed during the group assignments in the modules. The membership of the groups is changed every semester to ensure that students get to meet and know as many of their fellow students as possible.

9 The Performance of the Programmes So Far, Including Any Ratings by Participants

The exciting new MEM programme was designed to develop well-rounded science, technology, engineering, and mathematics (STEM) innovators and entrepreneurs. It is estimated that in the next 10 years, 70% of global value creation will be derived from digital business models (World Economic Forum, 2022). Future leaders must have a solid foundation in STEM and have the necessary leadership qualities to promote innovation, sustainability and entrepreneurship in a rapidly changing world (Ibrahim et al., 2023; Raupp, 2020). This is the focus and outcome of SU's MEM programme. It is achieved by focused, student-led, industry-aligned learning that students undertake in the core modules of Technology Management, Innovation Management, Project Management, Advanced Strategy Management, and Advanced Engineering Management. Student competencies are then sharpened in the electives Emerging Topics in Engineering and Technological Entrepreneurship to guarantee well-rounded STEM leaders. The latter two modules were specifically developed for this degree because of market demand. Entrenched in all the modules is a strong focus on student-led lifelong learning, unstructured problem-solving and "real-world" application. The structure of the programme, modules, and its hybrid online delivery mode encourage students to develop leadership traits, such as adaptability, teamwork, and communication which are essential in the modern world of work.

The first MEM students are expected to graduate early in 2023, having completed the 8 modules and Research Assignment by the end of 2023. As interim measures of success, we are encouraged by two metrics:

- The number of expressions of interest (including their global distribution and diversity) as well as the actual applications and enrolments. The numbers for the first SU MEM intake year (2022) were exceptional—we budgeted for 30 enrolments but 84 were realised. In year 2 (2023), we enrolled 104 students. Interest for year 3 (2024) is very encouraging with over 148 applications to date.
- MEM students actively provide feedback, offering both suggestions for improvement and insights into the programme's impact. Notably, a significant number of new applications and enrolments come through word-of-mouth referrals from current students, highlighting their positive experiences. As a result, students serve as the programme's most valuable ambassadors.

All the modules require students to explain “what they have learnt”, and it is in this context that we gain insight into the real impact of the degree. Based on the students' comments, it is evident that the various modules are not only addressing their immediate knowledge and skills requirements for current work-related challenges but that the programme is also preparing them for their future career paths and professional goals. We can see an opening of minds, shift in mindsets, and a broadening of horizons. They are developing an appreciation for continuous life-long learning and are implementing Personal Learning Strategies in their day-to-day lives.

MEM students develop and apply critical thinking skills and decision-making strategies, viewing them as essential tools in their “Engineering Management Toolbox”—a skillset they continue to refine throughout their careers. Many students describe the programme as a transformative experience, influencing both their professional and personal growth. They report gaining not only technical expertise but also a broader perspective, helping them become more well-rounded professionals. The programme aims to equip graduates with the skills and mindset to actively contribute to shaping a better future.

10 Extracts of Student Ratings

Kiran Sewparsad (first year MEM student 2023 cohort): “Thank you for a great semester. I was adamant to use every second I had to work on these final assignments. The change in my thinking and how I handle my daily tasks has forever changed. Thank you for awaking this.”

Nkanyezi Nhlumayo (prospective MEM student): “I heard about this degree from a Masters student at Stellenbosch who recommended the programme due to the quality of the resources in the programme and it’s applicability in my career.”

Belinda (first year MEM student 2023 cohort): “Ek wil net bydra lewers en laat weet dat ek die konstante verandering en aanpassing met die MEM waardeer. Klein bietjie agtergrond van my. Ek was gemaak om ‘n chemiese ingenieur te wees maar dit beteken ook dat min dinge vir my interessanter is as dit (daaroor is my algemene kennis en “all-roundness” maar beperk)... maar soos ek ervaring opgebou het en in meer leierskaprolle beweeg het, het dit vir my al hoe meer interessant geword om my span tot hul beste te kan gebruik. Om die MEM te kan doen is so n groot voorreg. “Lever of Riches” was n goeie voorstel vir n pre-module opdrag. Soos genoem, dis nie n page turner nie en bevat baie inligting per bladsy maar sjoe, om die geskiedenis van tegnologie saam met die verskillende mikro en makro impakte te kon sien, probeer te verstaan en saam te bespiegel is so interessant. Ons bly die laaste twee jaar in Nederland en om die geskiedenis van die dorpe soos Nuremburg (waaroor ons mal oor was) of Karlsruhe te kon lees maak dit net meer ongelooflik. Deur die MEM kry ek waardeering en belangrikheid vir meer as chemiese ingenieurswese, maar ook verbreëing in chemiese ingenieurswese. Dit bied my die geleentheid om gaps te kan identifiseer en aan te spreek in my maatskappy. Om n kursus te kan doen waar soveel klem op selfverbetering en ontwikkeling geplaas word, is bewonderenswaardig. En vir dit wil ek net baie dankie sê.”

11 The Challenges That Were Encountered

The MEM programme aims to address the gap between an engineer and scientist's undergraduate education with the real "job of the engineer" in industry, which requires them to manage and lead. The programme focuses on developing the student's ability to identify, understand, and solve complex, unstructured, multi-disciplinary problems. The programme caters to the needs of young working professionals to pursue their postgraduate studies at any time and place in the world. The programme focuses on early to mid-career engineering and science graduates who would like to develop themselves further without breaking the bank or it negatively affecting their job performance. Trends in engineering management education are utilised in the design of this contemporary MEM programme that produces "better engineers".

The first cohort of students enrolled in the 2021 academic year. As anticipated, various challenges emerged, primarily stemming from the differing needs of residential students and part-time postgraduate students spread across the globe. Managing a tailored academic schedule with intensive online requirements required ongoing adjustments. The University worked to address these issues as they arose, though the process involved inevitable periods of frustration, which also served as valuable learning experiences.

The University made a grant available, with the specific purpose of supporting the development of academic material for the hybrid online delivery mode. This included helpful support from the University's dedicated Hybrid Learning Team. It was evident, however, that the programme would require dedicated resources specifically to support the online delivery mode. Funding was allocated to appoint specialists to support the programme. Given that students are based worldwide and primarily engage with lecturers, peers, and the university online, the addition of a dedicated student administrator and academic programme coordinator has been particularly beneficial. Serving as a central point of contact, they assist prospective and enrolled students with applications, academic matters, and other administrative challenges. This streamlined support system has significantly contributed to the programme's efficiency and the overall student experience.

12 Plans to Further Improve the Initiative

Having had two very successful intakes in 2022 and 2023, and with applications and expressions of interest for 2024 and 2025 being exceptionally encouraging, the MEM programme is off to a great start. The University is committed to and enthusiastic about continuing and expanding the programme.

The plan is to add more permanent academic staff members as well as part-time industry experts who contribute to teaching and supervision of the Research Assignments. This also contributes to enhanced interaction with industry, which provides useful advice and guidance to the MEM Programme team and encourages students to enrol.

The notion of “continuous improvement” is a key pillar of innovation management and is emphasised throughout the programme—and we are keen to practice what we preach. Feedback from students regarding the academic content, industry relevance as well as the delivery mode is solicited continuously through weekly virtual admin hours and monthly webinars; subsequent improvements are implemented as soon as practically possible.

In response to student interest, a new elective, Emerging Topics in Engineering, was introduced in 2023. This module explores key developments in Information and Communication Technology (ICT), particularly its role in the Fourth Industrial Revolution. Industry experts from South Africa, the United States, and Germany deliver the lectures, providing diverse global perspectives. Given the strong demand and engagement from students, additional electives may be introduced in the future.

Annexure A: Learning Objectives

This is a structured master’s degree in engineering management degree with a focus on educating innovative, future-focused leaders to solve the world’s complex sociotechnical challenges.

Learning objectives of the SU MEM based on the main module thrusts of the programme:

Introduction to Engineering Management:

- Gain insights into the national and international/global engineering management landscape and the challenges and opportunities it presents.
- Learn to rapidly find, comprehend, and apply knowledge and information in an engineering management context.
- Acquire financial skills for budgeting, forecasting, and managing resources in engineering projects and startups.
- Understand financial and business models and valuation techniques relevant to engineering ventures.
- Explore ethical considerations in engineering management and entrepreneurship.
- Understand the importance of sustainable practices in engineering and business.
- Develop a Personal Learning Strategy, a Personal Decision-Making Strategy and an “Engineering Management Toolbox”.

Technology Management:

- Learn the process of taking engineering and technology innovations from concept to market.
- Understand intellectual property rights and strategies for protecting innovations.
- Learn technology and product development processes and how to bring new engineering products to market.

Innovation Management:

- Understanding the inherent nature of innovation, specifically technological innovation underpinned by the dynamics of technological change. This includes various innovation modes, including incremental, radical, product, process, modular, and architectural innovation as well as disruptive innovation.
- The importance of the market, including diffusion and adoption characteristics.

- Development of an institutional innovation strategy.
- Cultivating innovation skills to creatively develop novel engineering solutions.
- Explore methods for fostering a culture of innovation within engineering teams and organisations.

Advanced Strategy Management:

- Develop a deep understanding of strategic planning and decision-making processes in engineering organisations.
- Apply strategic thinking to identify opportunities for innovation and entrepreneurship within the engineering industry.
- Develop a systems thinking approach.

Advanced Engineering Management:

- Develop leadership skills to effectively manage engineering teams and organisations.
- Understand team dynamics and strategies for building high-performing teams.
- Learn how to bring about and manage change in organisations.
- Personal leadership and management skills and development.

Project Management:

- Apply project management principles across the lifecycle, including scope, scheduling, budgeting, risk, and quality.
- Align project selection and planning with organisational strategy using tools like WBS, critical path, and EVM.
- Implement advanced scheduling, resource management, and portfolio-level decision-making techniques.
- Use appropriate methodologies (predictive, agile, hybrid) tailored to construction projects.
- Lead project teams effectively, manage stakeholders, and communicate across diverse, virtual environments.

Technological Entrepreneurship:

- By gaining a better understanding of one's entrepreneurial inclinations based on a personal Clifton Strengths Finder assessment, fostering an entrepreneurial mindset that encourages risk-taking and the pursuit of new opportunities.
- Develop the ability to identify and evaluate business opportunities within the engineering and technology field.
- Understand the value of partnerships and alliances in the engineering and entrepreneurial ecosystem.
- Create a comprehensive business plan for an engineering-based or technology-based venture.
- Learn how to pitch engineering and technology ideas and projects to investors, customers, and partners.

Emerging Technologies in Engineering:

- Staying up to date on current and emerging technologies shaping the engineering management field.
- Evaluate the potential impact of new technologies on innovation and entrepreneurship in an engineering management context.

Research Assignment:

- Use a research-based approach to apply the knowledge and skills acquired throughout the programme to identify, investigate, and solve a complex engineering management issue.
- Hone written and verbal communication and presentation skills to effectively discuss and convey complex technical information to various stakeholders.

References

- Cope, J. (2005). Toward a dynamic learning perspective of entrepreneurship. *Entrepreneurship Theory and Practice*, 373–397.
- Ibrahim, H. R., Alghfeli, A. H., Alnuaimi, F. S., Alshamsi, N. N., & Alkaabi, A. M. (2023). STEM and leadership in the future: A path to innovation, sustainability, and entrepreneurship. In *Restructuring leadership for school improvement and reform* (pp. 420–439). IGI Global.
- Mezirow, J. (1991). *Transformative dimensions of adult learning*. Jossey-Bass.
- Raupp, A. B., & Forbes Technology Council. (2020). *Entrepreneurship key to future success in STEM*. <https://www.forbes.com/councils/forbestechcouncil/2020/08/25/entrepreneurship-key-to-future-success-in-stem/>
- Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press.
- Rospigliosi, P. A. G. S., Bourner, T., & Sheehan, M. (2014). Human capital or signalling, unpacking the graduate premium. *International Journal of Social Economics*, 41(5), 420–432.
- Trist, E. L. (1981). *The evolution of socio-technical systems* (Vol. 2). Ontario Quality of Working Life Centre.
- World Economic Forum. (2022). *The digital economy | strategic alliance*. <https://intelligence.weforum.org/topics/a1Gb0000001SH21EAG>

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits any noncommercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if you modified the licensed material. You do not have permission under this license to share adapted material derived from this chapter or parts of it.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.





9

Nurturing Entrepreneurial Minds: Exploring Innovative Pedagogies in South African Hospitality Education

N. C. Seabi 

1 Mandate of the Program/Module or Initiative, Including the Targeted Young Entrepreneurs

This case study is based on an intervention that is embedded in an honors-level module, food service management systems. This module aims to equip students with the knowledge, attitudes, and skills needed to use management systems in the hospitality industry to boost revenue, fostering problem-solving and creativity in their application. This initiative seeks to address the lack of entrepreneurial skills in South African graduates and boost their confidence in succeeding in entrepreneurship (Jengeta, 2020). The module is offered to B. Consumer Science (Hons) Extension and Rural Development, and B. Consumer Science (Hons) Hospitality and Tourism students, where 13 students participated in a pilot project. In this project, participants were asked to develop and

N. C. Seabi (✉)

University of Zululand, Richards Bay, South Africa

e-mail: SeabiN@unizulu.ac.za

operate an entrepreneurship food service related (a coffee shop) that could operate within the University community. It offered training on the various steps required to start a business, including idea development, business plan creation, and pitching to investors. This is crucial for providing practical-on experience in entrepreneurship skills training. The program aim was not just learning theory but experiential practice and application to cultivate an entrepreneurial mindset rather than utilizing traditional classroom pedagogic methods that cannot create behavioral change (DeCoito & Briona, 2023). This is consistent with the need for alternative forms of instruction in addition to intellectual knowledge to develop critical entrepreneurial skills (e.g., resilience, problem-solving, and creativity) in an uncertain competitive environment.

The study bridges an essential gap identified by Dzomonda and Fatoki (2019), who observed a shortage of entrepreneurship confidence among South African graduates to venture into entrepreneurship due to a lack of adequate training in entrepreneurship. Poor training serves to underscore pedagogic innovation driven by the Sustainable Development Goals (SDGs), primarily SDG 4 (Quality Education) and SDG 8 (Decent Work and Economic Growth), through the establishment of an entrepreneurial culture and inclusive economic opportunity creation (United Nations, 2015).

This program thus responds to the demands revealed in the literature from studies that have attempted to integrate entrepreneurial education at all levels of education (Lackéus, 2015; O'Brien & Hamburg, 2019). The program adopts a hybrid model of learning, comprising theoretical education and experiential and practical components. It also draws on Kolb's Experiential Learning Cycle (Kolb, 1984) in respect of learning through experience-reflective processing, hence greater awareness and application of entrepreneurial learning. It consciously and deliberately escapes the limitations of traditional class-based approaches, which have been criticized for not doing enough to transform behavior by Bates and Bates (2015) and Bruni-Bossio and Delbaere (2021). The experiential component, the subject of this study, involves organizational and managerial activity in a student-run "Food Service" campus facility, offering application of theoretical knowledge in a real-world setting concerning the complexity and challenge of actual entrepreneurship.

The teaching approach applied a mix of pedagogical practices, from formal lectures that were provided in the form of a seminar on financial literacy facilitated by Rush Accountants Company to placements. Action learning principles (Bates & Bates, 2015; Revans, 1981), communities of practice, groupwork, mentoring, and coaching and reflective individual practice were employed. The mentorship component, drawn from Emma (2020), was derived from interactions with successful entrepreneurs and experts. Assessment focused on entrepreneurial ability as a broad general category, like business plan development, pitching, market research, networking, starting the business, and ongoing upkeep of the business. This approach covers issues while targeting technical expertise and the entrepreneurial mindset, a key focus for many researchers in this field. This case study offers insights into the teaching methods used to enhance entrepreneurial skills in South African hospitality education and contributes to the ongoing discussion on reforming entrepreneurship education.

2 Sustainability Problems This Initiative Is Trying to Address

The International unemployment pandemic, especially among youth, is a longstanding issue. South Africa's unemployment rate of the working-age (15–64) population in the first quarter of 2023 was 32.9% and is said to be among the highest in the world (Stats SA, 2024). Furthermore, graduate unemployment rate was sitting at 10.6% in 2023 according to the Maluleke (2023). This shortfall reflects an inherent mismatch between the capacity supplied by training schools and the capacity demanded by the job market. Hospitality training can combat this problem primarily through innovative pedagogies that foster entrepreneurialism. This program restructures the entrepreneurial learning of the hospitality programs in South Africa to a point where the graduates are more informed and confident to venture into their businesses, and hence to economic sustainability. Entrepreneurship education has been theorized worldwide as a driver of economic development and job integration (Boldureanu et al., 2020).

In addition to that, experiential pedagogies, such as project-based learning, have also been incorporated in a bid to shape the psychomotor and interpersonal skills of the students to maintain participatory action and engage in the learning process (Evcimik & Oruc, 2023). Through the development of such competencies as entrepreneurship, risk-taking, and innovation, education systems can equip their graduates to move away from the traditional streams of employment and emerge as job-generators (Chaurasia, 2022). If the throughput rates of South African universities are excellent and yet graduate unemployment remains widespread, then the need for entrepreneurship training cannot be overstated. Experience has shown, however, that now, despite entrepreneurship training, most of the graduates lack confidence and are not able to pursue entrepreneurial opportunities (Otache, 2019). It is through this assumption that there is a need to begin changing the pedagogy of learning entrepreneurship. Pedagogy within the program is founded on social constructivist theory and is concerned with experience and social interaction as vehicles for learning (Akpomi & Kayii, 2022).

This implies that learning is socially constructed because it is acquired through co-working and shared experience. The model is highly applicable to entrepreneurial learning because it can support the construction of knowledge collaboratively through experimentation and co-working. These were recently employed by Pardo-Garcia and Barac (2020) in the same entrepreneurial learning context and showed that problem-solving skills developed through groups had significantly enhanced the innovative and adapting abilities of the students, abilities which are much more critical in the entrepreneurship scenario. Apart from this, the program further capitalizes on the entrepreneurial intentionality setting in which the three success factors in entrepreneurship have been identified as creativity, risk-taking, and proactiveness (Yoo et al., 2023).

3 The Criteria Used to Screen Applicants/ Youth Entrepreneurs for Participation in the Program

The participants in this program were intentionally selected from the group of students who took the Food Service Management Systems module during the 2023 academic year. A minimum of 13 students, all recent graduates from undergraduate programs in B. Consumer Science (Extension and Rural Development) and B. Consumer Science (Hospitality and Tourism), were enrolled in this module. However, a significant drawback of the selection criteria used in this program is the reliance on convenience sampling. According to research by Prodromou (2022), this approach can introduce considerable selection bias, which may impact the generalizability of the results.

Homogeneity of the sample, which was selected from the 2022 cohort of graduates of specific Consumer Science courses, also adds to the difficulty through limiting the representativeness of the data. Current studies have argued in support of diversity in school studies. For instance, Viberg et al. (2022) showed that homogenous samples do not capture heterogeneous students' views and experiences in schools and, hence, provide generic results. The shared educational experience and promise of the students involved in this case study may have predisposed them to some degree to certain outcomes, which are possibly not indicative of outcomes for a more heterogeneous student group.

Members also had similar pre-membership qualifications and sound food service operation skills with limited formal education in business. To address this shortcoming, the mandatory provision of entrepreneurship workshops through a FASSET-accredited financial literacy training by Rush Accountants, was also a prerequisite for this program. These interventions are consistent with recent evidence that highlights the importance of experiential learning and skills development in entrepreneurship training (Ratten & Usmanij, 2021).

4 Strategies to Encourage the Inclusion of Diverse Candidates

This program has successfully finished a pilot phase to evaluate its model prior to a broader implementation, following the principles of iterative action research. The next phase will involve students and staff from additional faculties and departments, including Business Management and Education, in various capacities. Input from professors on students' scientific proposals is crucial for enhancing the program. This initiative aims to bolster the program's credibility. By incorporating skills from Computer Science in digital product development and sustainable procurement, the program promotes interdisciplinary collaboration to tackle issues in the hospitality industry, particularly those related to SDG 17 (Partnerships for Goals).

Cultivating entrepreneurial skills necessitates staff guidance, with educators' daily involvement being key. Expanding support and networking beyond the current framework will facilitate sharing of this vision across departments such as Commerce, Administration, and Humanities and Social Sciences. A cohesive strategy can amplify impact, especially if the project aligns with SDG 10 (Reduced Inequalities) by encouraging interactions among students from varied backgrounds. Applying sustainability theories, like the triple bottom line, allows students to investigate projects related to SDG 12 (Responsible Consumption and Production). Future phases will prioritize recruiting students from minority groups to increase their involvement and enhance access to Quality Education through entrepreneurial learning.

5 The Infrastructure/Support Provided by the Institution

These include the facilities and infrastructure of the institution at the disposal of entrepreneurial program both grounded in theoretical theories and in alignment with the Sustainable Development Goals (SDGs), specifically SDG 4 (Quality Education). The University of Zululand

and other universities have recognized the importance of the development of entrepreneurial competencies to respond to the socio-economic challenges that confront the nation.

5.1 Policies

Policymaking at the institutional level is most necessary to create an entrepreneurial culture of learning. Although still to find its foothold in South Africa (Ayandibu, 2020), the University of Zululand has begun formulating a policy to spearhead entrepreneurial endeavors. Although still in the making, the policy is intended to enable the students and academics to partner on entrepreneurial initiatives without bureaucratic delays. This agrees with the proposition by Mthembu (2022), which emphasizes the role of institutional policy in promoting the commercialization of research and entrepreneurship in all spheres of education. The theoretical framework borrows from the entrepreneurial ecosystem model (Nguyen, 2020), which, *inter alia*, is oriented toward the institutional policy role in creating an enabling entrepreneurial environment. In formulating industry-academia inter-sector partnership-enabling policy, the University of Zululand has a strong investment in the international perspective on the goal of sustainable development as it has been framed in SDG 17 (Partnerships for the Goals).

5.2 Teaching and Learning Support

Mechanisms of teaching and learning support are employed by the University of Zululand in an endeavor to instill entrepreneurial dispositions. Such programs employ the concept of experiential learning, where learning is achieved effectively through practice and reflection. Projects can include competitions that foster entrepreneurial skills in students, emphasizing innovation and creativity, both of which are essential for sustainable development (Zahrani, 2022). Apart from competitions, the University also promotes mentoring and networking, the keys to entrepreneurial success.

ENACTUS is a student-driven organization focused on fostering entrepreneurial initiatives that benefit society, and it receives support from the university. The organization organizes competitions and community projects to promote a culture of social entrepreneurship and advancing Sustainable Development Goal 8 (Decent Work and Economic Growth). Additionally, the university hosts seminars and workshops to help staff develop entrepreneurial teaching methods. These activities enhance the teaching of andragogy through experiential learning and participatory processes (Ferreira & MacLean, 2018). By allowing employees to engage in entrepreneurial education, the university promotes sustainable knowledge and skills, which aligns with Sustainable Development Goal 4 (Quality Education).

5.3 Technological and Infrastructure Facilitation

The University of Zululand provides the following technological and infrastructural resources to student innovators and student entrepreneurs: marketing facilities, laboratories, workspaces, communication facilities, access to Wi-Fi, and digital laboratory equipment. These facilities cater to entrepreneurial development and innovation needs so that the students enjoy a proper working environment and infrastructure to innovate new products and services.

The technology support provided is also consistent with the Technology Acceptance Model (TAM), which specifically identifies perceived ease of use and usefulness as the determinants of technology acceptance (Granić & Marangunić, 2019). By offering access to various facilities, the University allows students to innovate, experiment, and design sustainable solutions for their day-to-day problems.

6 Links to Other Entrepreneurship Activities Within the Institution

The connections between various entrepreneurship initiatives within the institution play a vital role in cultivating a culture of innovation and entrepreneurship among students. As outlined in the Entrepreneurship Education Theory (Kuratko, 2005), engaging with diverse entrepreneurship programs can significantly boost students' entrepreneurial intentions and actions. Involvement in entrepreneurial projects, even as a spectator, offers valuable lessons in crafting and presenting business plans, a fundamental skill for aspiring entrepreneurs (Otieno, 2015). Additionally, these activities foster collaboration and networking among students, faculty, and industry experts, which is essential for driving entrepreneurship and innovation (Klofsten et al., 2021).

Indirect engagement highlights the value of acquiring knowledge through observation in the cultivation of entrepreneurial skills (Kumar & Pansari, 2016). This learning process can be analyzed through the lens of social cognitive theory, which emphasizes the role of observation and modeling in adopting new behaviors (Bandura, 1999). Observing successful pitches and the integrated feedback systems during competitions provides an informal learning opportunity that complemented the formal educational approach of the pilot program. This approach resembles blended learning, where both unstructured and structured learning experiences are combined to enhance entrepreneurial capabilities (Santoso et al., 2023).

Identifying future opportunities for involvement in preparation workshops for Enactus and EDHE competitions is crucial for expanding the project's impact. These workshops offer a structured environment for skill development and networking, aiding participants in their entrepreneurial paths. This engagement aligns with experiential learning theory (Kolb, 1984), highlighting a cycle of experience, reflection, conceptualization, and active experimentation. Focusing on participation in these workshops should be a priority in future pilot program iterations and the institution's curriculum, enhancing connections within the entrepreneurial ecosystem and promoting growth in hospitality education.

7 A Description of the Ecosystem of the Initiative

The activity is structured as a competition in which students are divided into groups of three (with three groups of three and one group of four) to create and present business plans for a campus “food hub.” This competitive setting simulates real-world entrepreneurial scenarios, encouraging innovative thinking and strategic management (Klein, 2023). During the exercise, a panel of “investors” selects and assesses the best plan, reflecting the processes of business financing and viability analysis, which are key factors in determining entrepreneurial success (Aithal & Aithal, 2023). The winning plan is executed through the collaborative efforts of all participating students, providing them with hands-on experience in running a successful business. The group structure fosters cooperation, communication, and accountability among members, essential for successful entrepreneurship (Yoo et al., 2023).

A strong group culture fosters teamwork, open communication, and accountability, essential for new entrepreneurs (Bruni-Bossio & Delbaere, 2021). Effective preparation includes strategizing, rehearsing, and starting the entrepreneurial journey to build key skills. This involves understanding entrepreneurship fundamentals, creating a solid business plan, evaluating finances, and conducting market research. The pitching phase focuses on clear communication with investors and enhancing negotiation skills. And finally, launching the business provides hands-on operational experience, allowing for continuous improvements using agile methodologies (Magasi, 2025).

The program’s teaching approach is grounded in a series of theoretical frameworks. Initially, it incorporates experiential learning and Kolb’s (1984) experiential learning cycle, where students engage in hands-on experiences, reflect on their observations, develop abstract concepts, and actively test their ideas. Following this, competitive environments foster entrepreneurial education that emphasizes experiential learning, problem-solving, and critical thinking (Tseng, 2023). The program is structured into four distinct stages: preparation, planning, pitching, and launch. Each stage offers a progressive learning journey with increasingly complex tasks and responsibilities. This structure is consistent with

Vygotsky's (1978) sociocultural theory, which highlights the importance of social interaction and the role of scaffolding in the learning experience (Verenikina, 2008).

The annual programmatic process and the development of a model it has adopted demonstrate a strong dedication to continuous revision and enhancement. Its ongoing efforts to improve focus on innovation in teaching, ensuring that the curriculum remains relevant and effective in preparing students for the ever-changing hospitality industry.

7.1 The Inception Phase

In the initial phase, the focus shifted from a teacher-centered approach to a learner-centered model, encouraging students to take the initiative in their learning. Working in groups, students were tasked with generating a business idea using the resources at their disposal. This method is rooted in the concepts of a learner-centered environment, which, as noted by McCombs (2004), emphasizes the importance of individual experiences, perspectives, backgrounds, strengths, interests, abilities, and needs of the learners. McCombs (2004) identifies three key conditions essential for fostering an effective learning environment: (1) promoting the exploration of meaning, (2) creating a safe and welcoming atmosphere for students, and (3) offering chances for participation, interaction, and social engagement. These principles were put into practice during the early stages, encouraging students to craft innovative business ideas that could succeed within their communities. Guidelines were established for both the pitch presentation and the business plan, with a strong focus on nurturing creativity and innovation.

Students conducted market surveys to conduct a feasibility study on their business proposals and used the findings to inform them of their business plans. Budget forecasting was also important, as they had to show the chances of success and feasibility of their businesses. Active learning was prioritized during this phase, whereby students learned through meaning-making and personal discovery rather than the passive reception of information (Bernadó & Bratzke, 2024).

The outcomes of this phase were:

- A good business plan that met the guidelines given, i.e., a complete explanation of the business idea, justification, market survey and analysis, financial projections, and operational plan.
- A business pitch presentation, where one of the group members pitched the idea using the guidelines given.

7.2 The Pitching Phase

The pitching stage is an important entrepreneurial learning stage. In this stage, student groups pitch their ideas to a group of judges, including lecturers, successful entrepreneurs, and department staff members. The arrangement is carefully designed to imitate the experience of attaining funding and support for a new business endeavor. Judges for this exercise are seasoned experts in business entrepreneurship and food businesses, usually stakeholders, who provide feedback (Westberg & Jason, 2001). A 15-minute presentation format demands succinct communication and solid argument. Not only do students describe their business model, but they also must legitimize its evolution and make an accurate analysis in their market survey and financial analysis. This exercise involves students in critical thinking and evidence-based decision-making (Tseng, 2023). The focus on market research resonates with a lean startup model, which prompts students to test and iterate their business models based on real-world feedback (Westberg & Jason, 2001). This helps support SDG 8 (Decent Work and Economic Growth) by sustaining business operations and utilizing resources effectively.

Selection of a feasible business concept to pursue in the following phase, wherein the whole teams gather and undertake management responsibilities, gives a feeling of collaboration and joint ownership of the entrepreneurial company. This matches social entrepreneurship, whereby collaboration and collective action enable one to drive social change (Welch & Yates, 2018).

This stage may be explained using the Social Cognitive Theory (Bandura, 1999), where learning occurs through observation, modeling, and reinforcement. Having real entrepreneurs participate in the panel

provides good models, and the information gained reinforces desired entrepreneurial conduct.

7.3 Launching Phase and Business Running Phase

The startup and business operation phases signal the shift from abstract planning to concrete implementation. The students act as managers to launch the business, creating a shared vision and assigning responsibilities. This exercise emphasizes the importance of teamwork, communication, and leadership skills, which are vital for successful entrepreneurs (Pardo-Garcia & Barac, 2020).

Before launch, students carry out several preparation tasks, such as recipe testing, portioning, HR preparation, and staff induction. These are hands-on learning exercises in business operation from the operations side. Focusing on standardization and quality control is an indicator of operational efficiency and customer satisfaction focus. Ethical ingredient sourcing and waste management processes can also be incorporated into promoting sustainable business practices (Elkington, 1998), giving room for the program's development. The project is tailored to develop analytical, organizational, and interpersonal skills, and leadership and networking skills. The students are empowered with the capacity to recognize and resolve problems, analyze risks, and communicate effectively with various stakeholders, such as investors and suppliers for their business. The approach is holistic, focusing on developing well-rounded entrepreneurial skills. The experimentation, problem-solving, and implementation process stimulates innovation and creativity, taking students out of disciplinary modes of thinking to creative new realms. This is under SDG 4 (Quality Education): encourage lifelong learning.

Outputs of this phase:

- Evidence of activities pre-launch such as recipe testing, HR processes, portioning, standardization, marketing, and procurement.
- Effective business launch with evidence of contribution from each participant.
- Effective business operation with evidence of profit generation.

8 The Performance of the Program/Module/Initiative So Far, Including Any Ratings by Participants

The program has performed well in fostering entrepreneurial ideas among South African hospitality students, completing the preparation, inception, and pitching stages. Nevertheless, challenges were experienced in the launch phase, highlighting the program's vulnerability to external pressures thus emphasizing the need to evolve resilient pedagogies that adapt to the unexpected (Chow et al., 2020).

A program design that is closely aligned with campus life requires reconsideration of its purposes and methods of operation to ensure that it is possible to sustain it without interruption, regardless of external factors (Chow et al., 2020). Theoretically, this can be explained by the entrepreneurial ecosystem paradigm, which interprets entrepreneurial companies' success to be contingent upon how environmental determinants are interrelated (Theodoraki et al., 2018). There is, therefore, the need to critically evaluate the program, for example, by considering feedback from the participants so that areas where it can be optimized are actualized and how to minimize the impact of outside influences is mapped.

Using reflective practice as a method of teaching and learning can facilitate this, and learners can reflect on their experience critically and provide constructive critique (Westberg & Jason, 2001). This is an experiential learning theory process, which holds that learning is enhanced by experiential activity and reflection therefore contributing to psychological development of participants (Van der Westhuizen, 2023a, 2023b). By incorporating this feedback into the program plan, it is possible to design a more resilient and sustainable entrepreneurial education program based on the guidelines of the theory of sustainability (Welch & Yates, 2018).

The feedback and assessment mechanisms of the program will be key in assessing its general effectiveness and for planning future enhancements (Sadler, 2014). Boldureanu (2020) also observes that entrepreneurial education programs should be evaluated using both

quantitative and qualitative approaches. Through the addition of reflections and participant feedback in this instance, it will be possible to gather relevant information regarding the strengths and limitations of the program and the appropriate interventions created to make the program more effective.

9 Challenges That Were Encountered

The findings in this program corroborate Heydarian et al.'s (2021) assertion that the quality of entrepreneurship education at universities is confronted with some of the most serious challenges, such as financial limitations, low-quality curricula, lack of adequate resources, and shortages of lecturers who are appropriately trained. This case study focuses on a South African university setting, enhancing the comprehension of their significance.

9.1 Financial Constraints and Resource Re-allocation

The utilization of on-campus facilities for the program and with stringent regulations governing enterprise operations within the campus limits its operations. It acknowledges the necessity of some proposed source of finance in entrepreneurship education with a vision analogous to the resource-based view in which there is an emphasis on the acquisition of appropriate resources to achieve the goals of SDG 8 (to create sustainable, inclusive, and sustainable growth, productive and overall quality employment for all).

9.2 Operation Flexibility and Time Horizon

Having fixed schedules and a lack of contingency plans for unforeseen problems indicate inflexibility in program design. This design stiffness adversely affects project sustainability, necessitating a reevaluation of planning and implementation strategies.

9.3 Inadequate Clear Financial Architecture and Procurement Process

Unclear financial procedures hinder students' decision-making and financial management skills, which are essential for entrepreneurial development. Reforming these procedures is necessary to provide meaningful learning experiences that align with industry best practices.

9.4 Post-program Support and Intellectual Property

Insufficient infrastructure and lack of transparency in intellectual property policies hinder the long-term success of the program. To rectify this, efficient student-entrepreneur support infrastructures and university intellectual property rights policies must be created.

9.5 Curriculum Development and Assessment

Insufficient standards for testing business concepts require the organization to enhance its course development and collaborative design standards. This hinders the improvement of quality pedagogies that could facilitate innovative teaching methods, such as problem-based learning and design thinking.

9.6 Training and Development of Staff

Insufficient lecturer training limits their capacity to provide effective entrepreneurship education. This requirement aligns with Sustainable Development Goal 4, which promotes inclusive and equitable quality education and lifelong learning for all individuals.

9.7 Policy and Regulatory Framework

Lack of an entrepreneurial policy in the institution suggests a need for established rules to promote entrepreneurial activity. This will incorporate inclusive institutional assistance in the entire system.

10 Plans to Develop/Improve the Initiative

Though early feedback from program coordinators is positive about content strengths, significant weaknesses have been identified, particularly concerning depth of coverage and practical application. A typical example is the way the absence of depth in students' education in market research put students at a disadvantage regarding the assessment needs. This points to a lack of balance between theory teaching and practice implementation that requires assessment of pedagogical delivery to ensure alignment with competency-based learning outcomes (Anh et al., 2024).

Several key improvements are being undertaken to further advance and enhance the program and address the weaknesses outlined:

- **Duration and Depth of the Extended Workshop:** The suggested extension in the duration of the preparatory workshop has been structured to bridge the theory-practice gap as stipulated. This is consistent with demands for more assertive and more stringent teaching in such pivotal subjects as market research (Bruni-Bossio & Delbaere, 2021).
- **Interdisciplinary Collaboration:** Interdepartmental collaboration with Human Movement Sciences and Computer Science will introduce students to alternative thinking and allow them to realize interdisciplinary business opportunities, a step toward overall entrepreneurship skills development.
- **Industry Sponsorship and Collaboration:** External business strategic collaborations are required to facilitate startup funding and provide stimulating the world of work experience, further enriching the experiential learning process. It is an indication of the movement toward

greater industry engagement in entrepreneurship learning (Emma, 2020).

- Knowledge Dissemination: Refereed journal publication of the program outcomes and presentation at teaching and learning conferences reflect a commitment to adding to the scholarship base of effective entrepreneurship education, as in a scholarship of teaching and learning.

References

- Aithal, P. S., & Aithal, S. (2023). Super innovation in higher education by nurturing business leaders through incubation. *International Journal of Applied Engineering and Management Letters (IJAEML)*, 7(3), 142–167.
- Akpomi, M. E., & Kayii, N. E. (2022). Constructivist approaches: A budding paradigm for teaching and learning entrepreneurship education. *International Journal of Education, Teaching, and Social Science*, 2(1), 31–44.
- Anh, N. T. K., Hoa, H. Q., & Phuong, N. T. H. (2024). Assessing pedagogical students' learning outcomes through a competency-based approach. *Educational Administration: Theory and Practice*, 30(5), 7767–7776.
- Ayandibu, A. O. (Ed.). (2020). *Reshaping entrepreneurship education with strategy and innovation*. IGI Global.
- Bandura, A. (1999). Social cognitive theory of personality. In *Handbook of personality* (2nd edn., pp. 154–196). Guilford Press.
- Bates, A. T., & Bates, A. W. (2015). Experiential learning: Learning by doing. In *Teaching in a digital age*, 3.6.
- Bernadó, E., & Bratzke, F. (2024). Revisiting EntreComp through a systematic literature review of entrepreneurial competences: Implications for entrepreneurship education and future research. *The International Journal of Management Education*, 22(3), 101010.
- Boldureanu, G., Ionescu, A. M., Bercu, A.-M., Bedrule-Grigoruță, M. V., & Boldureanu, D. (2020). Entrepreneurship education through successful entrepreneurial models in higher education institutions. *Sustainability*, 12(3), 1267. <https://doi.org/10.3390/su12031267>

- Bruni-Bossio, V., & Delbaere, M. (2021). Not everything important is taught in the classroom: Using cocurricular professional development workshops to enhance student careers. *Journal of Management Education*, 45(2), 265–292.
- Chaurasia, S. (2022). Concept of entrepreneur and entrepreneurship. In *Agricultural microbiology based entrepreneurship: Making Money from Microbes* (pp. 3–24). Springer Nature Singapore.
- Chow, R. S., Lam, C. M., & King, I. (2020). Crisis resilience pedagogy (CRP) for teaching and learning. In *2020 IEEE International Conference on Teaching, Assessment, and Learning for Engineering (TALE)* (pp. 384–391). IEEE.
- DeCoito, I., & Briona, L. K. (2023). Fostering an entrepreneurial mindset through project-based learning and digital technologies in STEM teacher education. In *Enhancing entrepreneurial mindsets through STEM education* (pp. 195–222). Springer International Publishing.
- Dzomonda, O., & Fatoki, O. (2019). The role of institutions of higher learning towards youth entrepreneurship development in South Africa. *Academy of Entrepreneurship Journal*, 25(1), 1–11.
- Elkington, J. (1998). Partnerships from cannibals with forks: The triple bottom line of 21st-century business. *Environmental Quality Management*, 8(1), 37–51.
- Emma, E. (2020). *Applied entrepreneurship: A case study on a uniform vocational approach to teaching and learning entrepreneurship* (Doctoral dissertation). San Diego State University.
- Evcimik, S., & Oruc, C. (2023). Effects of project-based learning in moral values education. *International Online Journal of Educational Sciences*, 15(3), 495–508.
- Ferreira, D., & MacLean, G. (2018). Andragogy in the 21st century: Applying the assumptions of adult learning online. *Adult Learning*, 32, 10–19.
- Granić, A., & Marangunić, N. (2019). Technology acceptance model in educational context: A systematic literature review. *British Journal of Educational Technology*, 50(5), 2572–2593.
- Heydarian, N., Omidi Najafabadi, M. A. R. Y. A. M., Lashgarara, F., & Mirdamadi, M. (2021). Explaining the challenges facing the development of entrepreneurial university: The application of grounded theory. *Journal of Contemporary Issues in Business & Government*, 27(3).
- Jengeta, M. (2020). *Effectiveness of entrepreneurship education in a turbulent economy: The perceptions of entrepreneurship graduates in Zimbabwe* (Unpublished PhD dissertation). University of KwaZulu-Natal.

- Klein, G. (2023). Transformational and transactional leadership, organizational support and environmental competition intensity as antecedents of intrapreneurial behaviors. *European Research on Management and Business Economics*, 29(2), 100215.
- Klofsten, M., Jones-Evans, D., & Pereira, L. (2021). Teaching science and technology PhD students in entrepreneurship: Potential learning opportunities and outcomes. *The Journal of Technology Transfer*, 46(2), 319–334.
- Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Prentice-Hall.
- Kumar, V., & Pansari, A. (2016). Competitive advantage through engagement. *Journal of Marketing Research*, 53(4), 497–514.
- Kuratko, D. F. (2005). The emergence of entrepreneurship education: Development, trends, and challenges. *Entrepreneurship Theory and Practice*, 29(5), 577–597.
- Lackéus, M. (2015). *Entrepreneurship in education: What, why, when, how*. OECD Publishing.
- Magasi, C. (2025). Cultivating future graduate entrepreneurs: A holistic exploration of vital entrepreneurial skills from a tripod-based view and evidence. *SEISENSE Journal of Management*, 8(1), 76–97.
- Maluleke, R. (2023). *Quarterly Labour Force Survey (QLFS) Q1:2023*. Statistics South Africa.
- McCombs, B. L. (2004). Learner-centered principles and practices: Enhancing motivation and achievement for children with learning challenges and disabilities. In *International review of research in mental retardation* (Vol. 28, pp. 85–120). Academic Press.
- Mthembu, M. (2022). *The role of student support programmes in assisting Black students to navigate the institutional culture at the University of Witwatersrand* (Master's thesis). University of the Witwatersrand, Johannesburg.
- Nguyen, X. T. (2020). Factors affecting entrepreneurial decision of nascent entrepreneurs belonging to Generation Y in Vietnam. *The Journal of Asian Finance, Economics and Business*, 7(8), 407–417.
- O'Brien, E., & Hamburg, I. (2019). A critical review of learning approaches for entrepreneurship education in a contemporary society. *European Journal of Education*, 54(4), 525–537.
- Otache, I. (2019). 'Entrepreneurship education and undergraduate students' self- and paid-employment intentions: A conceptual framework. *Education + Training*, 61(1), 46–64.

- Otieno, C. A. (2015). *Influence of non-academic entrepreneurial initiatives on students' future business career aspirations: A case of public secondary schools students in Kisumu Central* (Doctoral dissertation, University of Nairobi).
- Pardo-Garcia, C., & Barac, M. (2020). Promoting employability in higher education: A case study on boosting entrepreneurship skills. *Sustainability*, 12(10), 4004.
- Prodromou, A. (2022). *Cypriot students' attitudes towards school science: The transition from primary to secondary school* (Doctoral dissertation). University of Leeds.
- Ratten, V., & Usmanij, P. (2021). Entrepreneurship education: Time for a change in research direction? *The International Journal of Management Education*, 19(1), 100367.
- Revans, R. W. (1981). The nature of action learning. *Omega*, 9(1), 9–24.
- Sadler, D. R. (2014). Beyond feedback: Developing student capability in complex appraisal. In *Approaches to assessment that enhance learning in higher education* (pp. 45–60). Routledge.
- Santoso, R. T. P. B., Priyanto, S. H., Junaedi, I. W. R., Santoso, D. S. S., & Sunaryanto, L. T. (2023). Project-based entrepreneurial learning (PBEL): A blended model for startup creations at higher education institutions. *Journal of Innovation and Entrepreneurship*, 12(1), 18.
- Statistics South Africa (Stats SA). (2024). *Quarterly Labour Force Survey (QLFS): Quarter 4, 2023*. Pretoria: Statistics South Africa. Available at: <https://www.statssa.gov.za/publications/P0211/Presentation%20QLFS%20Q4%202023.pdf>. Accessed 20 January 2026.
- Theodoraki, C., Messegheem, K., & Rice, M. P. (2018). A social capital approach to the development of sustainable entrepreneurial ecosystems: An explorative study. *Small Business Economics*, 51, 153–170.
- Tseng, A. L. U. (2023). *Building entrepreneurial self-efficacy through entrepreneurship education: Understanding the pedagogical designs* (Doctoral dissertation). Curtin University).
- United Nations. (2015). *Transforming our world: The 2030 Agenda for Sustainable Development (A/RES/70/1)*. Available at: <https://www.un.org/sustainabledevelopment/development-agenda/>. Accessed March 2025.
- Van der Westhuizen, T. (2023a). *Youth entrepreneurship: An ecosystem theory for young entrepreneurs in South Africa and beyond*. Springer Nature.
- Van der Westhuizen, T. (2023b). Internal Domains Entrepreneurial Heartset, Mindset and Handset. In *Youth Entrepreneurship: An Ecosystem Theory for Young Entrepreneurs in South Africa and Beyond* (pp. 31–55). Cham: Springer Nature Switzerland.

- Verenikina, I. (2008). Scaffolding and learning: Its role in nurturing new learners.
- Viberg, O., Engström, L., Saqr, M., & Hrastinski, S. (2022). Exploring students' expectations of learning analytics: A person-centered approach. *Education and Information Technologies*, 27(6), 8561–8581.
- Welch, D., & Yates, L. (2018). The practices of collective action: Practice theory, sustainability transitions and social change. *Journal for the Theory of Social Behaviour*, 48(3), 288–305.
- Westberg, J., & Jason, H. (2001). *Fostering reflection and providing feedback: Helping others learn from experience*. Springer Publishing Company.
- Yoo, S. C., Truong, T. A., & Jung, K. (2023). Entrepreneurship education for women through project-based flipped learning: The impact of innovativeness and risk-taking on course satisfaction. *Journal of Entrepreneurship, Management and Innovation*, 19(3), 229–260.
- Zahrani, A. A. (2022). Promoting sustainable entrepreneurship in training and education: The role of entrepreneurial culture. *Frontiers in Environmental Science*, 10, 963549.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits any noncommercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if you modified the licensed material. You do not have permission under this license to share adapted material derived from this chapter or parts of it.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.





10

Preparing South African Science Students as Innovators and Entrepreneurs

Karin Jacobs^{id} and Hanelie Adendorff^{id}

1 Context and Rationale

In South Africa, our reliance on well-trained scientists is paramount in addressing pressing societal challenges such as the development of sustainable agricultural practices, combating hunger, ensuring access to clean water, and facilitating quality healthcare. These challenges are not only national priorities but also resonate with several of the United Nations Sustainable Development Goals (SDGs), including SDG 2 (Zero Hunger), SDG 3 (Good Health and Well-being), SDG 6 (Clean Water and Sanitation), and SDG 13 (Climate Action). Addressing most

K. Jacobs (✉)

Department of Microbiology, Faculty of Science, Stellenbosch University,
Stellenbosch, South Africa

e-mail: kj@sun.ac.za

H. Adendorff

Centre for Teaching and Learning, Stellenbosch University, Stellenbosch,
South Africa

e-mail: hja@sun.ac.za

of these issues demand innovative, interdisciplinary approaches situated at the intersection of biology, engineering, and a deep understanding of microbiology.

At Stellenbosch University, the Microbial Ecology module (MKB364) responds to these challenges by offering senior undergraduate students an authentic undergraduate research experience (URE). The module's primary objective is to develop graduates who are not only technically proficient but also equipped with the curiosity, creativity, and identity as scientists that underpin meaningful innovation. In doing so, the module strongly supports SDG 4 (Quality Education) by prioritizing inquiry-led learning; contributes to SDG 9 (Industry, Innovation and Infrastructure) through skill development and entrepreneurial exposure; and advances SDG 10 (Reduced Inequalities) through inclusive pedagogical design.

Despite rising enrolments in STEM fields, reduced government funding and overloaded curricula have significantly constrained the availability of rich, research-based practical experiences for undergraduates in South Africa (Butler-Adam, 2018). This module addresses that gap through a dynamic, student-led approach that enables students to design and carry out their own research projects. In doing so, it prepares graduates to think critically, act independently, and contribute meaningfully to both science and society.

Practical training—particularly when delivered through well-structured practical or undergraduate research experiences (URE)—has been shown to play a critical role in nurturing future scientists (American Chemical Society, 2015). These experiences offer opportunities to integrate theoretical knowledge with hands-on practice, foster a sense of belonging (Linn et al., 2015) and support the development of graduates' professional identities (Graham et al., 2013). Beyond learning techniques, these experiences help students become proficient in applying their skills in meaningful ways. In this context, scientific competence includes not only laboratory techniques but also broader abilities, such as communication, reading, comprehension, as well as interpretation and innovation (Moreno et al., 2023).

Growing the numbers of STEM graduates with an entrepreneurial mindset, handset, and heartset (Van der Westhuizen, 2023a, 2023b) is critical in promoting economic growth, responsible consumption, and

sustainable production. Most important is the combined impact that innovations in these fields can have on mitigating the effect of climate change on our natural resources (UNDP, 2023).

However, many undergraduate science programs—particularly in resource-constrained contexts—continue to rely on rigid, step-by-step practicals that prioritize procedural correctness over exploration. While this method is effective for teaching specific skills, it fails to reflect how real science works (Spell et al., 2014). Moreover, repeating the same experiments year after year can perpetuate outdated methods and techniques, limiting pedagogical responsiveness to new knowledge and challenges.

Our module offers an alternative: providing all students with an opportunity to engage in inquiry-driven, open-ended scientific work. Students conduct their own experiments and make discoveries, through collaborative lab-based projects, supported by just-in-time learning. This is complemented by theoretical components focused on understanding and interpreting information. While the module is not explicitly designed as entrepreneurship training, it cultivates a foundational skillset for innovation (Van der Westhuizen, 2023a, 2023b). This is critical in a country where many of our STEM graduates have limited prospects in the job market.

These skills not only prepare students for postgraduate study but also empower them to contribute creatively and constructively to South Africa's innovation ecosystem.

2 Description on the Intervention

Delivering a Course-Based Undergraduate Research Experience (CURE) typically demands a substantial investment of time and resources (Gasper & Gardner, 2013). This can be a significant deterrent in a resource-constrained context. The case detailed here offers a less resource-intensive approach, with no additional staff or budget allocated. The intervention was sustained by a lean, but committed, team consisting of one academic, one technical technician, two support staff members,

and the invaluable assistance of six post-graduate students who acted as project advisors.

The CURE model is defined by five key components: (1) use of scientific practices, (2) discovery, (3) broadly relevant or important work, (4) collaboration, and (5) iteration (Auchincloss et al., 2014). Unlike traditional laboratory practicals, which often follow scripted experiments with predetermined outcomes, CUREs immerse students in authentic scientific inquiry. The MKB364 module incorporates all five elements, offering students the opportunity to conduct original research in groups, contribute to research areas of departmental relevance, and engage in repeated cycles of planning, testing, and troubleshooting—mirroring the iterative nature of real scientific work.

The practical component of the MKB364 module, based on the CURE model (Buchanan & Fisher, 2022), has been developed and refined over an eight-year period, incorporating all the components of a CURE (Buchanan & Fisher, 2022). The number of students enrolled in this course typically ranges from 80 to 120, spanning a 13-week semester. The central objective of this practical is to offer students a genuine research experience, necessitating that they design, execute, plan, and manage their own projects.

Students self-select their groups and are granted autonomy not only in shaping the content of their projects, but also in managing their lab time. Each student must log a minimum of 15 hours, though students are welcome to exceed this if they wish to deepen their investigations. Access to a fully equipped undergraduate laboratory is provided. There are no fixed practical times or protocols. Instead, students negotiate flexible lab access, often working well beyond the scheduled three hours per week.

Faculty members and post-graduate students also actively engage with students, in a social setting, at the start of the semester to help them define their projects through discussions. Dedicated support staff ensure smooth planning and preparation, while postgraduate mentors provide weekly technical and conceptual guidance. These mentors are specifically trained to scaffold student learning and project development. Techniques are taught on a just-in-time basis, and mentoring includes frequent opportunities for troubleshooting and feedback.

Based on previous iterations of the intervention, project descriptions are deliberately kept vague and only a limited number of past examples are shared. This is intended to foster creativity and prevent a homogenous grouping of projects with very similar topics. Students are encouraged to choose projects that resonate with their personal experiences which leads to the development of highly creative projects. This autonomy has been shown to result in a high level of student engagement, in self-selected groups.

Mentoring is a central pillar of the module, with weekly check-ins involving either a lecturer or senior student. Spell et al. (2014) argue that aligning teaching with the research expertise of staff creates more authentic and impactful learning experiences. In this module, all projects align with departmental research areas, with a specific focus on Microbial Ecology.

The fixed group budget, flexibility in time allocation, and autonomy in topic selection and project design allow students to tailor their research to their interests, academic potential, skill set, and the amount of time they wish to dedicate to laboratory work. This approach encourages curious students to explore and innovate. Those wishing to invest more time than the minimum requirement (15 hours during the semester) in the lab, are given the opportunity to do so, without penalizing students who can only meet the minimum requirement. This flexibility enables students to develop both subject-specific and generic skills (Fig. 1). All of these are assessed as part of the course outcomes, which are clearly communicated to students at the beginning of the semester. The module thus supports the development of both subject-specific and transferable competencies, including experimental design, data analysis, communication, and scientific writing.

The assessment includes a poster session, open to the wider university audience. This end-of-semester poster session garners substantial attendance from the department, as well as other departments in the molecular biology and biotechnology field and allows groups to interact with various invited experts.

Finally, students have the valuable opportunity to connect and engage with several spin-out companies within our faculty as well as with invited speakers from InnovUS at Stellenbosch University to share insights with

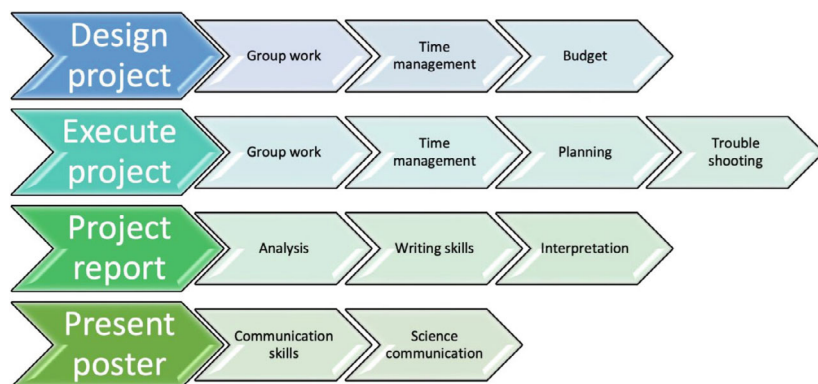


Fig. 1 Layout of the practical course, with the main skills development at each phase

our students regarding the potential for innovation through patents and the process of establishing their own companies.

The Faculty of Science at Stellenbosch University boasts the highest number of spin- out companies within the university, surpassing even the Faculty of Engineering in this regard. This underscores the fertile ground for entrepreneurial endeavors and innovation within our science community.

In my own laboratory, we provide a soil health service through Sporatec to the agricultural industry. As an educator, I actively share my personal experiences with students, particularly in the context of starting and running a company. Additionally, some students can embark on a 6-month internship with Sporatec if there is a need. This hands-on experience not only exposes them to the practical aspects of running a business but also allows them to apply their academic knowledge to real-world situations.

3 Theoretical Framing

For many lecturers, practical components are not only about skills development but also offer an opportunity to ignite students' passion for the subject and demonstrate its real-world relevance. Practicals can provide a platform for students to engage with authentic scientific research elements, and develop confidence through learning from their mistakes, engaging in troubleshooting, and begin to see how practical experiments fit into the bigger scientific picture.

The positive impact of research-based learning has been widely recognized. Even as early as 1997, the Boyer Commission recommended that “research-based learning” become a standard practice in universities. While this idea has gained traction, challenges like insufficient funding and large class sizes have hindered its implementation (Boyer Commission, 2002). Similarly, Brew (2013) proposed a framework for creating integrated learning and research in ways that are responsive to student needs, the learning context, and intended educational outcomes. While this approach is considered ideal, it can be difficult to implement (Brew & Mantai, 2017) and may pose challenges when dealing with large classes characterized by diverse student backgrounds and varying levels of prior knowledge.

In North American universities, Undergraduate Research Experience (URE) programs differ from traditional lab courses in that they are selective and highly competitive. There are many different models on which URE has been implemented, but it is notable that it is largely employed in Biology based courses (Ahmad & Al-Thani, 2022). This approach allows students to receive individual mentorship and training as scientists (Howitt et al., 2010; Linn et al., 2015). Although research internships, also known as apprenticeships, have demonstrated effectiveness in providing genuine learning experiences and guiding students toward becoming scientists, they are not always feasible or universally positive. Implementing this approach demands substantial time for training, and students' technical skills may not consistently meet the required standards. This can also impose costs on host laboratories in terms of time and consumable resources (Rowland et al., 2012).

This contrasts with Curriculum-Based Undergraduate Research Experience (CURE), which is open to all students but often involves many students sharing a single mentor. In both cases, the idea of participating in “real” or authentic science and being guided in becoming a scientist has positively impacted student retention at the postgraduate level (Buchanan & Fisher, 2022; Eagan et al., 2013; Rowland et al., 2012). This adaptation has been demonstrated as viable even in large undergraduate classes, or online courses (Wang et al., 2015; Werth et al., 2022), although in such cases, students typically participate in generating results and writing reports. Nevertheless, it remains possible to incorporate elements of these activities to provide students with an authentic research experience while helping them acquire skills for deeper learning, including critical thinking (Moreno et al., 2023; Werth et al., 2022; Williams & Reddish, 2018).

These experiences have boosted students’ confidence, expanded their scientific networks, instilled a sense of ownership over projects, and fostered a sense of belonging (Eagan et al., 2013). Graham et al. (2013), for example, note that when students identify with a specific discipline or community of practice, it boosts their confidence, leading to increased retention and persistence in their studies.

Course-Based Undergraduate Research Experiences (CUREs) offer a powerful model for achieving these aims. Research from around the world has consistently shown that Course-Based Undergraduate Research Experience (CURE) programs are beneficial for all students, with particularly strong gains observed among those from disadvantaged backgrounds (Buchanan & Fisher, 2022; Parker, 2018). Despite their benefits, CUREs are often resource-intensive and difficult to scale, especially in underfunded institutions (Gasper & Gardner, 2013).

The design of this laboratory component reflects a deliberate shift away from traditional, highly structured practicals toward a more student-centered, research-oriented learning experience. While the CURE model provides the foundation for this pedagogical approach, additional insight can be gained by considering how the learning environment supports students’ motivation and engagement. To this end, we draw on Self-Determination Theory (Deci & Ryan, 1985, 2000)

to make sense of the observed levels of creativity, autonomy, and deep involvement shown by students throughout the course.

Self-Determination Theory (SDT) is a widely used framework for understanding human motivation, particularly in educational settings. At its core, SDT posits that people are most motivated, engaged, and effective when their environment supports three basic psychological needs: autonomy (a sense of choice and control), competence (a sense of capability and mastery), and relatedness (a sense of connection to others and belonging within a community) (Deci & Ryan, 1985, 2000).

When these needs are satisfied, students are more likely to develop intrinsic motivation, characterized by curiosity, persistence, and deeper learning. Conversely, environments that thwart these needs tend to promote compliance or disengagement. In laboratory or research-based learning contexts, SDT helps illuminate how structural choices—such as allowing flexibility, fostering collaboration, and aligning tasks with real-world scientific practice—can significantly influence students' motivation and learning outcomes.

In the current initiative, these principles are evident in multiple design features: students choose their own groups, define their research questions, manage their time and resources in the lab, and engage with mentors in a sustained and supportive way. These elements are not merely logistical conveniences but serve as mechanisms for meeting students' psychological needs and cultivating a sense of ownership over the learning process. Baker and Goodboy (2019), for example, demonstrated that autonomy-supportive instruction significantly enhances learning and engagement. By intentionally designing for autonomy, competence, and relatedness, the module promotes not only the development of research skills but also a sustained engagement with the process of scientific inquiry and innovation.

4 Reflection

The approach detailed in this chapter represents a deliberate shift away from pre-set, procedural practicals toward a more open, student-centered design. Central to this is the idea that students thrive when they are given

meaningful choices and treated as capable contributors to knowledge-making. This aligns with principles from Self-Determination Theory (SDT), which posits that learning environments that support autonomy, competence, and relatedness foster deeper engagement and intrinsic motivation (Deci & Ryan, 1985).

The design of the MKB364 module intentionally supports all three needs. Students select their own groups and research topics, set their own schedules within flexible lab access, and are trusted to manage a fixed budget—contributing directly to a sense of autonomy. The experience of designing a proposal, executing a project, and presenting findings allows students to build and demonstrate competence, while regular mentoring, peer collaboration, and participation in departmental events strengthen their sense of relatedness.

These design features appear to have a direct impact on student engagement and skill development. In the 2018 student survey ($n = 16$), most students rated their experience very positively. Selecting their own group and topic, managing their own time and budget, and writing the proposal were especially well-received (Fig. 2). It's worth noting that some students find this aspect challenging, particularly those who struggle with reading scientific literature. However, this challenge is addressed during the theory component, though indecision can still cause delays in starting projects. Several students reported that, despite challenges, they valued the independence and real-world relevance of the project. This reflects the SDT idea that supporting autonomy can transform challenge into meaningful engagement (Baker & Goodboy, 2019).

Students also recognized significant gains in transferable skills. Survey data showed that the highest-rated learning outcomes included collaboration, troubleshooting, data analysis, and the ability to learn from mistakes—hallmarks of scientific thinking (Fig. 3). Importantly, these skills map directly onto the psychological needs defined by SDT: students felt competent in doing science, connected through collaboration, and autonomous in navigating their own learning paths. These are valuable skills not only for scientists but also for entrepreneurs, highlighting the broad applicability of the knowledge and competencies gained.

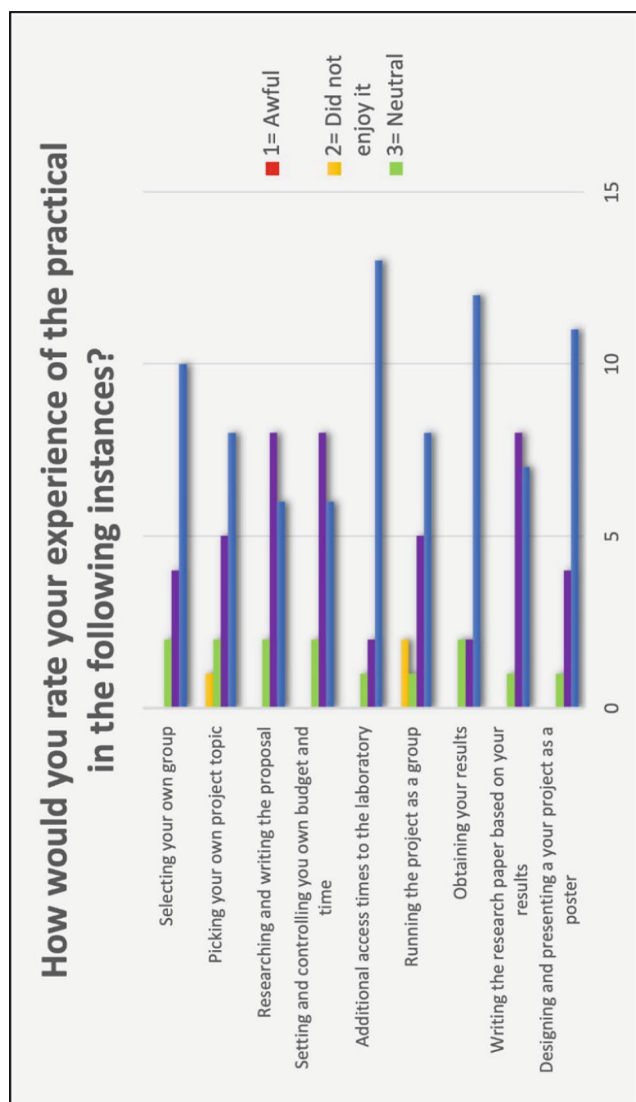


Fig. 2 Student's perceptions on the overall experience of the practical

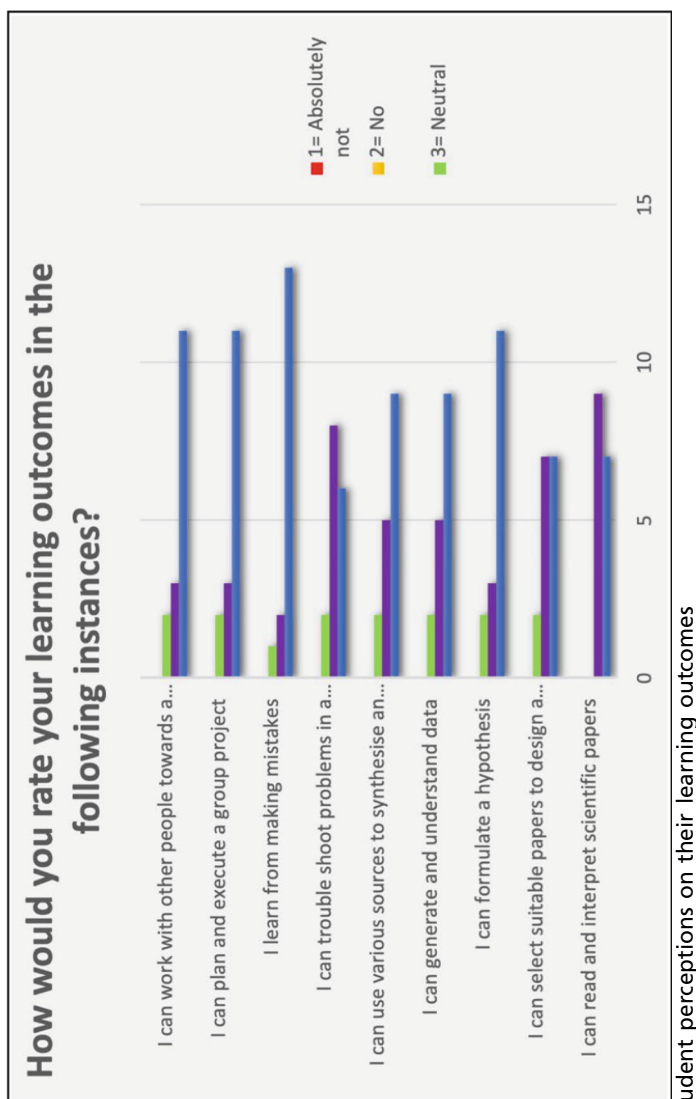


Fig. 3 Student perceptions on their learning outcomes

Student comments reinforce this. One noted that “this was the best way to prepare me for Honours and life in general,” while another remarked, “Even in my non-scientific work... I still refer back to the practical.” Such reflections signal deep engagement, long-term retention of skills, and evidence of identity formation—all outcomes supported by the SDT-informed course design.

The course’s inclusive and flexible structure—particularly the autonomy to connect projects to personal interests—allowed students to bring their own experiences and knowledge into the scientific space. This enabled students to act as knowledge creators, not just consumers, effectively apprenticing them into a community of practice (Williams & Reddish, 2018). Treating students as future colleagues and co-researchers also aligns with Healey et al. (2016) and Fahnert (2017), who note that such pedagogical approaches improve engagement, employability, and graduate attributes.

Perhaps most strikingly, out of 200 projects conducted between 2014 and 2024, not a single one failed completely. This is not only a testament to the support structures and scaffolding in place, but also to what becomes possible when students are given autonomy within a structure that affirms their competence and supports their relationships—the core of Self-Determination Theory in practice.

The MKB364 module has demonstrated significant positive outcomes in students’ abilities, easing their transition from undergraduate to postgraduate studies or entry into the workforce. Over the past few years, we have witnessed an increase in both the number and the quality of students applying for postgraduate degrees, with most of them coming from our final year class. This influx of high-caliber students is reflected in the BSc (Hons) class, where the average grade of the admitted students has risen with 10% on average. This has had a profound impact on our retention rates and the overall success of our postgraduate students.

Students were further asked to rate their overall experience of the practical on the same scale from 1 to 5. The data clearly indicated that students would highly recommend this course/practical to their peers. It also revealed that even among students who may have found the course challenging, they would still recommend it to others (Fig. 4). This reflects the concept of autonomy within the class, which can help

mitigate negative word-of-mouth feedback (Baker & Goodboy, 2019). Students not only recognized the skills they acquired during the practical, which were outlined in the course outcomes, but also felt a sense of belonging to this community of practice and an increased ability to make informed decisions about their futures.

Feedback from students underscores the valuable outcomes of this course, with many highlighting the autonomy they experienced and the skills, both generic and subject-specific, that they acquired.

This was the best exposure that an undergraduate course could have possibly given me to get an idea of what to expect as a scientist. I had no bad experiences, which is mainly due to the fact that I was very fortunate to have a great team working with me. The fact that we formed our group during the June/July holidays and already started compiling a list of possible topics with some basic background research to support each idea, truly gave us a head-start during the first two weeks of the practical. We also made appointments with as many professors in different laboratories and departments which helped a lot with finding the best possible way to approach our project. The best advice I can give to future MKB 364 students is that the most work and effort should go into writing a proper proposal, budget and timeline. Having a very well setup proposal meant that our group did not have to stress during the execution of the practical, as we knew exactly what to do and how much time we have for each experiment. Having a well setup timeline is also very crucial as not all team members have the same modules and are not always available to work in the lab - this especially applies to the biochemistry students during the September "holiday". Furthermore, this project helped me to see how an idea can actually be built into something feasible and a proper project. I taught me how to realistically use what I have learnt theoretically and apply it. I am also very glad to have had the poster presentation, as it gave me the opportunity to hear what other scientist would suggest as alternatives to a certain method used or an explanation for a certain result that we as a group did not consider. So, to conclude, this was the best way to prepare me for Honours and life in general as we were allowed to independently contact outside organisations and work amongst "real" scientists and professionals.

It was an amazing experience doing this practical project. It was a great simulation of how things are done in the "real world". It exposed us to

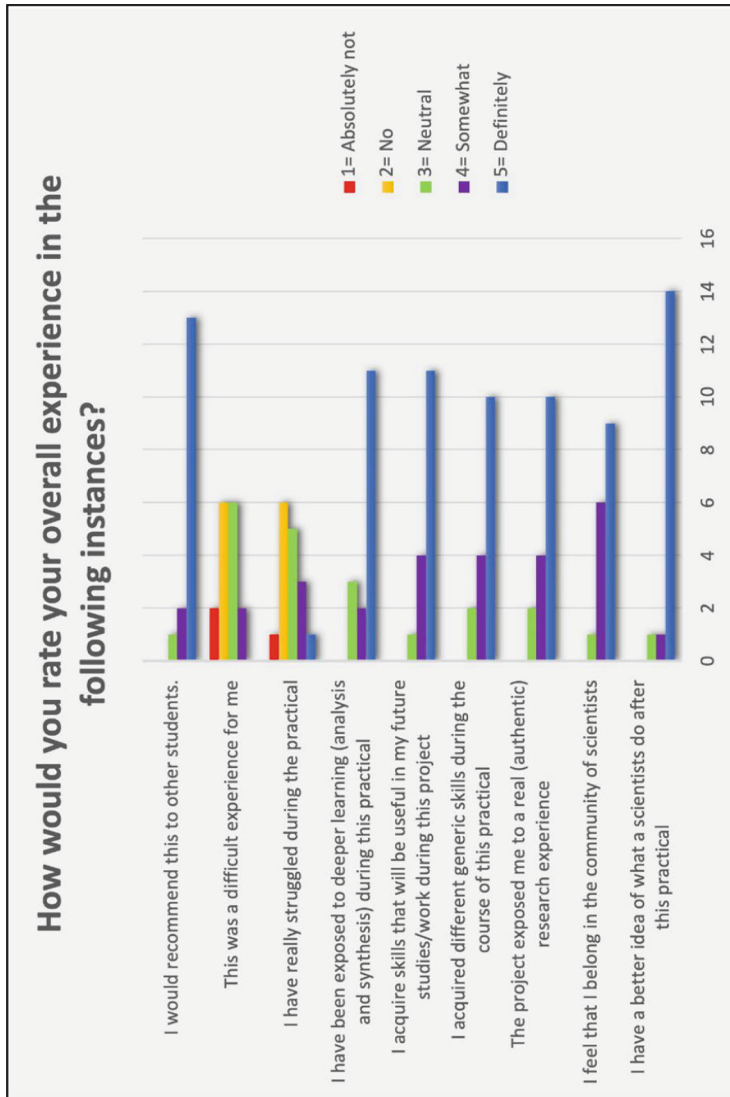


Fig. 4 Overall experience of students on the practical course

the realities of working with a group of people and how their work can affect you and the entire project. The budget component of the project was crucial, it guided us to think realistically about our project and what we could and could not do. I enjoyed the flexibility that came with the project. This was the best practical experience I had, and I value the skills I acquired, and the lessons learned.

Alumni feedback supports the long-term value of the experience. Among 14 former students surveyed, 35.7% were pursuing postgraduate studies and 57.2% were employed in scientific or other professional roles. Alumni consistently reflected on how the practical prepared them not just for further study, but for navigating complex, real-world problems—often outside science. Their comments highlight increased confidence, transferable problem-solving skills, and a lasting sense of ownership over learning. These skills are often considered essential in various academic and professional contexts, and their recognition by alumni underscores their importance in facilitating success and effectiveness in their chosen fields (Fig. 5). This suggests that the experience was not only formative for scientific identity, but also broadly empowering.

Some of the comments reflect the positive outcome of the practical.

This practical made me excited to be in the lab and be a scientist. It made me confident in my abilities. I felt better prepared with any lab work and experiment design than those who had not taken the course.

Even in my non-scientific work currently - I still refer back to the practical to my peers as an example of an intense and fun learning experience. I cannot stress the value that this project has added to my life!

The practical showed me the importance of collaborating with others and how if you don't manage your time and skills efficiently- it will be a disaster.

I enjoyed it a lot. Learned a lot of practical skills and problem solving on my own. I think it plays a vital role in helping you to be prepared for your future research. The practical skills is the best building block for a scientific degree.

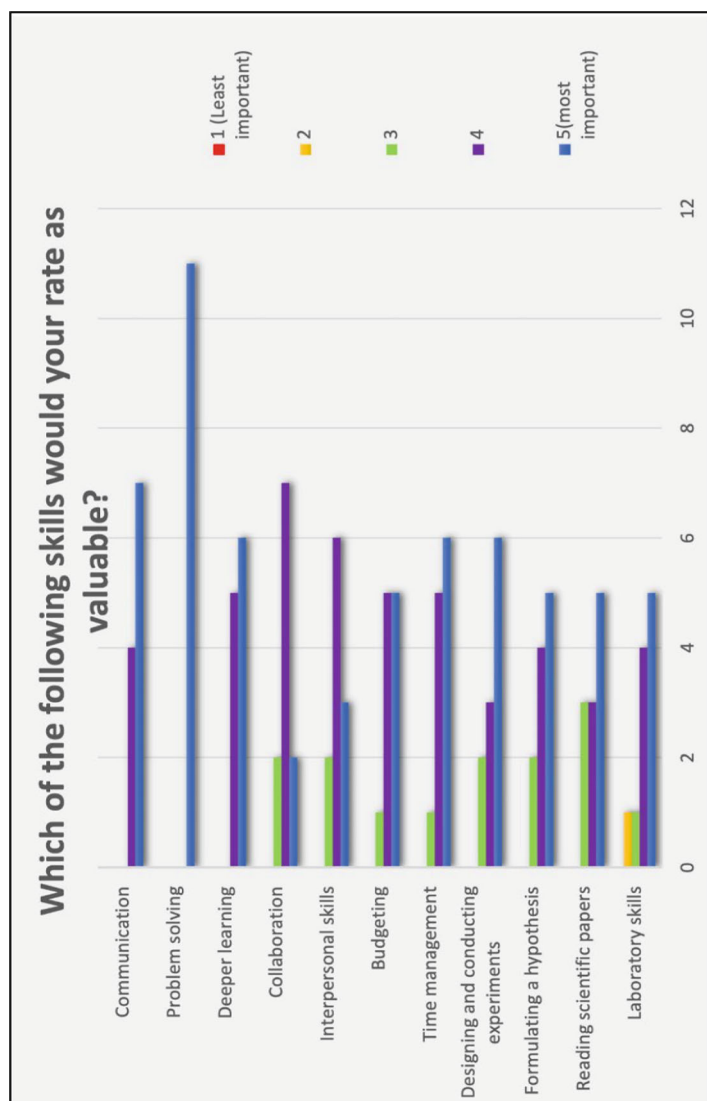


Fig. 5 Skills value rated by alumni

5 The Challenges That Were Encountered

Large class sizes pose a significant barrier to providing students with opportunities to build confidence, gain trust, and participate in authentic research experiences within practical classes. This challenge is often compounded by cost-cutting measures that lead to overcrowded undergraduate labs and limited resources, ultimately affecting the quality of the practical instruction. To address these issues, several strategies have been implemented:

1. Staggered lab times: To alleviate overcrowding and optimize resource utilization, lab times have been staggered. This means that students are allowed in the lab only when actively working on their projects, minimizing congestion and ensuring a more focused and productive learning environment.
2. Group work: Due to the constraints of large class sizes, practicals are typically organized into small groups of 5 students. While this approach promotes collaboration, it can be challenging to ensure that each student experiences some aspect of real-life research in such a setting.
3. Connecting with research labs: Ideally, students would benefit significantly from placement in research labs, a practice that has been shown to have substantial advantages for their training and retention, as indicated by studies (Hunter et al., 2007; Linn et al., 2015). However, large class sizes may limit the feasibility of such placements. Where possible we match students with some of our research labs to gain some experience, although this can only be done on an ad hoc basis.
4. Identifying students with potential: Identifying and nurturing students who demonstrate potential but may not be on a traditional academic track can be challenging in large classes. In these cases, efforts are made to connect these students with appropriate contacts in industry, providing them with alternative pathways to explore their interests and potential career opportunities.

5. Despite the challenges posed by large class sizes, ongoing efforts are made to maximize the benefits of the practical course while addressing constraints, ensuring that students have access to valuable learning experiences and opportunities for personal and professional growth.

6 Plans to Further Develop/Improve the Initiative

The MKB364 module is committed to staying current and relevant by continuously updating and modifying its content to expose students to the latest technologies and developments in the field. An ongoing initiative that we have recently introduced is the replacement of traditional essays on selected topics with interactive business proposals.

In this new approach, students are tasked with identifying real-life problems that could potentially be addressed through microbiology and proposing solutions based on their current knowledge base.

One of the driving factors behind this initiative is the realization, through close collaboration with industry, that there are instances where solutions and interventions are based on flawed scientific practices. Therefore, it is crucial that students in this module are equipped with the skills to offer solutions grounded in sound scientific principles.

If this approach proves successful, we plan to incorporate a stronger entrepreneurial component into the practical in future. Students will then have the option to either pursue a research project or engage in an extended business proposal, where they will work on providing a microbial solution to a problem that has a meaningful societal impact. This innovative approach aims to bridge the gap between academic knowledge and real-world problem-solving, preparing students to make valuable contributions to their fields and society at large.

References

- Ahmad, Z., & Al-Thani, N. J. (2022). Undergraduate Research Experience Models: A systematic review of the literature from 2011 to 2021. *International Journal of Educational Research*, 114, 101996.
- American Chemical Society. (2015). *Undergraduate professional education in chemistry: American Chemical Society guidelines and evaluation procedures for Bachelor's degree programs*. Office of Professional Training, American Chemical Society, Washington, DC.
- Auchincloss, L. C., Laursen, S. L., Branchaw, J. L., Eagan, K., Graham, M., Hanauer, D. I., Lawrie, G., McLinn, C. M., Pelaez, N., Rowland, S., & Towns, M. (2014). *Assessment of course-based undergraduate research experiences: A meeting report* (pp. 29–40).
- Baker, J. P., & Goodboy, A. K. (2019). The choice is yours: The effects of autonomy-supportive instruction on students' learning and communication. *Communication Education*, 68(1), 80–102.
- Boyer Commission on Educating Undergraduates in the Research University. (2002). *Reinventing undergraduate education: Three years after the Boyer Report*. The Carnegie Foundation for the Advancement of Teaching, Stony Brook, New York.
- Brew, A. (2013). Understanding the scope of undergraduate research: A framework for curricular and pedagogical decision-making. *Higher Education*, 66(5), 603–618.
- Brew, A., & Mantai, L. (2017). Academics' perceptions of the challenges and barriers to implementing research-based experiences for undergraduates. *Teaching in Higher Education*, 22(5), 551–568.
- Buchanan, A. J., & Fisher, G. R. (2022). Current status and implementation of science practices in course-based undergraduate research experiences (CUREs): A systematic literature review. *CBE—Life Sciences Education*, 21(4), ar83.
- Butler-Adam, J. (2018). Developing young scientists. Really? *South African Journal of Science*. 114(1–2), Art. #a0256.
- Deci, E. L. & Ryan, R. M., (1985). Conceptualizations of intrinsic motivation and self-determination. In *Intrinsic motivation and self-determination in human behavior* (pp. 11–40).
- Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11(4), 227–268.

- Eagan, M. K., Hurtado, S., Chang, M. J., Garcia, G. A., Herrera, F. A., & Garibay, J. C. (2013). Making a difference in science education: The impact of undergraduate research programs. *American Educational Research Journal*, 50(4), 683–713.
- Fahnert, B. (2017). Keeping education fresh—Not just in microbiology. *FEMS Microbiology Letters*, 364(21).
- Gasper, B. J., & Gardner, S. M. (2013). Engaging students in authentic microbiology research in an introductory biology laboratory course is correlated with gains in student understanding of the nature of authentic research and critical thinking. *Journal of Microbiology & Biology Education: JMBE*, 14(1), 25.
- Graham, M. J., Frederick, J., Byars-Winston, A., Hunter, A. B., & Handelsman, J. (2013). Increasing persistence of college students in STEM. *Science*, 341(6153), 1455–1456.
- Healey, M., Flint, A., & Harrington, K. (2016). Students as partners: Reflections on a conceptual model. *Teaching & Learning Inquiry*, 4(2), 1–13.
- Howitt, S., Wilson, A., Wilson, K., & Roberts, P. (2010). ‘Please remember we are not all brilliant’: Undergraduates’ experiences of an elite, research-intensive degree at a research-intensive university. *Higher Education Research & Development*, 29(4), 405–420.
- Hunter, A.-B., Laursen, S. L., & Seymour, E. (2007). Becoming a scientist: The role of undergraduate research in students’ cognitive, personal, and professional development. *Science Education*, 91(1), 36–74.
- Linn, M. C., Palmer, E., Baranger, A., Gerard, E., & Stone, E. (2015). Undergraduate research experiences: Impacts and opportunities. *Science*, 347(6222), 1261757.
- Moreno, A. C. R., Pasternak Taschner, N., Piantola, M. A. F., Armellini, B. R. C., Lellis- Santos, C., & Ferreira, R. D. C. C. (2023). Real-Lab-Day: Undergraduate scientific hands-on activity as an authentic learning opportunity in microbiology education. *FEMS Microbiology Letters*, 370, fnad062.
- Parker, J. (2018). Undergraduate research, learning gain and equity: The impact of final year research projects. *Higher Education Pedagogies*, 3(1), 145–157.
- Rowland, S. L., Lawrie, G. A., Behrendorff, J. B., & Gillam, E. M. (2012). Is the undergraduate research experience (URE) always best? The power of choice in a bifurcated practical stream for a large introductory biochemistry class. *Biochemistry and Molecular Biology Education*, 40(1), 46–62.
- Spell, R. M., Guinan, J. A., Miller, K. R., and Beck, C. W. (2014). Redefining authentic research experiences in introductory biology laboratories and

- barriers to their implementation. *CBE—Life Sciences Education*, 13(1), 102–110.
- UNDP. (2023). *The SDGs in action*. <https://www.undp.org/sustainable-development-goals>.
- Van der Westhuizen, T. (2023a). Internal Domains Entrepreneurial Heartset, Mindset and Handset. In *Youth Entrepreneurship: An Ecosystem Theory for Young Entrepreneurs in South Africa and Beyond* (pp. 31–55). Cham: Springer Nature Switzerland.
- Van der Westhuizen, T. (2023b). Youth Entrepreneur Ecosystem. In *Youth Entrepreneurship* (pp. 57–111). https://doi.org/10.1007/978-3-031-44339-8_3
- Wang, J. T., Daly, J. N., Willner, D. L., Patil, J., Hall, R. A., Schembri, M. A., Tyson, G. W., & Hugenholtz, P. (2015). Do you kiss your mother with that mouth? An authentic large-scale undergraduate research experience in mapping the human oral microbiome. *Journal of Microbiology & Biology Education*, 16(1), 50.
- Werth, A., West, C. G., & Lewandowski, H. J. (2022). Impacts on student learning, confidence, and affect in a remote, large-enrollment, course-based undergraduate research experience in physics. *Physical Review Physics Education Research*, 18(1), 010129.
- Williams, L. C., & Reddish, M. J. (2018). Integrating primary research into the teaching lab: Benefits and impacts of a one-semester CURE for physical chemistry. *Journal of Chemical Education*, 95(6), 928–938.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits any noncommercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if you modified the licensed material. You do not have permission under this license to share adapted material derived from this chapter or parts of it.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.





11

Transformative Learning in Correctional Education: Fostering Economic Inclusion Through Entrepreneurship

Juan Ontong  and Sher-Lee Fourie 

1 Introduction

Transformative learning can occur in many settings; one of which is the correctional services environment, where incarcerated individuals may acquire skills and knowledge through various on-site programmes, as well as externally provided programmes by stakeholders. In the South African correctional services context, education is delivered through the Department of Correctional Services (2005) and various external service providers, such as faith-based organisations and other non-profit organisations (Aziz, 2021).

Education in correctional facilities in South Africa has evolved significantly, particularly regarding rehabilitation and social inclusion (Daniels, 2023). The stigma and embarrassment associated with incarceration

J. Ontong (✉) · S.-L. Fourie

School of Accountancy, Stellenbosch University, Stellenbosch, South Africa

e-mail: ontongj@sun.ac.za

S.-L. Fourie

e-mail: sher@sun.ac.za

make the prison environment unwelcoming. Furthermore, various challenges are faced by the incarcerated post-release, such as difficulty in finding employment (Matshaba, 2015; Steyn & Louw, 2012). Incarcerated individuals serve their sentences for offences against society, and as a result, their custodians frequently treat them hostilely, believing they are unworthy of second-chance educational opportunities (Daniels, 2023). The Department of Correctional Services has shifted its focus from mere punishment to rehabilitation, in recognition of the potential of adult education to transform the lives of incarcerated individuals (Daniels, 2023; Department of Correctional Services, 2005; Department of Higher Education and Training, 2013). This shift is evident in the introduction of holistic adult educational programmes aimed at fostering active citizenship among inmates, although challenges remain in the implementation of these policies due to institutional culture and a potential lack of resources (Department of Correctional Services, 2005; Lewen, 2013). Correctional services can look toward other potential stakeholders in their communities to assist in providing educational services to incarcerated individuals.

Transformative learning in the correctional education system can play a significant role in fostering economic inclusion through entrepreneurship. The literature highlights the importance of education as a means of enabling formerly incarcerated individuals to lead meaningful and productive lives. Kaur (2012) raises critical questions about the inclusivity of educational programmes for diverse groups, particularly those who are incarcerated, and suggests that education can serve as a pathway to reintegration into society and economic participation.

The development of model transformative correctional education programmes, as discussed in the literature, emphasises the need for a supportive learning environment that fosters mutual respect and motivation. Such environments can facilitate innovative modes of content delivery, including entrepreneurship-focused curricula that are sensitive to the needs of incarcerated students. Access to training, including formal notes and the introduction of digital tools and technology, is also crucial, as it allows individuals to explore entrepreneurial opportunities and to develop skills that are relevant to the modern economy (Montoya, 2024).

This chapter aims to provide context for transformative learning in a correctional services facility using a mono-site case study example, where university lecturers, as part of their social impact initiatives, presented entrepreneurship training to young, incarcerated individuals. This represents a nexus where higher education, often viewed as inaccessible by those who are incarcerated, was offered free of charge.

2 Entrepreneurship as a Way to Foster Economic Inclusion

Entrepreneurship serves as a significant mechanism for fostering economic inclusion, particularly for marginalised communities. Social entrepreneurship, in particular, has emerged as a transformative approach that integrates economic objectives with social impact, thereby promoting inclusive development and long-term community resilience. Case studies indicate that social entrepreneurs implement various strategies, including skills training, microfinance initiatives, and market access facilitation, to enhance self-efficacy and sustainable livelihoods within these communities (Pertiwi, 2025). Equipping incarcerated individuals with entrepreneurship knowledge could help them integrate into society and better understand the needs of their communities.

Financial inclusion is another critical aspect that supports entrepreneurship in fostering economic inclusion. Research indicates that financial inclusion policies, which aim to integrate less privileged groups into the formal financial system, have a positive and significant effect on entrepreneurship in selected African countries. This relationship underscores the importance of access to financial resources in enabling business start-ups and reducing poverty and inequality (Ajide, 2020).

The COVID-19 pandemic further highlighted the need for inclusive entrepreneurship, as it disproportionately affected marginalised communities and significantly increased unemployment (Odeku, 2021; Statistics South Africa, 2021). In response, initiatives have been proposed to strengthen entrepreneurship development programmes that specifically target these groups. The focus is on overcoming the challenges faced by

entrepreneurs from marginalised backgrounds to ensure their economic sustainability in a post-pandemic context (Anand, 2021).

Economic inclusion is crucial for previously incarcerated individuals, as it significantly influences their reintegration into society and reduces recidivism rates (Alperstein, 2007). Entrepreneurship emerges as a viable pathway for economic inclusion, particularly for those facing labour market discrimination, such as previously incarcerated individuals. The use of entrepreneurship as a response to the barriers they encounter in traditional employment settings serves as a powerful tool for the economic inclusion of previously incarcerated individuals.

Historically, higher education institutions such as for-profit colleges have offered degree programmes to incarcerated individuals; however, various complexities related to educational access in correctional facilities have been noted (Ross et al., 2015). Furthermore, higher education institutions have been critiqued for only offering traditional degree programmes. There is a call for universities to consider alternative methods for delivering higher education that prioritise the needs of incarcerated students. This includes examining the experiences of inmates who have enrolled in such programmes and advocating for policy responses that support more equitable educational opportunities. The discourse surrounding higher education in correctional facilities also emphasises the need to rethink traditional metrics of success, such as recidivism rates and economic outcomes (Gould, 2018). Adult education through higher education institutions can be a driver for social change (Baatjes & Mathe, 2004). A more nuanced understanding of the transformative potential of education in these settings is necessary as it encompasses broader social and personal dimensions that are often overlooked (Gould, 2018).

The three pillars of higher education are research, teaching, and community involvement (Republic of South Africa, 1997). According to Bringle and Hatcher (1996), every higher education institution is dedicated to using its resources to develop good corporate citizens, solve challenging issues in their community, and form alliances with local communities (Bawa, 2003).

3 Transformative Learning Theory as the Basis for Developing Workshops for Entrepreneurship Education at Correctional Facilities

Transformative learning theory plays a significant role in enhancing entrepreneurship education by fostering critical reflection and perspective transformation among learners (Quay & McCaw, 2019). This theory suggests that transformative learning often begins with a “disorienting dilemma”, which prompts individuals to engage in cycles of critical reflection that will ultimately lead to a shift in their understanding and approach to entrepreneurship. The application of transformative learning in social entrepreneurship education is particularly relevant, as it encourages students to recognise the broader social and community-oriented purposes of entrepreneurship, thereby facilitating a deeper understanding of how entrepreneurial practices can be adapted to various economic and social contexts (Benson et al., 2012).

Additionally, the integration of educational theories, including transformative learning, into experiential entrepreneurship education can enhance pedagogical practices (Bell & Bell, 2020). A framework that combines various educational philosophies supports educators in delivering effective experiential learning experiences, which reinforces the transformative potential of entrepreneurship education (Bell & Bell, 2020).

4 The Role of Higher Education in the Entrepreneurship Learning of Incarcerated Individuals

There is a need for higher education institutions to engage in entrepreneurship training (Nhleko & Van der Westhuizen, 2022). Access to higher education has been shown to act as a ladder for individuals to escape poverty and the criminal justice system, thereby breaking the cycle of recidivism not only for the individuals but also for their families and

communities (Collica-Cox & Schulz, 2018). This access can empower inmates with the necessary tools to navigate the challenges of reintegration, including overcoming societal stigma and finding legitimate employment opportunities.

Training incarcerated individuals in entrepreneurship is therefore transformative, particularly given the high unemployment rate in South Africa that makes it challenging for formerly incarcerated individuals to find employment and reintegrate into society (Statistics South Africa, 2021). It is argued that conceptual clarity regarding incarceration and rehabilitation within the South African criminal justice system is essential to better understand initiatives that can aid in reintegrating former inmates into communities (Singh, 2008).

Based on transformative learning theory, this broad theoretical approach is closely aligned with the workshop's goals, which aimed to bridge the gap between educational and social impact requirements as a teaching and social impact initiative. It is important that the design of any learning material is not purely theoretical but instead focuses on practical solutions based on the input of the students, as they are best positioned to understand the needs of the community into which they aim to reintegrate post-release. Transformative learning occurs when students are exposed to new experiences and perspectives, such as interactions with diverse peers (Quinlan, 2011, 2014). The design of any training programme or workshop should include interaction and two-way communication between the instructor and the students. This means that traditional methods of lecturing to a large class must be tailored for a smaller group and should include elements of group work, one-on-one feedback, and sufficient time for reflection and discussion of theory within the workshop programme.

5 The Benefits of Entrepreneurship Education for Incarcerated Youths

Entrepreneurship education for incarcerated individuals offers several potential benefits that can facilitate their reintegration into society and reduce their recidivism rates. These benefits are discussed below.

5.1 Acquisition of New Skills and Knowledge

One significant advantage is the provision of skills and knowledge that can empower individuals to start their own businesses and thereby creating employment opportunities for themselves. This can provide a viable path to financial independence and stability, which are crucial for supporting families and contributing positively to communities (Battle, 2019).

5.2 Personal Growth and the Improvement of the Participants' Self-efficacy Beliefs

Entrepreneurship training can enhance personal growth and self-efficacy among incarcerated individuals. Engaging in entrepreneurial activities fosters motivation and a sense of achievement, both of which are essential for successful reintegration into society. The process of transitioning from prison to society involves various challenges, where entrepreneurship can serve as a constructive outlet that encourages individuals to overcome these obstacles (Battle, 2019). Design considerations for entrepreneurship learning for incarcerated individuals should focus on fostering cognitive and behavioural transformation, enhancing self-efficacy, and addressing the unique challenges faced by this population. The provision of entrepreneurial education can significantly influence incarcerated individuals' opportunity recognition and cognitive transformation, which are essential for developing an entrepreneurial mindset. This transformation is linked to improved attitudes and behaviours that can facilitate successful reintegration into society post-release.

5.3 Addressing Social Issues

Programmes that focus on entrepreneurship education can address specific social issues, such as the stigma associated with incarceration. By equipping individuals with entrepreneurial skills, these programmes can help to shift societal perceptions and promote acceptance of formerly

incarcerated individuals as productive members of society (Robby et al., 2022).

5.4 Improving Economic Reintegration

The implementation of entrepreneurship training has been shown to improve creative economic management capabilities, particularly among marginalised groups, such as previously incarcerated individuals. This not only aids in their personal development but also contributes to broader societal benefits, including economic growth and community reintegration (Daniels, 2018; Robby et al., 2022).

There is a need for education that is more holistic and sustainable in order to encourage individuals to connect and collaborate across conventional academic boundaries and linking their internal and external orientations (Van der Westhuizen, 2023). However, both teachers and learners must take the initiative, by being creative, innovative, and willing to take risks in the workplace—whether working for themselves or for small start-up businesses. Applying the skills required for success in such settings exemplifies the practical aspects of youth entrepreneurship (Chigunta, 2002)

6 The Potential Challenges of Transformative Entrepreneurship Learning for Incarcerated Individuals

There are various potential challenges to hosting an entrepreneurship-based learning initiative in a correctional services facility. These challenges are discussed below.

6.1 Design of the Course Content

Research indicates that many prison entrepreneurship programmes are not optimally designed to enhance entrepreneurial intentions among

inmates, which suggests that a more structured educational approach could be beneficial (Ciptono et al., 2023). This background informed the design of the workshop. The participants were required to engage in sessions and produce clear deliverables, with the focus not only on learning theory but also on considering its application in the context of developing a practical and implementable business plan for their communities.

6.2 Availability of Resources

Many correctional service facilities are not designed to provide classroom-based learning and face various operational challenges that include access to the facilities, security, and other protocols that are required when allowing external stakeholders into the correctional facility. It is important when designing a teaching-based initiative to be hosted within correctional facilities to do a detailed site visit to understand available resources including technology and the possibility of bringing in external technology and other resources.

6.3 Mindset of the Incarcerated Individuals

One significant aspect is the mindset of the participants, which can be profoundly influenced by their experiences of incarceration. Incarcerated individuals may need to reassess their circumstances, reform their behaviours, and prepare for re-entry into society. This programme emphasised the importance of the life lessons learned during incarceration, which can be pivotal in breaking the cycle of reoffending and returning to prison (Keena & Simmons, 2015).

6.4 Unique Learning Needs of Incarcerated Individuals

It is critical that content creators consider the unique backgrounds and psychological impacts of incarcerated individuals past experiences when

developing any learning material. Addressing both economic and social dimensions is necessary to facilitate successful training (Amone-P'Olak, 2007). It is important to note that many incarcerated individuals in the South African context often did not complete their high school education. As such, they may require additional explanations to comprehend course content and to understand the questions posed to them.

7 The Ex-Cell Workshop as a Mono-site Case Study: Background to the Workshop

The Ex-Cell Workshop was a joint initiative between a university and the Department of Correctional Services, with the focus on the Drakenstein Correctional Facility near Paarl, South Africa. The workshop's mandate was to encourage entrepreneurship through the development of a business plan and to empower incarcerated youths to create their own employment opportunities after their release from prison.

The workshop targeted incarcerated youths, defined as those between the ages of 18 and 35, who were nearing parole. It aimed to connect a higher education institution's teaching mandate to its social impact mandate for the purpose of inclusivity and facilitating access to higher education. As proposed by Ward (2002, p. 513), the good life theory suggests that every rehabilitation programme should have the desired outcome of possible good lives for offenders. This directly correlates with the outcomes of the workshop, which aimed to empower offenders through education to become economically active participants in society, either through employment or entrepreneurship.

As both a teaching and social impact initiative, the workshop aimed to bridge the gap between educational and social impact requirements. Transformative learning theory is an overarching theoretical approach closely aligned with the aims of the workshop. According to Quinlan (2011, 2014), transformative learning occurs when students are exposed to new experiences and perspectives, such as interactions with diverse peers. This exposure fosters personal and social responsibility, which

helps to integrate knowledge and skills with values, a sense of self, identity, and purpose. The classroom approach was collaborative and learner-centred and provided ample opportunities for dialogue and reflection. Furthermore, this workshop was presented in line with projects such as the National Development Plan, which seeks to find ways to reduce unemployment, especially among the youth.

7.1 What Sustainability Problem(s) Did This Initiative Attempt to Address?

Despite undergoing rehabilitation during imprisonment, a criminal record is retained after release from prison. Parolees therefore often struggle more than the general population to find employment due to their criminal history counting against them. Furthermore, given the current downturn in the economy, record high unemployment rates have worsened due to the effects of the COVID-19 pandemic. Offenders often find it difficult to reintegrate into society as the environment differs significantly from that of the correctional facility (Davis et al., 2013, p. 465). It is critical that professionals, families, and communities support offenders after their release to facilitate reintegration into society (Zondi, 2012, p. 766). Education is perceived by many educators as transformative and capable of changing students' worldview, which may be particularly important in correctional facility classrooms where the education that offenders receive can serve as a doorway to freedom, changed behaviour, and improved self-confidence. It can also ultimately assist in reducing recidivism and promoting inclusion (Cantrell, 2013, p. 2). Correctional facilities worldwide use education as part of their rehabilitation programmes to transform offenders into law-abiding citizens upon release (Vandala, 2019, pp. 1–12). Educational training programmes in correctional service facilities are viewed as tools to rehabilitate offenders and reintegrate them into society. However, programmes focused on entrepreneurial skills and finding employment (hereafter referred to as business acumen) are limited and often not included in South African correctional facilities' reintegration programmes.

This workshop served as an educational and capacity-building initiative that exposed the participants to the idea of creating their own businesses and seeking employment. The aim was to identify strategies to purposefully reduce unemployment, particularly among youths, including those who have faced legal issues, thereby contributing to provincial, national, and international development goals. The workshop aimed to upskill and empower the participants to create their own employment opportunities, which would improve their reintegration into society.

Entrepreneurship training plays a significant role in advancing the Sustainable Development Goals by fostering skills and capabilities that address various global challenges. One key aspect is the development of entrepreneurial skills among undergraduates, which has been shown to mediate the relationship between entrepreneurship education and core values of sustainable development.

The outcomes of the initiative were linked to the Sustainable Development Goals, specifically Sustainable Development Goal 1: No Poverty and Sustainable Development Goal 4: Quality Education.

The programme was a free-access initiative that was open to the general public, including individuals who have not attended university. The educational component of the project involved university lecturers volunteering their time, therefore at no substantial cost, while incarcerated participants learned with and from one another through dialogue and sharing experiences, ideas, and knowledge.

Educational training programmes in correctional service facilities are seen as a tool to rehabilitate offenders and reintegrate them into society. It is important that, as part of reintegration theory, society, which includes higher education institutions, plays a role in reintegrating them into society (Kim & Clark, 2013, p. 203).

7.2 The Criteria Used to Screen Youth Entrepreneur Applicants for Participation in the Programme

The workshop had no major restrictions. The only entry requirement was that participants needed to be nearing parole and fell within the youth age category of 18 to 35. Twenty participants were selected at a time. Although not a requirement, the majority of the participants were serving medium-term sentences, rather than maximum-term sentences, were nearing the end of their sentences, or were eligible for parole.

7.3 Strategies to Encourage the Inclusion of Diverse Candidates

As the workshop was open to everyone who met the aforementioned criteria, the cohort of workshop participants was diverse in terms of racial composition and represented the population statistics of the Western Cape. The majority of workshop participants came from previously disadvantaged backgrounds and identified with the BCI (Black, Coloured, Indian) racial categories, although race was not used as a deciding factor.

7.4 The Infrastructure and Support Provided by the Institution

The workshop provided assistance to the local community by equipping past offenders with business acumen skills to support the start-up of financially and socially sustainable businesses or to help them find employment through relevant free education in the form of a workshop and post-workshop support if needed.

The workshop provided free access to educational resources and in-person contact training. It was a free course that resulted in an attendance certificate. Free lunch, snacks, and beverages were provided during the workshop. Stationery was provided to the participants to make notes, and course workbooks, notes, and textbooks, as well as motivational

books, were all provided free of charge. The workshop concluded with a closing ceremony where participants received a certificate of attendance and an inspiring self-help book to aid their post-workshop growth. The ceremony aimed to empower the participants to feel good about their achievements and efforts in upskilling and bettering themselves.

A hybrid model was offered whereby lecturers conducted both in-person and online sessions. Institutional laptops were provided to the lecturers for the online sessions.

7.5 The Structure of the Programme

The workshop was programme-based and took place over a period of five days, providing educational support through the following sections and sub-sections:

Section 1: Analysing a business idea (using a provided case study):

- *Doing market research.*
- *Preparing a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis.*
- *Analysing supply and demand.*
- *Budgeting and funding opportunities.*
- *Ethical considerations in business.*
- *Understanding the concept of marketing.*
- *Crisis management and conflict resolution.*

Section 2: Considerations when working with other people and finding a job:

- *Employing staff.*
- *Business etiquette.*
- *Creating your Curriculum Vitae (CV).*
- *Finding job opportunities.*
- *Preparing for an interview (including mock interviews).*

Section 3: Conclusion of the workshop:

- *Presentation of business plans by students and certificate award function.*
-

The learning objectives of the workshop were to:

-
- Rehumanise learning by focusing on learning's social, Ubuntu-focused dimensions, namely collaboration, community building, and connectedness, and to empower the participants.
-

(continued)

(continued)

-
- Equip past offenders with business acumen skills in order to start financially and socially sustainable businesses or to find employment through relevant free education in the form of the workshop and post-workshop support as needed.
 - Aid in connecting the higher education institution's teaching mandate to its social impact mandate for the purpose of inclusivity and facilitating access to higher education.
-

The learning outcomes of the workshop included the following elements that the participants should have been able to do at the end of the workshop:

-
- Communicate effectively within the course context.
 - Engage creatively with the course material with the aim of solving real-life problems.
 - Function effectively as a member of a culturally diverse team.
 - Maintain a point of view with respect to the various disciplines, as well as in relation to the interaction between disciplines, with due respect for the diversity of ideas.
 - Reflect on their own learning and attitude to learning and demonstrate learning growth and progression.
-

The workshop also aimed to achieve the objective of supporting offenders to reintegrate into society after release by:

-
- Assisting participants in a holistic manner to develop a plan for the post-release future to reintegrate economically into society.
 - Creating awareness of the opportunities that exist post-release that will allow the participants to reintegrate into society.
 - Enabling the participants to develop a business plan and its sub-components in the participants' attempt to empower themselves through self-employment.
 - Enabling the participants to create a CV, identify avenues for finding employment, and prepare for a job interview.
-

7.6 The Ecosystem of the Initiative

The workshop took place in the classroom section of the Drakenstein Correctional Facility. The participants attended the workshop while

they were incarcerated at Drakenstein Correctional Facility. The workshop was conducted in the presence of prison guards and took place within prison-regulated hours. Lecturers provided the course content and training to these incarcerated individuals. Once released, former workshop participants were encouraged to contact the workshop coordinators so that they can assist them in further developing either a business plan or their CV, thereby putting the workshop training into action.

This workshop had a positive impact on the academics involved in presenting it, as well as on the attendees. Similar to other initiatives such as the Ubuntu Learning Community, which offers skills training at another correctional facility, the Ex-Cell Workshop offered a direct service of providing tertiary education, profound intellectual engagement, and re-entry services to those especially poised to benefit from it, while also addressing the systemic inequalities and criminogenic environments that led to their imprisonment in the first place. By giving people in prison access to opportunities, the programme elevates those from particularly disadvantaged positions to more powerful places in society through higher education. This may help to change the very fabric of the South African community regarding systemic inequality and institutional racism.

7.7 The Performance of the Initiative So Far, Including Ratings by the Participants

To date, the workshop has been presented three times (2021, 2022, and 2023) to a cohort of 20 participants per workshop. The workshop was also included in the Department of Higher Education and Training-accredited journal *Acta Criminologica: African Journal of Criminology & Victimology* in 2022. The overall feedback from the workshop participants was very positive. Quotations as obtained from the workshop participants (included in Ontong et al., 2022, pp. 77–79) are as follows:

Based on my experience, I think they must bring more courses, more workshops, in order to upskill us, as especially for me. I still have two

years and [a] few months left before seeing parole so I would be grateful if the institution can provide more workshops. (Participant A)

Shockingly, I have learned quite a few things from becoming a shareholder, if not flying solo, to what it takes to make a profit, funding, etc. Most importantly, what it takes to make your business come to fruition. (Participant B)

I learn[ed] a lot in [the] workshop. Firstly, they enlighten[ed] my mind in terms of business in any circumstances, also how to compile a CV. Also, in terms of [an] interview, how and what is expected from one as [an] interviewee, and the thing that was difficult... was to prepare [a] business plan so that you can present, so in [an]other way they break the ice in my life in terms of I [now] know the sequence of business. Another thing is that I know that [in the workplace there] is conflict that would need us as employees or employer to resolve it and [perform] crisis management. (Participant C)

I learned that life is too short and precious to carry on with crime, so you should make the best of out your time. (Participant D)

7.8 The Challenges That Were Encountered

Challenges encountered initially included, firstly, securing funding for the workshop. While it might have been expected that finding presenters and developing content would pose difficulties, this was not the case, as we found many lecturers willing to join the project. There were, however, a few administrative challenges in setting up this initiative; a memorandum of understanding between the university and the Department of Correctional Services had to be created, which involved negotiations among various stakeholders and the inclusion of the university's legal division to officially initiate the project. Overall, the Department of Correctional Services was very accommodating in providing a venue with adequate security, a data projector, and Wi-Fi to host the workshops. There were a few instances where participants arrived slightly late due to the security procedures and protocols that had to be followed before they were allowed to leave the prison and enter the classroom. The participants were, however, willing to learn and showed that they understood

the importance of entrepreneurship education as a tool to improve their lives post-release.

7.9 Conclusion and Plans to Further Develop/ Improve the Initiative

The role of adult educators in teaching entrepreneurship within correctional services facilities is pivotal in equipping inmates with essential skills for successful reintegration into society. There is a significant need for entrepreneurship in the current economic environment, and expanding this workshop, both locally and nationally, could help prevent those released from reoffending and enable them to make a positive contribution to society. This training not only prepares the incarcerated for potential small business creation but also contributes to their overall behavioural transformation, which is essential for successful re-entry into society. The involvement of higher education institutions in this process is vital, as they provide the knowledge and support necessary for inmates to navigate the challenges of re-entry and reduce recidivism rates. Workshops like the Ex-Cell Workshop can be enhanced by offering post-workshop support and strengthening communication channels to maintain contact with parolees after their release.

It should be considered how workshops such as the Ex-Cell Workshop can be rolled out on a larger scale. Funding poses a significant constraint in providing free education to incarcerated individuals. To be sustainable, programme designers need to utilise technology to create content that can be implemented across various correctional facilities. However, most correctional facilities lack resources such as reliable Wi-Fi, projectors, and functioning computers. As a consequence, face-to-face education often appears to be the only viable option in these settings.

Higher education institutions should also consider providing dedicated resources, either in the form of funding or staff who can teach and manage these programmes administratively. Although the concept of social impact is considered part of an academic's work, it is worth examining how higher education institutions can assist in reducing the constraints to the rollout of such workshops and training.

In conclusion, workshops focused on teaching incarcerated individual's entrepreneurship skills are integral to the implementation of entrepreneurship programmes in correctional services, as they facilitate skill acquisition, promote self-reliance, and foster behavioural changes that are essential for inmates' successful reintegration into society.

References

- Ajide, F. M. (2020). Financial inclusion in Africa: Does it promote entrepreneurship? *Journal of Financial Economic Policy*, 12(4), 687–706.
- Alperstein, M. (2007). Getting closer to the community voice in curriculum development: An exploration of the possibilities. *Education as Change*, 11(3), 59–67.
- Amone-P'Olak, K. (2007). Coping with life in rebel captivity and the challenge of reintegrating formerly abducted boys in Northern Uganda. *Journal of Refugee Studies*, 20(4), 641–661.
- Anand, K. (2021). Promoting inclusive entrepreneurship for marginalized communities in post pandemic situation. *American Journal of Management*, 21(6), 62–68.
- Aziz, G. (2021). Youth ministry: Offering hope in a COVID-19 South Africa through community. *HTS Theological Studies*, 77(3), 1–6.
- Baatjes, I., & Mathe, K. (2004). Adult basic education and social change in South Africa, 1994 to 2003. In L. Chisholm (Ed.), *Changing class: Education and social change in post-apartheid South Africa* (pp. 1–20). Human Sciences Research Council (HSRC) Press.
- Battle, M. V. (2019). *The lived experience of African Americans that transition from prison to society who become entrepreneurs* (Doctoral dissertation). University of Phoenix.
- Bawa, A. C. (2003). Rethinking community-based learning in the context of globalisation. In H. Perold, S. Stroud, & M. Sherraden (Eds.), *Service enquiry: Service in the 21st century* (pp. 47–59). Global Service Institute and Volunteer and Service Enquiry Southern Africa.
- Bell, R., & Bell, H. (2020). Applying educational theory to develop a framework to support the delivery of experiential entrepreneurship education. *Journal of Small Business and Enterprise Development*, 27(6), 987–1004.

- Benson, C. C., Palin, G. R., Cooney, T. M., & Farrell, K. (2012). Agents of change: Using transformative learning theory to enhance social entrepreneurship education. In *Proceedings of the 57th Annual ICSB World Conference, Wellington, New Zealand* (pp. 1–18). <https://www.proquest.com/openview/404974638d5797c492f6b4b097c09358/1?pq-origsite=gsc-holar&cbl=39996>
- Bringle, R. G., & Hatcher, J. A. (1996). Implementing service learning in higher education. *The Journal of Higher Education*, 67(2), 221–239.
- Cantrell, D. (2013). Correctional education as democratic citizenship education. *Journal of Correctional Education*, 64(1), 2–12.
- Chigunta, F. (2002). *Youth entrepreneurship: Meeting the key policy challenges*. Education Development Centre, Wolfson College.
- Ciptono, W. S., Anggadwita, G., & Indarti, N. (2023). Examining prison entrepreneurship programs, self-efficacy and entrepreneurial resilience as drivers for prisoners' entrepreneurial intentions. *International Journal of Entrepreneurial Behavior & Research*, 29(2), 408–432.
- Collica-Cox, K., & Schulz, D. M. (2018). Of all the joints, she walks into this one: Career motivations of women corrections executives. *The Prison Journal*, 98(5), 604–629.
- Daniels, D. (2018). Back from the edge: Exploring adult education and training as second chance opportunities for adult students. In A. Fataar (Ed.), *Mediation and materiality in troubled South African times: Unveiling the identities, practices, knowledge practices of students in educational sites* (pp. 111–134). SUN Publishers.
- Daniels, D. (2023). Adult education as care work in a South African prison: The role of adult educators. *Perspectives in Education*, 41(4), 143–161.
- Davis, C., Bahr, S. J., & Ward, C. (2013). The process of offender reintegration: Perceptions of what helps prisoners re-enter society. *Criminology & Criminal Justice*, 13(4), 446–469.
- Department of Correctional Services. (2005). *White paper on corrections in South Africa*. Department of Correctional Services. https://www.gov.za/sites/default/files/gcis_document/202001/whitepaperoncorrectionsinsouth-africa.pdf
- Department of Higher Education and Training. (2013). *White paper for post-school education and training*. Department of Higher Education and Training. <https://www.dhet.gov.za/SiteAssets/Latest%20News/White%20paper%20for%20post-school%20education%20and%20training.pdf>
- Gould, M. R. (2018). Rethinking our metrics: Research in the field of higher education in prison. *The Prison Journal*, 98(4), 387–404.

- Kaur, B. (2012). Equity and social justice in teaching and teacher education. *Teaching and Teacher Education*, 28(4), 485–492.
- Keena, L., & Simmons, C. (2015). Rethink, reform, reenter: An entrepreneurial approach to prison programming. *International Journal of Offender Therapy and Comparative Criminology*, 59(8), 837–854.
- Kim, R. H., & Clark, D. (2013). The effect of prison-based college education programs on recidivism: Propensity score matching approach. *Journal of Criminal Justice*, 41(3), 196–204.
- Lewen, J. (2013). Prison higher education and social transformation. *Saint Louis University Public Law Review*, 33, 353–361.
- Matlay, H., & Westhead, P. (2005). Virtual teams and the rise of e-entrepreneurship in Europe. *International Small Business Journal: Researching Entrepreneurship*, 23(3), 279–302.
- Matshaba, T. D. (2015). Challenges faced by ex-inmates after their release from incarceration in the democratic South Africa. *Acta Criminologica: Southern African Journal of Criminology*, SE2, 66–78.
- Montoya, R. M. (2024). *Toward the development of a model transformative correctional education program for incarcerated students in New Mexico prisons* (Doctoral dissertation). California Coast University.
- Nhleko, Y., & Van der Westhuizen, T. (2022). The role of higher education institutions in introducing entrepreneurship education to meet the demands of Industry 4.0. *Academy of Entrepreneurship Journal*, 28(1), 1–23.
- Odeku, K. O. (2021). Critical impact and effect analysis of the Covid-19 pandemic on the tour guide enterprises in South Africa. *Academy of Entrepreneurship Journal*, 27(3), 1–7.
- Ontong, J. M., Arendse-Fourie, S. L., & Everts, R. P. (2022). Higher education's role in teaching business acumen in offender rehabilitation in South Africa: A case study at the Drakenstein correctional facility. *Acta Criminologica: African Journal of Criminology & Victimology*, 35(3), 70–85.
- Pertiwi, H. (2025). Empowering marginalized communities through social entrepreneurship: A pathway to inclusive economic development. *Journal of Indonesian Scholars for Social Research*, 5(1), 35–45.
- Quay, J., & McCaw, C. T. (2019). Reflection, contemplation and teacher problem solving in the world(s) of the classroom. In R. S. Webster & J. D. Whelen (Eds.), *Rethinking reflection and ethics for teachers* (pp. 145–161). Springer.
- Quinlan, K. M. (2011). *Developing the whole student: Leading higher education initiatives that integrate mind and heart*. Leadership Foundation for Higher Education.

- Quinlan, K. M. (2014). Leadership of teaching for student learning in higher education: What is needed? *Higher Education Research & Development*, 33(1), 32–45.
- Republic of South Africa. (1997). The Higher Education Act, No. 101 of 1997. Government Gazette, 390(18515/1655), 19 December. Government Printer.
- Robby, M. T., Kamil, M., Saepudin, A., & Komar, O. (2022). The implementation of entrepreneurship training to improve ex-terrorist convicts' creative economic management capabilities in Tangerang, West Java. *Journal of Hunan University Natural Sciences*, 49(2).
- Ross, J. I., Tewksbury, R., & Zaldivar, M. (2015). Analyzing for-profit colleges and universities that offer bachelors, masters, and doctorates to inmates incarcerated in American correctional facilities. *Journal of Offender Rehabilitation*, 54(8), 585–598.
- Singh, S. B. (2008). Towards conceptual clarity of incarceration and rehabilitation within the South African criminal justice system. *Acta Criminologica: Southern African Journal of Criminology*, SE2, 59–77.
- Statistics South Africa. (2021). *Statistical release P0211: Quarterly labour force survey: Quarter 1: 2021*. Statistics South Africa. <http://www.statssa.gov.za/publications/P0211/P02111stQuarter2021.pdf>
- Steyn, F., & Louw, D. (2012). Recreation intervention with adolescent offenders: Prospects and challenges in the South African context. *African Journal for Physical Health Education, Recreation and Dance*, 18(2), 423–433.
- Vandala, N. G. (2019). The transformative effect of correctional education: A global perspective. *Cogent Social Sciences*, 5(1), 1–15.
- van der Westhuizen, T. 2023. Applying theory U through SHAPE to develop student's individual entrepreneurial orientation in a university ecosystem. In *Youth Entrepreneurship: An Ecosystem Theory for Young Entrepreneurs in South Africa and Beyond* (pp. 177–217). Cham: Springer Nature Switzerland.
- Ward, T. (2002). Good lives and the rehabilitation of offenders: Promises and problems. *Aggression and Violent Behavior*, 7(5), 513–528.
- Zondi, C. Z. (2012). Community participation in community correction operation and offender re-integration. *International Journal for Cross-Disciplinary Subjects in Education*, 3(3), 763–771.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits any noncommercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if you modified the licensed material. You do not have permission under this license to share adapted material derived from this chapter or parts of it.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.





12

Youth Entrepreneurship Development Through Design Thinking and Business Model Innovation

D. A. J. (Dawie) Bornman 

1 Introduction

In recent years, the rise in uncertainty in youth employability has gone from worrisome to devastating (CV & Johnson, 2021; Tan et al., 2023; van den Broek et al., 2023). Even before the global Covid-19 pandemic, questions such as, ‘where will I find a job?’, ‘what skills do I need to succeed in today’s economic climate?’ or ‘how will I be able to make a living from my degree/diploma/course/academic programme?’ have been issues that young students struggle with. This is especially true in a country such as South Africa where the current unemployment rate is at an all-time high (Mseleku, 2022; Ramnund-Mansingh & Reddy, 2021). There was therefore a need to re-think, re-shape and re-design the academic offerings (Bozkurt et al., 2022) that were being

D. A. J. (Dawie) Bornman (✉)

Department of Business Management, University of Pretoria, Pretoria, South Africa

e-mail: dawie.bornman@up.ac.za

presented to students which took place on a second-year BCom Business Management module presented to undergraduate students at a tertiary educational institution in Pretoria, South Africa since 2019. This module, focusing on design thinking and business modelling innovation, was targeted at young and potential youth entrepreneurs. The module also incorporates informal- and formal-sector South African entrepreneurs into the module's ecosystem, and is designed, developed and facilitated by the module's programme lead and coordinator. After being re-designed, the module has grown from 48 students in 2019 to 352 students in 2023. Although not all students have equal resources, the inclusion of diverse candidates is supported through the use of free-ware and free tools that students can access (i.e. the Google suite). This assists to make the teaching and learning fun, interactive, collaborative and accessible. Additional interactive online live streaming lectures and pre-recorded edutainment videos of textbook literature chapter discussions are also disseminated to students to assist with self-paced learning at no additional cost.

2 The Purpose of the Module

The purpose of the module focuses on getting students to understand the role of an entrepreneur as an individual who is an active citizen who can enhance the quality of their own lives, their community or environment. This is done by linking the students' knowledge to creative thinking through design thinking principles, which then attempts to assist students to take their ideas to market through product, service or process development. The module targets diverse background youth who rely not only on lecturer-to-student teaching, but also on peer-to-peer learning through group projects, and these projects are geared towards managing student innovation for sustainability. The idea is that these young students see themselves as more than just individuals who are part of a tertiary educational system, but rather try to illuminate their interest and encourage them to channel their ideas, passion and thinking towards economic possibilities such as self-employment through entrepreneurship. This links directly to the United Nations' Sustainable Development

Goals, and specifically to goals such as SDG 4 (Khan et al., 2022) and SDG 8 (Kreinin & Aigner, 2022). As SDG 4 focuses on the quality of inclusive equitable education and promotes lifelong learning opportunities for all where elements, such as peer learning, human rights education, global citizenship and re-imagining the learning ecosystem are applied to the module. In terms of decent work and economic growth as depicted by SDG 8, the module aims at promoting inclusive and sustainable economic growth through a process of fostering an understanding of employment by equipping students with future orientated learning which builds resilience and enthusiasm towards self- and community enrichment in intercultural environments.

3 Youth Entrepreneurship and Theoretical Frameworks

Through the module, three main areas are addressed which enhance youth entrepreneurship which align with theoretical frameworks focusing on entrepreneurial eco-systems (Fernandes & Ferreira, 2022), leadership and sustainability (Pauceanu et al., 2021), and social entrepreneurship (Kamaludin et al., 2024). This includes promoting (1) critical and analytical thinking (Xu et al., 2023), (2) service-learning (Mitchell, 2023) and (3) internationalisation (Bargoni et al., 2024). Firstly, promoting critical and analytical thinking focuses on how students are encouraged to think beyond the norm and how to apply themselves within different multi-cultural environments or countries (Gavriluță et al., 2022; Kamaruddin et al., 2021). This is especially true in a developing country (such as South Africa) with limited resources (Bornman & Steenkamp, 2023; Shahriar et al., 2021). Based on the literature an overwhelming majority of articles include students as the research group for entrepreneurial intention and mention that there is a lack in critical and analytical thinking (Hassan et al., 2020; Rasool et al., 2018; Urban, 2008). As governments recognise the importance of entrepreneurship and have moved to set up and coordinate an overall institutional framework that will create an enabling environment for young entrepreneurs in South Africa and globally (Bellò

et al., 2018; Nieman, 2012), programmes such as the Entrepreneurship Development Programme in South Africa, strive to create an enabling environment for young entrepreneurs, by helping young entrepreneurs gain access to the relevant skills, knowledge, values and attitudes to successfully run their own entrepreneurial ventures. In Europe, policies such as the ‘Strategic Framework for European Cooperation in Education and Training’ are specifically focused on students and geared towards enhancing creativity and entrepreneurship (Bellò et al., 2018; Gavriluță et al., 2022). Entrepreneurial education should become a focus of tertiary institutions in South Africa in order to assist current and future entrepreneurs with practical tools, as the entrepreneurial intention is low amongst the youth (Fatoki, 2014; Van der Westhuizen, 2023; 2024). Therefore this aspect of critical and analytical thinking also aims at exposing students to transdisciplinary projects in order to integrate their ideas beyond just one field of study or industry (for example, applying design thinking principles to merge the creative and financial sectors). Students are encouraged to think critically and analytical in order for them to come up with more than just a single solution to a problem (i.e. ideation), but also identify various solutions and how these solutions could affect local communities and international markets. This starts by firstly looking at the South African landscape and establishing an understanding of local entrepreneurship, then by gearing the thinking towards global impact. In the module students are also encouraged to dissect their daily activities through ‘creativity journal or vlogging’ exercises where they analyse how they utilise the textbook theory in real-life day-to-day situations. This assists the students to identify and realise that a ‘ten step process’ does not always begin with the textbook’s version of the process.

Secondly the module fosters growth and social value creation by bringing in service-learning through community engagement with student’s immediate communities such as assisting informal entrepreneurs (i.e. survivalist entrepreneurs) with business model development or business plan formalisation. Worldwide, policy makers, venture philanthropists and financial sponsors are shifting the business conversation to one where impoverished communities and self-efficacy

form part of the discussion (Guerrero et al., 2021; Urban, 2008), therefore it is imperative that students are able to not only understand the informal sector but see the informal sector's role in assisting with poverty alleviation. This aspect offers students the opportunity to form multi-culturally diverse student groups and invest time in engaging with for example Early Childhood Development or Day Care Centres in the Tshwane region (Mamelodi). Students are then expected to transform these informal businesses to a level of formalisation. These entrepreneurs in turn then form part of the assessment in terms of providing feedback, not only in terms of real business skills but also much needed life skills. Students gain a sense of ownership whereby they become invested in the development of the entrepreneurial venture and entrepreneurs which they interact with. If the entrepreneurial venture thrives, then the entrepreneurs along with the students who form part of the 'consultation group or advisory board to the entrepreneurs' are proud of the growth.

Thirdly, internationalisation is established through international collaborative projects with partnering European universities. This aspect showcases a boost in student self-confidence by illustrating their high-quality abilities compared to global markets and international university peers. This element also assists students with networking and relationship building for potential future collaboration, possible post-graduate studies or employment opportunities beyond their university studies (Martínez-Martínez et al., 2025). Guerrero et al. (2021) states that by putting a business development task force or team in place by recruiting a variety of individuals, from various backgrounds, with a similar goal of social upliftment will benefit both the community and an entrepreneurial venture. Therefore, the internationalisation aspect is formulated as a task force team-based project where for example a small group of international students visit the tertiary educational institute in Pretoria for a week and are integrated into the larger student group on campus. Due to the large number of undergraduate students taking this module, the forming of groups takes place in the following manner: Students divide themselves into small groups consisting of five members each, and then four small groups will combine to form a large group ('an organisation') thus an organisation of twenty 'employees'. Thirteen to fifteen groups

(‘organisations’) are formed which then each consist of four departments. Each ‘organisation’ is assigned an international student and an entrepreneur or entrepreneurial venture to consult with. Each department consists of five students (‘employees’) where one student functions as the head of the department who will communicate with the other departmental heads (i.e. the other group leaders of each smaller group). The departments are then divided as: (1) The department of information and data collection (conducting interviews with the real-life entrepreneurs); (2) The department of business development strategies (receiving the information from the former department and converting it into a business model and recommendations document); (3) The department of visual and design strategies (receiving the information from the former department and converting it into a poster and presentation); and (4) The department of communication and marketing (receiving the information from the former department and presenting it to the other departments on the final evening of the international students’ visit).

This instils a design thinking mindset (Antonites, 2020) within the students through exposure to diverse international mental models, transfer of practical skills and the application of business principles in a conducive environment where they do not have to fear to fail, but rather learn how to equip themselves for their future. Through this process, each student realises their critical role in the chain towards excellence.

4 Assessment Criteria

Although the assessment criteria for the module includes theoretical understanding, practical implementation, South African case studies and how students could link their problem-solving capabilities through creative problem-solving; currently the module is only presented to students who have successfully completed their first academic year in the Faculty of Economics and Management Sciences. Although this is limiting in that it is not open to anyone who would be interested, there are several initiatives to assist with expanding the opportunity to non-university students. Such initiatives include short courses that

are presented at no cost to individuals who enrol into the university's Entrepreneurship Development online programme, the Starting My Business hybrid course, or the Entrepreneurship Capacitation Building online course which is presented through a subsidiary of the university. In a private capacity, the lecturers also consult, mentor and coaches start-up entrepreneurs, specifically in the creative, retail, marketing and communication sectors. As the university where this module is presented is not discriminatory in terms of race, gender or age, the candidates that are allowed to partake in the module or initiatives are not limited. For the module however, an individual has to be registered as a student at the specific university, but for the training and coaching initiatives this is not a requirement. In a South African context, an individual is classified as 'youth' when the individual is 35 years of age or younger. This however does not hinder the training initiatives and support being offered to individuals who might be older than 35 years of age. Currently the university where the module is presented does make provision for infrastructure support through the Community Engagement Unit which assists with associated costs of, for example, transporting the students to the university's affiliate campus in a rural area of Pretoria (i.e. Mamelodi) to meet up with local entrepreneurs. In terms of the training and coaching initiatives, there have also been successful new programmes developed and implemented at the university (along with third party organisations' assistance) to provide support in terms of access to technology (i.e. WIFI and mobile devices) and facility support (i.e. venues or online platforms for lecturing and consultation).

As the module is an undergraduate module which is presented in the first semester of a BCom students' second year, it therefore lays the foundation for the follow-up module which focuses on developing the entrepreneurial venture ideas into real-life businesses. The module also feeds into the post-graduate diploma in Entrepreneurship where the programme coordinator is the programme lead. In this programme, post-graduate students are introduced to the same informal entrepreneurs situated in the Mamelodi business community to assist with further collaboration and therefore it is imperative to ensure that there is synergy, collaboration, growth and relationship building between the undergraduate and post-graduate students, as well as the real-life entrepreneurs.

This link establishes a more one-on-one consultation opportunity where established entrepreneurs can showcase their passion, hard work and progress to aspiring or young entrepreneurs (i.e. the post-graduate students), who then in turn can assist these established entrepreneurs with research and a theoretical foundation towards professionalisation (i.e. registering the entrepreneurial venture, as well as presenting yourself as an entrepreneur and your entrepreneurial venture in a professional goal-orientated manner, through a relevant strategy aimed at constant adaptability, growth and longevity).

The entrepreneurial ecosystem that is formed through the co-creation and co-existence of the module, the post-graduate diploma and the short course initiatives create a full circle cycle of development, growth and possible sustainability. A second-year student, formally studying at a university receives theoretical knowledge in class or in a hybrid-learning environment, develops an understanding for practical application in the informal and formal entrepreneurial environment, is assisted by post-graduate students to facilitate training and consultation to established entrepreneurs, and fosters a uniquely South African perspective through internationalisation. The long-term goal is then that this perspective will motivate South African youth to see their worth beyond South African borders and understand how critical their role is, not just in their local economic environment but also in the ecosystem of the global economy.

5 Feedback and Challenges

Thus far the feedback has been positive in terms of how the module has been managed, presented and constantly re-designed for relevance along with constructive feedback in terms of enhancing the overall initiatives. The module has been receiving ratings from students which ranges between 4.7 and 4.9 on a 5-point Likert-type scale, where 5 represents 'extremely satisfied'. The module has received qualitative feedback in the form of comments from international participants (as well as entrepreneurs) which state that the initiative is refreshing, realistic and has developed a better understanding of the entrepreneurial ecosystem,

whilst also being motivational and inspiring towards starting or running an entrepreneurial venture.

One of the biggest challenges however is still the initial phase when starting out with both the module and the initiatives. This is due to all individuals not necessarily being on the same level of comprehension in terms of the entrepreneurial theoretical knowledge, practical experience and understanding where an individual fits within their entrepreneurial ecosystem (nationally and internationally). Therefore, in a very short time frame, it is up to the facilitator, as well as the effort from the students (or in the case of the short course programmes, the efforts of the delegates), to be goal-orientated, motivated and enthusiastic in order to see the bigger picture, whilst at the onset only having the scattered puzzle pieces. This proves to be difficult, but what has come to light is that the first initial interaction, is as the saying goes, is one that makes a lasting impression. Although unemployment in South Africa is at an all-time high and youth employability is daunting, once this information is disseminated to students and delegates, then the reality is that there is only room for improvement, which starts with each individual self. This improvement is one that can only start when there is mentorship or facilitation which comes with an optimistic perspective or approach which aims to inspire, develop, grow and assist other individuals (in this case students) to gain self-worth, self-confidence and self-motivation towards building their own entrepreneurial futures.

6 Conclusion

When focusing on future development and improvements for the module as well as initiatives, it lays with scalability, expansion and embracing new technology. Therefore there is a necessity for digital transformation or the adoption of Industry 4.0 which entailed how technologies such as Immersive Realities (VR, AR, MR and XR), Artificial Intelligence (AI), Cloud Technology and 5G, amongst others, should be implemented need to be integrated into the module (Kruger & Steyn, 2024). The idea is to package the module, along with the initiatives in such a way that it could be transferred to other academic institutions

across South Africa and Africa. This will enrich the teaching and learning experience as students will be able to Africanise their experience, upscale themselves and learn from peers who are also studying or working in the field of entrepreneurship, and possibly transforming their lives and that of society. This will then ring true to the African proverb of 'Ubuntu'; in Zulu stating, 'I am because we/you are' (also 'humanity towards others'), and in Xhosa as 'the belief in a universal bond of sharing that connects all humanity'.

References

- Antonites, A. (2020). *Exploring creativity and innovation: A structured approach for entrepreneurs, managers and other game changers* (2nd ed.). Van Schaik Publishers.
- Bargoni, A., Ferraris, A., Vilamová, Š, & Wan Hussain, W. M. H. (2024). Digitalisation and internationalisation in SMEs: A systematic review and research agenda. *Journal of Enterprise Information Management*, 37(5), 1418–1457.
- Bellò, B., Mattana, V., & Loi, M. (2018). The power of peers: A new look at the impact of creativity, social context and self-efficacy on entrepreneurial intentions. *International Journal of Entrepreneurial Behavior & Research*, 24(1), 214–233.
- Bornman, D. A. J., & L. Steenkamp, L. (2023). Investigating the impact of a pandemic on entrepreneurial behaviour: A qualitative study of south African wedding vendors. *Cogent Business & Management*, 10(2), 1–18.
- Bozkurt, A., Karakaya, K., Turk, M., Karakaya, Ö., & Castellanos-Reyes, D. (2022). The impact of COVID-19 on education: A meta-narrative review. *TechTrends*, 66(5), 883–896.
- CV, S., & Johnson, B. (2021). Employability framework in the post-Covid scenario—A literature review. *Abhigyan*, 39(2), 28–36.
- Fatoki, O. (2014). The entrepreneurial intention of undergraduate students in South Africa: The influences of entrepreneurship education and previous work experience. *Mediterranean Journal of Social Sciences*, 5(7), 294–299.
- Fernandes, A. J., & Ferreira, J. J. (2022). Entrepreneurial ecosystems and networks: A literature review and research agenda. *Review of Managerial Science*, 16(1), 189–247.

- Gavriliuță, N., Grecu, S. P., & Chiriac, H. C. (2022). Sustainability and employability in the time of COVID-19. Youth, education and entrepreneurship in EU countries. *Sustainability*, 14(3), 1589.
- Guerrero, M., Santamaría-Velasco, C. A., & Maho, R. (2021). Intermediaries and social entrepreneurship identity: Implications for business model innovation. *International Journal of Entrepreneurial Behavior & Research*, 27(2), 520–546.
- Hassan, A., Saleem, I., Anwar, I., & Syed Abid, H. (2020). Entrepreneurial intention of Indian university students: The role of opportunity recognition and entrepreneurship education. *Education & Training*, 62(7/8), 843–861.
- Kamaludin, M. F., Xavier, J. A., & Amin, M. (2024). Social entrepreneurship and sustainability: A conceptual framework. *Journal of Social Entrepreneurship*, 15(1), 26–49.
- Kamaruddin, M. I. H., Ahmad, A., Husain, M. A., & Abd Hamid, S. N. (2021). Graduate employability post-COVID-19: The case of a Malaysian public university. *Higher Education, Skills and Work-Based Learning*, 11(3), 710–724.
- Khan, P. A., Johl, S. K., Akhtar, S., Asif, M., Salameh, A. A., & Kanesan, T. (2022). Open innovation of institutional investors and higher education system in creating open approach for SDG-4 quality education: A conceptual review. *Journal of Open Innovation: Technology, Market, and Complexity*, 8(1), 49.
- Krein, H., & Aigner, E. (2022). From “decent work and economic growth” to “sustainable work and economic degrowth”: A new framework for SDG 8. *Empirica*, 49(2), 281–311.
- Kruger, S., & Steyn, A. A. (2024). Navigating the fourth industrial revolution: A systematic review of technology adoption model trends. *Journal of Science and Technology Policy Management*, 16(10), 24–56.
- Martínez-Martínez, S. L., Ventura, R., & Santos-Jaén, J. M. (2025). Creativity Vs Grit: Key competences to understand entrepreneurial intention. *The International Journal of Management Education*, 23(2), Article 101143.
- Mitchell, T. D. (2023). Critical service-learning as social justice education: A case study of the citizen scholars program. In *Service-learning and social justice education* (pp. 1–12). Routledge.
- Mseleku, Z. (2022). Youth high unemployment/unemployability in South Africa: The unemployed graduates’ perspectives. *Higher Education, Skills and Work-Based Learning*, 12(4), 775–790.
- Nieman, G. H. (2012). *Small business management: A South African approach*. Van Schaik.

- Pauceanu, A. M., Rabie, N., Moustafa, A., & Jiroveanu, D. C. (2021). Entrepreneurial leadership and sustainable development—A systematic literature review. *Sustainability*, 13(21), 11695.
- Ramnund-Mansingh, A., & Reddy, N. (2021). South African specific complexities in aligning graduate attributes to employability. *Journal of Teaching and Learning for Graduate Employability*, 12(2), 206–221.
- Rasool, Y., Shaikh, D., Ahmed, A., & Khuwaja, F. A. (2018). Determinants of entrepreneurial intentions: A systematic review. *Kasbit Business Journals*, 11(1), 1–33.
- Shahriar, M. S., Islam, K. M., Zayed, N. M., Hasan, K., & Raisa, T. S. (2021). The impact of Covid-19 on bangladesh's economy: A focus on graduate employability. *The Journal of Asian Finance, Economics and Business*, 8(3), 1395–1403.
- Tan, E., Mwangwabi, F., Lim, T., & Lim, A. (2023). Graduate employability concerns amidst a crisis: Student perspectives from Singapore on COVID-19. *Industry and Higher Education*, 37(3), 370–383.
- Urban, B. (2008). Social entrepreneurship in South Africa: Delineating the construct with associated skills. *International Journal of Entrepreneurial Behavior & Research*, 14(5), 346–364.
- van den Broek, A., van Hoorn, L., Tooten, Y., & de Vroege, L. (2023). The moderating effect of the COVID-19 pandemic on the mental wellbeing of health care workers on sustainable employability: A scoping review. *Frontiers in Psychiatry*, 13(1), 1067228.
- Van der Westhuizen, T. (2023). *Youth entrepreneurship: An ecosystem theory for young entrepreneurs in South Africa and beyond*. Springer Nature.
- Van der Westhuizen, T. (2024). *Practical tools for youth entrepreneurs: An applied approach for South Africa and beyond*. Springer Nature.
- Xu, E., Wang, W., & Wang, Q. (2023). The effectiveness of collaborative problem solving in promoting students' critical thinking: A meta-analysis based on empirical literature. *Humanities and Social Sciences Communications*, 10(1), 1–11.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits any noncommercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if you modified the licensed material. You do not have permission under this license to share adapted material derived from this chapter or parts of it.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.





13

Innovative Teaching in Food Product Development and Entrepreneurship for Student Success

Maricel Krügel 

1 The Title and Mandate of the Programme/Module or Initiative, Including the Targeted Young Entrepreneurs

The world is facing a lot of challenges, like climate change, that will affect food production, food security and nutrition and the competition between food and non-food agriculture products (FAO, [2022](#)). According to the Food and Agricultural Organisation of the United Nations the world population is expected to increase and reach around 9.7 billion people by 2050. Food production must therefore increase by about 50%–70% to meet increased demands (FAO, [2022](#)). South Africa (SA) will have to produce 50% more food by 2050 to feed an estimated population of 73 million people (von Bormann, [2019](#)). In the

M. Krügel (✉)

Department of Food Science, Stellenbosch University, Stellenbosch, South Africa

e-mail: maricel@sun.ac.za

past few decades, millions of people across the world have been lifted out of poverty. This has led to a rapid growth in the middle class, particularly in developing economies, with resultant lifestyle changes. While population growth increases the demand for agricultural products and stimulates farming activities, urbanisation, on the other hand, requires food to be easily processed, transported, stored, and distributed. Thus, food processing and distribution have become key factors in the transformation of food systems (FAO, 2022). Our modern food system is very complex and changes continuously in time and space. During the past century, food processing evolved to make food the basis of a healthy civilisation, help society overcome hunger and disease, and improve the safety, nutrition, convenience, affordability, and availability of foods (Floros et al., 2010). Food Science is, therefore, a knowledge area that not only focuses on our dietary needs but aims to solve many food related challenges and is crucial to the success of the food industry.

Food manufacturers are, therefore, in the business of meeting the ever-changing demands of consumers as well as developing food products that are original and have the ability to increase a company's share of a particular market (Guiné et al., 2020). Today's manufacturing companies rely heavily on the success of new products which is critical for business performance, while taking into consideration the present competitive and fast shifting markets (Horvat et al., 2019). The higher education sector in SA is under ever increasing pressure to become more responsive to stakeholder demands and to deliver graduates that meet their expectations (Metcalfé et al., 2020). The Department of Food Science at Stellenbosch University, therefore, has an enormous task to provide the quantity and calibre of graduates essential to support the large, complex and evolving food industry in SA.

The 48-credit module, Trial Design and New Product Development (NPD) is one of the final year modules, in the fourth year of the BSc Food Science degree. This module is purposefully designed as a capstone project-based module that assesses various student learning outcomes, allowing students to gain insight into the entire food product development process, from farm to fork. A capstone experience, thus, enables students to integrate and apply knowledge gained throughout their course (McSweeney et al., 2017). In this NPD module students,

who work in randomly assigned teams for the entire year, must integrate all fundamental food science and related disciplines' principles they learned (Fig. 1) to research and develop food products. Students are, therefore, exposed to experimental Food Science and this process equips them with knowledge and skills that allow them to develop products that meet the needs of the producer and the consumer. Various technical skills, like microbial safety, nutritional value, formulation, the use of different ingredients, packaging, regulatory aspects, and sensory and chemical analyses are involved. Other, more business-orientated skills must also be considered, like the budget and cost of the product, taking into consideration numerous variables and clearly indicate the consumer market research they have performed identifying their target market. This entire process starts with brainstorming and concepts before moving to kitchen-scale development.

It has been indicated through various studies that the agri-food sector, world-wide, not only needs people skilled in technical aspects, but needs a multitude of extra skills, such as lifelong learning, teamwork, business, communication, and time management skills (Bodescu et al., 2024;

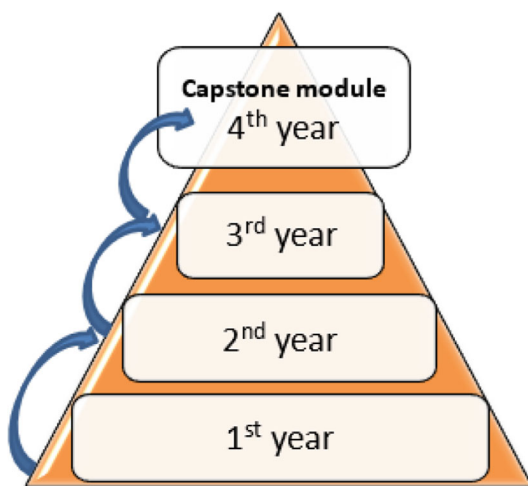


Figure 1 Students must integrate and apply all the knowledge and practical skills they have learned in the first, second, third, and fourth year to research and develop food products during the capstone module

Bohlscheid & Clark, 2012; Flynn et al., 2017; Mayor et al., 2015; Metcalfe et al., 2020; Weston et al., 2019, 2020) which are also essential for entrepreneurship (Bodescu et al., 2024). Through an integrated and continuous curriculum renewal and alignment process (Hubball & Burt, 2004; Loughlin et al., 2021), assessing the outcomes (Table 1), assessing the rubrics, and assessing the assignments and learning opportunities in conjunction with consultation sessions with various micro and macro stakeholders, this module evolved and gained a lot of traction from industry in the last seven years. The module evolved to not only focus on technical and practical skills but also embrace learning opportunities that include various soft skills, like (Barnett et al., 2001) communication, conflict management, self-assessment to identify personal and team strengths and weaknesses (using the Gallup Clifton Strengths assessment), effective teamwork (Krügel et al., 2025) and leadership skills (Fig. 2). It is clear that this module not only embrace the three curriculum domains identified by Barnett et al. (2001), namely knowledge (knowing), action (doing), and self (being), but also integrate it throughout to prepare future entrepreneurial students for a complex world (Barnett, 2012).

South Africa is a complex environment with a population of 64 million of which 55% lives in poverty. Food production and processing is a major part of the agricultural-food entrepreneurship in SA (Samkange et al., 2021) and it is imperative to train and challenge the students to critically think about how they can innovatively and critically address hunger, food security and sustainability issues (Zaka et al., 2024) in the South African context as Food Scientists. This module is designed to cultivate and support students with a natural inclination towards youth entrepreneurship. It fosters their innate drive for innovation, risk-taking, and profit-seeking (van der Westhuizen, 2024) within a structured and supportive environment. Guided by mentorship, students engage collaboratively in the process of new product development, allowing them to refine their entrepreneurial skills in a safe and experiential learning setting.

Table 1 The various specific and general learning outcomes for the 4th year capstone module Trial Design and New Product Development

Learning objectives

Specific Learning Outcomes

By participating in this course and successfully completing group assessments, each student should comply with the following specific learning outcomes:

- The learner is able to integrate various fundamental food science and related disciplines' principles in the theory and practice while developing food products
- The learner is able to evaluate and apply foodstuffs related regulation/s in a South African context
- The learner is able to research, evaluate, and apply appropriate methods linked to processing and various food related analyses
- The learner is able to research and comprehend food trends and market research with a view to understand the consumer and the role the consumer plays in product development
- The learner is able to effectively participate in various electronic activities
- The learner is able to effectively work with others as part of a group

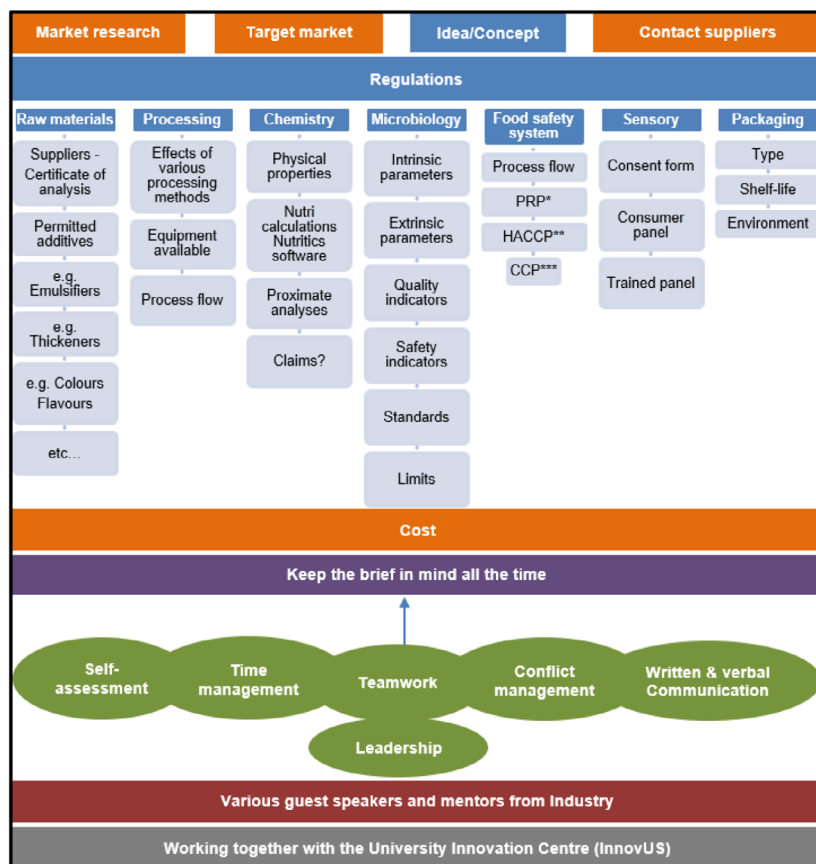
General outcomes

By participating in this course and successfully completing group assessments, each student should comply with the following generic learning outcomes:

- The learner is able to organise, manage, and motivate himself/herself personally in an effective way
 - The learner is able to identify and solve problems in a clear and logical manner
 - The learner is able to collect, process, and critically evaluate scientific information
 - The learner is able to effectively and professionally communicate at different levels using the relevant language and writing and presentation skills
 - The learner is able to exhibit professional and social skills and behaviour
-

2 What Sustainability Problem(s) Is This Initiative Trying to Address?

The NPD module plays a pivotal role in sustainable food innovation, ensuring that food science contributes not only to health and industry growth, but also to environmental sustainability. By addressing both local and global food challenges, the module equips students with the entrepreneurial mindset and problem-solving skills necessary to develop innovative, market-ready solutions that respond to real-world sustainability issues.



*PRP = Pre-requisite program; **HACCP = Hazard analysis critical control point;

***CCP = Critical control point

Figure 2 All the different skill sets and stakeholders the students are exposed to during the year module Trial Design and New Product Development.

Each year, students are provided with an NPD theme and brief, a structured document that guides the development of original food products. This ensures that students focus on consumer needs, market relevance, and commercial viability (Stewart-Knox & Mitchell, 2003). Student teams must adhere to the given theme and any accompanying

technical, regulatory, or sustainability-related or other specified requirements set by the module lecturer. Over the years, the module has tackled pressing South African sustainability challenges, demonstrating its commitment to fostering responsible innovation.

Sustainability is a global priority, and its implications extend far beyond the food itself (von Bormann, 2019). Sustainable food production encompasses multiple factors, including ethical sourcing, waste reduction, ingredient traceability, responsible supply chain management, eco-friendly packaging, and consumer engagement. By integrating these considerations into the NPD module, students develop a holistic understanding of sustainability, ensuring they are well-equipped to drive change in the food industry. This module, therefore, aligns closely with the United Nations (2015), Sustainable Development Goals (SDG), specifically SDG 2, 3, 9, 12, 13, and 17 (Table 2).

In this module the three pillars of sustainability—environmental, social, and economic—are, therefore, integrated and play a crucial role in educating and teaching students to ensure long-term success.

- Environmental sustainability involves sourcing ingredients ethically and responsibly, minimising food waste (Garrone et al., 2016), and adopting sustainable packaging solutions (Guillard et al., 2018) and novel processing technologies (Brennan, 2015).
- Social sustainability focuses on developing healthy, nutritious food options that align with consumer well-being (Brennan, 2015).
- Economic sustainability requires cost-effective production (Brennan, 2015), and competitive pricing that ensure profitability without compromising ethical and environmental responsibilities (Samkange et al., 2021).

By embedding entrepreneurial education, critical thinking, and sustainability-driven innovation into the curriculum, the NPD module prepares students to become leaders in food science, capable of addressing industry and societal challenges through responsible, forward-thinking, innovative, but also responsible product development. These principles are fundamental to the module and students must carefully consider each aspect throughout the product development process.

Table 2 The NPD module aligns well with various United Nations, Sustainable Development Goals

SDG 2: Zero Hunger	• NPD focuses on creating nutritious, affordable, and accessible food products to combat hunger and malnutrition • Emphasis on functional foods, alternative protein sources, and food fortification to better supports nutrition
SDG 3: Good Health and Well-being	• Developing health-conscious food products that reduce the risk of lifestyle diseases (e.g., obesity, diabetes) • Use of clean-label ingredients and food safety principles to ensure consumer well-being
SDG 9: Industry, Innovation, and Infrastructure	• Encourages innovation in food processing and packaging to improve efficiency and reduce waste • Collaboration with food industries and startups to develop novel food products
SDG 12: Responsible Consumption and Production	• NPD includes strategies for reducing food waste, upcycling by-products, and promoting sustainable food sourcing • Focus on eco-friendly packaging and minimising carbon footprints in food production
SDG 13: Climate Action	• Integration of climate-smart food technologies and sustainable agricultural practices • Research on reducing the environmental impact of food production, such as alternative proteins (plant-based, insect-based and lab-grown meat)
SDG 17: Partnerships for the Goals	• Collaboration with government agencies, industry partners, and academic institutions to develop sustainable food solutions • Participation in global food sustainability initiatives and research networks

Examples of themes that student teams had to follow during food product development from 2017 to 2022 include:

2016: Nutritious and safe treats for either lactose intolerant and/or allergic kids. Examples of the food products that were developed are: (1) dairy-free strawberry or caramel flavoured frozen dessert made from macadamia nut milk and root vegetables, (2) fruit flavoured potato milk based mousse, (3) a cookie cup filled with a vegetable based pudding, topped with a marshmallow, (4) fruit and vegetable lollipop with an accompanying popping candy coconut sherbet, (5) beetroot and cocoa flavoured cultured soya with cereal based inclusion, and (6) nutritious dairy-free and egg-free baked and glazed pumpkin doughnut.

2017: Profit rather than “waste”. Teams had to develop a product where value was added to food waste or the value engineering of co-products obtained from manufacturing, to enable sustainable food product production. The products developed were: (1) gluten-free bread that mainly used carrots that could not be sold on the market due to aesthetics, (2) brewing of a craft beer using bread waste, (3) instant noodles that was made from pumpkin and other vegetable waste, (4) purple pretzels that was made using grape pomace waste, (5) toffee that was manufactured using sweet whey waste, (6) a baked snack that mainly consisted out of spent coffee ground and vegetable waste, and (7) a coffee flavoured yoghurt with flakes made from banana peel.

2018: “Local” is Lekker. Teams had to address South African challenges by utilising regional and sustainable sources to develop innovative food products. The products developed were: (1) lactose-free Amasi-based ice cream, (2) smoke and chili flavoured fish spread made from locally and sustainably sourced catfish, (3) bobotie flavoured sorghum and alfalfa-based baked snack, (4) bean balls canned in a chakalaka sauce, (5) chakalaka sandwich slice made from Bambara nuts, and (6) a breakfast cereal made from brewer’s spent grain, butternut waste and wheat flour.

2019: Protein gone “wild”. Each NPD team had to develop a product by using alternative proteins. The students were not allowed to use meat, dairy, or the more known protein sources. The products developed were: (1) dairy-free hemp and pea- based cream cheese, (2) garlic and rosemary flavoured mushroom and legume-based tortilla style chip, (3)

vegan legume-based lactose-free dairy alternative snack, (4) vegetable and legume-based instant soup concentrate, (5) ginger and cinnamon sweet cookie spread that included black soldier fly larvae as the main protein source, and (6) a vegan fava-bean and yeast-based savoury spread.

2020: Sustainability and affordability. Teams had to address sustainable and affordable nutrition for the South African consumer. They had to clearly identify their South African target market. The products developed were: (1) chicken flavoured gluten meat substitute strips in a chakalaka sauce with red kidney beans, (2) savoury flavoured bean and vegetable corned meat substitute, (3) vegan liquid egg alternative made from green mung bean and up cycled aquafaba, (4) chocolate flavoured drink made from maize, lentils, and sweet potatoes, (5) minced meat alternative made from mango kernel flour, and (6) a powdered milk alternative made from white kidney beans.

2021: Geriatric Food. Each team had to develop a product targeting the ageing population of 60 year and up. Design thinking was used during this process where students had to connect with their chosen target age group and solve a specific food or nutrition related problem for their potential customer. The products developed were: (1) creamy maize-based drink flavoured with non-alcoholic rum, rich in cocoa powder, and fortified with magnesium and lactium, (2) high fibre, allergen-free beetroot-based cracker, (3) sago pearls in a mageu sauce complimented by a layer of stewed peaches, (4) instant coffee pods, (5) chocolate flavoured plant-based sweet treat with cranberries, and (6) nutritiously dense, easy to bite-sized snack.

2022: Food with a South African twist—An innovative twisting idea! In line with this theme each team had to develop a product that showed an innovative approach to achieve the result by either in the ingredients used and/or the processing method. They again had to develop the product for the South African palate and therefore had to clearly sketch a bio of their proposed target market within SA. The products developed (Fig. 3) were: (1) small cake bites, fortified with faba bean protein concentrate and fibre, (2) biltong-flavoured spread & dip, made with chickpeas, sugar beans and maize, (3) frozen maize meal ball with a flavourful tomato filling and a crust made of breadcrumbs, (4) barley and tapioca-based American pale ale craft beer infused with honeybush,

(5) plant-based bites made using samp and beans, coated with a golden, crispy crumb, and (6) a vegan and dairy-free drink made from red speckled beans, sorghum, and Rooibos extract.



Figure 3 Examples of the newly developed products in 2022

3 The Criteria Used to Screen Applicants/ Youth Entrepreneurs for Participation in the Programme

Students that register for this module are part of the BSc Food Science degree co-hort. This module is not an elective; therefore, each student must register for this 48-credit module and pass it in order to graduate. Food Science is an election programme, and applications are considered according to the university entry requirement rules and procedures as set out in the Selection guidelines and admission policy for undergraduate programmes for the Faculty of AgriSciences.

The faculty has the following requirements for students that are interested to study BSc Food Science:

- An average of at least 60% in the National Senior Certificate (NSC) (a high school diploma that students receive in South Africa after completing grade 12), Independent Examinations Board or relevant final school examination.
- The average is calculated by taking your highest score in Language of Learning and Teaching subject (English or Afrikaans) + (5 x best results in 20-credit subjects excluding Life orientation and Mathematics 3). The total divided by 6 equals your NSC average.
- Afrikaans or English (Home Language or First Additional Language) 4 (50%)
- Mathematics 5 (60%)
- Physical Sciences (Physics and Chemistry) 4 (50%)

4 Strategies to Encourage the Inclusion of Diverse Candidates

The AgriSciences Faculty has a fantastic recruitment team that is part of the management team. They are responsible for the recruitment of undergraduate students and this team focusses on diverse schools across the country to speak to students from various backgrounds. The faculty

also launched the #WomeninAgriSciences campaign in 2022. The aim is to encourage more women, especially Black, Coloured, and Indian students, to study in the field of AgriSciences, such as Food Science. This campaign was started to inform students what Applied Sciences is about, even if it is just to change their perspective. The University also has a recruitment bursary campaign where academically strong Black, Coloured, and Indian students are given funding for their entire degree. Current Food Science students are also used to engage with other campus students to broaden their knowledge about Food Science.

The AgriSciences Faculty also participate in the annual Open Day of the University, where the Department of Food Science hosts detailed sessions and webinars to high school learners. During these sessions, where translation services are available, applicants from all backgrounds are well informed, by various post-graduate students and staff members, about the various career options in Food Science and the prospective students are assisted in making informed decisions about their academic futures. The Department also participates in the interactive tours where parents and prospective students can visit the Department and meet all the staff members and see the facilities. During these in-house tours the staff take care to answer questions in depth and provide insight into the various work opportunities graduates may encounter or highlight the possibility of going the entrepreneurial route once graduated. These tours aim to showcase the inclusive and diverse student community. During Open Day events, leadership emphasises the institution's focus on inclusivity, transformation, and support for students from all backgrounds. This commitment is highlighted in speeches and information sessions, reinforcing the University's dedication to providing a transformative experience for every student, aimed at student success.

5 The Infrastructure/Support Provided by the Institution

The Department of Food Science boasts state-of-the-art laboratories where students can conduct a wide range of analyses. It features two fully equipped NPD kitchens, allowing students to select from an

array of equipment to produce their products on a kitchen scale. The microbiology, chemistry, and sensory laboratories further enable students to carry out essential food safety and nutritional analyses within the Department. Additionally, students have the opportunity to work with Nutritics, an online software platform, for which the Department purchases an annual licence. This ensures access to the most up-to-date tools for calculating the nutritional values of food products.

The success of this module is driven by the collective cooperation of academic and technical staff members, who provide guidance and support where needed. A key pillar of the learning approach is the cultivation of a safe, experimental environment, where students are encouraged to take risks, embrace failure as a learning opportunity, and refine their entrepreneurial mindset. To foster critical thinking and resilience, students must feel empowered to experiment, iterate, and learn from setbacks without fear of repercussions.

Throughout the NPD process, students encounter a variety of obstacles, mirroring the uncertainties and complexities of real-world product development (Falihat et al., 2024; Rudder et al., 2001). These challenges arise from multiple factors, requiring adaptive problem-solving, rapid decision-making, and creative thinking under pressure. During the NPD process emphasis is also placed on developing effective group work skills (Krügel et al., 2025). By navigating these hurdles within tight time constraints, students develop essential entrepreneurial skills such as agility, resourcefulness, and the ability to pivot their ideas when faced with unexpected barriers. This experiential, innovation-driven pedagogy ensures that students graduate not only with technical expertise but also with the confidence and strategic thinking necessary to thrive in dynamic industry environments (Mayor et al., 2015). Quinlan (2014) clearly addresses the need for educational leadership at universities and this module clearly shows the leadership and involvement to ensure holistic student learning and development.

Hybrid learning is now an integral part of education (Guppy et al., 2022). The COVID-19 pandemic demonstrated that various online platforms, such as Microsoft Teams, can be effectively utilised to host guest speakers, deliver lectures, collaborate, and conduct meetings when in-person sessions are not feasible. The Moodle-based student learning

management system, SUNLearn, is also fully functional and widely used in NPD. Furthermore, the University provides excellent support through the Centre for Teaching and Learning and the Centre for Learning Technologies.

6 Links to Other Entrepreneurship Activities Within the Institution

Due to the innovative and entrepreneurial nature of NPD, collaboration is fostered with various institutional partners, including InnovUS, the Technology Transfer Office, and LaunchLab.

InnovUS is a division of Stellenbosch University responsible for technology transfer, entrepreneurial support, development, and innovation. The Technology Transfer Office manages the University's innovation and intellectual property portfolio by seeking appropriate intellectual property protection, including patents, trademarks, designs, and other forms of protection. The team is also responsible for managing the portfolio and commercialising innovation through licensing and the formation of spin-out companies. InnovUS guide and share their knowledge on intellectual property with the students. InnovUS has also been instrumental in assisting an international food company in obtaining a licensing fee to trial the formulation developed in 2019 for the fava-bean and yeast-based savoury spread.

LaunchLab has been helpful in integrating the innovative approach known as Design Thinking into the NPD process. Through this methodology, students gain a deeper understanding of consumer empathy—learning how consumers think and feel about the problem they aim to solve through product development (Olsen, 2015).

LaunchLab cultivates an entrepreneurial environment centred on co-working, events, and business support. Students can also take part in Countdown, an outcomes-based programme that supports early-stage ideas across various sectors. This incubation initiative helps young entrepreneurs assess the feasibility and desirability of their business concepts. As a confident commercial co-builder, LaunchLab assists students in securing their first sale, increasing revenue, and obtaining

mission-aligned funding. Several Food Science students have participated in this programme, with one advancing to the final round.

7 A Description of the Ecosystem of the Initiative

The South African food industry has a strong interest in our NPD module. At the end of each year, student teams showcase their newly developed products to industry professionals at an event hosted by the Department, known as NPD Day. Each year, over 120 guests gather at the Department, and since 2020, the event has also been streamed online. As a result, between 120 and 400 attendees, annually, have had the opportunity to engage with the students' innovations. During the event, students not only present their products, but also deliver comprehensive presentations detailing the entire development process. These products and presentations are evaluated by industry professionals, carefully selected from various sectors of the South African food industry.

NPD Day is more than just a showcase; it is the culmination of an experiential, innovation-driven learning process designed to equip students with the entrepreneurial mindset essential for success in the food sector. Through cutting-edge project-based learning as a pedagogical approach, students gain hands-on experience in concept development, problem-solving, and market validation. The event not only serves as a platform to highlight their technical and creative capabilities but also reinforces their ability to think strategically and commercially about product innovation.

Numerous prizes are donated to the Department for NPD Day, with a total value exceeding R100,000 per year. These prizes range from cash awards to workshops and mentorship sessions, further incentivising entrepreneurial excellence. This highlights the industry's commitment to and recognition of the Department's role in preparing students for their future careers in the food sector.

Students are assessed based on the following criteria:

- The quality of consumer research conducted and how well the problem is defined
- Effectiveness of idea presentation
- Commercial viability
- Originality and innovation
- Relevance
- Competitor analysis and competitive advantage
- Financial metrics
- Holistic sustainability, considering multiple aspects such as packaging, ingredients, and processing
- Product taste
- Consideration and application of relevant regulations
- HACCP plan development

Innovative teaching methodologies are embedded throughout the NPD module to ensure students develop critical entrepreneurial skills. The curriculum is structured to integrate real-world challenges, fostering adaptability, resilience, and strategic decision-making. Industry professionals are actively involved, either directly or indirectly, mentoring students through guest lectures and hands-on guidance. Experts share insights into emerging trends and advancements in the food sector, including food additives such as colours, flavours, hydrocolloids, and sweeteners. Students are also encouraged to liaise with potential suppliers to request ingredient samples, as they are given only a modest budget for product development. While this budget is limited, it serves as a crucial learning tool, compelling students to engage with the industry, negotiate effectively, and cultivate professional relationships. This experiential learning approach not only enhances technical competencies but also fosters an entrepreneurial spirit, ensuring students are well-prepared to navigate the complexities of the food industry.

Over the years, these industry connections have resulted in strong partnerships and invaluable professional networks. In 2022 alone, more than 30 different suppliers contributed ingredient donations, demonstrating the collaborative and innovation-driven nature of the programme. Through these dynamic pedagogical approaches, the NPD module continues to bridge the gap between academia and industry,

shaping future food entrepreneurs who are equipped to drive innovation and sustainable growth.

8 The Performance of the Programme/ Module/Initiative So Far, Including Any Ratings by Participants

Every year after NPD Day various professionals from industry provide feedback. See an example of such an email from industry:

Many thanks to you and the Food Science Department for the warm hospitality on Thursday last for the student NPD presentations.

Congratulations for another successful and informative event. Special best wishes to all the award winners. However, all the teams did excellent work for the novel concepts and realized products they came up with, as too their slick presentations. In this regard all have proven themselves winners.

Having attended these NPD events for many years, it is gratifying to see how they have become more integrated and professional. This is in no small measure due to the efforts of all the Food Science staff and various other external stakeholders who have given willing support and guidance. Each successive cohort of final years have had to up their game and it shows in their confidence during the presentations and in response to questions from the floor afterwards. Well done!

Best wishes to all the departments students as the end of the year approaches, for success in their exams or theses. For the staff, after all the year-end marking and admin, may you enjoy a relaxing vacation.

Students are also required to provide annual feedback on the module. The following excerpts reflect students' experiences of different aspects of the module and the NPD process.

- *The best part of this module was that it allowed for a lot of self-reflection on my part w.r.t communication and self-confidence and finding my voice in a predominantly white class.*
- *The ability to actively engage in the content of the module as well as apply the knowledge previously acquired.*

- *The module was also a very good indication of what to expect in industry.*
- *The best aspects of online learning—it made me more aware of all the different apps and things that can be used to facilitate online learning.*
- *Meeting new people, learning how to deal with people and industry and the reward of developing a new product.*
- *The lectures from industry representatives. Contact with industry. The initial idea generation period and execution of said ideas.*
- *Being able to finally do product development and have our product be launched. A small glimpse into the future.*
- *I've learnt which areas are my strengths and how this can contribute to our NPD team by taking on roles that align with these strengths. This makes the work I do in the team both enjoyable and beneficial to the team as I take pride in that sector of work. I have also learned which areas are my weaknesses and have tried to be conscious where I can better improve these areas by seeing how my teammates approach their strengths which may not be mine. This information has been both insightful and beneficial.*
- *Yes definitely. We really work very well as a group together and I think the best thing we learned is how each person wants to receive a certain message, good or bad, even though you have to get a point across, we now know what the best way possible is.*
- *We know who works well under stress and who doesn't and then we can support those who needs a little bit of extra motivation to ensure they are doing a great job.*
- *Yes. The roles we assigned according to people's strengths, and it was proven to work really well. As mentioned, I struggle with executing, so our group coordinator (who is organised and a good executer) sets clear goals and due dates which helps me complete tasks on time.*

9 The Challenges That Were Encountered

The NPD module spans an entire year, with students collaborating in groups or teams from January to the end of October. As many students may have limited experience working in teams, significant emphasis is placed on self-assessment, communication, conflict resolution, time

management, and teamwork skills. Navigating these dynamics can be challenging—not only for the students but also for the lecturers involved, who provides ongoing mentorship and guidance throughout the process.

It is acknowledged that the module could further strengthen supply chain knowledge, an area that requires greater focus in the future. Additionally, there is room for improvement in the development of comprehensive business plans, ensuring students gain a well-rounded understanding of the commercialisation process.

10 Plans to Further Develop/Improve the Initiative

The Food Science Department, particularly the NPD module, intends to collaborate with the Grapevine and Wine Sciences Department, which hosts The Future of Wine initiative. Together, these modules aim to encourage other programmes to integrate entrepreneurial competencies into the curriculum—not only in the fourth year but progressively from the first year onward.

To support this vision, the AgriHub seeks to inspire and cultivate a secure and dynamic space for entrepreneurship within the Faculty of AgriSciences, fostering an environment where entrepreneurial principles are systematically embedded across various departments. Consequently, curriculum reform initiatives will be essential to establishing a robust entrepreneurial culture.

References

- Barnett, R. (2012). Learning for an unknown future. *Higher Education Research and Development*, 31(1), 65–77. <https://doi.org/10.1080/07294360.2012.642841>
- Barnett, R., Parry, G., & Coate, K. (2001). Conceptualising curriculum change. *Teaching in Higher Education*, 6(4), 435–449. <https://doi.org/10.1080/13562510120078009>

- Bodescu, D., Sîrghea, A., Rațu, R. N., Chiruță, C., Mălăncuș, R. N., Donosă, D., & Robu, A. D. (2024). Relevant skills for employment and entrepreneurship in the agri-food sector. *Sustainability (Switzerland)*, 16(2). <https://doi.org/10.3390/su16020787>
- Bohlscheid, J., & Clark, S. (2012). Career preparedness survey outcomes of food science graduates-a follow-up assessment. *Journal of Food Science Education*, 11(2), 8–15. <https://doi.org/10.1111/j.1541-4329.2011.00139.x>
- Brennan, C. S. (2015). The importance of food science and technology in modern society. *International Journal of Food Science and Technology*, 50(1), 1–2. <https://doi.org/10.1111/ijfs.12747>
- Falahat, M., Chong, S. C., & Liew, C. (2024). Navigating new product development: Uncovering factors and overcoming challenges for success. *Heliyon*, 10(1). <https://doi.org/10.1016/j.heliyon.2023.e23763>
- FAO. (2022). Thinking about the future of food safety—A foresight report. In *Thinking about the future of food safety*. <https://doi.org/10.4060/cb8667en>
- Floros, J. D., Newsome, R., Fisher, W., Barbosa-Cánovas, G. V., Chen, H., Dunne, C. P., German, J. B., Hall, R. L., Heldman, D. R., Karwe, M. V., Knabel, S. J., Labuza, T. P., Lund, D. B., Newell-McGloughlin, M., Robinson, J. L., Sebranek, J. G., Shewfelt, R. L., Tracy, W. F., Weaver, C. M., & Ziegler, G. R. (2010). Feeding the world today and tomorrow: The importance of food science and technology. *Comprehensive Reviews in Food Science and Food Safety*, 9(5), 572–599. <https://doi.org/10.1111/j.1541-4337.2010.00127.x>
- Flynn, K. M., Ho, P., Vieira, M. C., Pittia, P., & Rosa, M. D. (2017). Food Science and Technology students self-evaluate soft and technical skills. *International Journal of Food Studies*, 6(2), 129–138. <https://doi.org/10.7455/ijfs/6.2.2017.a1>
- Garrone, P., Melacini, M., Perego, A., & Sert, S. (2016). Reducing food waste in food manufacturing companies. *Journal of Cleaner Production*, 137, 1076–1085. <https://doi.org/10.1016/j.jclepro.2016.07.145>
- Guillard, V., Gaucel, S., Fornaciari, C., Angellier-Coussy, H., Buche, P., & Gontard, N. (2018). The next generation of sustainable food packaging to preserve our environment in a circular economy context. *Frontiers in Nutrition*, 5(December), 1–13. <https://doi.org/10.3389/fnut.2018.00121>
- Guiné, R. P. F., Florença, S. G., Barroca, M. J., & Anjos, O. (2020). The link between the consumer and the innovations in food product development. *Foods*, 9(9), 3–5. <https://doi.org/10.3390/foods9091317>
- Guppy, N., Verpoorten, D., Boud, D., Lin, L., Tai, J., & Bartolic, S. (2022). The post-COVID-19 future of digital learning in higher education: Views

- from educators, students, and other professionals in six countries. *British Journal of Educational Technology*, 53(6), 1750–1765. <https://doi.org/10.1111/bjet.13212>
- Horvat, A., Behdani, B., Fogliano, V., & Luning, P. A. (2019). A systems approach to dynamic performance assessment in new food product development. *Trends in Food Science & Technology*, 91, 330–338. <https://doi.org/10.1016/J.TIFS.2019.07.036>
- Hubball*, H., & Burt, H. (2004). An integrated approach to developing and implementing learning-centred curricula. *International Journal for Academic Development*, 9(1), 51–65. <https://doi.org/10.1080/1360144042000296053>
- Krügel, M., Van der Merwe, C., & Adendorff, H. (2025). What does it take to become a team? Group work in a final year food science capstone module. *Journal of Food Science*, 90(11), e70688. <https://doi.org/10.1111/1750-3841.70688>
- Loughlin, C., Lygo-Baker, S., & Lindberg-Sand, Å. (2021). Reclaiming constructive alignment. *European Journal of Higher Education*, 11(2), 119–136. <https://doi.org/10.1080/21568235.2020.1816197>
- Mayor, L., Flynn, K., Dermesonluoglu, E., Pittia, P., Baderstedt, E., Ruiz-Bejarano, B., Geicu, M., Quintas, M. A. C., Lakner, Z., & Costa, R. (2015). Skill development in food professionals: A European study. *European Food Research and Technology*, 240(5), 871–884. <https://doi.org/10.1007/s00217-014-2400-z>
- McSweeney, P., Calvo, J., Santhanam-Martin, M., & Billman-Jacobe, H. (2017). Meeting the capstone challenge in postgraduate food science education. *Journal of Food Science Education*, 16(3), 77–80. <https://doi.org/10.1111/1541-4329.12113>
- Metcalf, D. J. A., Fourie, C. M., & Myburgh, C. P. H. (2020). Graduate capabilities required of South African food science and technology students. *Journal of Food Science Education*, 19(2), 85–96. <https://doi.org/10.1111/1541-4329.12177>
- Olsen, N. V. (2015). Design thinking and food innovation. *Trends in Food Science and Technology*, 41(2), 182–187. <https://doi.org/10.1016/j.tifs.2014.10.001>
- Quinlan, K. M. (2014). Leadership of teaching for student learning in higher education: What is needed? *Higher Education Research and Development*, 33(1), 32–45. <https://doi.org/10.1080/07294360.2013.864609>

- Rudder, A., Ainsworth, P., & Holgate, D. (2001). New food product development: Strategies for success? *British Food Journal*, 103(9), 657–671. <https://doi.org/10.1108/00070700110407012>
- Samkange, F., Ramkissoon, H., Chipumuro, J., Wanyama, H., & Chawla, G. (2021). Innovative and sustainable food production and food consumption entrepreneurship: A conceptual recipe for delivering development success in South Africa. *Sustainability (Switzerland)*, 13(19). <https://doi.org/10.3390/su131911049>
- Stewart-Knox, B., & Mitchell, P. (2003). What separates the winners from the losers in new food product development? *Trends in Food Science and Technology*, 14(1–2), 58–64. [https://doi.org/10.1016/S0924-2244\(02\)00239-X](https://doi.org/10.1016/S0924-2244(02)00239-X)
- United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development*. United Nations. <https://www.undp.org/sustainable-development-goals>. Accessed February 27, 2025.
- Van der Westhuizen, T. (2024). *Practical tools for youth entrepreneurs: An applied approach for South Africa and beyond*. Springer Nature.
- von Bormann, T. (2019). *WWF: Agri-food systems: Facts and futures*. How South Africa can produce 50% more by 2050. https://www.wwf.org.za/our_research/publications/?27341/agri-food-systems-facts-and-futures
- Weston, E., Benlloch-Tinoco, M., Mossop, L., McCullough, F., & Foster, T. (2020). Curriculum mapping food science programs: An approach to quantification of professional competencies. *Journal of Food Science Education*, 19(2), 97–108. <https://doi.org/10.1111/1541-4329.12182>
- Weston, E., Foster, T., Crilly, J., & Mossop, L. (2019). Development of a professional competency framework for UK food science graduates. *Journal of Food Science Education*, 19(1), 10–25. <https://doi.org/10.1111/1541-4329.12173>
- Zaka, G., Zaka Anandi, G., & Ariyanto Azis, A. (2024). Addressing hunger in South Africa: Food aid and food security programs for needy communities. *Eduvest—Journal of Universal Studies*, 4(3), 1088–1103. <https://doi.org/10.59188/EDUVEST.V4I3.1083>

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits any noncommercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if you modified the licensed material. You do not have permission under this license to share adapted material derived from this chapter or parts of it.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.





14

Innovative Pedagogies for Entrepreneurship Education: Insights and Reflections from South Africa

Onica Thandi Matsheke

1 Introduction

Entrepreneurial education has seen significant growth in both local and international universities, indicating a significant focus on its development including higher education within South African context. However, there is still no universally accepted curriculum dedicated to aspiring entrepreneurs (Rasmussen et al., 2006). Solomon (2007) argues that the traditional teaching methods of creating business plans still serve as a foundation for teaching entrepreneurship and small business management, however, the focus should be on inspiring and enhancing entrepreneurial abilities to students. Anand et al. (2016) indicated that poor education programmes result in high unemployment rate.

This study focuses on the innovative pedagogies for entrepreneurship education by emphasising the utilisation of innovative pedagogy such as

O. T. Matsheke (✉)

Vaal University of Technology, Vanderbijlpark, South Africa

e-mail: onica@vut.ac.za

the use of Design Thinking Process (DTP) and the utilisation of sustainable development goals in searching for solutions for problems within our society.

2 Innovative Pedagogies for Entrepreneurship Education

The first versions of the framework for innovation pedagogy were presented nearly 14 years ago by Lehto et al. (2011). Lehto et al. (2011) posit that the aim of innovation pedagogy is to contribute to the development of students' innovation competencies such as knowledge, skills, and attitudes needed for innovation activities to be accomplished. Innovation pedagogy adapts to rapidly changing environment by offering guidance for education to create a good life for graduates, society, and the globe, while acknowledging global challenges and addressing sustainability crises (Konst et al., 2020).

Innovation is a central theme in Entrepreneurship Education (EE). The development of effective Entrepreneurship Education (EE) in higher education systems requires innovation (Igwe et al., 2022). "The ongoing changes in the workplace demand that worker, both present and future, receive adequate training since their knowledge, abilities, and optimistic positive attitude are critical for meeting the demands of the contemporary world" (Koloba, 2017).

3 Design Thinking Process

Design thinking is in essence a human-centred process that helps students to think like designers which may better prepare them to deal with difficult situations and to solve complex problems in school, in their careers, and in life in general (Razzouk & Shute, 2012).

To Peter Rowe "Design Thinking" meant reflection on the "situational logic and the decision-making process of designers" (Rowe, 1987). It is a strategy that enables businesses to create products and services that serve consumer needs and fulfil their requirements (Fig. 1).



Fig. 1 Design thinking process (Source Stanford University Institute of Design [2016])

Design thinking process (DTP) has five stages: empathise, define, ideate, prototype, and test (Syachputri et al., 2023). The discussion of these five stages is outlined in depth by (Deitte et al., 2019; Albay & Eisma, 2021; Pratomo et al., 2021).

Empathise

The empathise phase is the stage where the design team gains an empathetic understanding of the users' needs, wants, and objectives, the way they act and think, and the things that are meaningful to them. This can be done by observing and engaging with the users to understand their experiences and motivations. This stage may also involve immersion with the physical environment of the users to understand the issues involved both at the psychological and emotional levels. Central to human-centred design is empathy and obtaining an empathetic understanding means setting aside one's personal assumptions about the situation to gain real insights from users.

Practically, the design thinking process assists students to meet with their potential users, face-to-face or virtually to empathise with them prior to starting the business to find out what the exact problems are, to be able to define the exact problems, to get the background and the real needs of potential users. They are expected to empathise with at least 100 to 200 potential users. Then they can regenerate or refine their business ideas based on the information they gained from potential users. Afterwards, they are expected to follow and complete all the stages of the design thinking process and conduct the pilot study.

In the first stage, empathise, students are invited to understand the problem to be solved. They need to be involved directly in the environment where the problem occurs to understand the experience and increase their empathy. Students are exposed to entrepreneurial competitions and industry calls and challenges for innovative business ideas to close that gap of high rate of unemployment are essential to cope with the demands of the modern world.

Define

The define stage, also called the sensemaking stage, requires the design team to define the problem. This can be done by consolidating the

insights that they have gathered from the users during the empathise stage. The goal of the define stage is to craft a relevant and attainable problem statement or design challenge statement. This statement is a clear and explicit expression of the problem that the design team needs to address. It provides focus and frames the problem, expresses the team's understanding of the users, and synthesises the most important needs to fulfil. The key is that the design challenge statement should be stated in a human-centred manner. Instead of saying—"We need to ...", a better way of stating it would be—"The users need to ...".

In this stage students read and interpret the information they gathered and observed during the empathy stage then. The define stage helps students gather ideas that are useful in solving problems.

Ideate

The ideate stage concentrates on idea generation with the goal of finding potential and innovative solutions to the problem statement or design challenge statement which the design team had created in the define stage. In this stage, the design team performs ideation sessions employing various ideation techniques, utilise both convergent and divergent thinking to challenge established practices and explore possible alternatives, generate a wide range of solution concepts, and test and investigate these solution ideas.

In this stage students can generate series of solutions in accordance with the identified problems. They analyse the viability and the feasibility of the business ideas. They also analyse the marketability of the business ideas. Not all business ideas are business opportunities. Screening the business ideas helps students to turn business into business opportunities.

Prototype

This is characterised by experimentation and turning the possible solutions into tangible and concrete products. This means that the team will produce inexpensive scaled-down models or anything that the users can interact with which incorporates the possible solutions that were identified in the previous stage. These prototypes will be tested and investigated to check how these address the design challenge statement and/or identify any constraints or flaws. The prototypes may be

shared and tested by the team and/or by different groups of individuals, including the users. Depending on the experiences of the users and those who tested, the prototypes may be accepted, improved, redesigned, or rejected.

Test

After prototyping, the design team and/or other experts will rigorously evaluate, and the users will test the product. This is known as the test stage. It is important to understand however, that although the test stage is the final step in the design thinking process, the results may lead the design team to review the previous stages, learn more about the users, redefine the design challenge statement and the solution concepts, and refine prototypes and solutions. During this phase, alterations and refinements are made to address the identified constraints and flaws of the prototypes to better provide the users with solutions that clearly represent their insights. To fulfil the goal of the test stage, the design team must allow the users to interact with the prototypes and make meaningful comparisons. It is important that the team listens and learns from what the users say, ask, and suggest. It is not a good practice to ask the users whether they like the product or not. Instead, the design team should ask the users what else the members of the design team could do better to satisfy the users' obvious and hidden needs. The key is to develop an emphatic understanding of the users, challenge assumptions, redefine problems, create innovative solutions, and perform rapid prototyping and testing.

Remarkably, Daniel (2016) study on fostering an entrepreneurial mindset by using a design thinking approach in entrepreneurship education concluded that "design thinking is a cross-disciplinary and user-centred method for finding innovative solutions to problems". Entrepreneurial actions are based on creativity and innovation, necessitating individuals to innovate beyond traditional methods, requiring more than just applying knowledge and skills (Higgins et al., 2019). In contrast, Fischer (2015) argue that the Design Thinking (DT) is more of user-centric focusing too much on individual needs which require extensive expertise. DT overemphasises technological innovation and promotes an isolationistic philosophy, lacking critical and embodied

cognition qualities (Kagan et al., 2020). However, Van der Westhuizen (2018; 2023) conclude that DT practices, within an ecosystem context or youth entrepreneur support (YES) network, may bear more potential to probe into alternative futures and gain relevance to enhance sustainability transformation by fostering deeper transformative social practices in communities.

Design Thinking enhances education experiences by emphasising empathy, equal participation, and neutralising power differentials, promoting inclusion and empowerment, ultimately leading to superior solutions (Deitte et al., 2019).

According to Linton and Klinton (2019), connecting entrepreneurship education with design thinking aligns with "through" education approach focusing on creating opportunities rather than assuming ideas exist, and entrepreneurs need to act on them. However, not all students are interested in becoming entrepreneurs, but employers are also seeking for employees who are creative and innovative. Entrepreneurial mind set and critical thinking is not only crucial in starting own business but also important in the workplace.

Romero Caballero et al. (2025) study reveals that "If the pedagogical approach of learning based on challenges is articulated with the design thinking methodology and the active and continuous assessment instruments, the learning results improved significantly compared to traditional teaching methodologies". This study acknowledges the importance of the implementation of design thinking process in education.

4 A Description of the Ecosystem of the Initiative

4.1 Internal Ecosystem

Entrepreneurship module is offered from the Faculty of Management Sciences within the department of Logistics and Supply Chain Management. This faculty service other faculties such Applied Sciences and Humanities.

4.2 External Ecosystems Stakeholders

Entrepreneurship Development in Higher Education (EDHE)

The EDHE Programme is people focused. It is intended to develop the entrepreneurial capacity of students, academics and leaders. The intention is for students to be more successful in terms of becoming economically active during and after their tertiary education. Entrepreneurial activity during their studies could enable students to generate an additional income and fast-track the process of becoming economically active.

We are building an entrepreneurship module on the triple helix model where the university provides both theory and practice in collaboration with the government's support, which is enhanced by the Universities South Africa (USAF), an umbrella body representative of the 26 public universities in South Africa and coordinated by EDHE to all the 26 public universities. EDHE came up with entrepreneurial strategies such as Student Entrepreneurship Week (SEW). This opportunity allows students at universities to apply the theory of knowledge and skills in practice by showcasing their entrepreneurial abilities. During this time, students sell their products and services in campus. Some students generate business ideas and participate in elevator pitches, where they get further training to refine their business ideas. Some of these students participate in another opportunity brought by EDHE of inter-university competition. In 2021, I came across Mpho Qhubu, an M-Tech student in Chemistry, the founder and owner of Qhubu Supplies, which manufactures liquid hand sanitisers, home fragrance diffusers, car fresheners and cleaning detergents. She progressed from the internal round of the EDHE competition to the regional round and the national round. Although she did not win the final round of the competition, she learned a lot about business models and how to pitch clearly to the judges. EDHE exposed her to training opportunities. I conduct online workshops to assist students in preparing their pitch and to coach them on how to handle the judges' questions.

ENACTUS Stands (Entrepreneurial Act US)

The involvement of the industry is encouraged through students' participation in challenges brought by the industry to the university to stimulate entrepreneurship. Most of these businesses that offer competitions and challenges to the university have collaborated with Enactus South Africa to coordinate all these opportunities. ENACTUS stands for Entrepreneurial Act US. It is a non-profit international organisation and a social enterprise dedicated to motivating students to realise the sustainable development of society, economics, and environment through the practice of entrepreneurial spirit. Enactus South Africa brought business challenges and competitions to students.

The triple helix model of innovation refers to a set of interactions between academia (the university), industry and government, to foster economic and social development, as described in concepts such as the knowledge economy and knowledge society (Fig. 2).

Some of these challenges and competitions are discussed below:

MTN challenged students to bring solutions in education, health, and agriculture. MTN conducted bootcamp training to further assist students to get knowledge and skills in Information Technology (IT). MTN further sponsored the students with seed funds to kickstart the

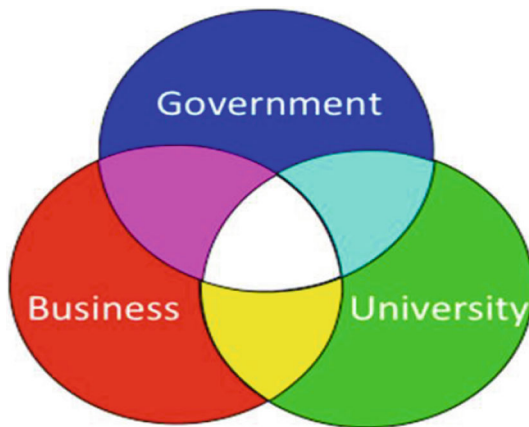


Fig. 2 The triple helix model (Source Etzkowitz et al. [2007])

business. Academics within the Higher Education Institutions (HEIs) are selected as Faculty Advisors (FAs) to advise and guide students in conducting needs analysis research and in implementing the five steps of design thinking process and also organise transport and accommodation to MTN bootcamp sessions. I became a faculty advisor in 2015. I noticed that this programme also supplements what students learned and opens opportunities to apply what they have learnt in their communities and among themselves.

The students participated in the businesses below:

MiTherapySpace links anyone to a mental health specialist and is a company that aims to bridge the gap between patients and practitioners by leveraging on technology. It provides 24-hour online mental health specialists at an affordable price. Students make therapy accessible for everyone, everywhere. This business addressed the SDG number 3 which is good health and wellness.

Students engaged in needs assessments by using the design thinking process prior to engaging in business. After they had undergone all the steps of the design thinking process, they conducted a pilot study after which they redefined the problem. They designed prototypes and engaged in business. This competition resulted in students' registered businesses such as Notes Technologies—a library in your pocket where students can exchange study notes online.

Again, Notes Technologies came first at the MTN App of the Year Campus Cup Challenge, walking away with a whooping R50,000.00 cash prize. The competition was hosted by MTN, one of the largest mobile network providers in Africa on 13 October 2022 at the Empire Conference Events, Johannesburg. Now this student owns a business in collaboration with marketing and labour law students. I played my part as a teacher of entrepreneurship and the industry played its part in alleviating unemployment and in developing the economy and the economic growth in South Africa. These students address the sustainable development goal number 4, which is quality education.

MAAGRI is a consulting and distribution service aimed at bringing technology into agriculture.

The other two opportunities that are brought by the industry are:

- Harmony food and health security challenge addressing SDG 1, 2, and 3. Students are expected to develop and implement social enterprises that tackle challenges in food security and health care access.
- Harmony NGOs challenge.

Students are given an opportunity to apply the knowledge and skills taught in the entrepreneurship module by giving them practical assignments that make them meet with the potential users. Application to real life situations is capitalised by engaging students in competitions and challenges brought by EDHE and companies like MTN and Harmony.

Entrepreneurship workshops are conducted and Business Simulation games with students (University Business Challenge [UBC 2017, 2018]) sponsored by the following companies and NPC below:

- General Electric (GE)
- Learning Dynamics, the simulation space

Sustainable Development Goals and the Role of Entrepreneurship in Social Development

Sustainable Development Goals (SDGs) came as an agreed in the United Nations (UN) 2030 agenda for sustainable development (UN, 2015), are a major step forward and the improvement on the Millennium Development Goals (MDGs) containing a better coverage and balance among the three dimensions of sustainable development which are social, economic, and environmental. Students can implement some SDGs through participating in entrepreneurship competitions brought by organisations such as MTN, Harmony, Schneider, and Ford. Overall SDGs covered by these entrepreneurship competitions are sustainable goal numbers 1, 2, 3, 4, and 15 (Fig. 3).

The Sustainable Development Goals (SDGs) have challenged the whole world to act towards ending poverty, protecting the planet and ensuring that all people enjoy peace and prosperity. Africa accepted the

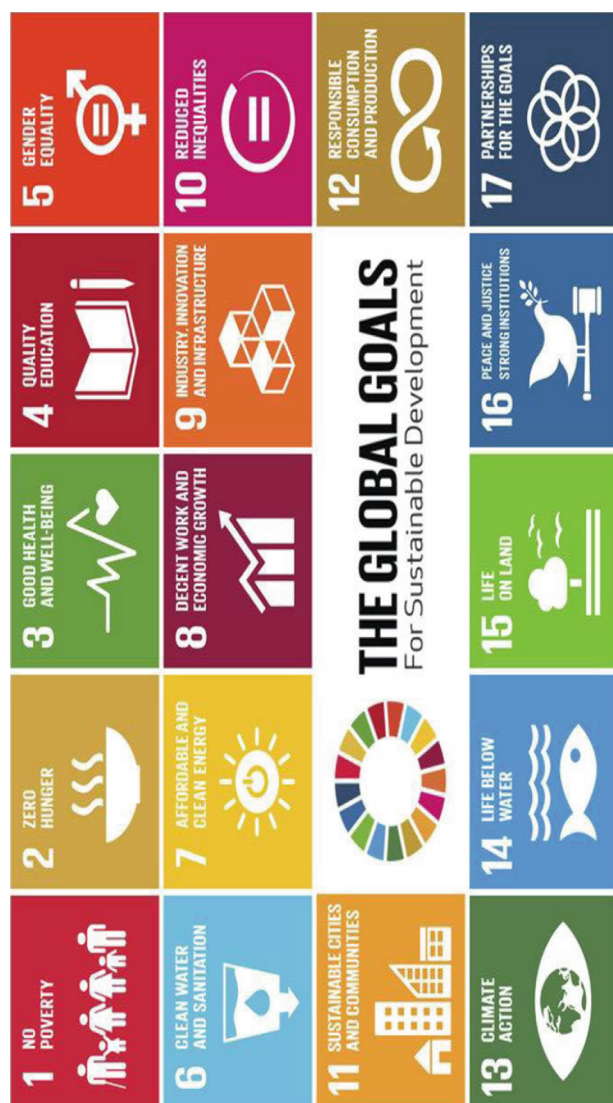


Fig. 3 Sustainability (Source Aleixo et al. [2020])

challenge of implementing the SDGs by coming up with the “shared strategic framework for inclusive growth and sustainable development and a global strategy to optimise the use of African resources for the benefit of all Africans” (NEPAD Agency, [n.d.](#)) known as the African Union (AU) Agenda 2063. In 2015, South Africa played a critical role in guiding the process and in negotiating the adoption of the 2030 Agenda’s SDGs as part of the G77 community. Equitable access to the knowledge infrastructure is a challenge that South Africa continues to face despite considerable Science, Technology, and Innovation (STI) advances and investments. However, the study by Awuzie and Emuze (2017) reveals that there is a low level of awareness concerning the SD agenda and the sustainability implementation framework itself among various sections of the university’s population in South Africa within central region. Zhou et al. (2020) point out that the challenge relates to current pedagogy in use in many HEIs which is teacher centred and does not allow for critical thinking. Classroom-based teaching is viewed as being inadequate for achieving SDGs. Notably, Pramjeeth et al. (2023) recommend that “leaders within HEIs must create awareness of SDG 4 by developing a focused task team/s within the institution to facilitate the integration of the SDG 4 outcomes into policies and to encourage widespread internal and external stakeholder engagement”.

Technological Higher Education Network South Africa (THENSA)

THENSA previously known as SATN exists to enable its partner institutions to respond to the challenges and targets set in the National Development Plan (NDP), the UN SDGs and the Africa 2063 Agenda, through Technological Education, Research, and Innovation.

SATN was established in 2006 by five South African Universities of Technology (UoTs), namely, Cape Peninsula University of Technology (CPUT), Durban University of Technology (DUT), Central University of Technology (CUT), Tshwane University of Technology (TUT), and the Vaal University of Technology (VUT), which resulted in the registration of the SATN trust in August 2008. The SATN became the collective

voice of UoTs to provide a common platform for discussion on matters pertaining to higher education and to share leverage existing competencies of the member intuitions. The period 2008–2019 was a period of significant changes in higher education generally with heightened policy activity and changes in curriculum, research, and innovation agendas in South Africa. The SATN mission and strategic objectives were reviewed accordingly and its membership, its mission, and the concomitant focus on new projects and initiatives were successfully implemented during this period.

The change of name in 2019 to THENSA (Technological Higher Education Network South Africa) was an outcome of the change in its membership to include all technology focused institutions, the teaching, learning, research, and innovation agendas that it set itself. The new member organisations now include six (6) South African Universities of Technology, three (3) South African comprehensive Universities, and one (1) African University. Interest in forming partnerships with Continental Technology focused intuitions has resulted in the Association of Technical Universities and Polytechnique's in Africa (ATUPA) and it's (200+ members) joining THENSA. THENSA has also committed to being a member of CAPA in 2020.

THENSA conducted a pilot study in all the universities of technology. Twelve students were selected from the faculty of management. I coordinated this entrepreneurship programme offered by THENSA as a pilot study. I find the programme very effective because it enforces students to conduct needs analysis research before venturing into business by utilising the scientific technique similar to the design thinking process. Twelve students were selected, however, only seven students were able to finish the course and receive the certificate. These students are keen to implement their business ideas. Some want to pivot to other business ideas. Some want to abandon their initial ideas and start from scratch.

5 Conclusion

The innovation pedagogy which aligns with the design thinking process can enable students to be creative and address the problems facing our communities. It can also contribute in addressing the SDGs within South African context. The concept of innovation pedagogy assists in understanding the gradual progression of education and its ability to adapt to sustainable future demands Konst and Kairisto-Mertanen (2020). Design thinking continuously positively impacts teaching and learning as a teaching methodology in entrepreneurship education. Design thinking is undoubtedly comparable to entrepreneurship education and can be used to solve complex challenges and uncover unexpected issues, entrepreneurial design thinking needs to be supported up by sound educational philosophy as a teaching methodology (Schneider et al., 2023).

The integration of SDGs into HEIs comes with challenges. Van der Westhuizen (2024a) provide practical tools for youth entrepreneurs to develop their entrepreneurial capabilities, and enabling tools to connect youth entrepreneur support (YES) networks. Connecting an ecosystem and bridging ecosystemic gaps are necessary en route to achieving the SDGs. In South Africa, government programmes like Entrepreneurship Development in Higher Education (EDHE) provide national framework for HEI towards economic activation that in return might contribute to sustainable socio-economic development, especially for the next generation (EDHE 2021; 2025; Van der Westhuizen, 2024b)". Mawonde and Togo (2019) posit that "while the most noticeable contribution of universities to SDGs is towards quality education (SDG 4), higher education, including distance education institutions, can play an active role in implementing other SDGs as well". Olugbola (2017) state that the discovery of the opportunity depends on readiness to partake in such entrepreneurial activities. Students should be motivated and coached on how to use the design thinking process in addressing the problems and challenges facing our communities by aligning it with the SDGs and other challenges which are not covered in the 17 SDGs.

References

- Albay, E. M., & Eisma, D. V. (2021). Performance task assessment supported by the design thinking process: Results from true experimental research. *Social Sciences & Humanities Open*, 3(1), Article 100116.
- Aleixo, A. M., Azeiteiro, U. M., & Leal, S. (2020). Are the sustainable development goals being implemented in the Portuguese higher education formative offer? *International Journal of Sustainability in Higher Education*, 21(2), 336–352.
- Anand, R., Kothari, S., & Kumar, N. (2016). *South Africa: Labor market dynamics and inequality*. International Monetary Fund.
- Awuzie, B., & Emuze, F. (2017). Promoting sustainable development implementation in higher education: Universities in South Africa. *International Journal of Sustainability in Higher Education*, 18(7), 1176–1190.
- Daniel, A. D. (2016). Fostering an entrepreneurial mindset by using a design thinking approach in entrepreneurship education. *Industry and Higher Education*, 30(3), 215–223.
- Deitte, L. A., & Omary, R. A. (2019). The power of design thinking in medical education. *Academic Radiology*, 26(10), 1417–1420.
- EDHE. (2021). United nations economic commission for Africa study on advancing entrepreneurial universities in Africa. [Online]. Available: <https://edhe.co.za/wp-content/uploads/UNECA-Report.pdf>. Accessed 20 January 2026.
- EDHE. (2025). Impact Report 2024. Available: https://edhe.co.za/wp-content/uploads/EDHE_ENTREPRENEURSHIP-DEVELOPMENT-LAN DSCAPE.pdf. Accessed 20 January 2026.
- Etzkowitz, H., Dzisah, J., Ranga, L. M., & Zhou, C. (2007). *The triple helix model for innovation: The university-industry-government interaction*. Asia Pacific Tech Monitor.
- Fischer, M. (2015). Design it! Solving sustainability problems by applying design thinking. *GAIA-Ecological Perspectives for Science and Society*, 24(3), 174–178.
- Higgins, D., Refai, D., & Keita, D. (2019). Focus point: The need for alternative insight into the entrepreneurial education paradigm. *Journal of Small Business & Entrepreneurship*, 31(3), 225–242.
- Igwe, P. A., Madichie, N. O., Chukwuemeka, O., Rahman, M., Ochinanwata, N., & Uzuegbunam, I. (2022). Pedagogical approaches to responsible entrepreneurship education. *Sustainability*, 14(15), 9440.

- Kagan, S., Hauerwaas, A., Helldorff, S., & Weisenfeld, U. (2020). Jamming sustainable futures: Assessing the potential of design thinking with the case study of a sustainability jam. *Journal of Cleaner Production*, 251, Article 119595.
- Koloba, H. A. (2017). Perceived employability of university students in South Africa. Is it related to employability skills? *International Journal of Social Sciences and Humanity Studies*, 9(1), 73–90.
- Konst, T., & Kairisto-Mertanen, L. (2020). Developing innovation pedagogy approach. *On the Horizon*, 28(1), 45–54.
- Lehto, A., Kairisto-Mertanen, L., & Penttilä, T. (Eds.). (2011). *Towards innovation pedagogy—A new approach to teaching and learning for universities of applied sciences* (Reports from Turku University of Applied Sciences 100). Turku University of Applied Sciences, Turku.
- Linton, G., & Klinton, M. (2019). University entrepreneurship education: A design thinking approach to learning. *Journal of Innovation and Entrepreneurship*, 8(1), 1–11.
- Mawonde, A., & Togo, M. (2019). Implementation of SDGs at the university of South Africa. *International Journal of Sustainability in Higher Education*, 20(5), 932–950.
- NEPAD Agency (n.d.) Agenda Dashboard. Available at: <https://nepad.org/agenda-dashboard-v2>. Accessed 21 January 2026.
- Olugbola, S. A. (2017). Exploring entrepreneurial readiness of youth and startup success components: Entrepreneurship training as a moderator. *Journal of Innovation & Knowledge*, 2(3), 155–171.
- Pramjeeth, S., Nupen, D. M., & Jagernath, J. (2023). Challenges impacting higher education leaders in achieving the sustainable development goal of quality education in South Africa. *African Journal of Inter/multidisciplinary Studies*, 5(1), 1–13.
- Pratomo, L. C., Siswandari., & Wardani, D. K. (2021). The effectiveness of design thinking in improving student creativity skills and entrepreneurial alertness. *International Journal of Instruction*, 14(4), 695–712. <https://doi.org/10.29333/iji.2021.14440a>
- Rasmussen, E. A., & Sørheim, R. (2006). Action-based entrepreneurship education. *Technovation*, 26(2), 185–194.
- Razzouk, R., & Shute, V. (2012). What is design thinking and why is it important? *Review of Educational Research*, 82(3), 330–348.
- Romero Caballero, S., Canquiz Rincón, L., Rodríguez Toscano, A., Valencia Pérez, A., & Moreno Gómez, G. (2025). Challenge-based learning and design thinking in higher education: Institutional strategies for linking

- experiential learning, innovation, and academic performance. *Innovations in Education and Teaching International*, 62(2), 557–574.
- Rowe, P. G. (1987). *Design thinking*. Cambridge.
- Schneider, H. L., Huxtable-Thomas, L., Jones, P., Bowen, R., & Högsdal, N. (2023). *Design thinking within entrepreneurship education: Different perspectives and common themes in the literature*. Progress in Entrepreneurship Education and Training, 261.
- Solomon, G. (2007). An examination of entrepreneurship education in the United States. *Journal of Small Business and Enterprise Development*, 14(2), 168–182.
- Stanford University Institute of Design. (2016). A virtual crash course in design thinking-Stanford D School [Website]. <https://dschool.stanford.edu/resources-collections/a-virtual-crash-course-in-design-thinking>
- Syachputri, L. I. N., Persada, S. F., Prasetyo, Y. T., & Young, M. N. (2023, April). Consumer centric ecosystem for apparel industry: An approach of sentiment analysis and design thinking on a SME case study. In *Proceedings of the 2023 5th International Conference on Management Science and Industrial Engineering* (pp. 199–207).
- United Nations. 2015. *Transforming our world: The 2030 agenda for sustainable development*. Outcome document for the UN summit to adopt the post-2015 development agenda: Draft for adoption, New York.
- Van der Westhuizen, T. (2018). The SHAPE project: Shifting hope, activating potential entrepreneurship. In *Incubators for young entrepreneurs—20 case histories* (pp. 225–244). Reading: Academic Conferences and Publishing International Limited.
- Van der Westhuizen, T. (2023). *Youth entrepreneurship: An ecosystem theory for young entrepreneurs in South Africa and beyond*. Springer Nature.
- Van der Westhuizen, T. (2024a). Youth entrepreneur ecosystem. In: *Practical tools for youth entrepreneurs: An applied approach for South Africa and beyond*. (pp. 57–114). Springer Nature Switzerland.
- Van der Westhuizen, T. (2024b). *Practical tools for youth entrepreneurs: An applied approach for South Africa and beyond* (p. 223). Springer Nature. <https://doi.org/10.1007/978-3-031-44362-6>
- Zhou, L., Rudhumbu, N., Shumba, J., & Olumide, A. (2020). *Role of higher education institutions in the implementation of sustainable development goals* (pp. 87–96). Sustainable Development Goals and Institutions of Higher Education.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits any noncommercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if you modified the licensed material. You do not have permission under this license to share adapted material derived from this chapter or parts of it.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.



Part III

Entrepreneurship for Social And Economic Transformation



15

Cultivating Entrepreneurial and Other Related Critical Skills in Agriscience Students

Albert E. Strever 

1 Introduction

1.1 Background

The Institute of Futures Research (IFR) at Stellenbosch University released a report on the future skills needed in agricultural employment (Viljoen, 2022), which outlined systems thinking, technology integration and several “soft skills” as pivotal. Entrepreneurial competencies overlap with several soft skills, preferably described as professional skills (Pontefract, 2023), which students can acquire in an entrepreneurial education environment, such as time management, leadership, communication, and opportunity recognition. These are also expected to be increasingly required in the future of employment (Wong & Chan, 2022). Some of the agriculture-related entrepreneurial competencies

A. E. Strever (✉)

Department of Viticulture and Oenology/SAGWRI, Stellenbosch University,
Stellenbosch, South Africa

e-mail: aestr@sun.ac.za

outlined by Nieuwoudt et al. (2017) such as personal strength, commitment, organising, and relationship, as well as opportunity competencies also overlap strongly with aspects mentioned in the Institute of Futures research report. Millennials and post-millennials (Gen-Z) value autonomy, innovation, practical experience, collaboration, and social and environmental impact, all of which are core aspects of entrepreneurship education. A lot has been written about the focus of these generations on work-life balance, mental health, digital connectivity, and awareness of environmental/climate change issues (Cagarman et al., 2023). The generation also favours hands-on, dynamic learning styles, which can be enhanced through problem-based learning techniques and entrepreneurship education.

There is pressure on employment opportunities in several agricultural sectors, more due to the volatility in selected sectors than the performance of the sector. It has consistently recorded an average trade surplus of US\$ 5.1 billion over the past five years with record-breaking exports in 2024 of more than US\$ 14 billion. The 14% GDP contribution of the agriculture value chain is only the formal sector, with the informal sector's contribution being difficult to quantify. Despite the recent volatility in the sector, agriculture has outperformed total gross domestic product growth in South Africa over the past 20 years (Arnoldi, 2025). Despite this positive outlook, a student enrolling for a BSc degree in an Agricultural Sciences-related discipline, cannot predict how the specific degree they are studying, and its related sector will fare in four years after they enrolled and are ready to seek employment. For this reason, exposing students to different possibilities within their chosen domains of study, including entrepreneurial opportunities, becomes increasingly important. The concept of being able and willing to “pivot” from a chosen and assumed employment option linked to a university degree, into something different also links to the entrepreneurial concept of “pivoting” to different consumer segments or markets. In the past it was sufficient for students enrolling for a BSc degree in Viticulture and Oenology (the science of growing grapes and making wine), to aspire to become winemakers or viticulturists. Considering, however, the diversity of the value chain of these and related industries (i.e., table grape

production, raisin grape production, grape juice concentrate, and by-products) as well as the pressure on employment opportunities in these industries, we need to think again about how to prepare students for the unpredictable world of employment. Many of the opportunities within the value chain, and even within current employment scenarios are entrepreneurial or intrapreneurial in nature. Furthermore, such opportunities are much more visible and abundant in a value chain recognising circular agricultural principles as well as opportunities embedded within the social system in and around it. This concept of supply/value chains in agriculture will be dealt with in more detail in Sect. 2.1.

1.2 Institutional Context

An Entrepreneurial University needs to focus on more than its conventional research and teaching roles, but also ideally contribute to societal, economic, technological, and policy development in its ecosystem, which is referred to as the “third mission” of higher education institutions (Nicotra et al., 2021). Cultivating entrepreneurial skills and fostering an entrepreneurial mindset should venture beyond the confines of traditional classroom settings. While the primary focus often involves students currently enrolled in degree programmes, a multifaceted approach is needed to target a broader audience and instil a culture of entrepreneurship within the faculty and the University. Stellenbosch University has identified institutionalising innovation and entrepreneurship into all their activities, including teaching, learning, and assessment as a game-changer project. Although this is envisaged to receive even more emphasis in future, the case studies and other interventions discussed later in this chapter are aimed at accelerating initiatives in the faculty of AgriSciences and are in line with rapidly changing employment requirements and industry pressures.

During a faculty-wide workshop in June 2022, the Institute of Futures Research at the University guided 11 senior academics and practitioners, including members of the University’s teaching and learning division, to think about the future(s) of our students and academics. Futures studies emphasise an understanding of multiple, alternative possible futures,

rather than a single, predetermined one (Kristóf & Nováky, 2023). The process during the workshop involved:

1. Defining how we see entrepreneurship within our faculty context.
2. Outlining the implications (positive/negative) of entrepreneurship integration into the curriculum for our students, faculty, and related industries.
3. “Looking into the future”—if we have firmly established an entrepreneurship mindset among students, academics and industries—what it would look like, what has happened, and what are we commended for?

This led to the idea of developing a capstone project (its definition and context will follow later), which perfectly aligned with the expansion of the then recently started “Future of Grapes and Wine” course which was presented in the final year of the Viticulture and Oenology degree programme. It was scoped with the department in question, and modifications to the curriculum were designed to be submitted to the academic planning committee for approval.

A secondary process ensued, namely creating a community of practice in the faculty related to entrepreneurship and innovation activities. The project facilitated several one-to-one meetings as well as workshops in the faculty, to contribute to this community, and a “train the trainers” initiative was also initiated in 2023 for other lecturers in the faculty wanting to implement similar initiatives in their respective Departments, in collaboration with our Launchlab incubator using design thinking principles. The game-changer status within the University meant that the enhancement of innovation and entrepreneurship mindsets across the institution became an important focus, which includes a wider adoption of entrepreneurship education within the institution, apart from the obvious focus it already enjoyed within the business school or economic and management sciences faculty environments.

1.3 Problem Statements and Objectives

The main problems/issues that were targeted to address during the faculty workshop and ensuing discussions were the following:

- A lack of an entrepreneurial and intrapreneurial mindset and culture was identified in both students and academics in the faculty.
- There were notions from some (senior) academics that “entrepreneurs are born, not made”, and “less than 5% of our students have any ambition to be entrepreneurs anyway”—insinuating that entrepreneurship integration into a curriculum would not be advantageous for the larger group of students.
- The already full curriculum and programmes, with academics sometimes overloaded create the feeling that it would be impossible to integrate these concepts into the curricula.
- Although some departments already offer limited exposure to entrepreneurship and related aspects, academics are not well equipped and supported to incorporate entrepreneurship into their teaching practices, leading to low further adoption.

The objective of this chapter is to show how some of the stated problems can be addressed, by exploring two distinctly different case studies in the Agricultural Science Faculty at Stellenbosch University. These two case studies differ in terms of three core aspects of importance when considering entrepreneurship integration into an Agricultural Sciences context. These are depicted in Table 1. While the primary focus of this chapter is to highlight these two distinctly different case studies in two Agri-Sciences Departments, it is also essential to provide context by delving into the broader entrepreneurial ecosystem being cultivated within our faculty and the university. This ecosystem forms the backdrop against which these and other initiatives operate and grow. The goal of these initiatives is to equip students and academics with the necessary skills and mindset to navigate the complex world of entrepreneurship as a career option or as a teaching goal effectively. It also strives to foster a culture of innovation and enterprise that extends beyond the classroom and into the broader community at Stellenbosch University.

Table 1 Case studies and characteristics in two different departments/disciplines in the AgriSciences Faculty

Department/discipline	Grape and Wine Sciences	Forest and Wood Science
Space available for implementation in the current curriculum	Significant: more than 50 hours per module for full-year modules over three years of study	Limited: less than 10 hours per module for a week in the year in two modules (2nd and 3rd year of study)
Resources available	Dedicated lecturer in the same department to coordinate and teach, plus a teaching assistant	Limited: one visiting lecturer from a different department available only for the duration of the module

2 Theoretical Framework and General Principles

The general principles discussed in this section apply to both case studies in terms of approach and the strategy employed to keep students engaged and interested in the coursework. Specific aspects that are different between the case studies will be discussed in the case study sections.

2.1 Linking an Industry Value Chain and Student Career Aspirations

The agricultural supply chain, sometimes interchangeably referred to as the agricultural value chain typically includes production, processing, and distribution stages. Although specific agricultural industries differ in terms of the specific parts of a value chain, there are generalities that students can recognise, also in terms of where they see their future employment options. Students are therefore in both courses presented with several value chain depictions, highlighting differences in what is included or excluded. For example, students are shown differing value chains of forestry, one depicting a typical forest stand, harvesting and processing facility, transport and manufacturing, while the other

also shows other possible opportunities within the forestry sector, such as hunting or other recreational activities, eco-tourism or bio-pest and disease management. Typically, these would represent opportunities that students may not even have considered when choosing the specific degree, and therefore also different job opportunities or supply/customer/segments, and these are discussed in terms of differences and similarities. The concept of “value addition” is also discussed, as outlined in Feller et al. (2006) where it is mentioned that some investigators simply see the passing of a product from one step to another as a value chain, while in other studies, clear value addition needs to take place, i.e., grape processing to fermenting must in the winemaking value chain is a clear change in the value of the resource. Though the traditional view of the agricultural value chains of various industries has primarily been a linear one (“farm to fork”), a circular bioeconomy view has gained importance (Duque-Acevedo et al., 2020; Jones et al., 2021; Toop et al., 2017), with some in-depth reviews also done on the topic, such as the one by Lengyel et al. (2021). The concepts of circular agronomy/agriculture are becoming increasingly embedded into “futures thinking” in agriculture (Jones et al., 2021; Toop et al., 2017) and should also form an integral part of any Agriscience programme. By integrating these aspects, also presenting them as entrepreneurial opportunities, students are encouraged to think wider than just their chosen field of study. Jones et al. (2021) presented an adapted framework for a food and agricultural system, which shows the traditional value chain elements within a context of inputs and impacts (Fig. 1). Probably the most comprehensive and useful depiction of the Agri-Food system and its various steps where valorisation can take place or where efficiencies can be improved to reduce waste is shown in Fig. 2. These concepts of value addition and circularity now underpin key principles of entrepreneurial ventures, where the focus on sustainability and value creation should also be at the centre of each new venture, but potentially also the sole focus of some newly created ventures by so-called “ecopreneurs” (Bahrololoum et al., 2022; Dotsiuk, 2023).

Students are, after being exposed to these different views, then challenged with three questions, namely: (a) “Where do you see yourself in the value chain of industry x?” as well as (b) “Which problems/challenges

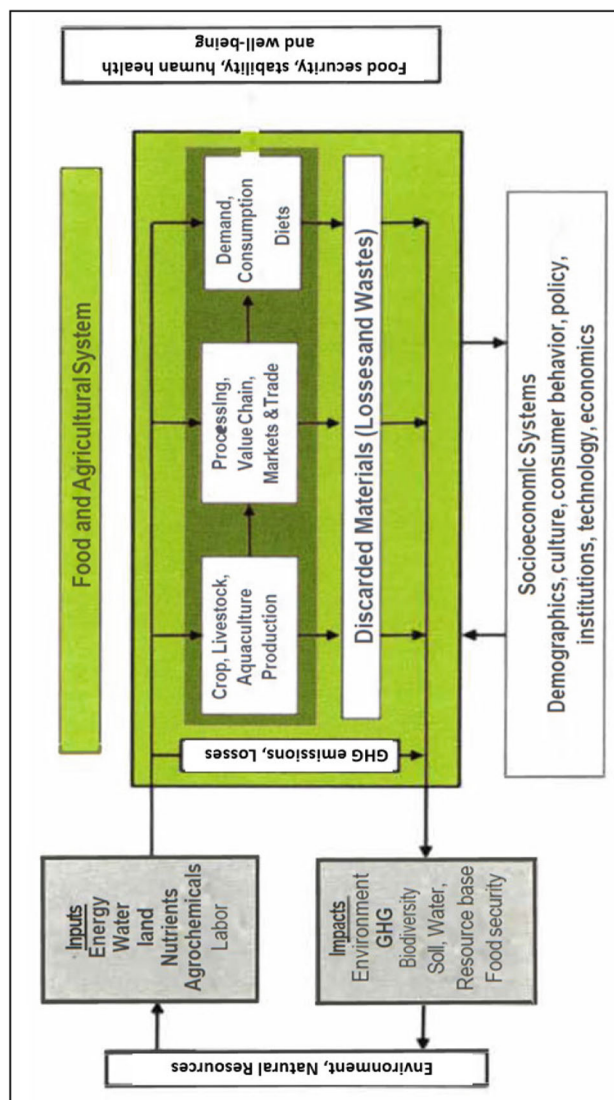


Fig. 1 Schematic of a current food and agricultural system, also depicting external impacts (Source Jones et al., 2021)

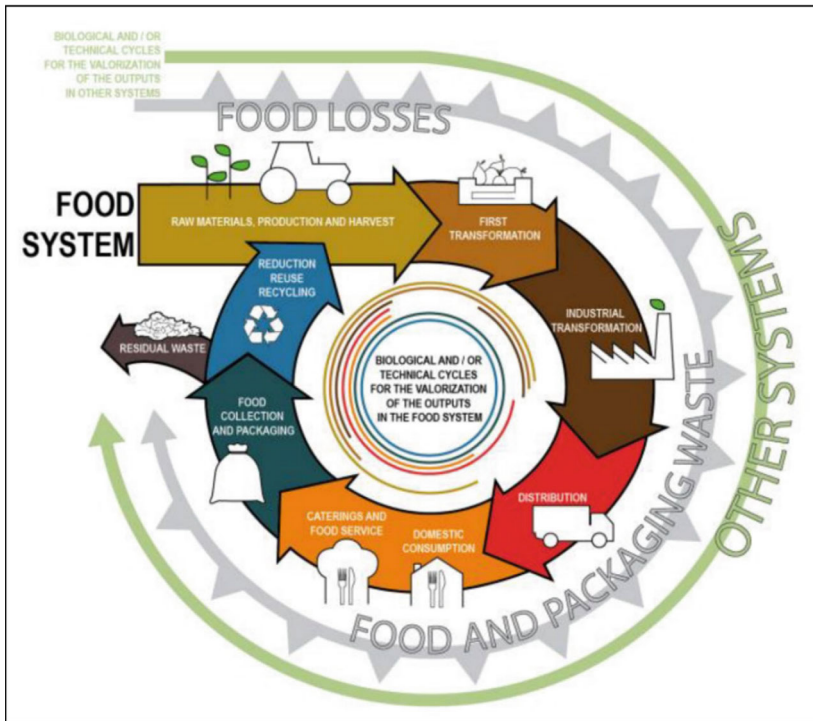


Fig. 2 A circular bioeconomy view of the Agri-Food system (Source Fassio & Tecco, 2019)

do you see in different parts of the value chain for industry x?” and finally (c) “Which opportunities for entrepreneurial or intrapreneurial ventures exist across the value chain and are related to these problems identified?”.

The principle of using the industry value chains to highlight entrepreneurial opportunities has therefore proven to be a two-edged sword, by highlighting wider opportunities students can consider in their careers within an employment scenario, or as a catalyst for discussions around opportunities for entrepreneurship. The experience in the classroom is that students encounter, in some cases potentially life-changing opportunities that they may have never considered, also including the option to create their own unique opportunities especially if the sector is over-subscribed with qualified graduates.

2.2 Integrating Problem-Based Learning Principles

Entrepreneurship education, through the enhancement of problem-solving competencies, innovation, and innovative and creative thinking, can advance progress in societies (Adelakun & Van der Westhuizen, 2021; Awotunde & Van der Westhuizen, 2021; Van der Westhuizen, 2024). Raimundo and Rosário (2024) performed a systematic review exploring and clarifying the interactions between problem-based learning and entrepreneurship in both educational and industry contexts. The main intersection is the identification of real-world challenges and ensuing solutions achieved by critical and creative thinking, but also by considering the problem from a potential customer or consumer's perspective, as also elaborated in design thinking methods related to entrepreneurship studies. Problem-based learning also provides useful tools that may trigger various learning modes, such as learning by doing, or planned methods. By design, problem-based learning also often considers issues related to sustainability and social responsibility in its process (Raimundo & Rosário, 2024). This pedagogical method therefore aids in preparing students for entrepreneurial challenges in various contexts, while also underscoring the foundations of entrepreneurship.

Although problem-based learning (PBL) often focuses on identifying a specific problem in a practical context which students can engage with, the principles in the case study courses in this chapter were to expose students to multiple problems through discussion and interrogation of the value chains linked to industries, the current and possible future problems related to circularity and sustainability, as well as possible opportunities. Students can then, following their respective “points of interest” related to their career aspirations choose a problem to solve and a related business idea that could potentially offer real-world solutions.

2.3 Integration of Artificial Intelligence (AI) into Entrepreneurship Courses

In the capstone grapes and wine entrepreneurship course, the module is part of a larger module where we also compare conventional library

techniques with artificial intelligence-aided research and literature review techniques. Students are guided and encouraged therefore also in the entrepreneurship part of the module to use AI responsibly to develop business ideas, formulate value propositions, create logos or taglines, and even in their final assignments to use it to frame or develop pitches, podcasts, or to assist them in writing professional correspondence when asking for advice on their ideas via email. Thottoli et al. (2024) presents a systematic review on AI integration into entrepreneurship education, highlighting possible AI integration into university incubation centres, among other potential uses in this context. The recent introduction of AI tools that keep a user's prompts and interactions private within the university, is considered a game-changer as it alleviates issues linked to students' unwillingness to use these platforms with their private accounts, as well as fear of their ideas being "stolen" by international AI platforms.

2.4 Entrepreneurship Course Content/Principles

The courses use principles of design thinking and lean startup methodologies at their base, but with customisation applied to fit with the duration and topic of the course. York (2021) compared design thinking and agile principles, and their commonalities as well as differences from lean startup principles. Setting aside the differences, these techniques are used in the current courses discussed in this chapter, as they share a common focus on innovation, user/customer needs, problem/solution focus, prototyping, testing, failing fast, and iteration. Teaching students to "dig deeper" and to ask "why" at least five times is intertwined with methods that reduce the focus on an extended business plan or pitch, towards methods for briefly explaining an idea and solution to potential investors. To this end, both the lean canvas and the value proposition canvas are used, with the latter also shown to be useful in showing pains, gains and customer jobs in a farmer's market context (Pokorná et al., 2015). Chandra et al. (2024) highlighted that a competence model that employs lean startup principles can increase entrepreneurial behaviour after graduation. In the longer capstone course, however, we also implement aspects of the book by Bill Aulet (2013) and the related

Open Courseware from the Massachusetts Institute of Technology, which presents a much more comprehensive view of creating a new enterprise. All of the 24 steps cannot be handled in the course, but a careful selection is made to give students sufficient tools to develop their ideas, assess the market opportunity and segmentation, create a business model, and pitch their ideas effectively. As Chandra et al. (2024) noted, a “blended approach” may lead to improved outcomes, in particular in courses such as the case studies in this chapter, where the lecturer cannot easily gauge students’ prior knowledge and entrepreneurial intent before presenting a course.

2.5 Capstone-Like Entrepreneurship Programme

A capstone project normally occurs at the end of an educational programme, integrating prior learning and knowledge, often from multi-disciplinary sources to address a particular real-world problem. These are often defined in research-based courses rather than in an entrepreneurial context and often involve students from different backgrounds/courses (Huang-Saad et al., 2015; Lee & Loton, 2015). Within this chapter, the concept is referred to in an entrepreneurial project context and within a single department, but it also represents a culminating experience, with staggered outputs, where students use prior learning to build ideas, first individually and then in teams/virtual companies.

3 Case Study 1: Capstone Entrepreneurship Project in Grape and Wine Sciences

3.1 Targeted Participants

The primary audience is students currently registered for the Viticulture and Oenology degree who are in their second to final (fourth) year of their studies. Although these students form what we may refer to as a “captured audience” (with it being part of their compulsory coursework

and not in the co-curriculum) the course is structured in a way that they learn many other skills and also have some fun along the way. We have integrated the use of artificial intelligence tools to scrutinise business ideas, and group work towards filtering and pitching their ideas, and students compete in a “grape and wine industries idea pitching challenge” in the last two years of their studies. The coursework and other interventions are integrated into their curriculum, ensuring that they are exposed to opportunities and gain essential competencies as part of their educational journey. This approach not only equips them with valuable entrepreneurial skills but also adds value to the other modules they are enrolled for—as an example they learn basic marketing principles as well as how to present themselves and their team/idea in public, along with having to navigate leadership and different “company” roles within a safe group setting.

3.2 Course Background/Evolution

The focus of this initiative was to identify ways to integrate entrepreneurial and other future-critical skills into a capstone project for the Viticulture and Oenology degree in the Faculty of AgriSciences, Stellenbosch University (SU). Although students were initially targeted in one department, academics in the faculty were also included in a community of practice to enhance the entrepreneurial content in other departments. Through this intervention, it is believed that students could be better prepared for the volatile, uncertain, complex, and ambiguous (VUCA) environment they will face as graduates. The main activities and deliverables were firstly to scope and develop the capstone project, and secondly to host events to create a community of practice in entrepreneurship integration into the curricula. An important principle was to minimise disruption to the current curriculum while developing a shared resource base for teaching, learning, and assessment related to entrepreneurship and other relevant competencies.

The capstone project led to successful changes in the curriculum content for the mentioned department, where entrepreneurial skills teaching was initially confined to about 6–7 weeks in the final semester

of the final year of study. After the workshop previously mentioned, and comments from one of the final-year Grapevine and Wine Sciences students remarking: “If this was implemented in my 2nd year, I would have not chosen employment but would have pursued this idea I am pitching today with my group”, we knew it had to be changed.

3.3 Course Overview

After defining the progression and yearly outcomes of such a project, it was mapped onto the current curriculum of the department and curriculum changes were implemented. The initial approach in 2021/22 to entrepreneurship teaching in the course (Fig. 3) and the adapted capstone approach (Fig. 4) are shown below.

Although the main objective stayed the same, and students are still developing their ideas first individually and then within groups or “companies” culminating in a final pitch, the process and outcomes have now been split over three years of implementation—with a period of “customer discovery” aligning with the period the students will spend on an industry internship. This allows them to test their ideas within a real-world context. The idea brief is that students can come up with any innovation related to any part of the value chain for grape and wine production, which can be brought to a proof-of-concept stage within six months and with R60 000. It must constitute an idea that can be turned into a business in time, and therefore cannot just be a product marketing innovation.

3.4 Future Perspectives

After a few iterations of this capstone course, it was realised that more support is needed from the University and industries involved to assist students in turning their ideas into real businesses adding value to the respective grape and wine-related industries. In the future more funding will be needed to achieve this, as well as a stronger network of mentors and current entrepreneurs working in and around the industries to assist students in implementation.

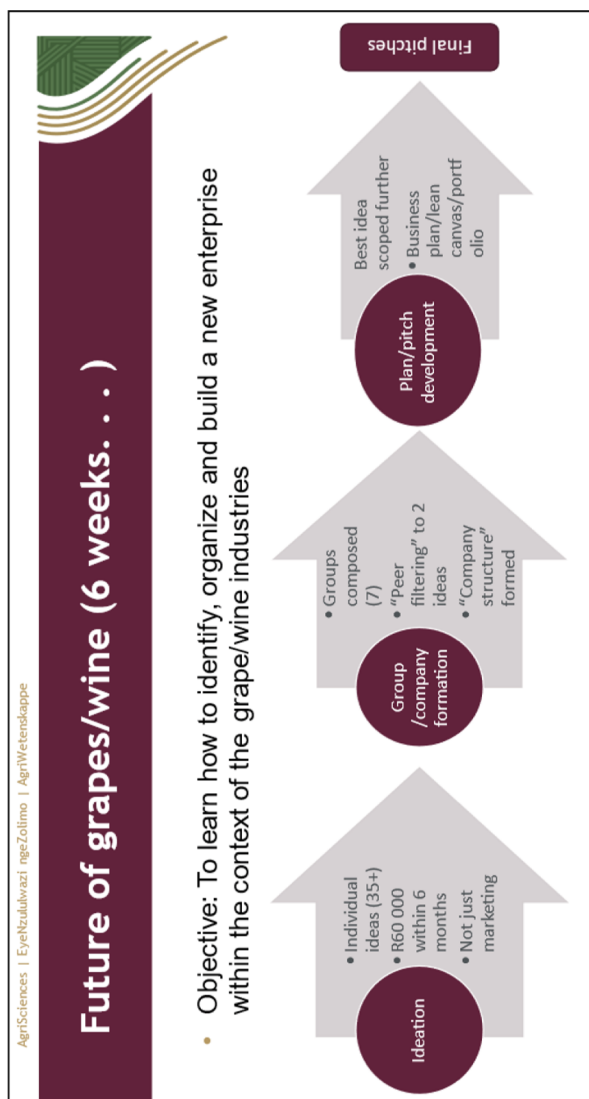


Fig. 3 Initial (2021/2022) final-year module "Future of grapes and wine" presented over a 6-week period

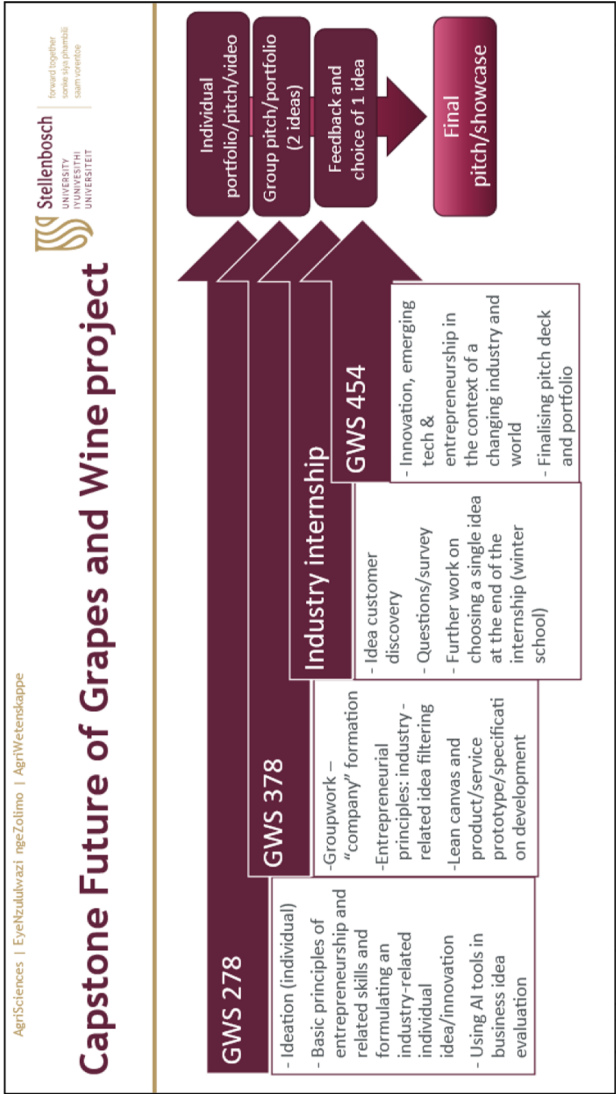


Fig. 4 Modified (2023) capstone entrepreneurship project approach (outcomes/assessments are shown on the right-hand side). Note It runs over a total of three years (the first number in the module code constitutes the year of study). The internship happens in the first semester of year four

4 Case Study 2: Forest and Wood Science Entrepreneurship

4.1 Targeted Participants

The targeted participants in this course are BSc Forest and Wood Science second- and third-year students, with possible extension to the final-year students in future.

4.2 Course Background

After engaging in a “Forest21 climate-smart forest entrepreneurs initiative” (<https://www.forest21.org/>), academics from the Forest and Wood Science Department in the Faculty of AgriSciences at Stellenbosch University expressed the need to integrate entrepreneurship into their courses, driven also by requests from the different forestry industry partners. The mentioned initiative has enabled the creation of excellent resources and materials for entrepreneurship education, which are developed to be forestry-specific but also would be easily adaptable to other disciplines. It consists of training materials and videos specifically designed to enable academics to teach entrepreneurial concepts to students. The main author of this chapter was approached to implement entrepreneurship training within the department’s modules, but one key limitation was the time available within the current curriculum. Brief, but targeted interventions were therefore designed, along similar principles compared to the previous case study, to start a course in the second academic year for this degree. After the first successful implementation, this was extended to the third study year and will soon possibly be linked to the project module of the students in their final year, as a topic option.

4.3 Course Overview (Duration, Objectives)

The different brief interventions are limited to less than 10 hours per module per study year, for a week in each of the second and third years of study. These interventions aim at exposing students to different career

options related to entrepreneurship, and they are taught design thinking principles, lean startup principles, and value chain problem definition in a few lectures. They are also taught how to create a lean and value proposition canvas and how to pitch their ideas, which they do on the last day of their lectures in a group format.

4.4 Future Perspectives

Following a request from participating students, it is envisaged that students could continue to work, after the second iteration of this course in their third year, on a final-year project that focuses entirely on planning and prototyping an entrepreneurial idea, with support from the forestry-linked industry partners. Academics involved in this course were amenable to this idea, and if students choose this route, it will be explored with the next group of final years who have already experienced both interventions in the second and third years of study, respectively.

5 Key Enablers and Success Factors for Entrepreneurship Integration

5.1 Institutional and Industry-Related Enablers

Without institutional support, these initiatives would not have been possible to implement. The support includes (but is not limited to):

- Enabling key academics in roles that may deviate from a conventional subject or discipline-based teaching and research role. However, this does not come without a cost to the department and faculty, especially if the university is not willing to deviate from the traditional teaching/research/service key performance areas linked to most academic positions in research-intensive universities. The author of this chapter has actively transformed his teaching/research position into a teaching/scholarly research/innovation and entrepreneurship position by challenging the current status quo at the university. Considering all the

different actors in the ecosystem, it is important to have a coordinating role in faculty to actively engage with the technology transfer/innovation office and the incubator, to stay abreast of the opportunities offered to students and staff.

- Advancing the scholarly work on entrepreneurship education and leveraging associated funding sources and networks for this purpose. The author engaged, as an example, in a Teaching Advancement at Universities fellowship on the topic of this chapter in 2022/2023 and leveraged University Capacity Development Grant funding from the Department of Higher Education and Training to support workshops focusing on curriculum transformation, also wider in the AgriSciences Faculty.
- The AgriSciences Faculty also allocated an innovation/entrepreneurial support budget from 2019 to support certain initiatives, including innovation challenges, “train the trainers” workshops presented to faculty staff in 2023, as well as a subsidy of students and staff attending entrepreneurship programmes and boot camps.
- With regard to wine industry support, Winetech (now South Africa Wine Research, Development and Innovation) has continuously supported “Future of Wine” capstone entrepreneurship project with prize money, with the innovation committee within South Africa Wine also developing a pipeline to assist students in further developing and potentially commercialising their ideas.
- Alumni Engagement—we have observed a growing trend among our alumni who, after entering various industries related to AgriSciences, express a keen interest in entrepreneurship. They are increasingly reaching out to us for guidance and support in launching ventures within our industry. This interaction with alumni underscores the enduring impact of our entrepreneurship education but can be broadened and leveraged through additional industry support. Also, it offers an opportunity to look at presenting professional qualifications such as a postgraduate diploma or short course incorporating entrepreneurship and intrapreneurial principles.
- Ad-Hoc Interventions—recognising the importance of extending our efforts beyond students and alumni, we have introduced ad-hoc interventions, which include participating and co-sponsoring as a faculty

the university entrepreneurship boot camp initiatives. The “train the trainers” workshops as well as entrepreneurship curriculum integration workshops offered to academics from other departments are more examples. These initiatives aim to nurture a culture of entrepreneurship within our faculty among academic and other staff members. By involving the broader academic community, we seek to create an environment that encourages innovative thinking and entrepreneurial action.

- Collaborative Partnerships—to bolster our outreach and support to both current students and alumni, we have established strategic collaborations with internal (i.e., the Launchlab incubator and INNOVUS) and external partners (such as an online “school of entrepreneurship”). The university has also, recognising the fragmented nature of entrepreneurship initiatives, implemented an annual Entrepreneurship Indaba to bring together different actors in the ecosystem. This approach aligns with our goal of cultivating a culture of entrepreneurship that extends beyond curriculum implementation.

Although the above aspects constitute significant support, the roles of the mentioned Technology Transfer office (INNOVUS) and the University Incubator (Launchlab) are also pivotal, and important support structures to assist both students and staff in entrepreneurship development. The “ecosystem of support” also includes other departments in faculty, and other faculties in the University (i.e., Engineering, Science, and Economic and Management Sciences), and students are encouraged to consult with students and academics of other faculties for advice and support when scrutinising their business ideas.

For the entrepreneurial development initiatives, we advertise widely in the faculty across departments to attract students from diverse backgrounds. One of the key reasons for encouraging the “train the trainers” initiative across departments is to reach more students from different disciplines, different demographics, and different backgrounds to enhance diversity.

Although there is recognition that all students will not become entrepreneurs, the project has also shown that there is much to benefit

from any course (also out of the business domain) due to competencies gained from entrepreneurial integration. These competencies, such as teamwork, creative thinking, problem-solving, and openness to innovative technologies and learning are deemed critical for employment in future and are as applicable to agricultural employment as any other industry (Fitz-Koch et al., 2018). The project also involved interaction with other faculties to learn from their experience and has initiated a community of practice within the AgriSciences faculty to address this need.

Our faculty also have entrepreneurship-related courses that have been in existence for some years, including our Food Science Department's New Product Development course in the fourth year as well as our Genetics department's "non-biological aspects of biotechnology" course in the third year of the degree, which deals with entrepreneurship and intellectual property-related aspects.

5.2 Sustainability and Sustainable Development Goals Principles and Integration

The cultivation of an entrepreneurial culture and entrepreneurial ventures are crucial to the future of our agricultural industries, the sector, and the country. The traits associated with "farmers" have always been associated with innovation, frugality, ingenuity, resilience, grit, and a social conscience (Nieuwoudt et al., 2017). Still, increasingly an agricultural production entity functions more like a startup company or growing business venture. Furthermore, agricultural value chains are immensely diverse, which we also experience from the diversity of employment opportunities available to our students.

From a social perspective, a wider view of entrepreneurship opportunities, including social entrepreneurship, which is very relevant in a South African context, as well as a focus on the diversity of entrepreneurial ventures in agriculture and beyond creates space for students (especially during group work) to explore cultural and social diversity opportunities when ideating towards entrepreneurial goals. Social entrepreneurship holds significant relevance in South Africa due to its potential to

address pressing social issues while fostering economic sustainability. The concept has gained traction as social enterprises are recognised for their ability to create jobs and tackle social problems, which is particularly crucial in a country facing high unemployment rates. This recognition stems from the understanding that social entrepreneurship can contribute to economic development by establishing sustainable business models that prioritise social objectives alongside financial viability, notwithstanding the challenge of grant/venture funding being in short supply in South Africa (Quacoe et al., 2022).

An example of decolonisation of entrepreneurship and innovation elements is to introduce a (very important) “frugal innovation” context to entrepreneurship education. In my opinion, South Africa is ideally positioned to develop low-cost and for-good innovations, with a specific focus on agriculture, which does not only have to be limited to social entrepreneurship initiatives. It is also important to alert students to the issues around “reverse innovation” where large (often colonial) corporations take frugal ideas from developing countries and commercialise them successfully in developed markets, and the positive and negative aspects linked to this (Malodia et al., 2020).

6 Challenges

Some challenges in implementing the courses mentioned, as well as for future expansion include:

- Rollout wider than the current championing departments—although our faculty is quite large and diverse, and this is a real challenge, it is believed that organic growth in smaller steps would be crucial.
- Capacity to implement changes—lecturers and module coordinators as well as administrative staff are under pressure to “do the job of the hour”, and there is some resistance to new initiatives—therefore incremental and smaller organic changes are important.
- Participation in workshops and surveys as well as a general willingness to adopt change—increased pressure on academics, especially coming back to face-to-face lecturing after Covid-19, are possible

reasons that participation is still limited to a few academics in the faculty. One reason for this may also be a limited understanding of the new University Game Changer strategic focus on innovation and entrepreneurship, and generally, a quite complex and fragmented system of innovation and entrepreneurship interventions in faculties.

The major lessons learnt related mostly to the willingness to push for change, being persistent and outlining the benefits of integrating entrepreneurship into the curriculum, but also to be understanding of the challenges mentioned. Also, although there was a lot of resistance to putting elements of entrepreneurship directly into the current module offerings—after face-to-face and personal engagements with Departments it emerged that there always seemed to be some space/opportunity to either renew or even eliminate what is redundant in the current curricula to make space for these elements, but also to relook at our way of implementing changes in future to current modules. To this end, a clearer framework of competencies/skills/acumen is required in Agricultural Sciences, but also a way to continuously scope new and emerging trends and technologies which can be integrated into our current theoretical and scientific base work in modules. Other qualifications such as the South African Institute of Chartered Accountants, for example, include entrepreneurial thinking under their “enabling and future competencies” category.

7 Plans to Further Develop/Improve the Initiatives

It was decided to first have internal scoping exercises and alignment, before involving industries and external stakeholders in the process. There were, however current entrepreneurs included in some of the workshops as well as some people external to the faculty. The networks and ecosystem indicated previously in which the faculty participates are also very valuable, especially through the shared material produced (videos and slide shows) to assist academics in implementing entrepreneurship concepts.

It would be crucial to develop new material collaboratively and look at complementary material/modules from, i.e., economic and management sciences, engineering and the business school, Launchlab and INNOVUS, where appropriate. This project aimed to set up some base material, but also at the same time explore complementary avenues to offer material to students—the online space could be crucial in this regard as well as the use of existing material available online, for instance in the previously mentioned open courseware that we have been using in the Future of Grapes and Wine module.

8 Concluding Remarks

Although several challenges were encountered along the way, the mentioned case studies and related ecosystems contributed to enhancing and intensifying efforts in the faculty towards improving the entrepreneurial mindsets of both academics and students. This intervention has been and will be, not only of benefit to the students currently in the departments where this is focused on, with a view on the soft skills acquired and potential of creating different career opportunities but also through staff/academic involvement, it will enhance the general innovation and entrepreneurship culture in the faculty and wider in the university. The links created with other faculties or parties external to our faculty are valuable, and in effect create a much-needed ecosystem when entrepreneurship initiatives are integrated into current academic offerings or alongside it.

References

- Adelakun, Y., & Van der Westhuizen, T. (2021). Delineating government policies and individual entrepreneurial orientation. *Journal of Sociology and Social Anthropology*, 12(3–4), 106–117.
- Arnoldi, M. (2025, January). Better prospects ahead for South Africa's agriculture sector, but risks remain. *Engineering News*. <https://www.engineeringnews.co.za/article/better-prospects-ahead-for-south-africas-agriculture-sector-but-risks-remain-2025-01-28>

- Aulet, B. (2013). *Disciplined entrepreneurship: 24 steps to a successful startup*. Wiley.
- Awotunde, O., & Van der Westhuizen, T. (2021). Entrepreneurial self-efficacy development: An effective intervention for sustainable student entrepreneurial intentions. *International Journal of Innovation and Sustainable Development*, 15, 475. <https://doi.org/10.1504/IJISD.2021.118424>
- Bahrololoum, S., Kermani, M. M. M., & Koozhadi, F. (2022). Ecopreneurs and agricultural waste management. *Journal of Global Entrepreneurship Research*, 12(1), 47–51. <https://doi.org/10.1007/s40497-022-00311-7>
- Cagarman, K., von Arnim, L., Bürger, T., & Weber, J. (2023). *Pioneering Gen Z entrepreneurs: Reflections and policy considerations* (p. 28). Bertelsmann Stiftung. <https://doi.org/10.11586/2023090>
- Chandra, A., Stewart, C. M., & Meyer, C. (2024). An eclectic problem-based learning model in an entrepreneurship capstone course. *The International Journal of Management Education*, 22(3), Article 101034. <https://doi.org/10.1016/j.ijme.2024.101034>
- Dotsiuk, S. (2023). Entrepreneurship as a basis for sustainable development of the agricultural sector of the economy. *Green, Blue and Digital Economy Journal*, 4(2), Article 2. <https://doi.org/10.30525/2661-5169/2023-2-2>
- Duque-Acevedo, M., Belmonte-Ureña, L. J., Yakovleva, N., & Camacho-Ferre, F. (2020). Analysis of the circular economic production models and their approach in agriculture and agricultural waste biomass management. *International Journal of Environmental Research and Public Health*, 17(24), 9549.
- Fassio, F., & Tecco, N. (2019). Circular economy for food: A systemic interpretation of 40 case histories in the food system in their relationships with SDGs. *Systems*, 7(3), Article 3. <https://doi.org/10.3390/systems7030043>
- Feller, A., Shunk, D., & Callarman, T. (2006). Value chains versus supply chains. *BP Trends*, 1, 1–7.
- Fitz-Koch, S., Nordqvist, M., Carter, S., & Hunter, E. (2018). Entrepreneurship in the agricultural sector: A literature review and future research opportunities. *Entrepreneurship Theory and Practice*, 42(1), 129–166. <https://doi.org/10.1177/1042258717732958>
- Huang-Saad, A., Gibson, M., Goebel, J., Sheridan, R., & McNaughton, B. (2015). Student learning outcomes from a multidisciplinary capstone entrepreneurship course. In *Proceedings of open, the annual conference* (pp. 1–10). VentureWell. <https://www.proquest.com/docview/1749280944/abstract/20B3F8E7CE4F66PQ/1>

- Jones, J., Verma, B., Basso, B., Mohtar, R., & Matlock, M. (2021). Transforming food and agriculture to circular systems: A perspective for 2050. *Resource Magazine*, 28(2), 7–9.
- Kristóf, T., & Nováky, E. (2023). The story of futures studies: An interdisciplinary field rooted in social sciences. *Social Sciences*, 12(3), Article 3. <https://doi.org/10.3390/socsci12030192>
- Lee, N., & Loton, D. (2015). Integrating research and professional learning: Australian capstones. *Curquarterly*, 35, 28–34.
- Lengyel, P., Bai, A., Gabnai, Z., Mustafa, O. M. A., Balogh, P., Péter, E., Tóth-Kaszás, N., & Németh, K. (2021). Development of the concept of circular supply chain management—A systematic review. *Processes*, 9(10), 1740.
- Malodia, S., Gupta, S., & Jaiswal, A. K. (2020). Reverse innovation: A conceptual framework. *Journal of the Academy of Marketing Science*, 48(5), 1009–1029. <https://doi.org/10.1007/s11747-019-00703-4>
- Nicotra, M., Del Giudice, M., & Romano, M. (2021). Fulfilling University third mission: Towards an ecosystemic strategy of entrepreneurship education. *Studies in Higher Education (Dorchester-on-Thames)*, 46(5), 1000–1010. <https://doi.org/10.1080/03075079.2021.1896806>
- Nieuwoudt, S., Henning, J. I., & Jordaan, H. (2017). Entrepreneurial competencies and financial performance of farmers in South Africa. *South African Journal of Economic and Management Sciences*, 20(1), 1–13.
- Pokorná, J., Pilař, L., Balcarová, T., & Sergeeva, I. (Eds.). (2015). Value proposition canvas: Identification of pains, gains and customer jobs at farmers' markets. *AGRIS On-Line Papers in Economics and Informatics*. <https://doi.org/10.22004/ag.econ.231899>
- Pontefract, D. (2023). *It's about time we abandoned the term 'soft skills'*. Forbes. <https://www.forbes.com/sites/danpontefract/2023/03/27/its-about-time-we-abandoned-the-term-soft-skills/>
- Quacoe, D., Yusheng, K., & Quacoe, D. (2022). Assessing social entrepreneurship in South Africa. *International Journal of Economics Business and Management Studies*, 9(1), 28–38. <https://doi.org/10.55284/ijebms.v9i1.644>
- Raimundo, R. J., & Rosário, A. T. (2024). A Bibliometric systematic literature review on the relationship between problem-based learning methodology and entrepreneurship. *Businesses*, 4(4), 765–790. <https://doi.org/10.3390/businesses4040042>
- Thottoli, M. M., Cruz, M. E., & Abri, S. S. S. A. (2024). The incubation revolution: Transforming entrepreneurial education with artificial intelligence. *Asia Pacific Journal of Innovation and Entrepreneurship*, 19(1), 2–23. <https://doi.org/10.1108/APJIE-11-2023-0221>

- Toop, T. A., Ward, S., Oldfield, T., Hull, M., Kirby, M. E., & Theodorou, M. K. (2017). AgroCycle—Developing a circular economy in agriculture. *Energy Procedia*, 123, 76–80. <https://doi.org/10.1016/j.egypro.2017.07.269>
- Van der Westhuizen, T. (2024). Internal domains entrepreneurial heartset, mindset, and handset. In T. van der Westhuizen (Ed.), *Practical tools for youth entrepreneurs: An applied approach for South Africa and beyond* (pp. 31–55). Springer. https://doi.org/10.1007/978-3-031-44362-6_2
- Viljoen, D. (2022). *Futures of agricultural employment in South Africa 2035*. Stellenbosch Business School. <https://www.agbiz.co.za/document/open/ifr-futures-of-employment-in-agriculture-2035>
- Wong, H. Y. H., & Chan, C. K. Y. (2022). A systematic review on the learning outcomes in entrepreneurship education within higher education settings. *Assessment & Evaluation in Higher Education*, 47(8), 1213–1230. <https://doi.org/10.1080/02602938.2021.2021583>
- York, J. (2021). Status of the lean startup methodology (2021): From theoretical foundations to practice experience and current academic discussions. *Journal of Entrepreneurship & Organization Management*, 10(8), 1–22.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits any noncommercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if you modified the licensed material. You do not have permission under this license to share adapted material derived from this chapter or parts of it.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.





16

Entrepreneurship Education for Sustainable Production of Bio-Based Products: A Case Study

Vhuhwavho Tshavhungwe 

1 Introduction

1.1 Background

Most significant social and economic consequences, including financial success, health, stable households, and social ties, are highly correlated with education (Hout, 2012). However, a university education is costly for many people and their families (Barr, 2002). Students fund their studies through different methods such as bursaries, student loans, family support, etc. People attend university to secure employment in their chosen fields of study after graduation; however, with the high unemployment rate in South Africa, graduates are finding themselves unemployed (van Aardt, 2012). Higher education institutions are at the forefront of innovation and should, as a result, operate “entrepreneurially” and inspire students to do the same (Pittaway & Cope, 2007). The

V. Tshavhungwe (✉)

Department of Forestry, University of Venda, Thohoyandou, South Africa

e-mail: Vhuhwavho.tshavhungwe@univen.ac.za



Fig. 1 Entrepreneurship environment framework (Source Adapted from Paradis, 2023)

entrepreneurship environment framework is shown in Fig. 1. The figure highlights the different stakeholders associated with an entrepreneurship environment.

The Need for Entrepreneurship Education

Programmes in higher institutions are often geared towards teaching procedures, principles, and information (von Graevenitz et al., 2010). Lately, governments and academia are focusing on fostering entrepreneurship since it is strongly tied to innovation, helps boost the national economy through job and wealth creation, and is increasingly seen as an employment alternative (Petridou et al., 2009). It is believed that entrepreneurship education is one of the policy measures that should

be implemented to help address youth unemployment by providing opportunities for young individuals who wish to pursue entrepreneurship (Strachan, 2018). Incorporating entrepreneurship education into universities aims to instil an entrepreneurial culture and spirit in students and produce new educated entrepreneurs and businesses based on science and technology (Ghina, 2014).

Entrepreneurship is crucial to long-term economic growth and job creation (Yıldırım et al., 2016). Entrepreneurship can often be attributed to the establishment of new firms. However, it is occasionally broadened to include new organisational activity inside existing corporations and non-profit organisations that aspire to produce new social or economic value (Levie, 1999). In higher education, operational definitions of entrepreneurship vary, and various educational components are covered, including employability skills, social enterprise, self-employment, venture development, jobs in small firms, startup management, and the oversight of rapidly expanding initiatives (Pittaway & Cope, 2007).

Entrepreneurship programmes include interactive education, experience-based learning, mentors, and company and community connections (Petridou et al., 2009). An innovative teaching strategy in entrepreneurship education is moving towards problem-based learning, which addresses open-ended, real-world problems (Bragelien & Voldsund, 2023).

1.2 Barriers to Implementing Entrepreneurship Education

There are some barriers to implementing entrepreneurship education. Some of this barriers to the implementation of entrepreneurship in education include the lack of a standard entrepreneurship curriculum within universities, a shortage of instructor skills in delivering a new paradigm on the importance of entrepreneurship, the ineffective operation of entrepreneurship centres within higher education institutions, a lack of cooperation between institutional education and business

owners and the community, and collaboration with both financial and non-financial institutions (Ghina, 2014).

In their study, Petridou et al. (2009) highlighted that in practically all scientific subjects, female students participate in entrepreneurial education programmes at a lesser rate than male students. Another concern is that entrepreneurship education may be understood systematically, in the sense of being able to identify contextual elements, inputs into a system, methods of instruction, and outputs; however, the systemic aspect of entrepreneurship education is hampered by the reality that there is relatively no consensus on what the outputs are supposed to be (Pittaway & Cope, 2007).

Kuratko (2005) highlighted the following challenges affecting the incorporation of entrepreneurship in higher education training. The first is the difficulty in developing current programmes and staff to improve the field's quality, and the second is a lack of formal academic programmes, indicating a lack of commitment on the part of institutions.

1.3 Entrepreneurship Intention Among Students

Finding and seizing opportunities for value creation can be facilitated by having an entrepreneurial attitude (Bragelien & Voldsund, 2023). When entrepreneurship education influences students' attitudes and perceptions, it may affect their goals for entrepreneurship and, as a result, actions (von Graevenitz et al., 2010). Yildirim et al. (2016) say that entrepreneurship is a behaviour that results from an attitude that shows an individual's drive and capacity to spot an opportunity and follow it to create new value or achieve financial prosperity.

In their study, Pittaway and Cope (2007) identified a variety of influences on student propensity towards entrepreneurship:

- Personal characteristics are related to attitudes towards self-employment and, thus, indirectly to intent to start a business.
- Entrepreneurial goals are strongly related to perceived obstacles and supportive elements in the setting in which the activity will take place.

- Students were found to be significantly deterred by a lack of business expertise and a perception of danger.
- Gender, family background in entrepreneurship, level of education, and age were found to impact intentionality directly.
- Entrepreneurship education programmes can change people's intentions and beliefs about the desirability and feasibility of establishing a business.
- Broader political, cultural, and economic concerns, such as business backing facilities, can significantly influence graduate intentions in various nations.

Several research studies have focused on the determinants of entrepreneurial behaviour, specifically the role of education in moulding and improving entrepreneurial activity (Petridou et al., 2009). The entrepreneurial intent of university students is the first step in creating an innovative and viable economy powered and supported by entrepreneurial and inventive activity (Yildirim et al., 2016). von Graevenitz et al. (2010) outlined that a student may get contradicting signals when learning about entrepreneurship, and different students may receive signals of varying quality. They argued that there are students who learn nothing and those who learn and discover whether they like or despise entrepreneurship.

Higher education administrators should consider the influence of their institutions' curricula on their students' entrepreneurial inclinations (Yildirim et al., 2016). They mentioned that aside from more rigorous, concentrated, and well-designed formal courses and practices on strengthening students' entrepreneurial ambitions, various societies and organisations, such as clubs for students and contests, should also be included on the agenda. This is why several entrepreneurial programmes have gone beyond traditional lecture-based teaching approaches, including guest lecturers, case studies, and mentors, and have centred around technology (Petridou et al., 2009).

Research findings by von Graevenitz et al. (2010) support educational strategies that regard entrepreneurship training as teaching students about career possibilities and generating learning opportunities for calibrating and improving their evaluations of which occupation best suits

them. This is because entrepreneurship education can act as a catalyst for the commencement of entrepreneurial activity by enhancing students' entrepreneurial thinking and behaviours (Petridou et al., 2009).

1.4 Towards Sustainability in Higher Education

The strategic adoption of sustainability in higher education necessitates an extensive reconsideration of innovation in the organisational framework, including internal structure and operations, as well as interactions with outside parties (Covas & Solcan, 2023). The discipline of sustainable entrepreneurship education combines two crucial areas of study: entrepreneurship education and sustainable entrepreneurship (Sharma et al., 2020). Strachan (2018) emphasised that there should be a clear distinction between entrepreneurship education in general and sustainable entrepreneurship education in particular, since the latter can help achieve the Sustainable Development Goals (SDGs) and offer answers to many of the environmental and social problems of the twenty-first century.

A word cloud generated from the reviewed literature highlights the key themes discussed. The main discussion points in Fig. 2 are entrepreneurship, education, research, business, entrepreneurial, development, and social. This illustrates a link between different variables that all support entrepreneurship activities.

1.5 The Forest as a Source of Entrepreneurial

Forestry is essential to the nation's socioeconomic growth (Shafie et al., 2017). The need for and supply of forest-derived resources is expected to rise steadily over the years (Hashim et al., 2015). Rapid population growth, technological advancements, rising individual incomes, increasing educational attainment, and shifting standards of judgement have all contributed to a shift in the need for forest products, which are acknowledged as one of the most significant natural resources (Gul Sarikaya, 2019).



Fig. 2 Identified themes from reviewed literature

The emergence of a new view of forestry that considers societal demands and strives for diverse benefits identifies non-wood forestry products as having essential financial, ecological, social, and cultural functions (Gul Sarikaya, 2019). The production of forest-based products falls under the bioeconomy in the economic sector. Bioeconomy refers to cultivating and utilising sustainable natural resources and transforming them into goods with additional value (Carus & Dammer, 2018). Compared to natural forests, plantation forestry may generate much more wood and non-wood products in a comparatively shorter time, ranging from three to thirty years (Abidin et al., 2021). Figure 3 shows the interaction between green economy, bio-based economy, bioeconomy, and circular economy in the economic sector.

The forest provides countless renewable resources that can be processed into products that people use daily, as shown in Fig. 4. Those products can be categorised as timber-based forest products and non-timber forest products. The use of all these resources supports the concept of circular economy. A circular economy is an environment where waste production is kept to a minimum, and the value of goods,

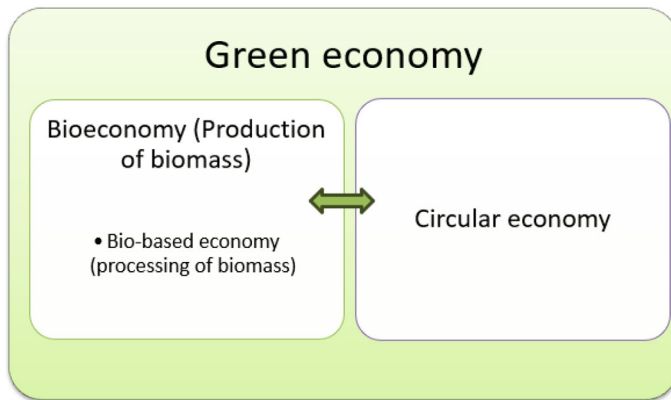


Fig. 3 Sustainable economic setting (Adapted from Kardung et al., 2021)

materials, and resources is preserved for as long as feasible (Carus & Dammer, 2018).

2 Case Study Highlighting Entrepreneurship Education in a Forestry Module

This investigation was carried out through a case study because case studies explore a current phenomenon in its real-life environment. The following section presents evidence of the implementation of entrepreneurship education in a non-entrepreneurship course offered in a higher education institution. This was done to incorporate entrepreneurship education content in existing modules without altering the structure of the course itself. The implementation will be discussed in the following sections.



Fig. 4 Examples of products that can be made from forest-based products

2.1 The Title and Mandate of the Programme/ Module or Initiative, Including the Targeted Young Entrepreneurs

The module where entrepreneurship education was implemented was FRT 3142: Sawmilling, a module for 3rd-year Forestry students at the University of Venda.

2.2 What Sustainability Problem (s) Is This Initiative Trying to Address?

South Africa is faced with the problem of a high rate of unemployment, which affects the Sustainable Development Goal: SDG 1: End poverty in all its forms everywhere. This unemployment rate is affecting graduates across different fields of study. As the unemployment rate rises, this impacts SDG 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture, as most people cannot afford necessities. With its roots in actual sustainability issues, the circular economy concept is seen as a shared language and platform for entrepreneurship education problem-solving (Bragelien & Voldsund, 2023).

The forestry and wood science/technology programmes produce graduates for commercial and general forestry, sawmilling, pulp and paper, composite products manufacturing, agroforestry, etc. Although the industries seem many, the overall forestry industry is struggling to absorb the number of graduates produced by the five universities (University of Venda, University of Pretoria, Nelson Mandela University, Fort Cox Agriculture and Forestry Training Institute and Stellenbosch University) offering forestry and wood science/technology-related courses in South Africa.

The intake of students in those universities is reasonable for the industry, and even with the relatively small quantity of output (graduates), some of these graduates are finding themselves unemployed. Thus, there is a need for higher institutions to prepare their graduates for an alternative to traditional practices, where graduates expect to go straight into the job market after graduating, as most graduates find themselves without work. The conventional university curriculum is geared towards teaching students to fit into the job market and not necessarily create jobs for themselves. Although changing the entire curriculum to fit entrepreneurship education might not be feasible, entrepreneurship can be incorporated into the curriculum without changing it.

As part of module planning, the module lecturers decide how they will assess the students' understanding of the content being taught in the module. Depending on the module content, design, and expected

outcome, these assessment forms may include tests, assignments, quizzes, practical sessions, etc. Entrepreneurship components can easily be integrated into the tasks and projects students must complete in the module. This allows students to apply their minds using the module content theory to carry out an entrepreneurship-centred project or assignment. In this way, the module is not restructured entirely.

When students graduate, they can consider entrepreneurship as an option when starting their careers. The advantage of this is that young people have massive potential for creativity and risk-taking, which may result in startups employing many people. These forestry-related startups can partially answer this unemployment problem, not only for the graduate entrepreneur but also for the people who will be hired in those potential startups. To fully realise the potential contained in forestry, the use of curriculum should generate curious graduates who can think in new ways and who have the bravery to encounter and adapt to the difficulties that face them, as well as an entrepreneurial attitude. This mentality will enable university graduates to find, create, exploit, and expand possibilities in sustainability-related forestry.

2.3 The Criteria Used to Screen Applicants/Youth Entrepreneurs for Participation in the Programme

There were no criteria to screen participants as students registered for FRT 3142 become participants by default. This is because the students were required to submit a report for their module assignment, contributing to their semester marks. For this reason, there was no reason to screen participants. In this way, all students become participants in the project without the need for selection, which allows all students to be exposed to the entrepreneurship component.

2.4 Strategies to Encourage the Inclusion of Diverse Candidates

The participants for the project comprised all students enrolled on the module. As module lecturers, we cannot control who enrolls in our modules. This implies less control over who gets to participate in the project, as all the students were required to do an assignment and submit it for grading. The assignment was part of their semester mark; therefore, whoever was registered for the module became a participant.

2.5 The Infrastructure/Support Provided by the Institution

Due to the nature of implementing the entrepreneurship education component in the module, not much infrastructure was needed. The students were, however, able to access library resources, such as library databases and books through the institution, to conduct their research for the assignment since the study was qualitative. As we further refine, the department will have to ensure that we get resources, such as equipment, for the students to test the application and development of some of the products they were discussing theoretically.

2.6 Links to Other Entrepreneurship Activities Within the Institution

The Department of Forestry at the University of Venda is part of the 21st Century Climate-Smart Forestry Education for Livelihood and Sustainability in South Africa (FOREST21) project (FOREST21, [2021](#)). The FOREST21 project, funded by the Erasmus + programme of the European Union, has participants from South Africa and Europe. The participants include universities in South Africa, namely, the University of Venda, Tshwane University of Technology, Nelson Mandela University, Fort Cox Agriculture and Forestry Training Institute, and Stellenbosch University and universities in Europe, which include Håme University of Applied Sciences, Aalto University, and Inland Norway University of

Applied Sciences. The aim of the FOREST21 project and the SDG goals they link with are shown in Fig. 5.

Since the project's inception, different stakeholder engagements have addressed the aspects discussed above. This has created an opportunity to rethink forestry and the foresters produced by the higher education system. This is achieved through the project's objectives. The project's overall goal is to increase South African forestry higher education institutions' capacity to deliver work-life suitable and diverse higher education for societal and environmental development, with the following specific goals:

- Apply a novel climate-smart forestry curriculum incorporating entrepreneurial and analytical abilities;
- Enhanced student-driven teaching and learning approaches by implementing problem-based learning;
- Continuously cooperating in a network-based learning environment with the academic community and societal/industry counterparts in the South African context; and

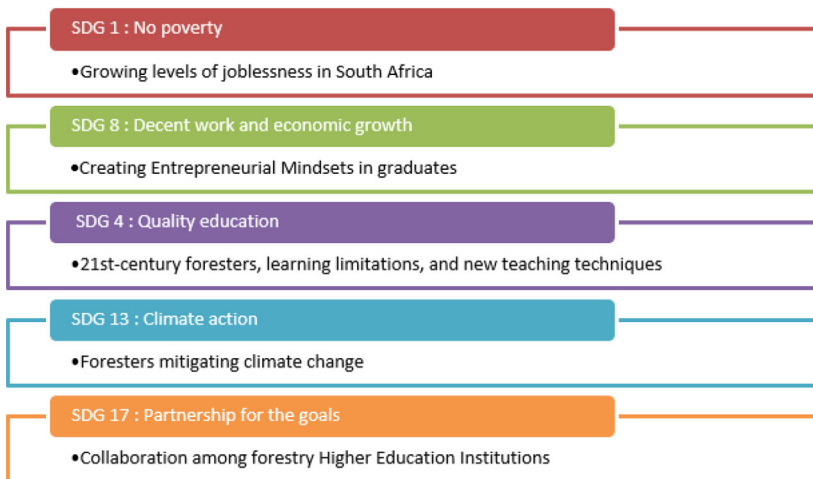


Fig. 5 Aims of the FOREST21 project and links to sustainable development goals

- Enhanced higher education institutions' capacity to contextualise and establish curricula, teaching methodology, and learning environments through local and global alliances.

The initiative has created an environment where colleagues from different universities can come together and discuss matters affecting forestry education in South Africa and Europe and share ideas on ways to improve or incorporate entrepreneurship in the modules offered by each institution. In the past years, since its inception, students from different universities have come together and participated in student-based challenges. This allowed students to identify problems and work together to solve such industry problems. In so doing, students are already being challenged to think outside the box, in this case, the classroom, and solve real-life problems.

A select number of modules were chosen for inclusion in the entrepreneurship programme after a course comparison of all the modules offered by the different universities. For example, modules such as FRT 3142: Sawmilling (University of Venda), Wood Products Manufacturing I (Stellenbosch University) and Timber Processing II & III (Nelson Mandela University) all cover similar content. The module lecturers were tasked with exploring ways to incorporate entrepreneurship components in their modules. This allows lecturers to learn from each other by sharing ideas on what they did in their modules. In their study, Faludi and Gilbert (2019) highlighted that project-based learning in multidisciplinary teams was an excellent option for teaching techniques, mainly when collaborating with outside parties or the industry.

2.7 A Description of the Ecosystem of the Initiative

Entrepreneurship education pedagogy in higher education specifies three options for how entrepreneurship can be instructed: providing instruction regarding entrepreneurship, instructing for entrepreneurship, or instructing using entrepreneurship (Bragelien & Voldsund, 2023). In response to the Forest21 initiative and what it intends

to do, entrepreneurship was incorporated in the assignment given to the students registered for FRT 3142, a wood product manufacturing module. The main aspects of the module deal with the processing of structural timber and composite products, which are produced on a large scale and require significant capital investment for log breakdown machinery, transportation, and labour.

Students were given an assignment where the business-oriented questions were standardised, but were assigned different products to investigate. The assignment's main question was, "You are about to start a business. As a forestry student, you have decided that your product will be made from wood or a forest-based resource/ingredient. For your assigned product, explain the steps you will take to make and sell the product". The students were provided with guidelines in the form of specific questions that needed to be addressed in their research. The students followed Fig. 6 to address their assigned problem.

As stated previously, each student was assigned a different product to investigate. The assigned products were eucalyptus oil, pencils, toothpicks, chairs, chopping boards, pallets, log houses, wine barrels, palm oil, rubber, hardwood tables, bamboo products, broomsticks, couches, charcoal, doors, windows, wine corks, woven baskets, and pellets. All these products can be made from raw forest material sourced from sustainably managed commercial forestry plantations in South Africa. This means that SDG 12: Ensure sustainable consumption and production patterns was considered in the implementation of this project.

The products were selected because they could be produced on a small startup scale with less capital investment. In so doing, entrepreneurship was introduced into the curriculum without having to change the curriculum and without requiring additional hours outside of the regular module hours. Through the typical content of the module, students already knew about manufacturing wood and forest-based products, which were discussed thoroughly in the modules. Students could also use their knowledge from modules, such as Introduction to Forest Economics, Forest Valuation and Investment, Forest Nursery Management and Propagation, to answer business-related questions. Having a relatively small group allowed for the assignment's individualisation, which made the students see this as their business.

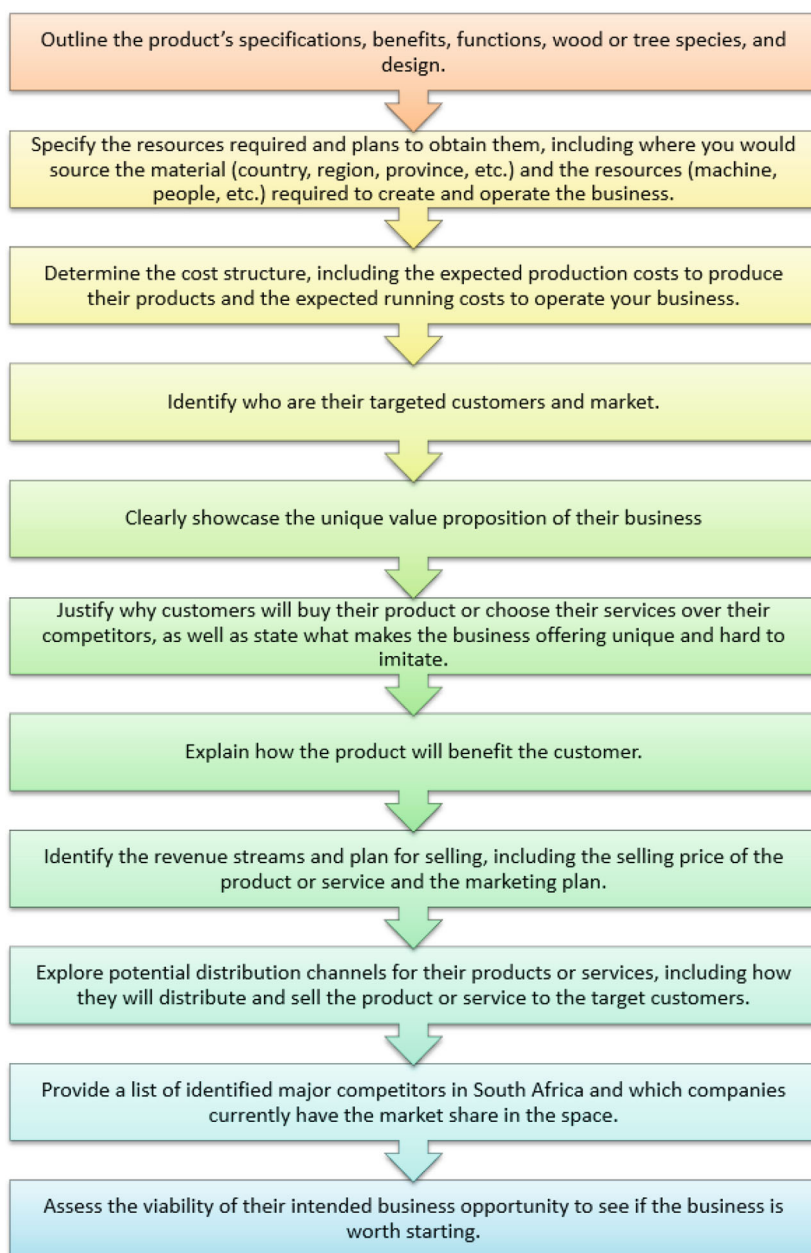


Fig. 6 Steps followed to make and sell the different forest-based products

2.8 The Performance of the Programme/Module/ Initiative So Far, Including Any Ratings by Participants

For students to experience transformative personal growth, desirable learning outcomes, and a shift in attitudes and values, entrepreneurship instructors should encourage and excite them (Strachan, 2018). Incorporating entrepreneurship in the module through the assignments has proven to be a great way to educate students on entrepreneurship opportunities in forestry. The module does not detail some aspects of forestry and sawmilling operations. Assigning students different products or aspects to look at presented an opportunity for students to teach their peers what they learned while researching their product.

The students said that the presentations allowed them to learn about the different products that were not assigned to them. This is corroborated by Hout (2012), who outlined that collaboration is promoted in entrepreneurship education based on experiential and problem-based learning through activities such as co-participation in knowledge development. The amount of data each student gathered related to their assigned product and the level of analysis done in ensuring that they addressed all the assignment questions was good enough to make them and their classmates understand the different manufacturing processes and start businesses using various wood and forest-based products.

This was a success because the curriculum could not cover all the manufacturing of forest and wood products; however, the students educated each other through student presentations. This was also a great way to ensure students did not copy each other's work while looking at different products or services. This could be another way lecturers could ensure that students take ownership of their assignments and do their work independently.

2.9 The Challenges That Were Encountered

The project implementation could only be done as part of the assignment, with no additional hours required outside the specified module

hours. The idea was not to restructure the course but to stick to the course's specified learning outcomes. This influenced the implementation of the entrepreneurship component in the course. The main challenge was that the curriculum was already fixed and designed to teach content and prepare students to fit into the forestry industry, and not necessarily redefine the industry. Implementing such programmes requires much time outside the standard allocated class period, which, in the case of the current curriculum, presents a challenge for both the students and the lecturer.

This is because the students will have, on average, five modules per semester, each with module-specific requirements that impact the students' workload. It is also the case that most of us lecturers work in silos because each module has different and specific module-specific outcomes. This creates a situation where students must focus on various aspects of each module they are taking and not focus much on the entrepreneurship project beyond submitting it for grading. The other challenge is that we have access to the students for a semester in that particular module, as the module is a semester module and not an entire year, which is insufficient time to fully monitor and evaluate all the stages of the project life cycle.

The stages of the project life cycle are project selection, planning, execution, and termination (Jiang & Heiser, 2004). Although students are given projects in the form of assignments, and each goes through the different phases of the project life cycle, which ends when they each submit their written report and present their work to their peers, and each gives feedback on how they found the exercise and what they learnt in terms of entrepreneurship education, there is not much following up that can be done since by then the semester would be ending, and the students would be moving on to do other modules. Despite some of the highlighted challenges, we could still successfully incorporate entrepreneurship education in a forestry module without restructuring the course.

2.10 Plans to Further Develop/Improve the Initiative

The department could procure small research equipment that registered students can use as part of practical exposure to processing some of these wood and non-wood forest products. Small equipment to process non-timber forest products, such as a steam distiller to extract eucalyptus oil from eucalyptus trees and freeze dryers and dehydrators to process medicinal plants found in the forests, can be procured. A wood-processing workshop where students can design wooden furniture (tables, chairs, cupboards, doors, windows, etc.) and manufacture them can be built on campus. This will allow students to gain practical experience in manufacturing different products. This way, students will know the time, effort, skill requirements, resources, challenges, etc., associated with processing such products.

An industry-specific manual or guide can be developed to give students a reference point to use when they want to start their businesses after leaving the university. This can also be made available to the public through the Universities' innovation hub. The guide could include topics such as how to conduct market research, strength, weakness, opportunities and threats (SWOT) analysis, business models, writing a business plan, securing finance, managing finances, business branding, business legalities (copyrights, trademarks, patents, and universal product codes), business marketing, developing internal and external customers; business management strategies, product development and manufacturing, quality assurance, product pricing, ethics and social responsibility, business expansion, networking, etc.

The reference guide could also include small summaries in the form of diagrams or flow charts demonstrating the manufacturing of different forest-based products, such as eucalyptus oil, pencils, toothpicks, chairs, chopping boards, pallets, logs houses, wine barrels, palm oil, rubber, hardwood tables, bamboo products, broomsticks, couches, charcoal, doors, windows, wine corks, woven baskets, and pellets. A summary of other entrepreneurship opportunities in forestry-related services, such as Biodiversity, Recreation, Carbon reporting, Consulting, Forest management services, and Agroforestry. This will help the students understand

the linkages between the mainstream forestry industry and the different products and services offered in forestry.

There needs to be a system where all module lecturers can be involved in a single project that feeds into their different modules. The first entering students could then be introduced to different entrepreneurial projects related to different modules that they are taking. They can then develop their business ideas and assess the feasibility of their projects as they move through the years. This will also allow lecturers to not work in silos, as different students can work on projects that solve entrepreneurial problems across the different module components. For example, lecturers teaching forest economics could ensure that they highlight the economics of startups and not just mainstream commercial forestry operations.

For forest nursery management and propagation offered in the second year, students could establish a nursery they will establish as a business. The students could keep track of all the resources and the costs of such resources that they used in establishing their nursery. In this case, they will be able to have an idea of how much it would take to establish a small nursery business. The students could then “sell” the young trees to the 3rd-year silviculture students to use for their planting practical sessions. In this way, students will understand the flow of resources in forestry while still studying. For modules such as sawmilling, students could learn how to manufacture different wooden products on a small scale. In research methodology, lecturers could introduce an aspect of market research.

All these activities could be linked to one project that students and all lecturers in the department could be part of. The goal is to have a student-centred forestry operation where students make things that the university purchases externally, such as decorative plants, office furniture, composts, sawdust, etc., which students can produce as part of their practicals and assignments.

3 Conclusions

Entrepreneurship education allows students to consider entrepreneurship as an alternative to the traditional job market. Entrepreneurship education can be achieved by incorporating different entrepreneurship-centred activities in the existing curriculum through assignments and projects without requiring a complete programme overhaul. Higher education institutions' initiatives, such as the 21st Century Climate-Smart Forestry Education for Livelihood and Sustainability, encourage lecturers to start looking at ways to rethink what and how they teach their students. This is because module lecturers are now finding ways to incorporate entrepreneurship education into the modules and trying to inspire registered students to consider starting their businesses instead of relying on the job market.

Through this exercise, the students showed interest in learning about business opportunities in forestry and ways of processing and selling different wood and non-wood forest products. Although we encountered a few challenges or limitations in trying to incorporate entrepreneurship in the module, these challenges can be used as learning opportunities to improve the delivery of entrepreneurship education. By implementing the plans to develop further/improve the initiative, students and lecturers will have tools to explore entrepreneurship education. Future research is necessary to understand the students' view of the forestry programme and their entrepreneurial Intentions.

References

- Abidin, S. Z., Bahari, S. A., Ibrahim, A., Ghazali, A. E. M., Ahmad, M. A., Muji, M. S., Delgado, M. V. B., Zbiec, M., Garrido, J., Ortega, J. J., Gómez, M. V. G., Ratnasingam, J., Hashim, R., Zakaria, S., & Amin, M. N. Z. M. (2021). Analysing the Malaysian higher education training offer for furniture design and woodworking industry 4.0 as an input towards joint curriculum validation protocol. *Asia Pacific Journal of Educators and Education*, 36(1), 1–24. <https://doi.org/10.21315/apjee2021.36.1.1>

- Barr, N. (2002). Funding higher education: Policies for access and quality. In *Education* (Issue September, pp. 19–35).
- Bragelien, J. J., & Voldsund, K. H. (2023). Entrepreneurship education through sustainable value creation-exploring a project introducing circular economy. *Procedia Computer Science*, 219, 1920–1929. <https://doi.org/10.1016/j.procs.2023.01.491>
- Carus, M., & Dammer, L. (2018). The circular bioeconomy—Concepts, opportunities, and limitations. *Industrial Biotechnology*, 14(2). <https://doi.org/10.1089/ind.2018.29121.mca>
- Covas, L., & Solcan, A. (2023). The orientation of entrepreneurship education. In *11th international conference of management and industrial engineering* (pp. 67–74).
- Faludi, J., & Gilbert, C. (2019). Best practices for teaching green invention: Interviews on design, engineering, and business education. *Journal of Cleaner Production*, 234, 1246–1261. <https://doi.org/10.1016/j.jclepro.2019.06.246>
- FOREST21. (2021). *FOREST21 climate smart forestry entrepreneurs*. <https://www.forest21.org/>
- Ghina, A. (2014). Effectiveness of entrepreneurship education in higher education institutions. *Procedia—Social and Behavioral Sciences*, 115, 332–345. <https://doi.org/10.1016/j.sbspro.2014.02.440>
- Gul Sarikaya, A. (2019). Recognizability of some non-wood forest products by young people: Case of Atabey Vocational School, Isparta, Turkey. *International Journal of Ecosystems and Ecology Science (IJEES)*, 9(3), 569–574. <https://doi.org/10.31407/ijeess9321>
- Hashim, M. N., Mohd Hazim, M. A., & Syafinie, M. (2015). *Strategic forest plantation establishment in Malaysia for future product*. Kuala Lumpur International Agriculture, Forestry and Plantation. January 2016, 1–16.
- Hout, M. (2012). Social and economic returns to college education in the United States. *Annual Review of Sociology*, 38, 379–400. <https://doi.org/10.1146/annurev.soc.012809.102503>
- Jiang, B., & Heiser, D. R. (2004). The eye diagram: A new perspective on the project life cycle. *Journal of Education for Business*, 80(1), 10–16. <https://doi.org/10.3200/JOEB.80.1.10-16>
- Kardung, M., Cingiz, K., Costenoble, O., Delahaye, R., Heijman, W., Lovrić, M., van Leeuwen, M., M'barek, R., van Meijl, H., Piotrowski, S., Ronzon, T., Sauer, J., Verhoog, D., Verkerk, P. J., Vracholi, M., Wesseler, J. H. H., & Zhu, B. X. (2021). Development of the circular bioeconomy: Drivers

- and indicators. *Sustainability (Switzerland)*, 13(1), 1–24. <https://doi.org/10.3390/su13010413>
- Kuratko, D. F. (2005). The emergence of entrepreneurship education: Development, trends, and challenges. *Entrepreneurship Theory and Practice*, 29(5), 577–597.
- Levie, J. (1999, October). *Entrepreneurship education in higher education in England: A survey* (pp. 1–41). London Business School.
- Paradis, M. (2023). *7 ways governments can foster entrepreneurship*. World Economic Forum. <https://www.weforum.org/agenda/2023/02/7-ways-governments-can-support-entrepreneurship/>
- Petridou, E., Sarri, A., & Kyrgidou, L. P. (2009). Entrepreneurship education in higher educational institutions: The gender dimension. *Gender in Management*, 24(4), 286–309. <https://doi.org/10.1108/17542410910961569>
- Pittaway, L., & Cope, J. (2007). Entrepreneurship education: A systematic review of the evidence. *International Small Business Journal*, 25(5), 479–510. <https://doi.org/10.1177/0266242607080656>
- Shafe, S. M., Othman, Z., & Hami, N. (2017). *Journal of Technology and Operations Management*, Special Issue (May), 60–69.
- Sharma, S., Goyal, D. P., & Singh, A. (2020). Systematic review on sustainable entrepreneurship education (SEE): A framework and analysis. *World Journal of Entrepreneurship, Management and Sustainable Development*, 17(3), 372–395. <https://doi.org/10.1108/WJEMSD-05-2020-0040>
- Strachan, G. (2018). Can education for sustainable development change entrepreneurship education to deliver a sustainable future? *Discourse and Communication for Sustainable Education*, 9(1), 36–49. <https://doi.org/10.2478/dcse-2018-0003>
- van Aardt, I. (2012). A review of youth unemployment in South Africa, 2004 to 2011. *South African Journal of Labour Relations*, 36(1), 54–68.
- von Graevenitz, G., Harhoff, D., & Weber, R. (2010). The effects of entrepreneurship education. *Journal of Economic Behavior and Organization*, 76(1), 90–112. <https://doi.org/10.1016/j.jebo.2010.02.015>
- Yıldırım, N., Çakır, Ö., & Aşkun, O. B. (2016). Ready to dare? A case study on the entrepreneurial intentions of business and engineering students in Turkey. *Procedia—Social and Behavioral Sciences*, 229, 277–288. <https://doi.org/10.1016/j.sbspro.2016.07.138>

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits any noncommercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if you modified the licensed material. You do not have permission under this license to share adapted material derived from this chapter or parts of it.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.





17

Cultivating Change Agents: An Experiential Pedagogy for Social Entrepreneurship

Ruenda Loots 

1 Introduction

This chapter explores the Diploma in Sustainable Development (Dip SD) at Stellenbosch University as an innovative model for developing social entrepreneurship through experiential learning. The Dip SD integrates interdisciplinary learning, constructive alignment, and place-based learning, to prepare students for South Africa's complex socio-ecological landscape. By combining theory with hands-on practice, the programme focusses on developing entrepreneurial mindsets and resilience for volatile, uncertain, complex, and ambiguous (VUCA) futures.

Focussing on the curriculum's design, this chapter details the Dip SD's embedded approach to social entrepreneurship (SE), emphasising experiential learning contextualised within local sustainability frameworks.

R. Loots (✉)

School of Public Leadership, Stellenbosch University, Stellenbosch, South Africa

e-mail: ruenda@sun.ac.za

Through this approach, the programme aims to empower youth to become catalysts for transformative change in a rapidly evolving world. The chapter concludes by highlighting both success stories and challenges, offering insights into the programme's impact and potential for wider adoption of these pedagogical practices.

1.1 Context

South Africa's transition to a green economy is anchored in key national policies such as the National Framework for Sustainable Development, the National Strategy for Sustainable Development and Action plan, the National New Growth Path 2010 and the Green Economy Accord (Stafford & Facer, 2014). Despite these policy commitments, South Africa faces considerable challenges in transitioning to a green economy while simultaneously addressing high rates of youth unemployment. Graduate unemployment rates have nearly doubled in the past decade, with 11.8% of South African graduates facing unemployment in the first quarter of 2024 (Statistics South Africa, 2024), despite a shift towards high-skilled labour demand and substantial growth in tertiary enrolment rates (MacGinty, 2024).

Within this context of youth unemployment and green transitions, the Dip SD was developed as a three-year programme targeted at students aged 18–25. Student numbers have steadily increased since the launch of the programme in 2018, as the demand for theoretical knowledge and practical skills increases in the growing field of sustainability-related careers.

Drawing on Freire's (1979) argument that true education serves as an act of liberation, the Dip SD reimagines higher education as a catalyst for critical reflection and systemic transformation, resisting the notion that the primary objective of higher education is to prepare workers for the immediate demands of the Fourth Industrial Revolution (Harland et al., 2010; Loots et al., forthcoming; Raimondi, 2012). Instead, the Dip SD aims to activate students' imagination for innovation and solutions, particularly considering the VUCA realities that will await them after university.

2 Social Entrepreneurship for Sustainable Futures

Social entrepreneurship (SE) has emerged as a framework for addressing systemic inequities like poverty, unemployment, and social welfare. Unlike traditional entrepreneurship, which primarily seeks financial gain, SE focusses on the creation of social value and driving positive societal change. Social entrepreneurs often merge public social goods with market-based strategies, operating at the intersection of non-profit and for-profit philosophies. By aligning social and economic objectives, SE reduces negative externalities and contributes meaningfully to the sustainable development agenda (Gupta et al., 2020).

The Dip SD's graduate attributes and learning outcomes of the Dip SD are anchored in three pillars:

Interconnected systems thinking: Developing students' understanding of social, ecological, and economic interdependencies.

Entrepreneurial agency: Stimulating entrepreneurial mindsets and action to address sustainability challenges.

Practical competencies: Equipping students with skills in sustainability reporting, strategic communication, facilitation, and ethical leadership.

By integrating SE with sustainability values, the Dip SD encourages value-driven entrepreneurship, which positions graduates as catalysts for just and sustainable African futures. The first cohort of students, Team One, expressed these attributes and outcomes in their own words (Table 1).

SE is not only a theoretical underpinning of the Dip SD but also serves as a practical, actionable framework embedded throughout the curriculum to achieve the graduate attributes and learning outcomes in Table 1. The programme uses SE as a thought-leadership practice and intentionally develops change agency by guiding students through socio-ecological principles, helping them discover their purpose and passion for systemic change.

Table 1 Graduate attributes and learning outcomes, as expressed by students

Stellenbosch University Graduate attributes	Graduate attributes as interpreted by Diploma students
<i>An enquiring mind</i>	
• Lifelong learner • Critical and creative thinker • Exercises responsibility for learning and using knowledge	• To be a reflective activist and a grounded philosopher • Curious, creative, and passionate
<i>A dynamic professional</i>	
• Problem solver • Uses sustainable and effective technology • Innovative	• To be a strategist, a facilitator, a planetary steward, a trail blazer, and a professional communicator
<i>An engaged citizen</i>	
• Leader and collaborator • Social entrepreneur • Effective in a diverse environment	• To innovate with empathy and to advocate for socio-ecological justice • To be an authentic voice
<i>A well-rounded individual</i>	
• Connected to head, heart, and hands • Takes responsibility for own development • Takes informed and considered decisions	• To live principles of <i>Ubuntu</i>,¹ community, Earth, and culture

Source Adapted from Stellenbosch University (n.d.) and Diploma Team One (2020)

In the programme, SE is also operationalised as a solution-orientated process to develop self-efficacy and the creative competencies that are foundational to ideation and innovation. SE modules are designed as “safe-to-fail” spaces where students experiment with solutions for local socio-ecological challenges. The curriculum emphasises the development of entrepreneurial and intrapreneurial competencies, like strategic communication, ethical decision-making, collaborative leadership, and stakeholder engagement (Mitchelmore & Rowley, 2010).

The hallmark of the Dip SD is its student-led innovation ecosystem, embodied by annual events like Ideas Fest (for first-year students) and the

¹ *Ubuntu* is a Southern African philosophy that emphasises the interconnectedness of all human beings, often embodied in the phrase, “I am because we are.” It is a belief in the shared bond of humanity, where our individual identity and well-being are deeply rooted in our relationships with others (Terblanche & Waghid, 2023).

Future Now Summit (organised by second-year students, presented by third-year students). These events are platforms that enable students to showcase and refine their entrepreneurial ideas through audience engagement and peer feedback. This type of experiential learning through simulated real-world environments helps students to translate theory into actionable solutions.

The following section will illustrate how this commitment to SE is intentionally integrated into the Dip SD's curriculum design, through interdisciplinary integration, constructive alignment, and experiential learning.

3 Curriculum Architecture for Social Entrepreneurship

In 2021, the Dip SD underwent a collaborative, year-long curriculum renewal to align its curriculum, programme outcomes and educational goals as expressed in Stellenbosch University's graduate attributes (Cooper, 2017). This iterative process involved workshops with a team of interdisciplinary facilitators, primarily external "pracademics"—individuals who are both academics and practitioners in their field. The pracademics in the team were vital in bridging academic theory and industry practice, thereby ensuring authentic real-world application of educational theories (Dickinson et al., 2022).

The following section explores three key aspects of the pedagogical approach in the Dip SD:

- The integration of interdisciplinary learning through curriculum mapping, schedule flexibility, and peer-led learning.
- Constructive alignment (both horizontal and vertical alignment) and alternative assessment practices.
- Experiential learning through place-based learning, active engagement, and safe-to-fail experimentation.

3.1 Interdisciplinary Integration

Cross-sectoral and interdisciplinary collaboration is essential for formulating contextualised, action-oriented learning outcomes (Wafi et al., 2022). In our experience, collaboration between academics, pracademics, and social impact leaders have helped us to bridge the gap between theoretically rigorous learning outcomes and the complexities of the real world (Loots et al., 2025). This synergistic approach ensures that learning is theoretically sound, practically relevant, and applicable to addressing real-world challenges (Dickinson et al., 2022).

As a facilitation team, we worked to identify interdisciplinary connections between all the modules in the Dip SD. Table 2 provides a high-level overview of thematic learning across the Dip SD. This map of skill development and theory allows facilitators to link concepts across modules.

One of the key enablers to interdisciplinary learning is the use of block teaching timetables, allowing students more time to engage meaningfully with the content, the facilitators, and their peers. Longer engagement times can be an antidote to the fragmentation and incoherence that often occurs due to modularisation in modern curricula (French, 2015; Wynyard, 2002). Block teaching days (in-person, three full days per week), combined with online learning days (both synchronous sessions and self-directed learning, two days per week), provide additional flexibility in the Dip SD, ensuring both vertical and horizontal curriculum alignment (Oliver et al., 2008).

Peer learning is an important tool in entrepreneurship education, as peer discussion creates novel opportunities for theoretical synthesis and practical application that are informed by the rich lived experience of diverse individuals. When students are invited to co-construct solutions through iterative processes, they become active participants in refining their understanding of social entrepreneurship and sustainability challenges, mirroring constructive learning principles (Bada & Olusegun, 2015).

We have leveraged the flexibility of our programme timetable to allow peer learning across cohorts, so that collaboration and reciprocity extend beyond the confines of a single module or assessment. Examples include:

Table 2 Thematic learning across three academic years (Loots, 2025)

	Term 1	Term 2	Term 3	Term 4
Year 1: Exploring Identity and Impact	The big questions <i>Critical thinking, worldviews</i> Skills: Reflective writing, argumentation, research, academic literacy	Empathy and agency <i>Sustainability, purpose</i> Skills: Group work, presentation, intercultural competence	Curiosity <i>Systems thinking</i> Skills: Observation, biomimicry, permaculture	Creativity <i>Social enterprise development</i> Skills: Design thinking, ideation
Year 2: Driving change through collaborative action	Problems and solutions <i>Circular economy, urban systems</i> Skills: Debating, service design blueprint, lean business model canvas	Tools and skills for change <i>Emotional intelligence, intervention design</i> Skills: Prototyping, testing, data interpretation, online facilitation	Process and action <i>Fundraising, marketing</i> Skills: Project management, ethical use of AI, infographic design, storytelling	Activism <i>Social activation, conflict resolution</i> Skills: Podcasting, event management, facilitation
Year 3: Leading with purpose and impact	Regenerative leadership <i>Governance and ethics</i> Skills: Mentoring, monitoring and evaluation	Networking <i>Professional development</i> Skills: interview, professional branding	Real-world innovation <i>Work-integrated learning</i> Skills: Innovation strategy	Giving back <i>Reflection and future casting</i> Skills: Newsletter output, seminar presentation, keynote presentation

- Mentorship Meet-ups on Thursday mornings in Semester One, where final-year students guide first- and second-year students.
- The annual student-led SE summit, called Future Now.
- The annual internship seminar, where third-year students present a “Internship 101” masterclass to prepare first- and second-year students for what lies ahead.

3.2 Constructive Alignment

Constructive alignment, as articulated by Biggs (1996) and Biggs and Tang (2010), serves as a foundational principle in the design of the Dip SD’s curriculum. This approach ensures that intended learning outcomes, teaching activities, and assessments are purposefully aligned. By utilising constructive alignment, students can actively construct their knowledge and develop competencies relevant to SE.

The Dip SD’s curriculum has also been designed with a focus on incremental skill development across the three years (i.e., vertical alignment) (Fig. 1). For example, students move from SE principles and ideation (Year 1) to tools for social entrepreneurs (Year 2), to funding and governance for SE (Year 3). Part of this vertical alignment or concentric learning for SE is the development of their emotional intelligence and leadership skills, as well as the integration of peer feedback within and across cohorts.

Giving sincere feedback requires a sense of community and trust, which is deeply embedded in the principles of *ubuntu*. A sense of community is supported through shared experiences over time, including a welcome celebration and commitment ceremony during orientation and shared meals throughout the year.

In addition to vertical alignment, graduate attributes related to SE, such as critical thinking, problem-solving, ethical decision-making, and innovation, are strategically embedded into the learning outcomes across modules in each academic in the Diploma (i.e., horizontal alignment).

Figure 1 illustrates how social entrepreneurship (SE) competencies are developed vertically over the three-year programme, while leadership and strategic communication modules provide horizontal support through

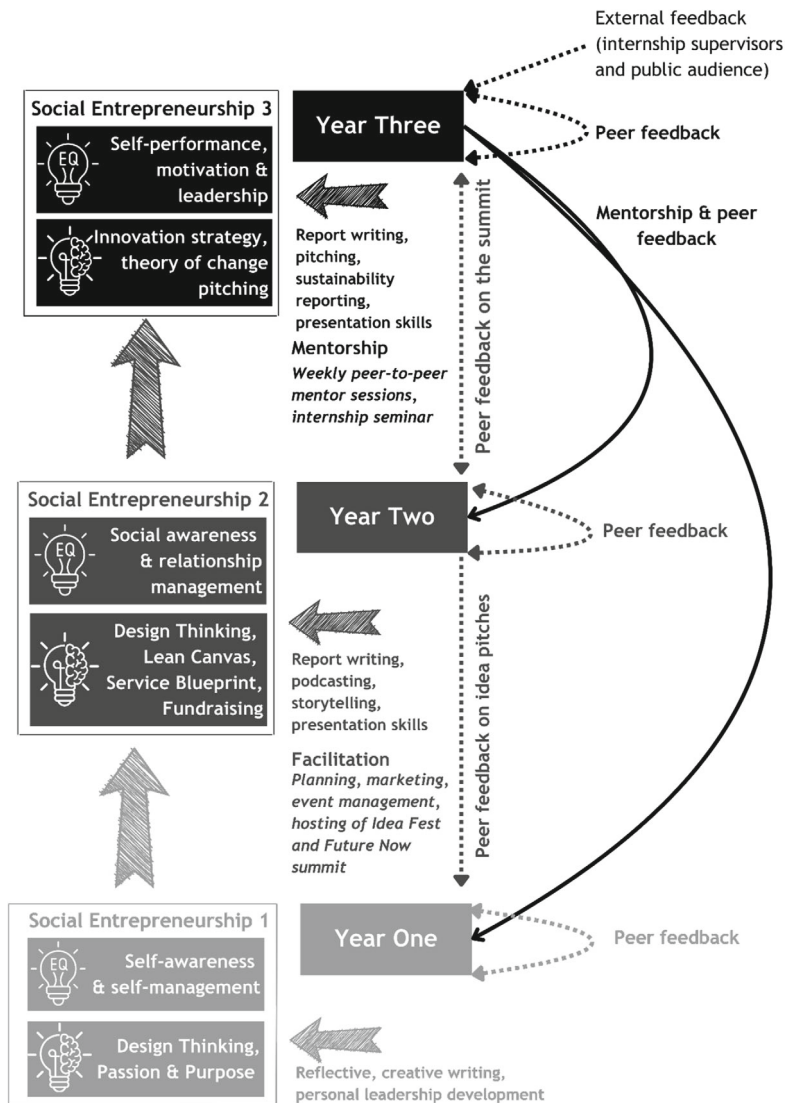


Fig. 1 Illustration of horizontal and vertical alignment through the progression of SE, leadership, communication skills, and other competencies (Source Adapted from Loots, 2025)

aligned learning outcomes. This "golden thread" approach ensures entrepreneurial skills are consistently developed across all subjects.

- Year One: Students focus on building self-awareness and self-management through personal leadership development (leadership module) and reflective, creative writing (strategic communication module). Peer feedback within the cohort is used to promote collaboration and authentic learning experiences. In the SE module, students are introduced to design thinking as a problem-solving tool. Students then draw on contemporary issues and theories from other modules (sustainability perspectives, ecoliteracy, and worldviews) to identify problems they are passionate about solving. At the end of the year, students draw on the values, ethics and methodologies from other modules to formulate their ideas for change, which they present as their final SE project at the expo-style festival, Idea Fest, where senior students provide peer feedback.
- Year Two: Students broaden their social awareness with modules on green economies, social change, and sustainable design, further developing their social entrepreneurship using tools like lean canvas (Aran-syah et al., 2023) and service blueprinting (Kostopoulos et al., 2012). A leadership module supports the development of facilitation skills, which students practice in collaborative projects like fundraising and event management of Idea Fest and the Future Now summit. Communication skills are advanced through storytelling projects, podcasting, and report writing. Peer feedback continues, now including input from final-year students.
- Year Three: Students apply their skills in the real-world context through work-integrated learning, independently securing internships at sustainability-focussed companies where they are required to develop innovation strategies. A communication module supports their formal writing and multimedia presentation skills. Additional skills are gained in sustainability reporting and mentoring. Final-year students mentor junior cohorts through a structured programme as part of a leadership module and present seminars post-internship to prepare younger students. At year-end, students present their change initiatives at the Future Now summit.

By scaffolding learning outcomes in this manner, the Dip SD has also moved beyond traditional exams towards authentic assessments, for example portfolios of evidence, peer assessments, and performance-based evaluations such as presentations, student-led discussions, and events organised by students themselves. These assessment formats encourage students to express their understanding and demonstrate their skills in ways that are relevant to their future roles as social entrepreneurs. These alternative assessment practices not only promote critical skills but also empower students to take ownership of their learning experiences in the age of generative artificial intelligence, ultimately preparing them for the complexities of the modern world.

3.3 Experiential Learning

Unlike traditional university programmes, most in-person teaching in the Diploma takes place at the Lynedoch ecovillage, approximately 15 km from the university main campus. The ecovillage serves as a praxis hub and a living laboratory where students engage deeply with concepts of community, sustainability, and regenerative interventions. As a learning environment, Lynedoch offers many experiential place-based learning opportunities; students participate in sustainable waste management practices, community service, and the cultivation of indigenous food crops.

We implement active learning and engagement through discussion, debate, and experiential activities to nurture intellectual curiosity and develop students' problem-solving skills. Simple interventions like classroom set up can greatly improve student engagement, for example arranging seating in clusters or circles, rather than creating traditional lecture-style setups. Students are also encouraged to explore "multiple ways of knowing" (Dullaart et al., 2023; Perry & Duncan, 2017), particularly through movement, music, art, nature immersions, indigenous knowledge, and reflective practices across modules.

Most school-leavers are not adequately prepared for the messy, risky, and iterative work of innovation. Experiential learning helps students "unlearn" many of the restrictions they were accustomed to in school

and helps them reconnect with their inherent creativity, passion, and sense of agency. The responsiveness and flexibility of the Dip SD makes it possible to simulate situations where young entrepreneurs can grow. Entrepreneurial mindsets cannot be cultivated by studying theory: students must experiment, make mistakes, and learn to fail forward. Safe-to-fail experimentation in the Dip SD includes work-integrated learning and real-world simulations.

In their final year, Diploma students complete a six-week internship as a work-integrated learning component. This provides students with valuable work experience and allows them to develop professional networks before leaving university. It also provides a chance to refine their career aspirations and identify knowledge and skill gaps prior to graduation.

In a country grappling with alarmingly high youth unemployment, it is crucial that higher education not only prepare students for the workforce but also empower them to create meaningful livelihoods for themselves. In the Dip SD, students are encouraged from their first year to experiment with side-hustles, develop viable business ideas within their Social Entrepreneurship modules, and take advantage of the numerous opportunities available to them at university level. The programme also has an active LinkedIn group for current students and alumni where we share job advertisements, funding opportunities, and additional training opportunities to support their continuous development.

4 Balancing Innovation and Sustainability

The Dip SD serves as an important exploration of alternative and transformative teaching and learning practices. Its strength lies in its nimbleness and responsiveness, which is largely due to “small is beautiful” approach. This alternative approach is not without its challenges within mainstream higher education. The programme’s reliance on small cohorts, block teaching timetables, and place-based learning demands significant resources, which creates tension between financial viability and pedagogical innovation. For example, maintaining safe-to-fail environments that support peer learning and student-led initiatives like Idea Fest and the Future Now Summit, requires ongoing investment from

facilitators and the operational budget. In some ways, this is similar to challenges social enterprises face, where limited budgets and resources often constrain scaling.

The other main challenge is maintaining a responsive, relevant curriculum when approval policies and process within higher education are often tedious. Rapid shifts in VUCA realities (e.g., economic crises, pandemics) disrupt long-term planning. In our experience, hybrid teaching and block schedules enable flexibility. It is crucial to find a balance between curriculum flexibility and the necessary structural coherence, which mirrors broader challenges in entrepreneurship education, where agility must coexist within rigorous frameworks.

These challenges require that programme leadership embody the entrepreneurial mindset we seek to cultivate in our students. Key enablers for the Dip SD are its admission practices, recruitment strategies, and its ability to leverage institutional partnerships..

By adopting broader admission requirements compared to conventional business degrees, the Dip SD provides access to many applicants that would be otherwise excluded based on their Mathematics/Mathematical Literacy grade. Initially, many applicants chose the Dip SD as it was the only university programme they were eligible for. While some still apply for this reason, the majority of applicants report applying for the Dip SD specifically for its alternative teaching approach and practical learning experiences, as well as its alignment with the increasing demand in sustainability-related careers (Di Battista et al., 2023).

The Dip SD employs storytelling through student-created content (e.g., alumni testimonials at open days, project showcases like the summit) to attract future applicants who are aligned with the programme's mission. Online open days have also been used to enhance accessibility and inclusivity, particularly for applicants from diverse socio-economic backgrounds.

To achieve the programme's objectives with limited budgets, it is crucial to leverage institutional support and resources to create a holistic ecosystem for student success. This includes guest lectures and formalised engagements with academic support services like the university's Language Centre, and service-learning programmes with the Social

Impact Division. Partnerships with external stakeholders (e.g., local non-governmental organisations and practacademics) further enrich student learning and mirror real-world collaborations for social entrepreneurs.

5 Measuring Impact Through Stories

The joy of a small programme is being able to measure success through student growth and impact on an individual level, more than just the immediate data of pass rates. As a community of practice, our facilitators share the incremental growth we notice, whether it is a student overcoming their stutter during presentations or the alumnus who launches a mentorship programme for young men in the programme or the budding entrepreneur that has launched the first iteration of a product.

One of the key indicators of impact is the feedback we receive from supervisors once students complete their internships. The work-integrated learning module builds on the personal leadership concepts introduced in the first two years as students prepare for the pivotal transition to professional life. Students are required to complete a 200-hour internship with an organisation or company whose work aligns with a Sustainable Development Goal (SDG). While the module supports students in identifying suitable internships and navigating the application and interview processes, it is ultimately their responsibility to secure a position. This real-world experience serves as a platform for students to develop essential professional skills, network, and take ownership of their personal and career development. While completing the internship, students also need to research and prepare an innovation strategy for the company. Two examples of supervisor feedback are provided below:

I could always rely on her to get the job done with excellence. Always on time and ready of any task at hand, big or small. She took a lot of initiative. I gave her free reign on some aspects of our project and she had excellent ideas which I almost always supported. She sees any task as an opportunity to learn. She could work on her confidence, but it will come with experience. She is a very strong strategic and systems thinker. Community development NPO

He displayed exceptional professionalism in his time keeping and reporting back on time. He was excellent in his attendance. He is very self-motivated and has self-leadership. Able to take feedback and lead projects with ease. He demonstrated curiosity throughout his internship, he already read the external reports on topics to prepare for sessions. He has great analytical perspectives and pays attention to detail. Further exposure to sustainability topics in the business context needed. International corporation

Over the years, Dip SD students have placed at many local and national entrepreneurship competitions. Students and alumni have also been acknowledged at national and international levels for their leadership and innovation. Most recently, a final-year student was selected as one of the top 100 participants in Africa for the Earthshot Prize Youth Programme in 2024 and an alumnus was selected as a delegate for the Young Ambassadors Society to attend the United Nation's Commission on the Status of Women in New York, North America in 2025.

When she was a second-year student in 2020, Lindelwa Mahlalela started developing an idea for a social enterprise in her SE module. She launched her enterprise, LeeConnect in 2021, which helps high school learners to apply for tertiary studies and funding schemes. Since its inception, LeeConnect has helped more than 11 000 South African youth to gain access to quality higher education (News24, 2024). Lindelwa has been named as one of the Mail and Guardian's 200 Young South Africans (2023) and News24's Young Mandelas (2024).

6 Conclusion

The Diploma in Sustainable Development at Stellenbosch University demonstrates how higher education can be transformed into a catalyst for social innovation and systemic change. By embedding social entrepreneurship within an experiential, interdisciplinary, and contextually relevant curriculum, the Dip SD empowers students to become proactive agents in their learning journey, as they shape their future careers in a VUCA world. The programme's holistic approach aims to

cultivate entrepreneurial skills and the much-needed ethical and adaptive capacities needed to address South Africa's pressing socio-ecological challenges.

Through its pedagogical approach, student-led initiatives, and commitment to authentic learning, the Dip SD demonstrates the transformative potential of higher education. The successes and challenges highlighted in this chapter offer insights for educators seeking to adopt similar approaches. Ultimately, the Dip SD offers a model for fostering the next generation of social entrepreneurs and future change agents who are prepared to navigate uncertainty but also inspired to create meaningful, sustainable impact in their communities and beyond.

References

- Aransyah, M., Fourqoniah, F., & Riani, L. (2023). Enhancing student entrepreneurship education model through design thinking and lean canvas approaches. *Journal of Social Studies Education Research*, 14(2), 195–216.
- Bada, S. O., & Olusegun, S. (2015). Constructivism learning theory: A paradigm for teaching and learning. *Journal of Research & Method in Education*, 5(6), 66–70. <https://doi.org/10.9790/7388-05616670>
- Biggs, J. (1996). Enhancing teaching through constructive alignment. *Higher Education*, 32(3), 347–364. <https://doi.org/10.1007/bf00138871>
- Biggs, J., & Tang, C. (2010). Applying constructive alignment to outcomes-based teaching and learning. In *Quality teaching for learning in higher education*. Ministry of Higher Education.
- Cooper, T. (2017). Curriculum renewal: Barriers to successful curriculum change and suggestions for improvement. *Journal of Education and Training Studies*, 5(11), 115–128. <https://doi.org/10.11114/jets.v5i11.2737>
- Di Battista, A., Grayling, S., Hasselaar, E., Leopold, T., Li, R., Rayner, M., & Zahidi, S. (2023, November). Future of jobs report 2023. In *World Economic Forum* (pp. 978-2).
- Dickinson, J., Fowler, A., & Griffiths, T.-L. (2022). Pracademics? Exploring transitions and professional identities in higher education. *Studies in Higher Education*, 47(2), 290–304. <https://doi.org/10.1080/03075079.2020.1744123>

- Diploma Team One. (2020). Diploma in sustainable development prospectus. School of Public Leadership. Retrieved March 7, 2025, from [https://www.sun.ac.za/english/faculty/economy/spl/SPL%20Library/Diploma%20SD%20prospectus%20web%202024%20\(002\).pdf](https://www.sun.ac.za/english/faculty/economy/spl/SPL%20Library/Diploma%20SD%20prospectus%20web%202024%20(002).pdf)
- Dullaart, G., Coetsee, Y., Farmer, J.L., Feldman, J., Joorst, J., Loots, R., McKay, M., & Ntwasa, S. (2023). Challenges of transforming curricula: Reflections by an interdisciplinary Community of Practice. *Transformation in Higher Education*, 8(0), a301. <https://doi.org/10.4102/the.v8i0.301>
- Freire, P. (1979). Pedagogy of the oppressed. In J. Beck, C. Jenks, N. Keddie & M. F. D. Young (Eds.), *Toward a sociology of education* (1st ed., pp. 374–386). Routledge. <https://doi.org/10.4324/9780429339530>
- French, S. (2015). *The benefits and challenges of modular higher education curricula*. (Issues and Ideas Paper No. 20, pp 1–12). Melbourne Centre for the Study of Higher Education.
- Gupta, P., Chauhan, S., Paul, J., & Jaiswal, M. P. (2020). Social entrepreneurship research: A review and future research agenda. *Journal of Business Research*, 113, 209–229. <https://doi.org/10.1016/j.jbusres.2020.03.032>
- Harland, T., Tidswell, T., Everett, D., Hale, L., & Pickering, N. (2010). Neoliberalism and the academic as critic and conscience of society. *Teaching in Higher Education*, 15(1), 85–96. <https://doi.org/10.1080/13562510903487917>
- Kostopoulos, G., Gounaris, S., & Boukis, A. (2012). Service blueprinting effectiveness: Drivers of success. *Managing Service Quality: An International Journal*, 22(6), 580–591.
- Loots, R. (2025). *Teaching portfolio*. Stellenbosch University.
- Loots, R., Moloto, M., & Von der Heyde, V. (2025). The power of imagination: Leading curriculum renewal for transformative Higher Education. In U. G. Singh, C. G. Proches, A. A. James & R. Ruttenberg-Rozen (Eds.), *Higher educational leadership in VUCA contexts: Accessing VUCA prime and wisdom for effective leadership*. Emerald Publishing.
- MacGinty, H. (2024). Graduate unemployment in South Africa [Master's dissertation, Stellenbosch University]. https://lmi-research.org.za/wp-content/uploads/2024/03/Graduate-Unemployment-in-South-Africa_LMI-Bursary-Output_March2024.pdf
- Mitchelmore, S., & Rowley, J. (2010). Entrepreneurial competencies: A literature review and development agenda. *International Journal of Entrepreneurial Behavior & Research*, 16(2), 92–111.

- News24. (2024). Young Mandelas 2024: Lindelwa Mahlalela, Innovation. *News24*. Retrieved March 24, 2025, from <https://www.news24.com/news24/specialreports/youngmandelas2024/young-mandelas-2024-lindelwa-mahlalela-innovation-20240715>
- Oliver, R., Kersten, H., Vinkka-Puhakka, H., Alpasan, G., Bearn, D., Cema, I., Delap, E., Dummer, P., Goulet, J. P., & Gugushe, T. (2008). Curriculum structure: Principles and strategy. *European Journal of Dental Education*, 12, 74–84. <https://doi.org/10.1111/j.1600-0579.2007.00482.x>
- Perry, E. S., & Duncan, A. C. (2017). Multiple ways of knowing: Expanding how we know. *NPQ*. Accessed December 16, 2025 from <https://nonprofitquarterly.org/multiple-ways-knowing-expanding-know/>
- Raimondi, L. (2012). Neoliberalism and the role of the university. *PAACE Journal of Lifelong Learning*, 21(1), 39–50.
- Stafford, W., & Facer, K. (2014). *Steering towards a green economy: A reference guide*. CSIR.
- Statistics South Africa. (2024). *Quarterly labour force survey*. Statistics South Africa
- Stellenbosch University. (n.d.). Graduate attributes of Stellenbosch University. Stellenbosch University. Retrieved March 7, 2025, from <https://www.sun.ac.za/english/learning-teaching/student-affairs/about/graduate-attributes>
- Terblanche, J., & Waghid, Y. (2023). Glo-ubuntu as an extension of global citizenship education: Cultivating the notion of an African university. *South African Journal of Higher Education*, 37(2), 272–282. <https://doi.org/10.20853/37-2-5427>
- Wafi, A. A., Subri, U. S., Zulkifli, R. M., Mohamed, S., Hanapi, Z., Che'Rus, R., & Kamal, M. F. M. (2022). 'You are hired': Technical and vocational education and training graduate employability and experts' views. *Pertanika Journal of Social Sciences & Humanities*, 30(2), 1–20. <https://doi.org/10.47836/pjssh.30.2.23>
- Wynyard, R. (2002). Hamburgerology by degrees. In D. Hayes & Wynard, R. (Ed.), *The McDonaldization of higher education* (pp. 200–210). Praeger.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits any noncommercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if you modified the licensed material. You do not have permission under this license to share adapted material derived from this chapter or parts of it.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.



18

Effectiveness of Entrepreneurial Programmes as a Mitigating Strategy to Curb Unemployment: A Case Study of University of Limpopo Graduates

Kgahliso Maoto

1 Introduction

Unemployment remains a pressing global concern, with young graduates often facing the brunt of this challenge. In the dynamic landscape of higher education, universities are increasingly embracing entrepreneurial programmes as a strategic response to combat graduate unemployment and foster self-employment opportunities. This case study delves into the effectiveness of such entrepreneurial programmes, particularly within the context of the University of Limpopo, a South African institution committed to equipping its graduates with the skills and mindset necessary for success in an ever-evolving job market (University of Limpopo, 2021).

K. Maoto (✉)

University of Limpopo, Limpopo, South Africa

e-mail: kgahliso.maoto@ul.ac.za

2 Background and Rationale

Graduate unemployment is a multifaceted issue, influenced by economic factors, shifts in industry demands, and the preparedness of graduates themselves (Krugman, 2018). South Africa, like many countries, grapples with this challenge as it seeks to harness the potential of its educated youth (Statistics South Africa, 2020). Against this backdrop, universities play a pivotal role in shaping the employability of graduates through curriculum design, experiential learning, and entrepreneurship education (Fayolle & Gailly, 2015; Guerrero et al., 2015). Entrepreneurship education has become increasingly vital in higher education institutions worldwide as a means to address unemployment, foster innovation, and stimulate economic development (Fayolle & Gailly, 2015). Entrepreneurship education is viewed as a key strategy for equipping graduates with the skills and mindset to become self-employed and contribute to the economy (Lalkhen & Anthony, 2017). Entrepreneurial education has gained prominence as a means of enhancing graduates' employability and fostering self-employment opportunities (Kuratko, 2005; Lackéus, 2015). The acquisition of entrepreneurial skills and mindset equips graduates with the agility and creativity to identify and create job opportunities, thereby mitigating unemployment (Gibb, 2002). These skills also align with the evolving demands of the job market, making graduates more adaptable and resilient (Fayolle & Gailly, 2015).

The University of Limpopo has been proactive in integrating entrepreneurship education into its academic landscape and promoting entrepreneurial initiatives across various faculties. Recognising that different faculties may face unique challenges and opportunities in this endeavour, this case study aims to provide an in-depth analysis of the effectiveness of entrepreneurial programmes within the university, taking into account the experiences, perceptions, and outcomes of both students and faculty members.

The University of Limpopo, situated in the Limpopo Province of South Africa, has recognised the imperative of entrepreneurship education to address graduate unemployment and regional development.

Founded on the principles of equity and access to education, the university aims to empower its diverse student body, many of whom come from historically disadvantaged backgrounds (University of Limpopo, 2021). In this context, entrepreneurship education is designed not only to impart theoretical knowledge but also to facilitate practical experience and innovation. The university has established various entrepreneurial initiatives and programmes that span multiple faculties to promote entrepreneurship across diverse academic disciplines.

Several factors underpin the drive for entrepreneurship education at the University of Limpopo. First, the South African government has prioritised entrepreneurship and small business development as critical components of its economic growth strategy (Small Business Development, 2015). This policy emphasis has influenced higher education institutions to align their programmes with national development goals.

Second, the University of Limpopo recognises the role of entrepreneurship in addressing regional economic disparities. Limpopo Province, characterised by a predominantly rural population and limited economic opportunities, stands to benefit significantly from initiatives that nurture entrepreneurship and stimulate local economies (Statistics South Africa, 2018).

Third, the university acknowledges the need to produce graduates who are not job seekers but also job creators. Entrepreneurship education is viewed as a means to foster a culture of innovation, self-reliance, and creativity among students, enabling them to identify and seize entrepreneurial opportunities (Mthembu & Gcwensa, 2019).

To achieve these objectives, the University of Limpopo has implemented various entrepreneurship programmes, including the Student Training for Entrepreneurial Promotion (STEP) programme, business incubators, and innovation hubs. These initiatives aim to instil entrepreneurial thinking, equip students with practical skills, and facilitate the creation of start-ups (University of Limpopo, 2021).

In conclusion, the University of Limpopo's commitment to entrepreneurship education is rooted in the broader context of addressing graduate unemployment, promoting regional development, and aligning with national economic priorities. By providing a conducive environment for entrepreneurship across its faculties, the university seeks to

empower its students and contribute to the socioeconomic advancement of the Limpopo Province and South Africa as a whole.

3 Purpose and Scope of the Case Study

The purpose of this case study is to provide a comprehensive examination of entrepreneurship education at the University of Limpopo. The study aims to delve into the university's entrepreneurial initiatives, strategies, and their impact across various faculties. Specifically, the case study seeks to:

1. **Examine Entrepreneurial Initiatives:** Investigate the range of entrepreneurial initiatives, programmes, and activities implemented by the University of Limpopo within different faculties. This includes the Student Training for Entrepreneurial Promotion (STEP) programme, business incubators, innovation hubs, and entrepreneurship competitions.
2. **Evaluate Integration Across Faculties:** Assess the extent to which entrepreneurship education is integrated across different academic disciplines and faculties within the university. This involves understanding how entrepreneurship courses and opportunities are made available to students from diverse backgrounds and areas of study.
3. **Analyse Impact and Outcomes:** Investigate the impact of entrepreneurship education on students, faculty members, graduates, and the broader community. This includes assessing the success of start-ups initiated by students, research output related to entrepreneurship, and employment outcomes for graduates.
4. **Identify Challenges and Best Practices:** Identify the challenges and barriers faced in implementing entrepreneurship education across faculties and highlight best practices that have proven effective in fostering entrepreneurial skills and mindset.
5. **Provide Recommendations:** Based on the findings, offer recommendations and strategies for enhancing entrepreneurship education at the University of Limpopo, addressing challenges, and maximising the impact of entrepreneurial initiatives.

The scope of this case study encompasses a broad exploration of entrepreneurship education within the University of Limpopo. It includes data collection, analysis, and interpretation from multiple sources, including faculty members, students, administrators, and programme documents. The study seeks to provide a holistic understanding of how entrepreneurship education is conceptualised, implemented, and experienced within the university, while also considering its alignment with regional and national development objectives. This case study draws on existing literature and policies related to entrepreneurship education in South Africa, providing insights into the broader context in which the University of Limpopo operates.

4 Research Questions and Objectives

4.1 Research Questions

1. To what extent does entrepreneurship education influence students' entrepreneurial intentions and actions at the University of Limpopo?
2. How is entrepreneurship education integrated across different faculties within the University of Limpopo, and what are the key challenges and successes associated with this integration?
3. What is the impact of entrepreneurship education on graduates' entrepreneurial activities, including the establishment and sustainability of start-ups, in the context of the University of Limpopo?
4. What are the best practices in entrepreneurship education within the University of Limpopo, and how can these practices be leveraged to enhance the overall effectiveness of entrepreneurial initiatives?

4.2 Research Objectives

1. To assess the influence of entrepreneurship education on students' entrepreneurial intentions and actions.
2. To examine the integration of entrepreneurship education across different faculties and identify challenges and successes in this process.

3. To analyse the impact of entrepreneurship education on graduates' entrepreneurial activities, including start-up creation and sustainability.
4. To identify and share best practices in entrepreneurship education within the University of Limpopo and provide recommendations for enhancing effectiveness.

By addressing these research questions and objectives, this study aims to provide a comprehensive understanding of entrepreneurship education at the University of Limpopo and offer insights that can inform the university's strategies, policies, and practices in fostering entrepreneurship among its stakeholders.

5 Research Problem

Unemployment remains a pressing socioeconomic challenge in South Africa, particularly among recent graduates. The University of Limpopo, like many other institutions of higher learning, faces the critical issue of unemployed graduates despite having implemented various entrepreneurial programmes aimed at fostering self-employment and reducing unemployment rates. This study seeks to investigate the effectiveness of entrepreneurial programmes as a mitigating strategy to curb unemployment, with a specific focus on University of Limpopo graduates. The problem at hand is multifaceted:

Rising Unemployment Rates: South Africa has a persistently high unemployment rate, and recent graduates are disproportionately affected. Despite the efforts of the University of Limpopo to prepare its graduates for entrepreneurial opportunities, a substantial number of alumni remain unemployed.

Efficacy of Entrepreneurial Programmes: It is unclear whether the entrepreneurial programmes implemented by the University of Limpopo are effectively equipping graduates with the skills and resources necessary to embark on entrepreneurial ventures or if these programmes are merely theoretical exercises without practical application.

Matching Graduates with Opportunities: The question arises as to whether the university is effectively connecting graduates with entrepreneurial opportunities in the local and national economy. If not, there may be a disconnect between programme offerings and the demands of the job market. There is an urgent need to address these issues in the University of Limpopo.

6 Literature Review

6.1 Theoretical Foundations of Entrepreneurship Education

Entrepreneurship education is underpinned by a range of theoretical frameworks that provide the foundational principles and insights guiding its design, implementation, and assessment. This literature review delves into key theoretical foundations of entrepreneurship education, shedding light on the diverse perspectives that shape the field.

Human Capital Theory

Human capital theory posits that investments in education and training enhance an individual's skills, knowledge, and capabilities, leading to increased productivity and income (Schultz, 1961). In the context of entrepreneurship education, this theory suggests that by equipping individuals with entrepreneurial skills and knowledge, they can more effectively identify, create, and manage entrepreneurial opportunities (Fayolle & Gailly, 2015). Entrepreneurship education, therefore, aims to enhance the human capital of individuals, preparing them for entrepreneurial endeavours.

Institutional Theory

Institutional theory highlights the influence of societal and institutional contexts on entrepreneurial behaviour (Scott, 2013). Within

entrepreneurship education, this theory underscores the importance of understanding the cultural, regulatory, and economic environments in which entrepreneurs operate. It encourages educators to contextualise entrepreneurship education programmes to align with the specific challenges and opportunities of the local and global business landscape (Mwasalwiba, 2010).

Equally, entrepreneurship education draws from various theoretical foundations, each offering unique insights into the development of entrepreneurial knowledge, skills, and behaviours. These theories inform the design and delivery of entrepreneurship education programmes, emphasising the importance of human capital development and contextual factors. By integrating these theoretical perspectives, entrepreneurship education aims to prepare individuals for the dynamic and complex world of entrepreneurship.

6.2 Challenges and Opportunities in Integrating Entrepreneurship Across Faculties at the University of Limpopo

Integrating entrepreneurship education across faculties in a university setting presents both challenges and opportunities. This literature review explores the key issues related to the integration of entrepreneurship across faculties at the University of Limpopo, shedding light on the complexities and potential benefits of this endeavour.

Challenges

a. Siloed Academic Traditions

Universities often have distinct academic traditions and disciplinary boundaries, making it challenging to integrate entrepreneurship seamlessly (Gibb, 2002). Different faculties may prioritise their core subject matter, resulting in resistance to cross-disciplinary initiatives.

b. Lack of Faculty Buy-In

Faculty members may resist incorporating entrepreneurship into their courses if they perceive it as a distraction from traditional academic content (Huyghe & Knockaert, 2015). Convincing faculty of the relevance and benefits of entrepreneurship education is crucial for successful integration.

c. Curriculum Misalignment

Aligning entrepreneurship courses with various faculties' curricula can be difficult, as the needs and expectations of different disciplines may vary (Bacigalupo et al., 2016). Achieving a balance between discipline-specific knowledge and entrepreneurship skills can be challenging.

Opportunities

a. Interdisciplinary Synergy

Integrating entrepreneurship across faculties can foster interdisciplinary collaboration and innovation (Fayolle & Klandt, 2006). It enables students and faculty from diverse backgrounds to work together on entrepreneurial projects, leading to creative solutions.

b. Holistic Skill Development

Entrepreneurship education can enhance students' critical thinking, problem-solving, and adaptability, irrespective of their academic discipline (Kuratko, 2005). It equips graduates with versatile skills valued in various career paths.

c. Broader Impact

Entrepreneurship education can extend beyond the university, benefiting the local community and regional development (Guerrero et al., 2015).

Students' entrepreneurial initiatives can contribute to economic growth and job creation.

d. Enhanced Employability

Entrepreneurship skills are highly sought after by employers, and integrating them into the curriculum can improve graduates' employability (Lackéus, 2015). Graduates with entrepreneurial competencies are better prepared for a rapidly changing job market.

e. Innovation and Research

Entrepreneurship education encourages students and faculty to engage in research and innovation, potentially leading to commercialisation opportunities (Etzkowitz & Leydesdorff, 2000). This contributes to the university's knowledge transfer and economic impact.

In conclusion, integrating entrepreneurship across faculties at the University of Limpopo presents both challenges and opportunities. Overcoming disciplinary silos, securing faculty buy-in, aligning curricula, allocating resources, and designing effective assessment methods are key challenges. However, the potential benefits, including interdisciplinary synergy, holistic skill development, broader societal impact, enhanced employability, and a culture of innovation, make it a worthwhile endeavour for the university.

6.3 The Role of Universities in Promoting Entrepreneurship

Universities play a pivotal role in fostering entrepreneurship by serving as hubs of knowledge creation, innovation, and entrepreneurship education. This literature review explores the multifaceted role that universities assume in promoting entrepreneurship within their ecosystems.

Knowledge Generation and Dissemination

Universities are centres of knowledge creation through research and development activities. Academic research contributes to the creation of new technologies, innovative products, and solutions (Acs & Audretsch, 2003). This knowledge is often the foundation upon which entrepreneurial ventures are built. Universities disseminate this knowledge through publications, conferences, and collaborations, facilitating technology transfer and commercialisation (Etzkowitz & Leydesdorff, 2000).

Entrepreneurship Education

Entrepreneurship education is a core function of universities. It equips students with the skills, mindset, and knowledge needed to identify, evaluate, and exploit entrepreneurial opportunities (Fayolle & Gailly, 2015). Entrepreneurship courses, programmes, and incubators within universities provide students with practical experiences, mentorship, and networking opportunities (Lack  us, 2015). This educational support nurtures a new generation of entrepreneurs (Kuratko, 2005).

Incubation and Support Services

Many universities establish business incubators, accelerators, and innovation hubs that provide infrastructure, mentoring, and resources to start-up ventures. These programmes offer a supportive environment for nascent entrepreneurs to develop their ideas and businesses (Hackett & Dilts, 2004). University-affiliated incubators often lead to increased start-up success rates and job creation (Shane & Venkataraman, 2000).

Collaboration and Ecosystem Building

Universities actively engage with external stakeholders, including industry, government, and regional networks, to foster entrepreneurship

ecosystems (Etzkowitz & Leydesdorff, 2000). They facilitate collaboration between academia and industry through research partnerships, joint ventures, and technology parks (Guerrero et al., 2015; Van der Westhuizen; 2023; 2024). This collaboration promotes knowledge exchange and commercialisation.

Technology Transfer and Commercialisation

Universities are instrumental in the commercialisation of research discoveries and innovations. They often establish technology transfer offices (TTOs) to facilitate the licensing of intellectual property, patents, and spin-off company creation (Phan et al., 2005). This process accelerates the transformation of research outcomes into marketable products and services.

In summary, universities are pivotal players in promoting entrepreneurship. Through knowledge generation, entrepreneurship education, incubation, collaboration, technology transfer, and policy advocacy, they contribute significantly to the development of entrepreneurial ecosystems. Their role extends beyond traditional education to actively shaping the innovation and entrepreneurship landscape within their regions and nations.

6.4 Entrepreneurial Practices in Higher Education Institutions

Higher education institutions (HEIs) have increasingly embraced entrepreneurial practices to foster innovation, economic development, and entrepreneurial mindsets among students, faculty, and the broader community. This literature review explores key entrepreneurial practices within HEIs and their significance in preparing individuals for entrepreneurship.

Curriculum Integration

One of the primary ways HEIs promote entrepreneurship is through curriculum integration. Entrepreneurship courses, minors, and majors are offered across various disciplines, allowing students to develop entrepreneurial knowledge and skills (Fayolle & Gailly, 2015). This approach ensures that entrepreneurship becomes an integral part of students' educational experiences.

Entrepreneurship Competitions

HEIs organise entrepreneurship competitions that challenge students to develop business ideas, create business plans, and pitch to potential investors (Pittaway & Cope, 2007). These competitions foster creativity, innovation, and practical problem-solving skills while providing students with networking opportunities and exposure to the entrepreneurial ecosystem (EDHE, 2025).

Industry Partnerships

Collaborations with industry partners enable HEIs to expose students to real-world business challenges (Guerrero et al., 2015). Through internships, research projects, and industry-sponsored initiatives, students gain practical experience and insights into entrepreneurial practices in specific sectors.

Technology Transfer and Commercialisation Offices

HEIs often TTOs to facilitate the commercialisation of academic research and intellectual property (Phan et al., 2005). TTOs work to patent and license innovations, spin off companies, and generate revenue that can be reinvested in entrepreneurship education and research.

Again TTO serves as an Entrepreneurship centres and hubs in our institution. The Majority of entrepreneurship-related activities happen within TTO office. They offer networking events, workshops,

mentorship programmes, and access to a supportive community of entrepreneurs, faculty, and students.

Nonetheless, entrepreneurial practices within higher education institutions encompass a range of initiatives aimed at fostering entrepreneurship education, innovation, and economic development. Through curriculum integration, business incubation, competitions, industry partnerships, technology transfer, entrepreneurship centres, faculty engagement, and policy advocacy, HEIs prepare individuals to navigate the entrepreneurial landscape and contribute to economic growth and societal well-being.

6.5 Success Stories and Best Practices: Entrepreneurial Programmes at the University of Limpopo

The University of Limpopo has demonstrated a commitment to fostering entrepreneurship across various faculties. Here are some success stories and best practices related to specific entrepreneurial programmes and initiatives at the university:

Student Training for Entrepreneurial Promotion (STEP) Programme

The STEP Programme at the University of Limpopo has been a remarkable success in promoting entrepreneurship among students. Through this programme, students from diverse faculties receive training in entrepreneurial skills and are encouraged to develop their business ideas. One notable success story is the creation of “EcoBags,” a start-up founded by a group of STEP Programme participants majoring in Environmental Sciences. EcoBags produces eco-friendly shopping bags made from recycled materials and has gained popularity in the local community. The STEP Programme’s hands-on approach and mentorship have been instrumental in nurturing student entrepreneurs.

Faculty Collaboration and Cross-Pollination

The university encourages faculty collaboration and cross-disciplinary initiatives to promote entrepreneurship. One best practice is the “Innovation Labs” that bring together faculty members from different departments to work on innovative projects. For instance, faculty members from the Engineering and Health Sciences faculties collaborated to develop a low-cost, locally produced medical device for rural healthcare settings. This project not only demonstrated the potential for interdisciplinary innovation but also led to the formation of a university-affiliated start-up.

Business Incubation and Support Services

The university’s business incubation centre, known as “Limpopo Innovations Hub,” has played a pivotal role in nurturing start-ups. One standout success story is the “AgriTech Solutions” company, founded by an alumna from the Faculty of Agriculture and Environmental Sciences. This start-up specialises in precision farming technologies and has garnered attention both locally and internationally. The Innovations Hub provided AgriTech Solutions with mentorship, access to funding networks, and office space, contributing to its growth.

Industry Partnerships and Research Commercialisation

The university has fostered strong partnerships with local industries to facilitate technology transfer and research commercialisation. An exemplar success story is the collaboration between the Faculty of Science and the mining industry. Researchers developed a novel ore processing technique that significantly reduces environmental impact. Through the university’s technology transfer office, a licensing agreement was established, leading to the creation of a spin-off company. This not only generated revenue for the university but also addressed an industry need for sustainable practices.

Entrepreneurship Competitions and Community Engagement

The University of Limpopo hosts annual entrepreneurship competitions that engage both students and the broader community. The “Limpopo Innovation Challenge” invites aspiring entrepreneurs to pitch their ideas, with winners receiving seed funding and mentorship. One memorable success story is the “Siyakhula Community Bakery,” founded by a local resident who participated in the competition. The bakery not only provides employment opportunities but also supports community development initiatives.

The researcher concludes by indicating that these success stories and best practices underscore the University of Limpopo’s dedication to promoting entrepreneurship across various faculties. By providing a conducive ecosystem for innovation, interdisciplinary collaboration, business incubation, and community engagement, the university has been able to nurture entrepreneurial talent and contribute to economic development in the region.

6.6 Faculty-Specific Entrepreneurial Initiatives at the University of Limpopo

The University of Limpopo has implemented faculty-specific entrepreneurial initiatives across various disciplines, demonstrating a commitment to fostering entrepreneurship, innovation, and economic development. Here are faculty-specific entrepreneurial initiatives within the Faculty of Management and Law, Faculty of Science and Agriculture, Faculty of Humanities, and Faculty of Health Sciences:

Faculty Management and Law More Specifically in the School of Economics and Management

Entrepreneurship Competitions: The faculty hosts annual entrepreneurship competitions tailored to business and economics students. These

competitions challenge students to develop innovative business ideas and business plans, fostering creativity and entrepreneurial thinking.

Industry Collaboration: The faculty actively collaborates with local businesses, financial institutions, and management consulting firms. These partnerships provide students with real- world exposure and internship opportunities, bridging the gap between academia and industry.

Faculty of Science and Agriculture

Research Commercialisation: Faculty members engage in research projects with a focus on agricultural and scientific innovation. The university's technology transfer office facilitates the commercialisation of research outcomes, leading to the creation of agribusiness start-ups and the development of new agricultural technologies. Again, the faculty has established an Agricultural Innovation Hub to promote entrepreneurship in agriculture and related sciences. This hub offers training, workshops, and resources for students interested in agribusiness and sustainable farming practices.

Student Farming Initiatives: The faculty encourages students to participate in farming and horticultural projects on campus. These initiatives not only provide hands- on experience but also create opportunities for student-led agricultural enterprises.

Faculty of Humanities

Creative Arts centre: The Faculty of Humanities hosts a Creative Arts centre to support students pursuing careers in arts, culture, and creative industries. This centre offers workshops, mentorship, and exhibition opportunities to budding artists, writers, and performers.

Humanities Entrepreneurship Symposium: The faculty organises an annual Humanities Entrepreneurship Symposium, bringing together students and industry professionals. This event explores the entrepreneurial aspects of humanities disciplines, including literature, languages, and cultural studies.

Community Engagement: Humanities students engage in community-based projects that promote cultural preservation, language revitalisation, and heritage tourism. These initiatives contribute to community development while providing students with entrepreneurship opportunities in cultural tourism and preservation.

Faculty of Health Sciences

Healthcare Innovation Lab: The Faculty of Health Sciences operates a Healthcare Innovation Lab that encourages students to develop healthcare solutions and medical technologies. This lab facilitates collaboration between health science students and engineering and science students to drive innovation.

Clinical Entrepreneurship Training: Students in health sciences receive clinical entrepreneurship training, equipping them with the skills needed to identify gaps in healthcare delivery and develop innovative healthcare solutions. This training fosters a culture of healthcare entrepreneurship.

Health Outreach Enterprises: The faculty supports student-led health outreach enterprises that provide healthcare services to underserved communities. These enterprises not only address healthcare disparities but also create opportunities for students to establish healthcare-focused start-ups.

These faculty-specific entrepreneurial initiatives at the University of Limpopo showcase the institution's commitment to promoting entrepreneurship across diverse fields of study. By tailoring programmes and resources to the unique needs and strengths of each faculty, the university empowers students to become entrepreneurial leaders in their respective disciplines, contributing to regional development and economic growth.

6.7 The Effectiveness of Student's Organisational Structures on the Implementation of Entrepreneurship Practices

The effectiveness of students' organisational structures such as ENACTUS, SEW SWEEP, and other similar entrepreneurship-focused groups plays a significant role in the successful implementation of entrepreneurship education practices at the University of Limpopo. These organisational structures, such as student clubs, associations, and initiatives, serve as catalysts for promoting entrepreneurship education and fostering an entrepreneurial mind-set among students. In this context, the following points highlight the effectiveness of these structures:

1. **Fostering Student Engagement:** Student organisational structures provide a platform for students to actively engage with entrepreneurship education. These clubs and associations encourage students to participate in entrepreneurial activities, workshops, and projects. This active involvement enhances students' understanding of entrepreneurship concepts and their practical applications.
2. **Promoting Peer Learning and Networking:** These structures facilitate peer-to-peer learning and networking opportunities. Students can exchange ideas, collaborate on projects, and learn from each other's experiences. Through interactions within these organisations, students gain valuable insights and build a network of like-minded individuals, which can be instrumental in their entrepreneurial journey.
3. **Enhancing Practical Exposure:** Student-led initiatives like entrepreneurship clubs often organise events, competitions, and workshops that provide students with hands-on experience in entrepreneurship. These experiences bridge the gap between theory and practice, equipping students with the skills and confidence needed to start their own ventures.
4. **Supporting Faculty Initiatives:** Effective student organisational structures can complement the efforts of faculty and administrators in delivering entrepreneurship education. They serve as a dynamic force

that actively reinforces classroom learning with practical application and real-world exposure.

5. **Showcasing Success Stories:** Student-led structures can showcase success stories of fellow students who have successfully launched businesses or entrepreneurial projects. These success stories serve as inspiration and motivation for other students, demonstrating the tangible benefits of entrepreneurship education.
6. **Advocating for Resources and Support:** Effective student organisations can advocate for additional resources, support, and opportunities for entrepreneurship education within the university. They can voice the needs and aspirations of students, leading to the allocation of resources for entrepreneurship-related initiatives.

In conclusion, the effectiveness of students' organisational structures at the University of Limpopo in implementing entrepreneurship education practices is pivotal. These structures contribute to student engagement, peer learning, practical exposure, and the overall entrepreneurial culture on campus. By actively supporting and enhancing entrepreneurship education, these student-led initiatives play a vital role in preparing future entrepreneurs and contributing to economic development.

6.8 Research Methodology

This study employs a mixed-methods research design, combining both qualitative and quantitative approaches. This approach allows for a comprehensive understanding of entrepreneurial education and practices within the University of Limpopo. A structured survey questionnaire will be administered to a sample of students and faculty members from various faculties at the University of Limpopo. The questionnaire will include Likert-scale questions to assess perceptions, attitudes, and experiences related to entrepreneurial education. Relevant documents, such as course syllabi, programme descriptions, and reports on entrepreneurship initiatives, will be analysed to understand the curriculum integration and institutional policies related to entrepreneurship education. In-depth semi-structured interviews will be conducted with key

stakeholders, including faculty members, students, entrepreneurship programme coordinators, and industry partners. These interviews will provide insights into the challenges, successes, and recommendations related to entrepreneurial education. A stratified random sampling technique will be used to select students and faculty members from different faculties. Each stratum (faculty) will be represented proportionally in the sample. A sample size of at least 300 participants is targeted. Purposeful sampling will be employed to select key informants who have expertise and experience in entrepreneurship education and practices. Approximately 15–20 interviews will be conducted.

Data Analysis Procedure: Descriptive statistics, such as means, frequencies, and percentages, will be used to summarise survey data. This analysis will provide an overview of participants' perceptions of entrepreneurial education. Inferential statistics, including t-tests and ANOVA, will be employed to examine significant differences in perceptions and experiences among different faculties and demographic groups. Qualitative data from interviews will undergo thematic analysis. Data will be transcribed, coded, and categorised into themes and sub-themes using NVivo or similar software. Findings from both quantitative and qualitative analyses will be integrated to provide a comprehensive understanding of entrepreneurial education and practices at the University of Limpopo. This research methodology aims to explore the nuances of entrepreneurial education and practices within the university. The combination of these methods will contribute to a holistic understanding of the subject, facilitating evidence-based recommendations for improvement.

6.9 The Significance of the Study

This study holds considerable significance on multiple fronts, given the pressing challenges associated with graduate unemployment and the potential of entrepreneurial programmes to alleviate this issue. The following points highlight the significance of this research:

1. Addressing Graduate Unemployment: Graduate unemployment is a critical issue in South Africa and globally. By focusing on the University of Limpopo as a case study, this research aims to contribute valuable insights into effective strategies for addressing this challenge. The findings can inform policies and practices not only within the university but also in other higher education institutions facing similar issues.
2. Promoting Entrepreneurship: The research explores how the university's initiatives contribute to graduates' ability to create their employment opportunities, potentially boosting local economic development. Furthermore, the research delves into the challenges and successes associated with entrepreneurial programmes. Identifying best practices and lessons learned can guide other universities in implementing similar initiatives effectively while avoiding common pitfalls.
3. Policy Implications: The findings can inform policy decisions both within the university and at the national level. Policymakers can use the research to develop and refine strategies for integrating entrepreneurial education into higher education curricula and improving the employability of graduates.
4. Contributing to the Academic Literature: This study contributes to the broader academic discourse on the role of entrepreneurial education in addressing graduate unemployment. It adds empirical evidence and real-world insights to the existing body of knowledge, advancing our understanding of the subject.

In summary, this research on the effectiveness of entrepreneurial programmes at the University of Limpopo is significant not only for the institution but also for higher education in South Africa and beyond. It offers the opportunity to address graduate unemployment, enhance employability, and promote entrepreneurship, ultimately contributing to socioeconomic development and the empowerment of graduates.

6.10 Recommendations of the Study

1. **Curriculum Enhancement:** Each faculty should evaluate its curriculum to identify opportunities for integrating entrepreneurship education. Create customised entrepreneurship modules or courses that align with the specific needs and objectives of each faculty.
2. **Regular Cross-Faculty Meetings:** Organise regular meetings and workshops that bring together faculty representatives, entrepreneurship programme coordinators, and faculty members to share experiences, best practices, and updates on entrepreneurship initiatives.
3. **Faculty-specific Entrepreneurship competition and Champions:** Appoint faculty entrepreneurship champions who can lead entrepreneurship initiatives within their respective faculties. These champions can advocate for the importance of entrepreneurship education and help tailor programmes to suit faculty-specific contexts. These faculty Champions must consider organising entrepreneurship competitions within each faculty, allowing students to focus on industry-specific challenges and opportunities. Winners can then compete in university-wide competitions
4. **Digital Collaboration Platforms:** Implement digital collaboration platforms to facilitate communication and knowledge sharing among faculty members and students interested in entrepreneurship. This can include shared online spaces for resource sharing and project collaboration.
5. **Strengthen Industry Partnerships:** Encourage and facilitate stronger partnerships with local industries, businesses, and start-ups. This can involve industry-sponsored projects, internships, and research collaborations that provide students with real-world exposure. Again, the university must engage alumni who have succeeded in entrepreneurial ventures to serve as mentors, guest speakers, and advisors. Alumni can also provide valuable networking opportunities and potentially invest in student start-ups.

By implementing these recommendations, the University of Limpopo can enhance its efforts to promote entrepreneurship across faculties. Improved coordination and communication, strengthened external

partnerships, and faculty-specific strategies will contribute to a more integrated and effective approach to entrepreneurship education and support.

References

- Acs, Z. J., & Audretsch, D. B. (2003). Innovation and technological change: An international comparison. *Annals of Regional Science*, 37(4), 613–632.
- Bacigalupo, M., Kamylyis, P., Punie, Y., & Van den Brande, G. (2016). *Entre-Comp: The entrepreneurship competence framework*. Publications Office of the European Union.
- Entrepreneurship Development in Higher Education (EDHE). (2025). EDHE Learning and Teaching Excellence Awards. Available at: <https://edhe.co.za/learning-and-teaching-excellence-awards/>. Accessed 21 January 2026.
- Etzkowitz, H., & Leydesdorff, L. (2000). The dynamics of innovation: From National Systems and “Mode 2” to a Triple Helix of university-industry-government relations. *Research Policy*, 29(2), 109–123.
- Fayolle, A., & Gailly, B. (2015). The impact of entrepreneurship education on entrepreneurial attitudes and intention: Hysteresis and persistence. *Journal of Small Business Management*, 53(1), 75–93.
- Fayolle, A., & Klandt, H. (2006). Entrepreneurship research in Europe: Taking stock and looking forward. *Entrepreneurship Theory and Practice*, 30(1), 1–18.
- Gibb, A. A. (2002). In Pursuit of a new ‘enterprise’ and ‘entrepreneurship’ paradigm for learning: creative destruction, new values, new ways of doing things and new combinations of knowledge. *International Journal of Management Reviews*, 4(3), 233–269.
- Guerrero, M., Urbano, D., Fayolle, A., Klofsten, M., Mian, S., & Urbano, D. (2015). Entrepreneurial universities: Emerging models in the new social and economic landscape. *Small Business Economics*, 47(3), 551–563.
- Hackett, S. M., & Dilts, D. M. (2004). A systematic review of business incubation research. *Journal of Technology Transfer*, 29(1), 55–82.
- Huyghe, A., & Knockaert, M. (2015). The influence of organizational culture and climate on entrepreneurial intentions among research scientists. *Journal of Technology Transfer*, 40(1), 138–160.

- Krugman, P. (2018). Graduates versus robots: The impact of changing technology on jobs and income. *Oxford Review of Economic Policy*, 34(3–4), 29–44.
- Kuratko, D. F. (2005). The emergence of entrepreneurship education: Development, trends, and challenges. *Entrepreneurship Theory and Practice*, 29(5), 577–598.
- Lackéus, M. (2015). Entrepreneurship in education: What why when how. *Entrepreneurship Education and Pedagogy*, 1(1), 5–24.
- Lalkhen, H., & Anthony, R. (2017). Exploring the role of entrepreneurship education in fostering South African youth entrepreneurship. *Education + Training*, 59(7/8), 837–853.
- Mthembu, Z., & Gwensa, S. (2019). Business incubation in South African universities: Lessons from the University of Limpopo. *International Journal of Entrepreneurship and Innovation*, 11(3), 234–251.
- Mwasalwiba, E. S. (2010). Entrepreneurship education: A review of its objectives, teaching methods, and impact indicators. *Education + Training*, 52(1), 20–47.
- Phan, P. H., Siegel, D. S., & Wright, M. (2005). Science parks and incubators: Observations, synthesis and future research. *Journal of Business Venturing*, 20(2), 165–182.
- Pittaway, L., & Cope, J. (2007). Entrepreneurship education: A systematic review of the.
- Schultz, T. W. (1961). Investment in human capital. *American Economic Review*, 51(1), 1–17.
- Scott, W. R. (2013). *Institutions and organizations: Ideas, interests, and identities*. SAGE Publications.
- Shane, S., & Venkataraman, S. (2000). The promise of entrepreneurship as a field of research. *Academy of Management Review*, 25(1), 217–226.
- Small Business Development. (2015). *National development plan 2030: Our future – Make it work*. Government of South Africa.
- Statistics South Africa. (2018). *Community survey 2016: Statistical release P0301*. Government of South Africa.
- University of Limpopo. (2021). *Student Training for Entrepreneurial Promotion (STEP) program manual*. University of Limpopo Press.
- Van der Westhuizen, T. (2023). *Youth entrepreneurship: An ecosystem theory for young entrepreneurs in South Africa and beyond*. Springer Nature Switzerland.
- Van der Westhuizen, T. (2024). Youth entrepreneur ecosystem. In: *Practical tools for youth entrepreneurs: An applied approach for South Africa and beyond*. (pp. 57–114). Springer Nature Switzerland.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits any noncommercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if you modified the licensed material. You do not have permission under this license to share adapted material derived from this chapter or parts of it.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.



Part IV

Leadership, Governance, and Policy in Entrepreneurial Universities



19

Bridging the Gap: Mapping Project Management Education to Graduate Employability and Entrepreneurship at the University of Cape Town (UCT)

Niall Naidoo  and Alison Catherine Meadows 

1 Introduction: Challenges in Project Management Education and Graduate Employability

1.1 Background

The transition from higher education into employment has become increasingly complex, exacerbated by a rapidly changing global job market and the evolving needs of employers (Cook, 2022a, 2022b; Underdahl et al., 2023). In South Africa, where graduate unemployment has reached alarming levels, recent data from the Quarterly Labour Force Survey (QLFS) indicates a graduate unemployment rate increase to

N. Naidoo (✉) · A. C. Meadows
University of Cape Town, Cape Town, South Africa
e-mail: niall.naidoo@uct.ac.za

A. C. Meadows
e-mail: Alison.Meadows@uct.ac.za

11.8% in the first quarter of 2024 (Maluleke, 2024). This statistic underscores a critical gap between the skills acquired through higher education and the actual competencies demanded by the labour market.

Addressing this challenge requires innovative pedagogical frameworks that strengthen graduate employability and facilitate entrepreneurship by tightly integrating university curricula with the competencies demanded by industry (Cook, 2022a, 2022b; Underdahl et al., 2023). Embedding entrepreneurship-centred employability strategies into programme design further equips students with the strategic thinking, product-development expertise, and practical implementation tools to turn ideas into market-ready solutions (Fudamu, 2022). Traditional education paradigms, focusing primarily on theoretical knowledge, no longer suffice in preparing students for the dynamic workplace. This has prompted a shift towards pedagogical approaches directly integrating experiential learning, industry engagement, and critical skills development into curricula (Cook, 2022a, 2022b).

1.2 Problem Statement

In the context of a rapidly evolving global labour market, graduates increasingly face challenges transitioning from higher education into employment and/ or entrepreneurial endeavours. Despite higher education institutions (HEIs) significantly emphasising graduate employability, recent statistics indicate that graduate unemployment rates continue to rise (Maluleke, 2024). The core issue lies in the persistent gap between the theoretical competencies provided by traditional curricula and the practical, transversal skills demanded by employers and entrepreneurs (Guraziu & Del Gobbo, 2023; Lees, 2002).

As an interdisciplinary and transversal skill set, project management has emerged as a promising mechanism to bridge cognitive academic learning and the requirements of contemporary workplaces. Empirical evidence suggests that teaching project management can significantly enhance critical employability and entrepreneurship skills such as

communication, problem-solving, teamwork, and leadership, effectively aligning academic outcomes with professional expectations (Guraziu & Del Gobbo, 2023). However, limited integration of project management into HEIs' curricula and insufficient recognition of its value as an employability and entrepreneurship enhancer restricts graduates' preparedness for the workforce (Guraziu & Del Gobbo, 2023; Lees, 2002).

Addressing this issue requires an innovative approach to curriculum design, embedding project management as a technical discipline and a transformative pedagogical method. Such an approach aims to foster continuous adaptability, lifelong learning capabilities, and transversal skills essential for sustained employability and start-ups in the face of ongoing workforce and economic transformations (Guraziu & Del Gobbo, 2023; Lees, 2002).

1.3 Purpose and Significance of the Chapter (Case Study)

This chapter contributes valuable insights into the practical implementation and effectiveness of pedagogical innovations by examining the Strategic Project Management course as a case study. The findings offer replicable strategies for higher education institutions aiming to bridge the gap between academia and industry, ultimately enhancing graduate employability through traditional full-time employment or entrepreneurship in a challenging economic landscape for developing countries.

2 Pedagogy: Teaching and Learning Innovations in Strategic Project Management

2.1 Course Overview and Vision

The Strategic Project Management course at the University of Cape Town (UCT) is strategically designed to equip students with comprehensive project management capabilities tailored to new product-development contexts. Structured around partnerships with industry leaders such as Procter & Gamble and Lindt South Africa, the course offers a hands-on approach to learning, enabling students to apply theoretical knowledge practically through direct engagement with real-world scenarios.

The primary objective of the course is to immerse students in the critical processes and methodologies of the project life cycle, encompassing feasibility assessments, strategic planning, quality and risk management, and effective communication and succession planning. Students work collaboratively in teams, simulating roles as management consultants to evaluate and develop strategies for the market introduction of international brands or products into South Africa. This project-oriented curriculum enhances technical competencies and emphasises critical soft skills such as teamwork, leadership, and strategic decision-making.

2.2 Instructional Design and Delivery

The instructional design and delivery approach for the Strategic Project Management course integrates a robust modular structure, innovative template-based case studies, and advanced teaching methodologies to maximise student engagement and learning outcomes. The course structure leverages pedagogical best practices aligned with industry standards and emerging educational paradigms.

Modular Approach: Corporate Strategy, New Product Development, and Project Management

The course's modular structure strategically integrates three key domains: corporate strategy, new product development (NPD), and project management. This design supports a progressive learning pathway where students first build foundational strategic management competencies, enabling them to critically analyse and interpret corporate strategic frameworks and identify growth opportunities (Arregi et al., 2025). The subsequent NPD module expands upon this strategic foundation by engaging students in the complete product-development cycle. Here, learners conduct detailed feasibility studies, financial modelling, and product specification tasks, which are pivotal in understanding market dynamics and consumer behaviour.

The final project management module synthesises the preceding modules, equipping students with practical execution skills using comprehensive project management tools and methodologies to effectively oversee the full product lifecycle from conception to market introduction.

Template Design Case Studies

A distinctive feature of the course is using structured templates such as work breakdown structures (WBS), Gantt charts, risk registers, and feedback loops to facilitate active learning and real-world application. These templates provide students with clear, standardised frameworks to methodically plan, monitor, and evaluate projects, enhancing their understanding of project scope, timelines, resource allocation, and risk management practices. This structured template-based approach supports consistent learning outcomes, fosters critical thinking, and enhances the students' ability to manage complexity effectively (Arregi et al., 2025).

Teaching Design Innovations

The course incorporates several pedagogical innovations to enrich the instructional design further to maximise student engagement and learning effectiveness. Notably, graphic design principles are strategically embedded within all lecture materials, significantly improving information retention and student interest. Visually appealing and concise lecture slides aid in the cognitive absorption of complex theories and methodologies, aligning closely with modern pedagogical frameworks emphasising visual learning (Arregi et al., 2025).

Additionally, implementing dynamic feedback loops allows instructors to assess and adapt to student understanding in real time. This iterative instructional approach ensures that educational delivery remains responsive and aligned with learner needs. Furthermore, employing social-media-style interaction platforms fosters enhanced peer-to-peer and student-to-instructor engagement, replicating real-world collaborative environments and stimulating active participation and discussion beyond the traditional classroom setting (Arregi et al., 2025).

2.3 Assessments

The assessment strategy for the Strategic Project Management course is purposefully designed to align with the project management life cycle and to mirror the iterative nature of real-world project delivery. Drawing on the principles of formative assessment, conceptualised as a process of diagnosing student learning to adapt instruction and support progression towards learning goals (Black & Wiliam, 2009), the course embeds continuous feedback loops throughout all phases of project development. This approach strengthens technical project management competencies, fosters an entrepreneurial mindset, and enhances transversal employability skills.

2.4 Integrating Triple Helix into the Course Design

The course focused on integrating a collaborative framework involving universities, industry, and government using the Triple Helix framework into the Strategic Project Management course design, which presents a strategic approach for embedding employability outcomes within the academic curriculum. Given the increasing disconnect between graduate competencies and market demands, this course facilitates the active participation of industry stakeholders in co-developing curriculum content, engaging in teaching activities, and informing assessment criteria. Such collaboration engenders a dynamic and contextually relevant learning environment that mirrors the complexities of the contemporary workplace.

As Borah et al. (2023) highlighted, University–Industry Research Collaborations (UIRC)s not only catalyse institutional innovation but also fulfil critical pedagogical roles. By positioning industry scientists and professionals as “teachers,” “faculty developers,” and “connectors,” these collaborations effectively transform intricate workplace challenges into educational scenarios that students can meaningfully engage with. This engagement advances cognitive and professional development, enhancing the overall academic experience.

Furthermore, authentic industry involvement in assessments ensures that students are evaluated not just on theoretical understanding, but also on applying skills valued by employers. Industry partners provide real project briefs, offer feedback on deliverables, and help assess outcomes based on real-world expectations. The course collaborated with companies such as P&G, Lindt, Distell, and Ernst & Young (EY). This participatory assessment model enhances graduate readiness by simulating work environments and requiring students to produce outputs aligned with professional standards. Such engagement exemplifies the principles of the Triple Helix model, where joint knowledge production and shared value creation benefit all actors (Borah et al., 2023).

Combined with insights from Cook (2022a, 2022b) and Underdahl et al. (2023), this approach supports a shift from purely academic instruction to competency-based learning that reinforces transversal employability skills, such as problem-solving, communication, and

adaptability, critical in a fast-evolving job market. Given the increasing graduate unemployment rate in South Africa, embedding employability and entrepreneurship into course design through industry co-creation is both a necessary and transformative step.

These instructional design elements and innovative delivery methods collectively support the course's overarching goal: to equip students with theoretical knowledge and the practical, transversal skills needed for employment and entrepreneurship. By combining strategic thinking, creative product development, and rigorous execution planning, the course prepares graduates to enter the workforce with confidence, adaptability, and a toolkit of employable capabilities. This alignment between pedagogy and industry demands is central to addressing higher education's employability challenges today. It exemplifies how instructional design can be purposefully structured to achieve long-term impact in graduate readiness.

3 Literature Review

3.1 Graduate Employability

Graduate employability is increasingly recognised as a dynamic and multidimensional process, involving the continuous acquisition of knowledge, skills, attributes, and self-efficacy necessary to navigate complex, evolving labour markets (Cook, 2022a, 2022b; Lees, 2002; Underdahl et al., 2023). Employability should not be conflated with immediate employment; rather, it reflects an individual's ability to secure and sustain meaningful work across diverse contexts over a lifetime (Barnett, 2011; Healy et al., 2025). Recent scholarship highlights that universities have historically adopted fragmented or “bolt-on” employability initiatives, often detached from core curricula, which inadequately prepare students for contemporary career demands (Cook, 2022a, 2022b).

Calls for an integrated, intra-curricular approach emphasise embedding employability skills such as communication, critical thinking, adaptability, and teamwork within disciplinary learning to build

perceived and real employability (Underdahl et al., 2023). Furthermore, modern employability models are increasingly framed through relational paradigms, recognising that employable graduates are individual economic agents and contributors to broader social, ecological, and technological systems (Cook, 2022a, 2022b). Thus, fostering employability involves cultivating reflective, adaptable, and socially responsible graduates capable of thriving within and positively shaping an unpredictable global employment landscape.

3.2 Graduate Entrepreneurship

The growing challenge of graduate unemployment has intensified scholarly and policy interest in entrepreneurship as a viable alternative career pathway for university graduates. Once capable of absorbing large cohorts of graduates into stable employment, traditional labour market structures have increasingly fragmented under the pressures of globalisation, technological disruption, and economic volatility (Akkermans et al., 2023; Healy et al., 2025). In this environment, entrepreneurship emerges not merely as a career choice but often as a necessity-driven response to a lack of employment opportunities, particularly among young and highly educated populations (Gaweł, 2010). As Alba-Ramírez (1994) posits, individuals are more likely to transition into entrepreneurial activity when the expected income from traditional employment falls below the potential gains from self-employment, creating a more pronounced dynamic the longer a graduate remains unemployed. Thus, graduate entrepreneurship is often shaped by both “push” factors, such as economic necessity and labour market exclusion, and “pull” factors, including the pursuit of autonomy, innovation, and financial independence (Ramadani et al., 2022).

Graduate entrepreneurship is increasingly framed as a critical mechanism for economic development, employment generation, and social mobility, particularly in emerging economies where high graduate unemployment persists (Guraziu & Gobbo, 2023). However, transitioning from graduate to entrepreneur requires more than technical knowledge;

it demands a distinctive set of transversal skills, including opportunity recognition, risk management, strategic planning, and resilience (Tamberg et al., 2021). Entrepreneurship education (EE) thus plays a pivotal role in fostering entrepreneurial intention (EI) among graduates by cultivating these capabilities and reshaping mindsets to view entrepreneurship as a credible and achievable career path (Ramadani et al., 2022). According to the Human Capital Theory, education enhances individuals' cognitive and behavioural skills, improving their capacity to identify and exploit entrepreneurial opportunities (Marvel et al., 2016). In this respect, graduate entrepreneurship serves a dual function: alleviating structural unemployment pressures and contributing to broader economic dynamism through new venture creation and innovation-led growth.

Nevertheless, while entrepreneurship offers a compelling pathway out of unemployment, it has risks. Studies caution that graduates “pushed” into entrepreneurship due to a lack of alternatives may encounter higher business failure rates unless adequately prepared through targeted education, mentorship, and resource access (Gawel, 2010). Thus, higher education institutions have a crucial role in embedding entrepreneurial competences across disciplines, supporting incubation initiatives, and linking entrepreneurship training to labour market realities. An integrated educational model that combines technical expertise, entrepreneurial capabilities, and project management skills offers the strongest foundation for enabling sustainable graduate entrepreneurship in contexts of high unemployment.

3.3 Theoretical Perspectives of Project Management on Employability

Project management instruction is a pedagogical mechanism that drives and cultivates transferable skills through the profession's link to real-life concepts (Garel, 2013). The body of knowledge is intrinsically multidisciplinary, allowing for cross-functionality and cross-disciplinary collaboration (Engwall, 2003). Guraziu and del Gobbo (2023) demonstrate empirical evidence that employability is grounded in domain-specific

competencies. Furthermore, the study highlights the link between skills transferability and the risk of losing or not finding a job. As a profession, project managers are professionals who manage complexity, risks, and change through the project management cycle, stimulating integrative and systems thinking while providing domain-specific competencies and transferable skills (Silvius & Schipper, 2020).

As Guraziu and del Gobbo (2023) demonstrated, integrating project management into higher education curricula fosters the development of critical transversal competencies such as communication, teamwork, negotiation, self-awareness, and the capacity for lifelong learning. The study at the University of Tirana revealed that a targeted 15-hour project management intervention produced statistically significant improvements in students' self-awareness, learning-to-learn abilities, and negotiation skills, with specific competencies that align closely with employer expectations across sectors.

Further supporting this perspective, Guraziu and Del Gobbo (2023) argue that project management acts as a transformative learning device. Their qualitative study found that formal instruction in project management enables students to develop key transversal competencies, including communication, leadership, problem-solving, time management, and resilience, aligning closely with the employability frameworks established by the World Economic Forum (2020) and UNESCO (2017). The study also emphasised that the learning of project management fosters "double-loop learning," encouraging students to move beyond technical problem-solving towards strategic thinking, adaptability, and the proactive design of new action schemes that identify skills critical for career sustainability in uncertain, complex environments.

Crucially, the integration of project management into tertiary education serves not only to deliver technical knowledge but also acts as a catalyst for critical reflection and transformative growth among students (Guraziu & Del Gobbo, 2023). This aligns with broader theoretical perspectives that view employability as an ongoing, lifelong developmental process rather than a static state (Yorke & Knight, 2006). As project management education cultivates reflective practitioners capable of navigating complexity, uncertainty, and change, it offers a strategic,

systems-based solution to address contemporary graduates' persistent employability challenges (Table 1).

3.4 Project Management Pedagogy and Entrepreneurship

The contemporary labour market increasingly demands that graduates possess technical expertise and entrepreneurial and project management capabilities. A growing body of scholarship highlights the convergence between entrepreneurship and project management as critical to enhancing graduate employability in volatile and complex environments (Tamberg et al., 2021). Entrepreneurship and project management share fundamental processes such as opportunity identification, resource mobilisation, risk management, and iterative execution, suggesting that entrepreneurial competencies naturally enhance project success rates (Kuura et al., 2014). Entrepreneurial skillsets, particularly proactiveness, innovativeness, self-efficacy, and risk tolerance, are positively correlated with improved project performance across various domains within start-up contexts and in structured corporate or R&D projects (Shekarian & Parast, 2021).

Furthermore, research indicates that integrating project management education with entrepreneurship development fosters a hybrid skill set characterised by strategic agility, leadership, and resilience (Ramadani et al., 2022; Tamberg et al., 2021). Graduates trained in this dual framework demonstrate stronger entrepreneurial intention (EI). They are better equipped to secure employment or create new economic opportunities when traditional employment pathways are inaccessible (Ramadani et al., 2022). Therefore, embedding entrepreneurial competencies within project management education prepares graduates to manage complex projects and empowers them to act entrepreneurially, enhancing their employability and capacity to contribute to economic innovation (Table 2).

Table 1 Summary of key project management variables that drive employability

Variable	Description	Source
Communication	Ability to effectively exchange information with stakeholders and team members	Guraziu and Del Gobbo (2023) and Underdahl et al. (2023)
Teamwork	Working collaboratively to achieve shared objectives	Guraziu and Del Gobbo (2023) and Lees (2002)
Problem-solving	Identifying, analysing, and solving complex project issues	Guraziu and Del Gobbo (2023), Lees (2002), and Underdahl et al. (2023)
Leadership	Directing, motivating, and inspiring teams towards successful project outcomes	Guraziu and Del Gobbo (2023) and Underdahl et al. (2023)
Negotiation	Managing conflicts and achieving mutually acceptable agreements	Guraziu and Del Gobbo (2023)
Time management	Effective allocation and prioritisation of time to manage tasks and deadlines	Guraziu and Del Gobbo (2023) and Underdahl et al. (2023)
Adaptability	Flexibility in adjusting to changing project conditions and environments	Guraziu and Del Gobbo (2023) and Cook (2022a, 2022b)
Critical thinking	Evaluating situations objectively and systematically to determine best actions	Underdahl et al. (2023) and Lees (2002)
Self-awareness	Understanding and assessing personal skills, limitations, and growth areas	Guraziu and Del Gobbo (2023)
Learning-to-learn	Continuous personal and professional skill development	Guraziu and Del Gobbo (2023); Lees (2002)
Resilience	Capacity to remain effective under pressure or in challenging situations	Lees (2002) and Guraziu and Del Gobbo (2023)
Integrative thinking	Synthesising information across multiple project domains and functions	Silvius and Schipper (2020)

(continued)

Table 1 (continued)

Variable	Description	Source
Systems thinking	Understanding the project in its broader context and recognising interdependencies	Silvius and Schipper (2020)
Decision-making	Making timely and informed decisions within project constraints	Guraziu and Del Gobbo (2023)

3.5 Framework to Improve Employability in Higher Education Course Design

Enhancing graduate employability requires strategically reorienting higher education curricula towards aligning academic outcomes closely with evolving industry demands. Underdahl et al. (2023) propose an integrated framework emphasising collaborative curriculum development between academic institutions and industry stakeholders. Central to this approach is the blending of disciplinary knowledge with essential transversal skills, including communication, critical thinking, leadership, teamwork, technology proficiency, and adaptability. Empirical evidence highlights the disconnect between academic preparation and the practical competencies employers seek, with less than half of graduates perceived as adequately prepared for entry-level positions (Underdahl et al., 2023). Consequently, curriculum designers are encouraged to adopt a more integrative pedagogical approach, directly embedding experiential learning opportunities such as internships, mentorships, and real-world projects within academic programmes.

According to Underdahl et al. (2023), fostering employability also involves strengthening graduate self-efficacy through active learning and authentic workplace experiences. Drawing on Bandura’s social cognitive career theory, the framework underscores the relationship between perceived self-efficacy, outcome expectations, and career-related goals, suggesting that increased practical engagement and experiential exposure significantly enhance students’ confidence and employability. This approach prepares graduates to meet immediate industry needs and

Table 2 Summary of key project management variables that drive entrepreneurship

Variable	Description	Reference(s)
Opportunity recognition	Identifying and assessing viable opportunities for value creation	Bacigalupo et al. (2016) and Tamberg et al. (2021)
Resource management	Mobilising, organising, and efficiently using resources (financial, material, human)	IPMA (2015) and Tamberg et al. (2021)
Risk management	Identifying, evaluating, and managing uncertainty and risks in both projects and ventures	Martens et al. (2018), IPMA (2015), and Tamberg et al. (2021)
Strategic vision	Defining goals and aligning actions with broader long-term objectives	George et al. (2016), IPMA (2015), and Tamberg et al. (2021)
Team leadership	Leading multidisciplinary teams, fostering collaboration, and resolving conflicts	IPMA (2015), Ramadani et al. (2022), and Tamberg et al. (2021)
Creativity and innovation	Generating and implementing novel ideas for products, services, or processes	Bacigalupo et al. (2016), Kuura et al. (2014), and Tamberg et al. (2021)
Self-efficacy	Confidence in one's ability to successfully perform entrepreneurial and managerial tasks	Shekarian and Parast (2021), Bacigalupo et al. (2016), and Tamberg et al. (2021)
Adaptability	Responding effectively to changing project environments or entrepreneurial conditions	Cook (2022a, 2022b) and Tamberg et al. (2021)
Communication and networking	Engaging with stakeholders and forming meaningful professional networks	IPMA (2015), Bacigalupo et al. (2016), and Tamberg et al. (2021)

(continued)

Table 2 (continued)

Variable	Description	Reference(s)
Decision-making under uncertainty	Making effective decisions with limited information in dynamic environments	IPMA (2015), Martens et al. (2018), and Tamberg et al. (2021)
Learning orientation	Continuously improving through reflection, learning from failure, and self-development	IPMA (2015), Tittel and Terzidis (2020), and Tamberg et al. (2021)
Value creation	Creating social, cultural, or financial value through project or entrepreneurial activities	Bacigalupo et al. (2016) and Tamberg et al. (2021)
Improvisation	Acting creatively and effectively in unforeseen circumstances without a predetermined plan	Tamberg et al. (2021)
Project planning and execution	Structuring, initiating, and completing tasks according to milestones, budgets, and deliverables	IPMA (2015), Van der Westhuizen (2024), and Tamberg et al. (2021)

equips them with lifelong learning skills crucial for sustained employability in dynamic labour markets. Such pedagogical strategies can help universities better facilitate graduates' transition from academic environments into professional settings, addressing perceived and actual skill gaps.

Moreover, the proposed employability framework emphasises the necessity of breaking down silos between academia and industry. Underdahl et al. (2023) highlight successful global practices, including partnerships where industry professionals actively contribute to curriculum design, engage directly with students through mentorship, and offer structured workplace learning opportunities. Such collaborations ensure curricula remain relevant and responsive to real-world demands, significantly improving graduate job readiness and employment outcomes. Implementing such a collaborative, experiential learning model across

higher education could substantially improve alignment between graduate capabilities and employer expectations, creating mutual benefits for students, educators, industry, and the broader economy (Underdahl et al., 2023) (Table 3).

Table 3 Table summarising key attributes from Underdahl et al. (2023) to improve employability in HE course design

Variable	Description
Collaborative curriculum development	Joint creation of curricula by academic institutions and industry stakeholders
Experiential learning opportunities	Integration of internships, mentorships, and real-world projects into academic programmes
Industry engagement	Direct interaction and mentorship from industry professionals to students
Graduate self-efficacy	Confidence in one's abilities to successfully execute workplace tasks
Outcome expectations	Beliefs about the outcomes of engaging in specific career behaviours
Career-related goals	Clear objectives and aspirations related to one's professional future
Lifelong learning skills	Skills and mindset to continuously adapt and learn throughout one's career
Industry partnerships	Structured collaborations with industry for practical learning and curriculum alignment

4 Research Methodology

This study adopts a mixed-methods research design to systematically evaluate the impact of the Strategic Project Management course on graduate employability, entrepreneurial capabilities, and curriculum effectiveness. Quantitative and qualitative thematic analysis ensures methodological triangulation, providing comprehensive insights into the course's influence on students' skill development and preparedness for professional and entrepreneurial endeavours.

4.1 Research Design

The evaluation utilises an explanatory sequential design integrating quantitative analysis of structured survey responses and qualitative thematic analysis of detailed textual data. The approach identifies broad trends through quantitative analysis, which are subsequently explored and elaborated upon using qualitative methods. The research aims to examine the relationship between project management instruction and its impact on graduate employability, entrepreneurial intention, and curriculum design effectiveness.

Overview of the research design process:

1. Data Collection:

- The Strategic Project Management Course Evaluation (quantitative and qualitative data).
- Course outline and documentation.
- Project assessments

2. Quantitative Analysis, Skills, and Variables Mapping:

- Descriptive statistics are used to evaluate variables of employability, entrepreneurship, and entrepreneurial course design across different data sources.
- Mapping identified variables against employability and entrepreneurship, and to improve entrepreneurship within course design.

3. Qualitative Analysis of Course Evaluation

- Thematic analysis of open-ended course evaluation responses.
- Content analysis of the course outline and assessment documents.

4. Triangulation and Interpretation:

- Synthesising quantitative and qualitative insights.
- Cross-verification of emerging themes with initial quantitative findings.

5. Comprehensive Evaluation:

- Final assessment of the course's impact on employability, entrepreneurship, and curriculum robustness.

4.2 Data Collection

The primary data comprises quantitative and qualitative responses from the course evaluation survey conducted upon course completion, achieving a response rate of 45% (49 of 109 students). Secondary data sources include the course outline and documented assessments. These sources provide critical contextual insights into the curriculum structure, instructional methods, and alignment with employability and entrepreneurial skill development objectives. These documents are reviewed to determine whether and how the instructional components explicitly address the identified employability and entrepreneurial variables, and to highlight areas of strength or opportunities for improvement.

4.3 Quantitative Analysis

Quantitative data is analysed using descriptive statistics (frequencies, percentages) to assess student perceptions of skill development aligned with employability and entrepreneurial outcomes.

5 Results

5.1 Quantitative Variable Converge Results

Employability Variable Coverage Across Assessments

Evaluating how employability competencies are embedded across academic assessments is crucial for aligning higher education curricula with the demands of contemporary labour markets. As graduate unemployment remains a persistent challenge, particularly in regions like South Africa, there is growing recognition that universities must go beyond theoretical instruction to develop the transversal skills employers value actively. Mapping these employability variables against specific assessment components helps educators identify strengths and gaps in course design, ensuring students are holistically prepared for complex, team-based, real-world environments. Figure 1 provides a visual representation of how employability skills are embedded across assessments, highlighting strengths in areas like teamwork and decision-making while revealing critical gaps in self-awareness, adaptability, and learning-to-learn. Understanding these patterns enables curriculum designers to make targeted improvements that balance technical competencies with reflective and adaptive skills essential for long-term employability.

While the Strategic Project Management course demonstrates a strong commitment to embedding core employability competencies, the analysis reveals critical areas for pedagogical enhancement, particularly in metacognitive and reflective skill development. Among the 14 employability variables evaluated across Assignments 1–3 and the Test, Self-awareness stands out as the most underdeveloped skill, scoring a uniform one across all assessments, resulting in a mean of 1.00 and a standard deviation of 0. This stark underrepresentation supports the observations of Yorke and Knight (2006), who argue that without structured opportunities for self-reflection, students may struggle to develop accurate self-perception and adaptive career strategies, both essential for long-term employability in complex labour markets.

Similarly, Adaptability (mean: 2.25) and Learning-to-Learn (mean: 2.00) reflect only moderate integration across the course, with notable

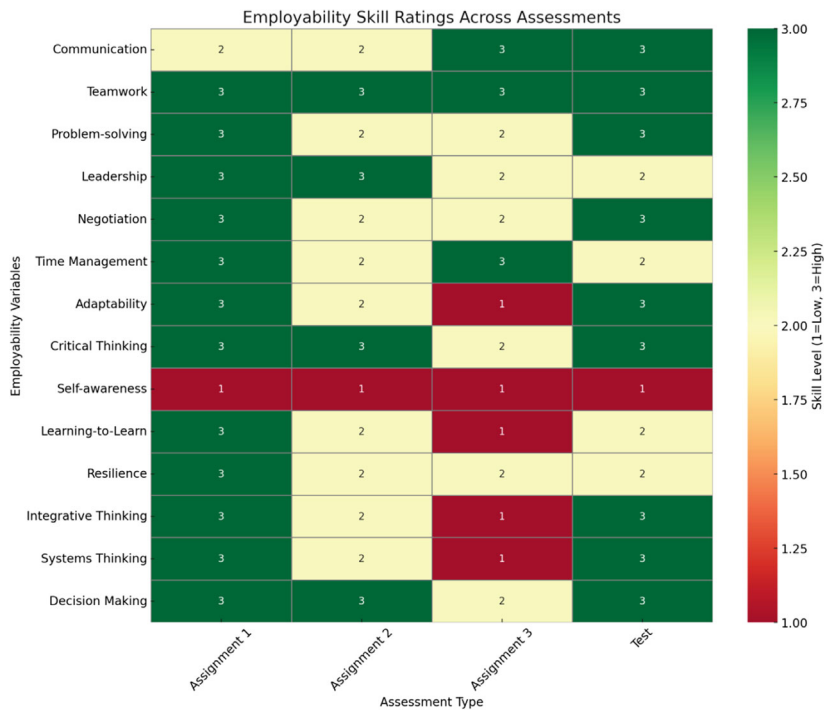


Fig. 1 Heat map of curriculum design variables across assessments

dips in Assignment 3, where both variables score 1. These results align with Cook (2022a, 2022b), who emphasises the growing need for higher education to prepare students with technical proficiencies, resilience, and the cognitive flexibility to navigate uncertainty, given that Assignment 3 functions as the capstone task, intended to consolidate and apply the full spectrum of project management skills, its relatively low attention to adaptability and continuous learning signals a missed opportunity. The absence of structured reflection, evolving project conditions, or autonomy-enhancing prompts likely contributes to this gap.

In contrast, foundational and operational skills such as teamwork and decision-making are comprehensively embedded across assessments, each earning a mean score of 3.00 and 2.75, respectively, suggesting consistent emphasis on collaborative problem-solving and strategic thinking. This

is consistent with Guraziu and Del Gobbo (2023) findings, who highlight that project-based learning environments are particularly effective at developing interpersonal and procedural competencies. Yet, the comparatively lower scores in Integrative Thinking (mean: 2.25) and Systems Thinking (mean: 2.25) suggest that while students may work in teams and make decisions, they are not always explicitly encouraged to reflect on how individual tasks interrelate within broader systems, another key gap.

These descriptive insights point to a broader issue: affective and integrative skills are inconsistently addressed, especially within formal assessment frameworks. Although traditionally limited in scope, the test surprisingly supports high-level thinking in some areas, such as Critical Thinking (mean: 2.75) and Systems Thinking (score: 3). This demonstrates that deeper skills can be assessed even in standardised formats when instructional design is intentional. However, Self-awareness, Learning-to-Learn, and Adaptability remain overlooked in both formative and summative tasks, indicating a need for the curriculum to incorporate reflection journals, personal development plans, or peer/self-assessment rubrics to close the loop between knowledge application and self-development.

Entrepreneurship Variables Coverage Across Assessments

This section presents an in-depth analysis of entrepreneurship skill integration across the Strategic Project Management course assessments. In the context of rising graduate unemployment and the need for entrepreneurial resilience, it is vital that higher education institutions not only prepare students for traditional employment but also equip them with entrepreneurial competencies. Project-based learning offers an ideal pedagogical platform to embed skills such as opportunity recognition, risk management, strategic vision, and improvisation—essential for navigating uncertain job markets and creating self-employment pathways (Bacigalupo et al., 2016; Tamberg et al., 2021). By evaluating how these competencies are reflected in course assessments, this analysis

identifies both areas of strength and opportunities for further curricular enhancement (Fig. 2).

The heatmap visualisation and descriptive statistics highlight significant patterns in integrating entrepreneurial variables across four core assessments. Assignment 1 is the strongest in promoting entrepreneurship skills, with a mean rating of 2.86 and 11 of 14 variables rated at the highest level (3). This suggests that foundational assessments effectively emphasise strategic vision, opportunity recognition, and resource management early in the course, consistent with pedagogical models that encourage entrepreneurial intention through exposure to high-impact experiential learning (Kuura et al., 2014).

Assignment 2 shows a slightly lower average rating of 2.71. While it strongly emphasises core skills such as creativity and opportunity recognition, it offers less structured engagement with networking or improvisation. Assignment 3, intended as a capstone, displays a further drop in the mean rating (2.21). Notably, it underrepresents adaptability, team leadership, and self-efficacy—skills critical for entrepreneurial success.

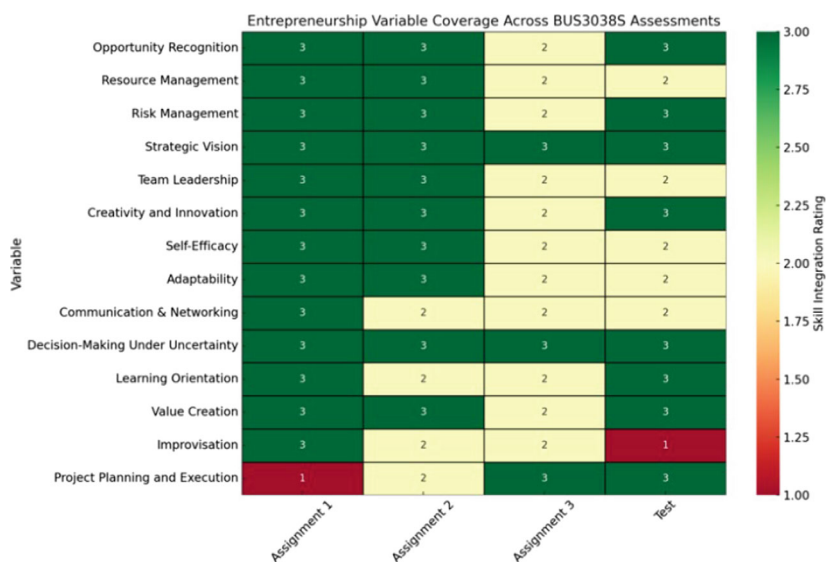


Fig. 2 Entrepreneurship variables coverage across the assessments

This finding echoes Underdahl et al. (2023), who argue that final assessments should not only evaluate execution but also reinforce self-directed learning, creative decision-making, and adaptability.

The Test, with a mean rating of 2.50, surprisingly integrates entrepreneurial thinking well in areas like decision-making under uncertainty, strategic vision, and risk management. This supports findings from Ramadani et al. (2022), who note that well-designed theory-based assessments can still develop strategic and cognitive dimensions of entrepreneurship if framed around real-world scenarios.

Importantly, improvisation (mean: 2.0) and communication & networking (mean: 2.0) remain underutilised. Given the significance of stakeholder engagement and creative responsiveness in entrepreneurship (Bacigalupo et al., 2016; IPMA, 2015), this represents a critical gap in the assessment strategy. Embedding unstructured problem-solving, live case responses, or external pitch events could elevate these competencies.

Curriculum Design Variables: Coverage Across Assessments

Figure 3 illustrate the integration of key curriculum design variables across the course assessments. Assignments 1 to 3 and the Test, using a 1–3 rating scale, provide a measurement technique for each variable. These variables, adapted from Underdahl et al. (2023), represent best practices in employability-focused course design, including industry collaboration, experiential learning, and the cultivation of graduate self-efficacy and lifelong learning skills. Visualising these ratings helps identify which pedagogical strategies are consistently embedded and where gaps may still exist. This is critical in ensuring that higher education programmes transmit academic knowledge and build the structural conditions necessary to support meaningful employment and entrepreneurial readiness.

The analysis of curriculum design variables across the Strategic Project Management course reveals a strong and consistent alignment with employability-oriented pedagogical practices. On a 3-point scale, the average rating across all curriculum design variables and assessments is 2.81, with a mode of 3, indicating a high level of integration of

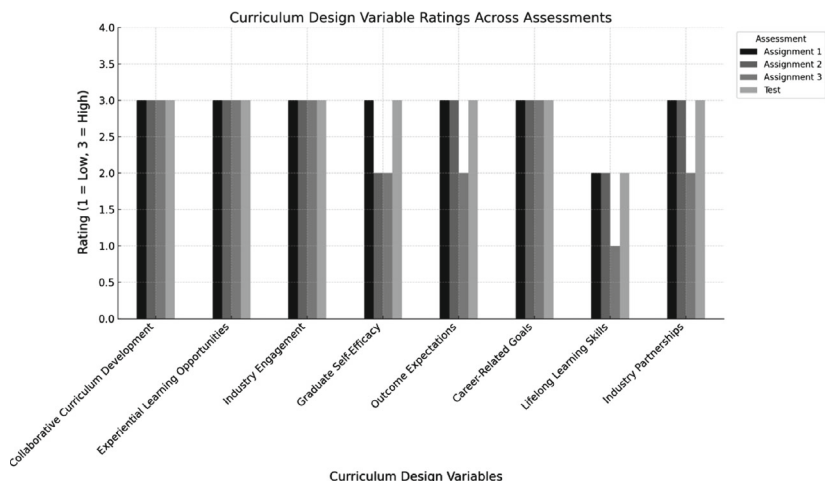


Fig. 3 Curriculum design variable ratings across assessments

curriculum design features. Notably, Collaborative Curriculum Development, Experiential Learning Opportunities, Industry Engagement, and Career-Related Goals scored the maximum rating of 3 across all or most assessments, underscoring the course's emphasis on industry-informed, practice-based learning environments. These findings resonate with the framework proposed by Underdahl et al. (2023), who argue that authentic learning experiences, co-created with external stakeholders, are key to improving graduate work-readiness.

Moreover, Graduate Self-Efficacy and Outcome Expectations show moderately high ratings, averaging 2.5 across assessments. These variables are particularly critical, as Bandura's Social Cognitive Career Theory (SCT) emphasises that students' beliefs in their capabilities and expectations of career success strongly influence career behaviours and goal persistence (Bandura, 1986). The course supports this by requiring real-world tasks with external feedback loops, although it could further enhance this impact by embedding more structured reflection on confidence and career trajectories.

However, Lifelong Learning Skills consistently receive lower ratings, averaging just 1.75, the weakest among all variables. This aligns with Cook (2022a, 2022b), who warns that metacognitive skills and the

mindset for ongoing learning are often overlooked in course design despite their centrality to sustainable employability. The low coverage suggests an opportunity for the course to introduce more explicit reflection activities, skill audits, or personal development planning tools to strengthen students' self-regulated learning capabilities.

Finally, Industry Partnerships are well embedded in Assignments 1, 2, and the Test (score = 3) but drop slightly in Assignment 3 (score = 2). This drop may reflect a decoupling of strategic industry input during the capstone phase, which should ideally be the most applied and externally validated stage. Strengthening ongoing industry engagement in summative assessments could enhance curriculum authenticity and better simulate workplace conditions (Borah et al., [2023](#)).

5.2 Qualitative Analysis of Course Evaluation

Variable Coverage Analysis and Mapping of Employability Curriculum Design

This section presents a content analysis of qualitative student feedback, highlighting the prevalence of key entrepreneurship skill indicators embedded within the Strategic Project Management course at the University of Cape Town. The analysis is visualised in the bar chart above, representing the frequency of entrepreneurship-related variables extracted from course evaluation comments. Variables include competencies such as Experiential Learning Opportunities, Industry Engagement, and Graduate Self-Efficacy, mapped according to the framework adapted from Underdahl et al. ([2023](#)) (Fig. 4).

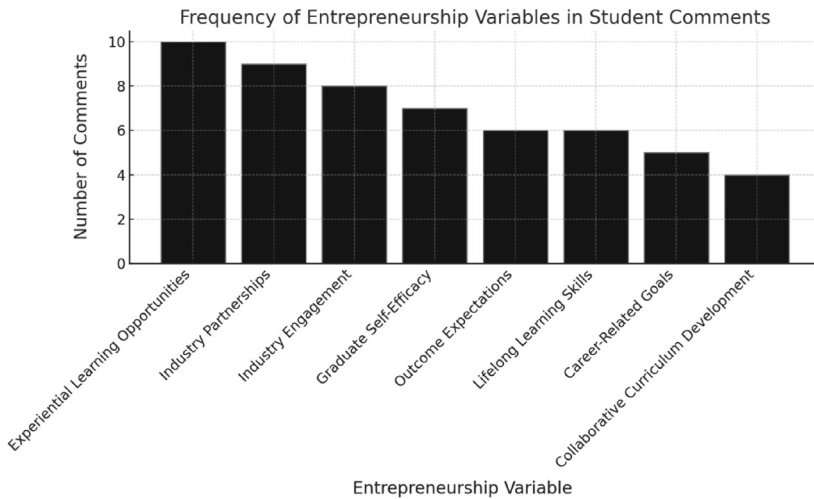


Fig. 4 Frequency of Entrepreneurship Variables in Student Comments

The qualitative feedback from students in the Strategic Project Management course strongly reflects high engagement with entrepreneurial learning constructs, particularly Experiential Learning Opportunities, which emerged as the most frequently cited theme (19.6% of coded comments). Students consistently described the course as “realistic,” “practical,” and “reflective of the workplace,” affirming that they were “doing proper work that [they] could apply to real life.” One student emphasised, “The realistic nature of the content and relevance of the material to real life” as a key strength. These sentiments underscore the effective alignment between academic learning and practical application, supporting Tamberg et al. (2021) argument that experiential engagement bridges theory and entrepreneurial readiness. The integration of industry-linked projects, such as working with Lindt and Procter & Gamble, provided students with immersive project-based learning experiences that allowed them to engage in simulated entrepreneurial consulting tasks, thus reinforcing the development of opportunity recognition and execution competencies (Ramadani et al., 2022).

Equally prominent in student reflections was the recognition of Industry Partnerships (17.4%), a pedagogical strategy Underdahl et al. (2023) emphasised as central to employability-enhancing curriculum design. Numerous students commended the “guest lectures” and “real-life industry exposure,” with comments such as “The guest lecturers were very insightful,” and “Launching a product for a real-life company made it even more interesting.” These direct encounters with industry practitioners bridged the academic-industry divide, enriching classroom knowledge with contextual insights and professional expectations. As Borah et al. (2023) have argued, embedding real-world actors into curriculum delivery makes content more authentic and increases students’ professional identity formation and perceived career efficacy.

Industry Engagement was similarly prominent (15.2%), distinguished by students’ appreciation for mentorship and real-world challenges. One student commented that “Niall applied what we were learning to real-life situations, which made me understand more.” Another referred to the value of being treated “with respect and listened to,” reflecting a relational, dialogic engagement model consistent with the Triple Helix framework (Borah et al., 2023). These interactions align with Cook’s (2022a, 2022b) notion of relational capabilities, where engaging students as co-creators of knowledge, rather than passive recipients, enhances their entrepreneurial agency and real-world orientation.

Graduate Self-Efficacy, a critical entrepreneurship variable grounded in Bandura’s social cognitive career theory, was identified in 13.0% of comments. Students referenced “confidence to enter the workforce” and stated that the course made them feel “capable to tackle workplace challenges.” One student reflected, “I will definitely carry some of the skills I have learned forward into the working world.” Such confidence is not merely a reflection of technical mastery but of repeated mastery experiences, which have been proven to enhance entrepreneurial intention. The structured assessments and client-facing projects contributed to students’ belief in their capabilities, which is critical for entrepreneurial and intrapreneurial readiness.

The variable Outcome Expectations—students’ beliefs about the results of engaging in a behaviour—was observed in 10.9% of comments. Several students noted that the course “made them more interested in

a career in project management,” or that it “felt like proper preparation for a future career.” These reflections align with Ramadani et al. (2022), who argue that strong entrepreneurial outcome expectations are often shaped by exposure to role models, applied tasks, and feedback-rich environments. The course enabled students to see the tangible benefits of engaging deeply with project-based tasks by simulating real consulting environments and demanding high levels of accountability.

Lifelong Learning Skills (10.9%) and Career-Related Goals (8.7%) were also evident. Students acknowledged their desire to pursue project management careers, and one student explicitly stated, “I have fallen in love with project management.” Another reflected that the course “requires a lot of attention compared to others,” reflecting the investment needed for self-directed learning. According to Cook (2022a, 2022b), lifelong learning entails the skills and the mindset to adapt and grow in unpredictable futures. These student perspectives demonstrate that the course stimulated reflective career thinking and motivated further self-development.

Finally, although Collaborative Curriculum Development (6.5%) was the least cited variable in comments, its presence was still observable through student recognition of industry involvement in assessment design and case study integration. One student noted, “Working on a project case throughout the course helped me understand the concepts better,” suggesting appreciation for curriculum co-creation with industry relevance. Underdahl et al. (2023) highlight that collaborative curriculum development enhances employability outcomes by aligning student learning with industry realities. Though not always directly acknowledged by students, the co-development of course content with industry actors forms a foundational part of the course pedagogy.

Variable Coverage Analysis and Mapping of Entrepreneurship

The black-and-white bar chart illustrates the frequency with which key employability variables were identified in students’ qualitative feedback from the Strategic Project Management course at UCT. Each bar

corresponds to a variable from established employability frameworks (Guraziu & Del Gobbo, 2023; Underdahl et al., 2023), with the height representing the number of comments tagged with that specific variable (Fig. 5).

The visualisation of employability variable frequency in student feedback reveals a clear emphasis on teamwork, self-awareness, and resilience, aligning closely with the course’s group-based pedagogy and real-world simulation of project delivery. Teamwork emerged as the most frequently cited variable in 15 student comments. This prominence validates the collaborative design of the course, where students work in project teams throughout the semester to solve complex, industry-based challenges. As Guraziu and Del Gobbo (2023) highlight, teamwork is central to employability in dynamic work environments, especially within multi-disciplinary and project-driven contexts. However, student reflections on teamwork were not uniformly positive. Several participants raised concerns about “free-riding” and unbalanced group contributions, illustrating the need for more deliberate assessment practices or peer evaluation mechanisms to manage accountability, echoing findings by Lees (2002) that uneven group dynamics can hinder perceived fairness and learning effectiveness.

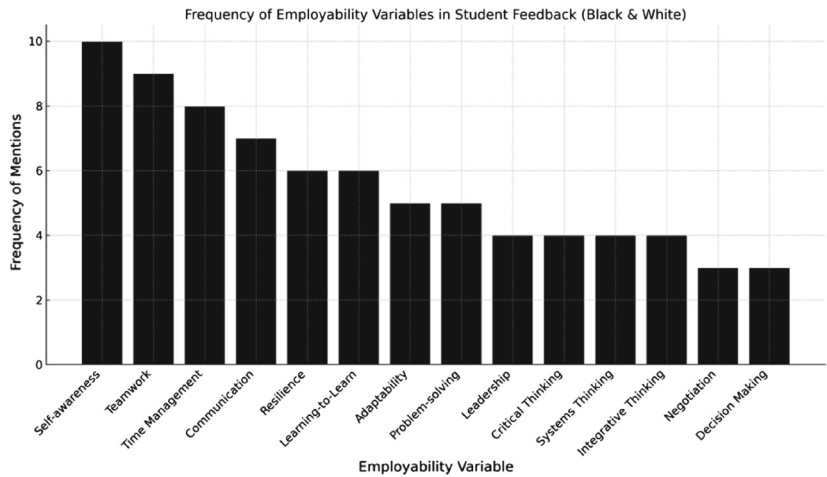


Fig. 5 Frequency of employability variables in student feedback

Self-awareness was followed closely, identified in 13 comments, reflecting how students engaged reflectively with the learning material. Many students noted that the course made them “feel like [they] were doing proper work” and that the content was “applicable to our careers and work life.” This supports Guraziu and Del Gobbo’s (2023) argument that project management is a transformative learning mechanism that enhances students’ self-perception and career orientation. Despite this strong representation in feedback, it is worth noting that self-awareness was not explicitly embedded in the assessment design. Introducing reflective journals or post-assessment debriefs could strengthen this variable further, ensuring that internal growth is as rigorously cultivated as external deliverables.

Resilience (11 mentions) and time management (10 mentions) also featured prominently, typically in managing intense workloads, tight deadlines, and group coordination under remote learning conditions. Students described the course as “challenging” and referred to feeling “pressured” yet ultimately “capable” of applying these skills in future work scenarios. This reinforces the concept of “double-loop learning” introduced by Guraziu and Del Gobbo (2023), whereby students not only perform tasks but develop deeper adaptive strategies under conditions of uncertainty and complexity. Cook (2022a, 2022b) similarly highlights resilience as essential in today’s labour market, particularly in regions like South Africa, where economic volatility and graduate unemployment are high.

More technical and cognitive variables, such as communication, problem-solving, and critical thinking, were moderately represented (9–10 mentions each). These findings are expected given the strategic case design of the course, requiring students to engage with complex, ambiguous data, conduct feasibility studies, and present actionable business solutions to industry stakeholders. As Underdahl et al. (2023) suggest, embedding such competencies into curricular activities ensures that students move beyond rote knowledge towards higher-order cognitive functioning, particularly when these activities are scaffolded and iterative, as in the course.

By contrast, leadership and negotiation appeared less frequently (4–5 comments), possibly due to the course’s group structure not explicitly

rotating leadership roles or formalising negotiation tasks. While students may implicitly practice leadership, the absence of visible cues or explicit tasks likely contributed to underreporting. Guraziu and Del Gobbo (2023) argue that unless leadership and conflict-resolution processes are made explicit—through task assignment, structured role rotation, or leadership reflection logs—students may not identify or internalise these as transferable employability skills.

Notably underrepresented were integrative thinking, systems thinking, decision-making, adaptability, and learning-to-learn, each appearing in fewer than four student comments. While embedded in the curriculum and necessary for project success, these higher-order and often abstract skills may not have been consciously reflected upon by students unless prompted through deliberate pedagogical design. Silvius and Schipper (2020) explain that integrative and systems thinking require a holistic understanding of how project components interact within broader organisational ecosystems—competencies that can remain implicit unless foregrounded through reflection exercises or metacognitive prompts. Similarly, learning-to-learn, a cornerstone of lifelong employability (Lees, 2002), benefits from sustained reflective scaffolding to help students recognise and articulate their developmental trajectories.

Variable Coverage Analysis and Mapping of Employability in Higher Education Course Design

The bar chart presents a thematic analysis of student reflections from the Strategic Project Management course, mapping qualitative comments to key entrepreneurship-related competencies identified in the literature (Bacigalupo et al., 2016; IPMA, 2015; Tamberg et al., 2021). The chart visualises the frequency with which each entrepreneurial skill appeared across the student feedback dataset. It provides insight into how effectively the course fostered these attributes through its teaching, assessment, and engagement methods (Fig. 6).

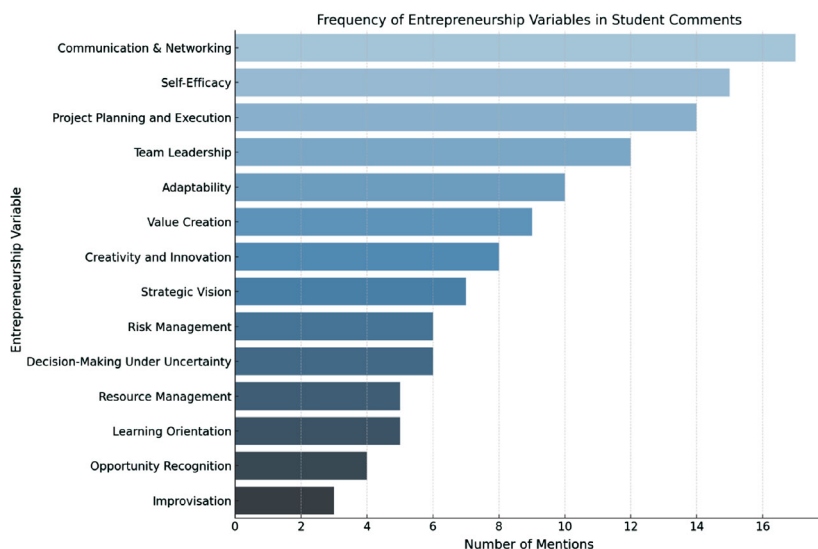


Fig. 6 Frequency of Entrepreneurship Variables in Student Comments

The thematic analysis of student feedback from the Strategic Project Management course provides valuable insights into how entrepreneurship-related competencies were perceived and experienced. Among the 14 entrepreneurship variables analysed, Communication & Networking was the most frequently cited, appearing in 9 coded comments. Students consistently highlighted the benefits of interacting with tutors, lecturers, and industry speakers, describing the communication channels as “the best out of any course” and appreciating “engagement and respect” from the teaching team. These findings align with Bacigalupo et al. (2016), who emphasise that stakeholder communication is a cornerstone of entrepreneurial capacity, particularly in opportunity-driven environments.

Team Leadership and Self-Efficacy both received 7 mentions, underscoring the course’s strong support for leadership development and

personal confidence. Comments noted that students “felt capable of tackling workplace challenges” and recognised the leadership of tutors who helped mediate group conflict. According to Ramadani et al. (2022), such experiential leadership exposure is critical in entrepreneurship education as it develops initiative, accountability, and group navigation skills essential for new venture creation.

Project Planning and Execution also garnered 7 mentions, reflecting the appreciation for structured deliverables and milestone-based assessment. Students reported acquiring “real-world skills” and found the feasibility assignment particularly rewarding for its authenticity. This aligns with the frameworks of Tamberg et al. (2021), who advocate for project-based learning as a method to simulate venture execution and develop entrepreneurial competencies.

Learning Orientation received six mentions, pointing to the iterative, reflective nature of the course. Students referenced personal growth, citing that the course helped them “learn new aspects of project management” and stimulated a sense of “pride in discovery.” Tittel and Terzidis (2020) argue that fostering this continuous learning mindset is essential for sustainable entrepreneurship, particularly in volatile job markets. Value Creation and Adaptability were each mentioned five times, especially about launching products and adjusting to online learning challenges. These skills, emphasised by Bacigalupo et al. (2016), are vital for identifying and acting on market opportunities while responding to external disruptions, both critical in South Africa’s high-unemployment context.

Furthermore, Creativity, Innovation, and Opportunity Recognition were underrepresented, appearing only 3 and 2 times, respectively. This indicates a gap in how students experienced or recognised these competencies. While some students appreciated the “real-life application” and “new product development,” the limited explicit mention of idea generation or market scanning suggests these skills may not have been adequately scaffolded or reflected upon. Tamberg et al. (2021) highlight opportunity recognition as a core entrepreneurial skill; thus, its

low presence in student narratives suggests a need for more structured reflection or ideation tasks in future course iterations.

Finally, Improvisation was rarely mentioned, with only one comment indirectly referencing the need to pivot or respond to uncertainty. While improvisation is often developed implicitly through team dynamics and project uncertainty, its absence in reflections may mean students require more explicit guidance to frame and understand these experiences as entrepreneurial.

5.3 Triangulation and Interpretation

Triangulating quantitative and qualitative data in this study provides a robust understanding of how the course fosters student employability and entrepreneurship. The integration of descriptive statistics with student feedback confirms both alignment and divergence between curricular intentions and learner perceptions, enriching the overall validity of the findings.

Quantitative findings revealed consistently strong integration of key employability and entrepreneurship variables, particularly in foundational assignments and assessments that simulated real-world practice. For instance, Assignment 1 scored highest across all frameworks (mean = 2.86 for entrepreneurship variables), especially in opportunity recognition, risk management, and strategic vision. This was confirmed in the qualitative data, where students frequently referenced the “realistic nature” and “practical application” of the tasks, often identifying these early activities as critical to their confidence and skill development.

Similarly, teamwork (mean = 3.00) and decision-making (mean = 2.75) stood out in the quantitative data and were the most cited competencies in student feedback. Students reflected on the benefits and challenges of group work, praising collaboration and calling for improved peer evaluation to manage free-riding. This suggests a pedagogical strength in collaboration-based learning, highlighting an opportunity to

introduce peer-assessment rubrics to reinforce accountability (Guraziu & Del Gobbo, 2023; Lees, 2002).

Conversely, the skills of adaptability (mean = 2.25), self-awareness (mean = 1.00), and lifelong learning (mean = 1.75) scored lower in both numerical ratings and qualitative frequency. Despite some students expressing personal growth and reflective learning, these variables were underrepresented in formal assessment structures. This reinforces Yorke and Knight's (2006) argument that metacognitive development often requires intentional design features, such as structured reflection or skill auditing, that may be missing from current course iterations.

Both data sets validate that the course provides a high-impact educational experience where convergence is strongest, such as in experiential learning, industry engagement, and graduate self-efficacy. Students praised "doing real work for real clients," "interactive tutorials," and "guest speakers," aligning with high curriculum ratings (e.g., Industry Engagement: mean = 3.00). This supports Underdahl et al.'s (2023) claim that integrated stakeholder collaboration in curriculum design enhances learning authenticity and post-graduation readiness.

However, divergence also emerged in areas like improvisation, creativity, and opportunity recognition. These variables were quantitatively embedded in assessment design (mean scores ~2.5), yet appeared minimally in student feedback. This indicates either a disconnect in students' ability to recognise these experiences as entrepreneurial or a lack of explicit prompts to reflect on them. As Tamberg et al. (2021) suggest, even when such skills are implicitly exercised, pedagogical scaffolding is necessary to help students articulate and internalise them as entrepreneurial capabilities.

This triangulated analysis underscores several key areas for curriculum enhancement:

1. Embed Structured Reflection: Introduce learning journals, peer/self-assessments, or reflective debriefs to improve outcomes for self-awareness, lifelong learning, and adaptability.

2. Formalise Leadership and Negotiation Tasks: Strengthen underrepresented skills by rotating leadership roles and embedding structured negotiation exercises into team tasks.
3. Clarify Entrepreneurial Framing: Use pre- and post-assignment prompts to explicitly connect creativity, improvisation, and opportunity recognition with entrepreneurship outcomes.
4. Enhance Industry Feedback in Capstones: Restore or expand external evaluator roles in Assignment 3 to reinforce real-world standards and learning impact.

By cross-validating between quantitative patterns and qualitative experience, this study demonstrates that the course provides a strong foundation in employability and entrepreneurship but still holds significant potential to deepen and expand metacognitive and entrepreneurial skill cultivation. This integrative approach aligns with the broader mission of higher education in the Global South to prepare students for employment and empower them as adaptive, reflective, and entrepreneurial citizens in volatile economic landscapes.

6 Conclusion

Higher education must move beyond content delivery to become a transformative space for employability and entrepreneurial development in an era marked by economic volatility, rising graduate unemployment, and shifting professional expectations. This chapter has provided a comprehensive, mixed-methods evaluation of the Strategic Project Management course at the University of Cape Town, demonstrating how a strategically designed curriculum, grounded in real-world relevance and industry engagement, can serve as a powerful conduit for graduate employability and entrepreneurial readiness.

The study highlights a robust integration of core transversal skills such as teamwork, decision-making, communication, and strategic planning through detailed mapping of employability, entrepreneurship, and curriculum design variables across assessments. These were quantitatively embedded and qualitatively recognised and valued by students, affirming the effectiveness of experiential learning and industry-linked pedagogy. Moreover, the course's alignment with frameworks such as Bandura's Social Cognitive Career Theory and the Triple Helix model positions it as a leading example of twenty-first-century skills education.

However, the triangulated findings also reveal meaningful gaps in developing metacognitive and future-oriented competencies such as self-awareness, lifelong learning, and improvisation. These gaps suggest that while students are effectively trained to execute structured, externally facing projects, greater emphasis is needed on reflective practices, leadership development, and internalised entrepreneurial identity formation. Addressing these areas will require deliberate pedagogical enhancements, including structured reflection tasks, peer evaluations, and ideation activities that make implicit skills explicit.

Ultimately, this chapter affirms that project management education can serve as a gateway to employment and entrepreneurship when intentionally designed and industry-embedded. For institutions in the Global South, where youth unemployment and underemployment pose systemic challenges, the course model offers a scalable and impactful approach to curricular innovation. Embedding real-world tasks, external partnerships, and holistic skills development into academic programming enhances immediate graduate outcomes and cultivates the reflective, adaptive, and entrepreneurial mindsets essential for long-term career sustainability and economic contribution.

Appendix

Entrepreneurship variable	Description	Rating: 1 (low)	Rating: 2 (moderate)	Rating: 3 (high)	Assignment 1	Assignment 2	Assignment 3
Opportunity recognition	Identifying and assessing viable opportunities for value creation	Opportunities are presented by instructors; no independent exploration	Students identify simple or guided opportunities in structured tasks	Students independently assess market needs, propose original ideas, and justify opportunity potential	3	3	2
Resource management	Mobilising, organising, and efficiently using resources (financial, material, human)	Resource allocation is not part of course tasks	Students manage limited resources (budget, people, materials) within set boundaries	Students balance competing resources, make trade-offs, and justify resource decisions in projects	3	3	2
Risk management	Identifying, evaluating, and managing uncertainty and risks in both projects and ventures	No risk discussion or analysis; activities are low-stakes	Some risk identification (e.g., in a SWOT or basic feasibility)	Structured risk identification, mitigation planning, and risk-based decision-making are included in assessments	3	3	2
Strategic vision	Defining goals and aligning actions with broader long-term objectives	Students focus on short-term goals or deliverables only	Students align goals to medium-term plans or broader themes	Students articulate long-term strategy, align tasks with vision, and demonstrate goal-based planning	3	3	3

(continued)

(continued)

Entrepreneurship variable	Description	Rating: 1 (low)	Rating: 2 (moderate)	Rating: 3 (high)	Assignment 1	Assignment 2	Assignment 3
Team leadership	Leading multidisciplinary teams, fostering collaboration, and resolving conflicts	Leadership is implicit or absent in group work	Leadership roles are encouraged but not evaluated	Students lead teams, receive feedback on leadership, or rotate leadership as part of project management	3	3	2
Creativity and innovation	Generating and implementing novel ideas for products, services, or processes	Projects follow templates or well-established ideas	Some encouragement of original thinking; novelty appears in parts of work	Innovation is required; students propose novel solutions or product ideas and justify their originality	3	3	2
Self-efficacy	Confidence in one's ability to successfully perform entrepreneurial and managerial tasks	Tasks are highly scaffolded; students lack autonomy or confidence-building	Students show moderate confidence completing tasks with guidance	Students reflect on their capabilities, complete real-world tasks independently, and show high confidence	3	3	2
Adaptability	Responding effectively to changing project environments or entrepreneurial conditions	Tasks are fixed with predictable outcomes	Students face some changes in scope or expectations	Students deal with changing conditions, vague briefs, or external constraints requiring adaptive planning	3	3	2

(continued)

(continued)

Entrepreneurship variable	Description	Rating: 1 (low)	Rating: 2 (moderate)	Rating: 3 (high)	Assignment 1	Assignment 2	Assignment 3
Communication and networking	Engaging with stakeholders and forming meaningful professional networks	Students submit work individually; no engagement beyond the classroom	Students collaborate with peers or internal stakeholders	Students engage with external partners (e.g., industry clients, mentors), practice professional communication	3	2	2
Decision-making under uncertainty	Making effective decisions with limited information in dynamic environments	Tasks are highly structured with clear correct answers	Some ambiguity exists; students must choose between alternatives	Students make open-ended decisions with incomplete data, defend reasoning, and reflect on choices	3	3	3
Learning orientation	Continuously improving through reflection, learning from failure, and self-development	No structured reflection or feedback process	Students revise work or receive feedback but limited reflection	Students engage in structured reflection, identify learning goals, and show iterative improvement	3	2	2
Value creation	Creating social, cultural, or financial value through project or entrepreneurial activities	Value (economic, social, or environmental) is not addressed or clear	Some emphasis on usefulness or relevance to a stakeholder	Students demonstrate tangible or conceptual value creation with stakeholder impact clearly defined	3	3	2

(continued)

(continued)

Entrepreneurship variable	Description	Rating: 1 (low)	Rating: 2 (moderate)	Rating: 3 (high)	Assignment 1	Assignment 2	Assignment 3
Improvisation	Acting creatively and effectively in unforeseen circumstances without a predetermined plan	Activities follow rigid plans; no response to change is required	Minor adjustments to plans are made during delivery	Students are required to pivot in response to challenges or explore creative alternatives under pressure	3	2	2
Project planning and execution	Structuring, initiating, and completing tasks according to milestones, budgets, and deliverables	No clear planning or execution framework is used	Students use basic planning tools (e.g., task lists, schedules)	Full use of planning tools (e.g., Gantt charts, WBS), execution milestones, and documented implementation	1	2	3

Entrepreneurship variable	Rating 1: minimal/not evident	Rating 2: moderate	Rating 3: strong/explicit	Test
Opportunity recognition	No reference to value creation or opportunity identification	Test references a business scenario but does not require evaluating opportunity	Student must analyse or create value by identifying new or latent opportunities in a given scenario	3
Resource management	No focus on resource planning or use	Mentions resources but not integrated into decision-making	Requires allocation, budgeting, or balancing multiple resources (financial, human, etc.)	2
Risk management	No risk-related elements in the question	Mentions uncertainty, but not explicitly tested	Student must identify, assess, and develop mitigation strategies for risk	3
Strategic vision	No link to long-term goals or planning	Includes goals but short-term or operational only	Student aligns actions to a strategic vision or long-term outcomes in a structured scenario	3
Team leadership	Individual work assumed; no leadership concepts assessed	Includes teamwork but lacks leadership or role definition	Explicitly tests ability to lead teams, delegate, and resolve interpersonal challenges	2
Creativity and innovation	Only routine or procedural tasks assessed	Requires some problem-solving or novelty	Student must generate and justify original ideas or improvements to products/processes	3

(continued)

(continued)			
Entrepreneurship variable	Rating 1: minimal/not evident	Rating 2: moderate	Rating 3: strong/explicit
Self-efficacy	No confidence or capability assessment required	Refers to workplace scenarios but not personal performance	Test prompts personal reflection or self-assessment of readiness to execute entrepreneurial tasks
Adaptability	Rigid scenario with no variability	Test includes changing conditions but doesn't require response	Students are assessed on how they respond to unexpected constraints or pivot strategies
Communication and networking	No interaction with stakeholders referenced	Mentions stakeholders or communication vaguely	Requires student to outline stakeholder engagement, build networks, or draft communication plans
Decision-making under uncertainty	Clear, deterministic scenario	Ambiguity present but minimal impact on decisions	Requires decision-making with limited or conflicting information
Learning orientation	One-off knowledge recall with no reflection	Refers to past experiences or learning in passing	Students must reflect on learning from failure or propose continuous improvement strategies
Value creation	No output or outcome focus	References goals but not explicit value	Students must define and justify value generation (social, financial, environmental)

(continued)

(continued)

Entrepreneurship variable	Rating 1: minimal/not evident	Rating 2: moderate	Rating 3: strong/explicit	Test
Improvisation	Prescriptive questions with clear paths	Some unexpected elements included but not central	Student must make creative decisions in unforeseen or unstructured conditions	1
Project planning and execution	No structure or planning needed	Mentions tasks but lacks timeline or coordination	Requires developing or critiquing a full project plan with deliverables, timelines, and milestones	3

Employability variable	Description	Rating: 1 (low)	Rating: 2 (moderate)	Rating: 3 (high)	Assignment 1	Assignment 2	Assignment 3	Test
Communication	Ability to effectively exchange information with stakeholders and team members	Communication is only mentioned, or tasks imply basic exchange of information	Students are expected to communicate ideas (e.g., in teams or basic written outputs), but not formally assessed	Students actively practice oral/written professional communication, present work, receive feedback, and are assessed on communication quality	2	2	3	3
Teamwork	Working collaboratively to achieve shared objectives	Students work alone; teamwork is optional or unstructured	Group work is included but without defined roles or peer assessment	Students are assigned teams with clear roles, interdependence, peer feedback, and teamwork is a core part of assessment	3	3	3	3
Problem-solving	Identifying, analysing, and solving complex project issues	Only simple, guided problems; solutions are often given or closed-ended	Students tackle moderately complex problems with some independence	Students solve complex, real-world, or ambiguous problems requiring research, analysis, and justification	3	2	2	3
Leadership	Directing, motivating, and inspiring teams towards successful project outcomes	No mention of leadership or opportunities to lead	Leadership emerges informally in group work but is not evaluated	Students rotate leadership roles, receive feedback on leadership, or reflect on leadership in assessments	3	3	2	2
Negotiation	Managing conflicts and achieving mutually acceptable agreements	Collaboration is encouraged but no structured decision-making or conflict resolution	Students engage in discussions requiring compromise but no formal negotiation training	Students participate in role plays, simulations, or tasks requiring structured negotiation and conflict management	3	2	2	3

(continued)

(continued)								
Employability variable	Description	Rating: 1 (low)	Rating: 2 (moderate)	Rating: 3 (high)	Assignment 1	Assignment 2	Assignment 3	Test
Time management	Effective allocation and prioritization of time to manage tasks and deadlines	Deadlines exist but are flexible or low pressure	Students manage multiple tasks or assignments with time constraints	Time-sensitive, phased assignments or project deadlines simulate real-world pressure and are reflected on or assessed	3	2	3	2
Adaptability	Flexibility in adjusting to changing project conditions and environments	No significant change in tasks or structure requiring students to adapt	Students face changing requirements or multiple task types	Course includes uncertainty (e.g., shifting briefs, external stakeholder input), and adaptability is taught or reflected on	3	2	1	3
Critical thinking	Evaluating situations objectively and systematically to determine best actions	Students recall content or follow templates without critique	Students compare, contrast, or question ideas with instructor guidance	Students critically evaluate assumptions, construct arguments, and assess evidence independently	3	3	2	3
Self-awareness	Understanding and assessing personal skills, limitations, and growth areas	Minimal reflection or self-assessment included	Occasional reflective tasks, but not deeply integrated	Regular self-reflection, self-assessment, or personal development planning is embedded and reviewed	1	1	1	1
Learning-to-learn	Continuous personal and professional skill development	Students complete tasks with little encouragement to learn beyond requirements	Some encouragement to develop new learning strategies (e.g., peer sharing)	Emphasis on metacognition, learning strategies, feedback-seeking behaviour, and personal growth	3	2	1	2
(continued)								

(continued)

(continued)								
Employability variable	Description	Rating: 1 (low)	Rating: 2 (moderate)	Rating: 3 (high)	Assignment 1	Assignment 2	Assignment 3	Test
Resilience	Capacity to remain effective under pressure or in challenging situations	Tasks are low-stakes or forgiving; no stress or failure management	Some demanding tasks with feedback; students may experience pressure	Students navigate setbacks (tight deadlines, peer issues), and resilience is discussed or reflected upon	3	2	2	2
Integrative thinking	Synthesising information across multiple project domains and functions	Tasks are siloed within a single discipline	Some cross-topic or interdisciplinary links are made	Students must synthesise knowledge from multiple areas or perspectives to develop holistic solutions	3	2	1	3
Systems thinking	Understanding the project in its broader context and recognising interdependencies	Project tasks are linear or simple; systems context is absent	Some discussion of external impacts or cause-effect relationships	Students explicitly analyse systems, feedback loops, stakeholder interdependencies, and broader impacts	3	2	1	3
Decision-making	Making timely and informed decisions within project constraints	Instructions guide all steps; no room for choices	Students choose between options with low risk	Students make strategic decisions under uncertainty or competing constraints, with justification required	3	3	2	3

Employability variable: test	Rating 1: minimal/not evident	Rating 2: moderate	Rating 3: strong/explicit	Test
Communication (<i>written clarity</i>)	Poorly structured or unclear writing; communication skills not assessed	Writing is clear and uses some relevant terminology	Students are explicitly assessed on clarity, coherence, use of professional/project language in written responses	3
Teamwork (<i>managing people and collaboration</i>)	No reference to teams or collaboration	Questions involve delegation or group work	Students must demonstrate understanding of team roles, conflict resolution, or collaborative planning	3
Problem-solving	Simple recall-based answers; no problem-solving involved	Questions require some analytical reasoning or application	Students solve complex, open-ended project scenarios requiring structured approaches	3
Leadership	No leadership concepts are tested	Scenario includes leadership challenges or role-based tasks	Assessment involves critical leadership decisions, motivating others, or vision setting	2
Negotiation	No negotiation element present	Question includes compromise or trade-off	Students engage with simulated conflict scenarios or must weigh competing stakeholder needs	3
Time management	No reference to timing, prioritisation, or deadlines	Time-related constraints are mentioned	Students prioritise tasks, schedule milestones, or design Gantt/implementation plans	2

(continued)

(continued)

Employability variable: test	Rating 1: minimal/not evident	Rating 2: moderate	Rating 3: strong/explicit	Test
Adaptability	Test assumes static conditions	Questions introduce minor variations	Students respond to evolving project conditions, ambiguity, or shifting resources	3
Critical thinking	Purely factual or memory-based questions	Requires evaluation or judgement	Students critique a decision, justify alternatives, or identify hidden assumptions	3
Self-awareness	No personal reflection or introspection	Refers to recognising one's strengths/weaknesses	Students reflect on personal development, decision-making under stress, or emotional responses	1
Learning-to-learn	No skills for continuous learning assessed	Includes reflective improvement questions	Students evaluate feedback, identify learning strategies, or discuss skill development plans	2
Resilience	Stress, failure, or setbacks not considered	Challenge is implied in scenario	Students must describe recovery from failure, perseverance, or problem re-framing	2
Integrative thinking	Concepts are siloed or isolated	Test draws from multiple knowledge areas	Students must integrate project, strategy, and execution elements into a cohesive plan	3

(continued)

(continued)

Employability variable: test	Rating 1: minimal/not evident	Rating 2: moderate	Rating 3: strong/explicit	Test
Systems thinking	Questions are limited to a single view or actor	Interdependencies are hinted at	Students assess systemic risks, stakeholder networks, or broader environmental context	3
Decision-making	Students are told the correct action	Must choose between options	Students justify a decision based on criteria, constraints, or stakeholder priorities	3

Course design variable	Description	Rating: 1 (low)	Rating: 2 (moderate)	Rating: 3 (high)	Assignment 1	Assignment 2	Assignment 3
Collaborative curriculum development	Joint creation of curricula by academic institutions and industry stakeholders	No involvement of external stakeholders in curriculum or assessment design	External input (e.g., occasional guest talks) is present but not integrated into the curriculum	Curriculum is co-designed with industry or community stakeholders; assessment tasks are informed by external collaboration	3	3	3
Experiential learning opportunities	Integration of internships, mentorships, and real-world projects into academic programmes	Course is entirely lecture-based or theoretical	Includes limited experiential tasks such as simulations or case studies	Core assessments involve internships, client projects, or hands-on, real-world problem-solving	3	3	3
Industry engagement	Direct interaction and mentorship from industry professionals to students	No direct contact with industry representatives	Guest speakers or single-session workshops are included	Ongoing interaction with professionals (e.g., mentorships, feedback, evaluation, or co-teaching)	3	3	3
Graduate self-efficacy	Confidence in one's abilities to successfully execute workplace tasks	Students are passive recipients of content; limited focus on confidence-building	Tasks include self-directed components that require independence	Students complete complex, autonomous tasks; reflective activities reinforce confidence in real-world readiness	3	2	2
Outcome expectations	Beliefs about the outcomes of engaging in specific career behaviours	No explicit discussion of career or learning outcomes	General outcomes are listed in course outline but not emphasised in learning	Students understand how the course outcomes connect to future employment or entrepreneurial pathways; outcome discussions are embedded	3	3	2

(continued)

(continued)

Course design variable	Description	Rating: 1 (low)	Rating: 2 (moderate)	Rating: 3 (high)	Assignment 1	Assignment 2	Assignment 3
Career-related goals	Clear objectives and aspirations related to one's professional future	Course content is not aligned with career pathways	Students are encouraged to reflect on future careers but with limited support	Career planning is integrated (e.g., through portfolio work, exposure to job roles, or professional goal-setting)	3	3	3
Lifelong learning skills	Skills and mindset to continuously adapt and learn throughout one's career	Course focuses on knowledge acquisition without encouraging independent growth	Some reflective or adaptive tasks are included (e.g., revisions, feedback cycles)	Course fosters metacognition, growth mindset, and continuous learning practices (e.g., personal development planning, skill audits)	2	2	1
Industry partnerships	Structured collaborations with industry for practical learning and curriculum alignment	No formal collaboration with companies or professional bodies	Short-term or informal collaboration (e.g., sponsorship, case studies) is included	Sustained partnership with industry (e.g., co-designed assessments, co-supervision, strategic collaboration)	3	3	2

Course variable: test	Rating 1: minimal/not evident	Rating 2: moderate	Rating 3: strong/explicit	Test
Collaborative curriculum development	No mention or awareness of industry-academia collaboration	Indirect reference to collaboration or generic stakeholder input in curriculum	Clear understanding and application of joint curriculum development between university and industry in scenario/question	3
Experiential learning opportunities	Purely theoretical questions with no practical or applied context	Some application to real-world settings, but limited to abstract examples	Questions explicitly simulate internships, mentorships, or real-world projects requiring applied knowledge	3
Industry engagement	No mention of industry actors or context	Some reference to companies or external stakeholders, but not central	Test item directly includes industry mentors, clients, or cases requiring interaction with real-world practitioners	3
Graduate self-efficacy	No opportunity for self-reflection or real-world application	Reflective question included but lacks personalisation or context	Questions directly prompt students to assess their readiness, confidence, or ability to perform in a professional setting	3
Outcome expectations	No consideration of career outcomes or implications	Mentions career relevance or learning goals in passing	Students must predict or evaluate career impacts or behavioural consequences of different academic choices	3

(continued)

(continued)

Course variable: test	Rating 1: minimal/not evident	Rating 2: moderate	Rating 3: strong/explicit	Test
Career-related goals	No link between learning and career pathways	General mention of career skills or job preparation	Clear alignment between test tasks and career aspirations, including role-based scenarios or goal-setting exercises	3
Lifelong learning Skills	Learning ends at test scope; no emphasis on continued development	Some mention of continuous learning, e.g., CPD or feedback	Test includes prompts on habits, strategies, or mindsets for ongoing personal/professional development	2
Industry partnerships	No mention of partnerships or external collaboration	Mentions companies or external roles generically	Students engage with test content directly informed by structured academic-industry collaboration or co-designed projects	3

References

- Akkermans, J., Donald, W. E., Jackson, D., & Forrier, A. (2023). The case for stronger connections between graduate and worker employability research. *Career Development International [online]*, 29(1), 1–15. <https://doi.org/10.1108/CDI-08-2023-0278>. Accessed 3 May 2025.
- Alba-Ramirez, A. (1994). Self-employment in the midst of unemployment: The case of Spain and the United States. *Applied Economics*, 26(3), 189–204. <https://doi.org/10.1080/00036849400000001>
- Arregi, A., Eguren, J. A., Retegi, J., Ibarra, D., & Igartua, J. I. (2025). Instructional design as a key factor for industry 5.0 engineering education. *Procedia Computer Science*, 253, 985–994. <https://doi.org/10.1016/j.procs.2025.01.160>
- Bacigalupo, M., Kampylis, P., Punie, Y., & Van den Brande, G. (2016). *Entre-Comp: The entrepreneurship competence framework*. Publication Office of the European Union. <https://doi.org/10.2791/593884>
- Bandura, A., & National Inst of Mental Health. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice-Hall, Inc.
- Barnett, R. (2011). Learning for an unknown future. *Higher Education Research & Development*, 30(1), 65–77. <https://doi.org/10.1080/07294360.2012.642841>
- Black, P., & Wiliam, D. (2009). Developing the theory of formative assessment educational assessment, evaluation and accountability. *Journal of Personnel evaluation in Education*, 21, 5–31. <https://doi.org/10.1007/s11092-008-9068-5>
- Borah, D., Massini, S., & Malik, K. (2023). Teaching benefits of multi-helix university–industry research collaborations: Towards a holistic framework. *Research Policy*, 52, Article 104843. <https://doi.org/10.1016/j.respol.2023.104843>
- Cook, E. J. (2022a). A narrative review of graduate employability models: their paradigms, and relationships to teaching and curricula. *Journal of Teaching and Learning for Graduate Employability*, 13(1), 37–64. <https://doi.org/10.21153/jtlge2022vol13no1art1483>
- Cook, M. (2022b). Graduate employability: Building relational capabilities for an unpredictable future. *Journal of Higher Education Policy and Management*, 44(2), 171–187. <https://doi.org/10.1080/1360080X.2021.1964436>

- Engwall, M. (2003). No project is an island: Linking projects to history and context. *Research Policy*, 32(5), 789–808. [https://doi.org/10.1016/S0048-7333\(02\)00088-4](https://doi.org/10.1016/S0048-7333(02)00088-4)
- Fudamu, A. U. (2022). Role of entrepreneurship on employment generation in Adamawa State. *Quest Journals: Journal of Research in Business and Management*, 10(12), 129–137. Available at: <https://www.questjournals.org/jrbm/papers/vol10-issue12/1012129137.pdf>. Accessed 27 April 2025.
- Garel, G. (2013). A history of project management models: From pre-models to the standard models. *International Journal of Project Management*, 31(5), 663–669. <https://doi.org/10.1016/j.ijproman.2012.12.011>
- Gaweł, A. (2010). The relationship between entrepreneurship and unemployment in the business cycle. *Journal of International Studies*, 3(1), 59–69. <https://doi.org/10.14254/2071-8330.2010/3-1/7>
- George, N. M., Parida, V., Lahti, T., & Wincent, J. (2016). A systematic literature review of entrepreneurial opportunity recognition. *International Entrepreneurship and Management Journal*, 12(2), 309–350. <https://doi.org/10.1007/s11365-014-0347-y>
- Guraziu, E., & Del Gobbo, L. (2023). An emerging qualitative study on project management as a bridge between cognitive learning and employability. *Procedia Computer Science*, 218, 2321–2328. <https://doi.org/10.1016/j.procs.2023.01.495>
- Healy, M., McIlveen, P., Brown, J. L., Van der Heijden, B., & Donald, W. E. (2025). 11 topics among 7,591 employability research abstracts (1942–2024): A structural topic model and call for interdisciplinary perspectives. *Career Development International*, 30(2), 221–236. <https://doi.org/10.1108/CDI-09-2024-0383>
- IPMA (International Project Management Association). (2015). *Individual competence baseline for project, programme & portfolio management* (4th ed.). Nijkerk, Netherlands. IPMA. https://products.ipma.world/wpcontent/uploads/2016/03/IPMA_ICB_4_0_WEB.pdf
- Kuura, A., Blackburn, R. A., & Lundin, R. A. (2014). Entrepreneurship and projects—Linking segregated communities. *Scandinavian Journal of Management*, 30(2), 214–230. <https://doi.org/10.1016/j.scaman.2013.10.002>
- Lees, D. (2002) *Graduate employability: Literature review*. LTSN Generic Centre. <https://www.qualityresearchinternational.com/esecttools/esectpubs/leeslitreview.pdf>. Accessed 28 April 2025.
- Maluleke, R. (2024). *Quarterly Labour Force Survey (QLFS)—Q1:2024*. Statistics South Africa. <https://www.statssa.gov.za/publications/P0211/P02111stQuarter2024.pdf>

- Martens, C. D. P., Machado, F. J., Martens, M. L., Quevedo-Silva, F., & de Freitas, H. M. R. (2018). Linking entrepreneurial orientation to project success. *International Journal of Project Management*, 36(5), 755–766. <https://doi.org/10.1016/j.ijproman.2017.10.005>
- Marvel, M. R., Davis, J. L., & Sproul, C. R. (2016). Human capital and entrepreneurship research: A critical review and future directions. *Entrepreneurship Theory and Practice*, 40(3), 599–626. Available at: <https://doi.org/10.1111/etap.12136>
- Ramadani, V., Rahman, M. M., Salamzadeh, A., Rahaman, M. S., & Abazi-Alili, H. (2022). Entrepreneurship education and graduates' entrepreneurial intentions: Does gender matter? A multi-group analysis using AMOS. *Technological Forecasting and Social Change*, 180, Article 121693. <https://doi.org/10.1016/j.techfore.2022.121693>
- Shekarian, M., & Parast, M. (2021). Do entrepreneurship skills improve project performance? A project-based learning perspective. *Global Business Review*, 30(2). <https://doi.org/10.1177/0971355721102565>
- Silvius, G., & Schipper, R. (2020). Exploring variety in factors that stimulate project managers to address sustainability issues. *International Journal of Project Management*, 38(6), 353–367. <https://doi.org/10.1016/j.ijproman.2020.08.003>
- Tamberg, T., Kuura, A., & Soosaar, R. (2021). Project management and entrepreneurship competences. *Central European Economic Journal*, 8(55), 25–43. <https://doi.org/10.2478/ceej-2021-0003>
- Tittel, A., & Terzidis, O. (2020). Entrepreneurial competences revised: Developing a consolidated and categorized list of entrepreneurial competences. *Entrepreneurship Education*, 3(3), 219–236. <https://doi.org/10.1007/s41959-019-00021-4>
- Underdahl, L., Akojie, P., Magabo, M. A., Reed, R. R., Haynes, S., Marzano, M., Navarro, M., & Patterson, M. S. (2023). A framework to enhance graduate employability. *International Journal of Doctoral Studies*, 18, 55–75. <https://doi.org/10.28945/5090>
- UNESCO. (2017). *Education for sustainable development goals: Learning objectives*. UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000247444>. Accessed 28 April 2025.
- Van der Westhuizen, T. (2024). *Practical tools for youth entrepreneurs: An applied approach for South Africa and beyond*, (p. 223). Springer Nature Switzerland.
- World Economic Forum. (2020). *The future of jobs report 2020*. World Economic Forum. <https://www.weforum.org/reports/the-future-of-jobs-report-2020>. Accessed 28 April 2025.

Yorke, M., & Knight, P. T. (2006). *Embedding employability into the curriculum*. Higher Education Academy. <https://www.advance-he.ac.uk/knowledge-hub/embedding-employability-curriculum>

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits any noncommercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if you modified the licensed material. You do not have permission under this license to share adapted material derived from this chapter or parts of it.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.





20

Entrepreneurship Education in South Africa: Innovative Pedagogies for Sustainability and Grand Challenges

Karen Stander , Kagiso Mashego ,
and Adedotun Adetunla 

1 Introduction

Sustainable Development Goal (SDG) 4 calls for inclusive, equitable, and quality education while promoting lifelong learning opportunities for all. Addressing the grand challenges facing education requires higher education institutions to focus not only on content but also on students' holistic development. We must cultivate students who can achieve strong educational outcomes despite structural and systemic challenges. This necessitates designing learning experiences with academic resilience in mind.

K. Stander (✉) · K. Mashego · A. Adetunla
University of South Africa, Pretoria, South Africa
e-mail: standk@unisa.ac.za

K. Mashego
e-mail: mashek@unisa.ac.za

A. Adetunla
e-mail: adetuao@unisa.ac.za

When we began designing the research experience for the BCom Honours in Business Management, we never anticipated that the world our students were preparing for would be disrupted by what strategists call a wicked problem. Rittel and Webber (1973) describe wicked problems as complex societal issues with no clear solutions, necessitating iterative problem-solving approaches. Relatedly, grand challenges encompass large-scale, multi-faceted problems requiring interdisciplinary collaboration and innovation (Ferraro et al., 2015; George et al., 2016). These challenges are ambiguous; there is no right or wrong answer, and each student constructs their own solutions based on their background. This module aims to prepare students to conduct meaningful research amid wicked problems and grand challenges at the master's and doctoral levels. To achieve this, we must teach in the grey space, where Symeonidis and Schwarz (2016) argue that educators cannot fully instruct but rather facilitate learning.

The Business Model Canvas (BMC) (Osterwalder & Pigneur, 2010) has gained traction in academic research as a tool for developing an entrepreneurial mindset and increasing entrepreneurial interest (Hendrasto et al., 2024). Additionally, exposure to human-centred design thinking has enhanced entrepreneurial skills such as creativity, problem-solving, and self-confidence. Iandoli (2023) explores the relationship between design thinking and artefact-centred pedagogy, highlighting its role in design-driven entrepreneurship education. This approach increasingly adopts a constructivist or pragmatic, action-based learning perspective—emphasising real-world engagement. However, artefact-centred learning introduces a novel dimension by integrating technology as a core element of entrepreneurial development. Berglund and Glaser (2022) highlight the significance of artefacts in entrepreneurship education, demonstrating how they transform abstract ideas into tangible prototypes that facilitate innovation. Entrepreneurship education in South Africa is evolving to address sustainability and grand challenges. Research highlights the need for practical, experience-based learning to bridge the gap between theory and real-world application was discussed by Pillay and Tlale (2024). Studies emphasise fostering entrepreneurial mindsets to tackle key issues like unemployment and

inequality (Berg, 2011; Bhorat & van der Westhuizen, 2012). Innovative pedagogies, such as design-driven entrepreneurial education (Abo-Khalil, 2024), are being integrated to equip students with skills for addressing complex challenges (Pak et al., 2020). Additionally, integrating sustainability principles into curricula is crucial for developing impactful entrepreneurial solutions (Barber et al., 2014).

Traditional design-thinking models often overemphasise ideation, while our conceptual framework—developed from case study insights—integrates research elements such as solution-building and peer-to-peer learning. Val et al., (2019) highlights that these critical skills are frequently overlooked when entrepreneurship education focuses solely on design thinking. Our pragmatic teaching approach aligns with the duality of Design-Driven Entrepreneurial Education (DDEE) methods, where scientific research and design methodologies converge. In this context, students develop various artefacts, including a five-minute pitch presenting a low-fidelity prototype and a research article addressing a grand challenge. This pedagogical approach, classified as pragmatic or practice-based, imparts skills (Iandoli, 2023), enabling graduates to meet NQF level outcomes while addressing Africa's grand challenges.

Using low-fidelity prototypes allows students to explore and refine viable ideas, leading to sustainable entrepreneurial ventures while informing scientific inquiry into grand challenges (Iandoli, 2023). Integrating diverse methods—both design- and research-based—has enhanced entrepreneurial intent. Furthermore, AI-driven tools have reduced the costs associated with failure, a persistent challenge in emerging markets such as Africa (Iandoli, 2023). Coupled with peer-to-peer learning, this approach strengthens competencies outlined in the IDEO Guide to Human-Centered Design, including empathy, creativity, agility, and prototyping. As Arthur (2007) argues, technology becomes a crucial enabler, allowing African students to produce low-fidelity prototypes with minimal barriers.

Research on storytelling in entrepreneurship has traditionally focused on the role of narratives in shaping entrepreneurial intention (Gartner, 2010) and supporting venture legitimacy (Becker-Blease & Sohl, 2015; Fisher et al., 2017). In this context, storytelling is integrated through a rapid review methodology that enables students to frame their first

artefact—addressing a problem from an academic perspective. Lupton’s (2017) approach, where narrative arcs visualise users struggling with a problem and then succeeding with the right tool, informs our use of storytelling techniques to help students present their prototypes effectively.

The adage, “Give a man a fish, and you feed him for a day. Teach a man to fish, and you feed him for a lifetime,” encapsulates the philosophy of the case module. Often attributed to the twelfth-century scholar Maimonides, this principle highlights the research objectives of the module. Maimonides’ eighth degree of charity emphasises empowering individuals by providing vocational skills and fostering self-sufficiency (Quote Investigator, 2023). Drawing on phenomenology, artefact-based and peer-to-peer learning, the process equips students with the ability to conduct rigorous research, collaborate effectively, and develop practical solutions to real-world challenges.

2 Case Study

In South Africa, higher education faces significant challenges in equipping students with the tools necessary to transition into successful business endeavours. A stark indicator of this issue is that 716,000 social grant recipients possess tertiary qualifications but remain unemployed, unable to secure sustainable livelihoods (Mlambo & Mpanza, 2024). This challenge highlights the gap between higher education and economic empowerment.

The Higher Education Qualifications Sub-Framework (HEQSF) defines an honours degree as preparation for research-based postgraduate study, with at least 30 credits dedicated to supervised research (HEQSF, 2013: 30). However, only 6.3% of students progress to a master’s degree, leaving 13.5% of honours graduates without further advancement opportunities. Within the classification of Business, Economics, and Management Studies (CESM 04) by the Department of Higher Education and Training (DHET), the case module is positioned within entrepreneurship to facilitate self-sufficiency and economic contribution.

The case module plays a pivotal role in addressing societal needs by empowering students to engage in research that enhances their academic competencies while mitigating the risk of poverty. Sustainable Development Goal 1 (SDG 1) emphasises poverty prevention, an urgent concern given South Africa's 34.5% unemployment rate (World Bank, 2023). In comparison, even war-torn nations like Afghanistan report lower unemployment figures (Hameed et al., 2023). The youth unemployment rate in South Africa is particularly alarming, with 63.9% of individuals aged 15–24 and 42.1% of those aged 25–34 unable to secure work.

Economic insecurity directly impacts living standards, with South African households averaging an annual net-adjusted disposable income of USD 9338, far below the OECD average of USD 30,490 (Osberg & Sharpe, 2012). Although the Grand Challenges framework (George et al., 2016) does not explicitly list unemployment and living standards as SDGs, it aligns with the broader mission of sustainable social progress.

By embedding research within entrepreneurship education, this case module provides a strategic tool for addressing these pressing socio-economic issues. Through innovation, research, and sustainable business practices, students are guided towards self-reliance and long-term success.

2.1 Key Deliverables of the Case Module

With an average annual enrolment of 800 students, the module demands meticulous planning, execution, and ethical research reporting. This magnitude surpasses that of residential universities. Given this scale, the South African Quality Authority (SAQA) incorporated group work as a requirement for Honours degrees. The research project, designed for creative problem-solving within a real-world context, aligns seamlessly with group work's essence. Beyond SAQA's mandate, this collaborative approach fosters a vital sense of community for online students (Hwanji et al., 2022). Groups are specifically created randomly to ensure cross-cultural learning.

Students are tasked with various activities that facilitate their engagement with the entrepreneurship process:

- Selection of Sustainable Development Goal (SDG): Students collaborate as a group to choose an SDG that aligns with their interests and ambitions.
- Rapid Literature Review: Groups conduct a rapid literature review to gain insights into their selected SDG, forming a foundation for their business ideas.
- Qualitative Data Collection and Small Business Creation: Students gather qualitative data through customer discovery interviews, developing small business concepts that create shared value (Kramer & Porter, 2011) within their communities.

This communal growth is palpable, evident in the exchanges within Teams groups. Here, students often learn from their “more capable peers” in mere seconds, as Vygotsky (1978) suggests. This rapid knowledge transfer far surpasses the gains of an entire day spent with textbooks. While textbooks hold their place in teaching “what” to think, they are secondary in the pursuit of teaching “how” to think. Equipping students with the capacity to think paves the way for knowledge accumulation, transfer, and community upliftment—essentially encapsulating phenomenology’s core (Symeonidis & Swarts, 2016).

Research Ethics and Literature Review

Ethical considerations are paramount in research, and institutional policies mandate ethical clearance for class-based projects. Ethical clearance was obtained for the rapid literature review and customer discovery interviews, contingent upon students’ adherence to ethical codes and participants’ informed consent. Microsoft Forms was used to design custom ethical conduct forms, ensuring compliance.

The rapid literature review (Hamel et al., 2021) is a structured approach to synthesising research efficiently. Unlike traditional systematic reviews, rapid reviews allow students to familiarise themselves with thematic analysis and prepare for more rigorous literature reviews in advanced studies.

Five-Minute Pitch, Prototype, and Business Validation

Students engage in human-centred design thinking, guiding them through critical entrepreneurial components. These structured interventions ensure students gain hands-on experience, fostering entrepreneurial resilience and equipping them with the tools to address grand challenges while making tangible social and economic contributions. A low-fidelity prototype has now been incorporated into the module, enhancing experiential learning, and enabling students to iteratively refine their ideas before finalising their business concepts.

Teaching Philosophy: Phenomenology and Artefact-Based Learning

When designing the case module, we couldn't have predicted the profound influence of both AI and the complex challenges brought on by global disruptions. These challenges, often referred to as "wicked problems," don't have clear solutions and thrive in uncertainty. Unlike problems with straightforward answers, wicked problems require students to develop their own solutions, shaped by their individual experiences.

The primary goal of the case module is to prepare students for research at the master's and doctoral levels. To do this, we needed a teaching approach that could handle uncertainty and complexity. As Symeonidis and Schwarz (2016) suggest, traditional teaching methods don't capture this reality—students need to learn through experience and trial.

In designing the case module, we used a strategic management framework, specifically a SWOT analysis. We also adopted a constructivist approach (Denicolo et al., 2016), combining effective practices from both residential and online education into a research-focused entrepreneurship module. This design naturally aligned with Siemen's constructivist theory, particularly phenomenon-based learning, or phenomenology. Phenomenology bridges the gap between theory and practice, much like the applied research integrated into the case module (Østergaard et al., 2010).

In an educational setting, phenomenology promotes studying a phenomenon as a whole, then breaking it down into its parts. This approach encourages deep, authentic learning and incorporates various viewpoints (Silander, 2019). By grounding the case module in the SDGs, we unintentionally fostered artefact-based learning, where students actively create and apply theoretical concepts in real-world situations. This method aligns with project-based learning and socio-constructivist theories (Silander, 2019), emphasising research as a tool for solving global sustainability issues.

Dimensions of Phenomenology and Artefact-Based Learning in the Case Module

The case module integrates several dimensions of phenomenology and artefact-based learning to foster an engaging and practical learning experience. Students embark on a collective journey, selecting an SDG, developing a research question, gathering qualitative data, and creating community-based businesses, promoting interdisciplinary knowledge and contextual research. They write research articles for publication and develop a Business Model Canvas, connecting theoretical learning to real-world practice. The module emphasises problem-based inquiry, where students define research problems based on wicked issues, and integrates artefact-based learning, allowing students to create tangible outputs like pitch videos, research articles, and Business Model Canvas posters as problem-solving tools (Berglund & Glaser, 2022). Structured feedback loops enhance their skills, exposing them to digital tools and market validation strategies, which bolster entrepreneurial resilience and employability. Rooted in Vygotsky's socio-constructivism, the module fosters collaborative learning and peer-to-peer knowledge transfer (Lu & Smiles, 2022). This approach ensures that students gain transferable skills, empowering them to solve complex societal challenges through research and innovation, thus bridging the gap between academia and applied business practice. Table 1 summarises the main dimensions of phenomenology and artefact-based learning in the case module.

Table 1 Dimensions of phenomenology and artefact-based learning

Dimension	Description	Application in the case module
Holistic	A collective journey where students engage in SDG-focused research, develop a business model, and address real-world problems	Students select an SDG, develop a research question, gather qualitative data, and create a community-focused business
Authenticity and contextuality	Learning that connects theory to real-world practice, focusing on actual publication and community-based business models	Students write research articles for publication and create a Business Model Canvas, integrating real-world entrepreneurship
Problem-based inquiry	Starting with the definition of a research problem related to a wicked issue, emphasising real-world application	Students define problems aligned with grand challenges and use research to develop innovative solutions
Artefact-based learning	Learning through tangible outputs like pitches, research articles, and business plans, iteratively refined in a design-driven environment	Students create and refine artefacts like a 5-minute pitch video, research article, and Business Model Canvas as part of their problem-solving process
Open-ended learning	A learning environment that encourages feedback loops for continuous refinement and skill development	Feedback on digital tools, qualitative data collection methods, and market validation strategies allow students to enhance their entrepreneurial resilience
Vygotsky's socio-constructivism	Collaborative learning where peer-to-peer knowledge transfer supports growth and skill development	Collaborative work and artefact creation help students learn through social interaction and reflection, reinforcing key skills necessary to address real-world challenges

2.2 Teaching and Learning Challenges

The implementation of phenomenology and artefact-based learning in the case module is not exempt from challenges. Several significant challenges have emerged and are discussed in the following sections.

Resistance to Group Work and the Socio-Constructivist Paradigm

At the start of each academic year, students exhibit resistance towards group work, often due to a lack of exposure to socio-constructivist learning approaches at the undergraduate level. Traditional didactic teaching methods may not adequately prepare students for collaborative learning, resulting in initial discomfort with teamwork. This resistance is further compounded by diverse cultural backgrounds and varying levels of motivation within groups.

Steep Learning Curve with Technology

While incorporating online and computer-based tools enhances students' employability, some struggle with adapting to these technologies. The steep learning curve associated with using new digital tools can hinder their ability to effectively engage in authentic learning experiences.

Ambiguity in Authentic Learning Assessment

Assessing authentic learning in a research-focused, phenomenological framework poses a challenge. The integration of artificial intelligence tools adds complexity to determining the originality and depth of student contributions. Additionally, the absence of clear right or wrong answers in research-based learning requires an assessment framework that evaluates the research process rather than just the final product.

Macro-Economic Constraints—Loadshedding

Intermittent power supply and internet connectivity issues significantly impact students' ability to engage with online collaboration tools. Since much of the group work relies on virtual meetings and digital submissions, students from different regions face logistical difficulties due to load shedding, limiting their ability to participate effectively.

The Issue of Ghost Students

Some students enrol in the module but do not actively participate in group activities. Their lack of engagement can frustrate other group members and disrupt collaborative learning. Furthermore, some disengaged students falsely claim to have withdrawn from the course, creating confusion among their peers.

Mitigation of Challenges

Over the past five years, the case module has evolved from an individual research proposal to a hybrid structure incorporating both individual and group work. The current assessment model includes 35% individual work and 65% group work, ensuring that students gain both independent research experience and collaborative problem-solving skills.

To mitigate group work challenges:

- Five teammate evaluations are conducted throughout the year to measure individual contributions. Marks are adjusted based on participation levels, reducing unfair workload distribution.
- Randomised group assignments ensure diverse collaboration, preventing self-selection biases and fostering cross-cultural learning.
- The institution, as a Microsoft-certified school, provides free access to Microsoft Teams, which students use for communication and collaboration.

- Data is provided for students to access the online learning platform without additional costs, although network disruptions due to load shedding remain a challenge.

Student-Friendly Teaching Approaches

Traditional distance learning methods—such as emails, discussion forums, and tutorial letters—have historically created a sense of isolation among students. Recognising this, the module has incorporated interactive, real-time engagement methods to bridge the transactional distance between faculty and students. Rather than relying solely on written communication, faculty members engage students through:

- Live Teams sessions for assignment briefings and feedback.
- Conversational support via digital platforms, ensuring students receive immediate guidance rather than waiting for formal responses.

Effectiveness of Constructive Alignment and Artefact-Based Learning

Constructive alignment, a teaching approach that synchronises learning outcomes, teaching activities, and assessments, has been shown to enhance student learning outcomes. This approach fosters deeper learning strategies, improving academic performance, student satisfaction, and motivation. Studies suggest that artefact-based education enhances learning by supporting multimodal and transactive learning, improving entrepreneurship education, and reinforcing technological pedagogical content knowledge (TPACK) (Bhatti et al., [2022](#); Biggs, [1996](#); Hailikari et al., [2021](#)).

Constructive Alignment and Student Learning Outcomes

1. Improved Learning Outcomes: Studies indicate that constructive alignment results in higher academic grades and increased

student satisfaction. Aligning teaching methods and assessments with intended learning outcomes helps students understand expectations and effectively achieve them.

2. Encouragement of Deep Learning: Active student involvement through structured assessments and interactive learning experiences promotes deeper engagement with course materials compared to traditional lecture-based methods.
3. Enhanced Student Motivation: Clear learning objectives and constructive feedback mechanisms increase student motivation, encouraging them to adopt deeper learning strategies.
4. Support for Diverse Learning Needs: Constructive alignment creates a supportive learning environment that caters to diverse academic needs, providing both high challenge and high support, which is crucial for effective learning.

Artefact-Based Learning and Application in the Case Module

Artefact-based learning reinforces constructive alignment (Pedro, 2020) by allowing students to engage in tangible, iterative learning processes. In the case module, students create and refine artefacts (Schlegel & Sattler, 2022) such as:

- A research article grounded in rapid literature review and qualitative data analysis.
- A 5-minute pitch video that encapsulates key research findings and the entrepreneurial application of their project.
- A Business Model Canvas poster as a structured representation of their business idea.

These artefacts serve as both learning tools and assessment mechanisms, reinforcing knowledge application while enabling students to iterate on their ideas based on structured feedback loops. The multi-modal nature of these artefacts also supports transactive learning, where students refine their entrepreneurial skills by combining research-based insights with practice-based applications.

Linking Theory to Practice: Student Reflections

The impact of constructive alignment and artefact-based learning is evidenced in student experiences and feedback. Many students initially struggle with the transition from traditional, content-heavy approaches to an interactive, applied learning framework. However, their reflections highlight significant growth in problem-solving, critical thinking, and research skills, which are crucial for entrepreneurship.

Entrepreneurship Ecosystem and Future Improvements

The Institution's Entrepreneurship Ecosystem

Beyond the academic objectives of the case module, the skills developed—problem-solving, social impact-driven solutions, business idea development, and Business Model Canvas pitching—are encouraged to be leveraged within the broader entrepreneurial ecosystem at the institution. As Ilonen (2021) suggests, entrepreneurial education should extend beyond theoretical learning, incorporating active, experimental, and engaging steps within real-life contexts. University-based entrepreneurial ecosystems provide a critical bridge, preparing students for the real world by offering mentorship, incubation, funding opportunities, and industry partnerships (Carvalho, Costa, & Dominginhos, 2010).

The institution's entrepreneurial ecosystem consists of various forums designed to support students in advancing their innovations and business ventures, including:

- **Business Incubator Hub:** This incubator fosters an entrepreneurial culture within the university's ecosystem. It provides mentorship, infrastructure, and structured support to students, alumni, and faculty, guiding them from ideation to market launch and business scaling across various sectors.
- **Technology Transfer and Commercialisation Directorate:** In its effort to strengthen research-based entrepreneurship, this unit offers student support programmes that include seed funding and mentorship for innovative research projects.

- **Innovation Challenge Programme:** A platform where students can pitch ideas, concepts, or products aimed at addressing societal challenges. Winning ideas receive funding and mentorship opportunities, fostering an environment where innovative and viable businesses can be developed.

By integrating students into the entrepreneurial ecosystem, the case module ensures that they are equipped with skills and networks necessary to transition from academic learning to real-world impact (Stats SA, 2023). This enables them to address pressing sustainability challenges such as poverty, unemployment, and inequality, reinforcing the practical application of research and entrepreneurship.

2.3 Plans for Further Development and Improvement

In response to student feedback, some have expressed a preference for grouping teams based on geographic location rather than research interests. While this approach may ease logistical challenges, it could limit students' exposure to diverse perspectives and international collaboration. To balance these concerns, we have decided to continue with randomised group formations using the institution's online learning platform, ensuring that students develop cross-cultural communication and collaboration skills. Additionally, we are exploring partnerships with a U.S.-based university to expand the global scope of team projects. In an increasingly interconnected world, geographical constraints should not dictate collaborative success.

To support effective teamwork and reduce early-stage group challenges, we have incorporated team strategy workshops and structured collaboration frameworks at the beginning of the course. These workshops aim to enhance group dynamics, improve communication strategies, and foster leadership development.

Strengthening the Business Model Canvas Component

The Business Model Canvas (BMC), a core component of the module, is being further integrated into the institution's Engaged Scholarship Programme. Students who demonstrate confidence in their business concepts will be able to present their ideas to the institution's business incubator for coaching and funding opportunities. This initiative fosters a culture of entrepreneurship and real-world application, bridging academic research with market-driven innovation.

Aligning with International Responsible Business Standards

We are also exploring the registration of the programme with the United Nations Principles for Responsible Management Education (UN PRME) initiative. This aligns with our commitment to embedding ethics, responsibility, and sustainability into entrepreneurship education. By integrating global best practices in responsible business management, we aim to equip students with the ability to develop sustainable and ethical business solutions that contribute to positive social impact.

Adapting to Emerging Technologies and AI Integration

Recognising the impact of Generative AI in education and business, we have restructured the course to include 23 weekly assignments that incorporate AI-powered research tools, digital prototyping, and iterative learning techniques. This ensures that students are not only aware of AI's potential applications in business and research but also develop the necessary critical thinking skills to effectively engage with these technologies.

3 Framework

This chapter set out to develop an epistemological framework. SDG 4 advocates for inclusive, equitable, and quality education while promoting lifelong learning opportunities. Higher education institutions must move beyond traditional content delivery and focus on equipping students to achieve strong educational outcomes despite systemic challenges. This requires embedding resilience into academic programmes, particularly in research-focused entrepreneurship education.

The grand challenges facing global economies—such as economic inequality, unemployment, and sustainability—demand a paradigm shift in how students are trained to think, research, and develop solutions. The integration of entrepreneurial frameworks, such as the Business Model Canvas (BMC) and human-centred design thinking, into research-based education provides a strategic means to bridge the gap between theoretical learning and practical application.

This framework incorporates academic resilience, artefact-centred learning, and iterative research processes to equip students with the skills necessary to address wicked problems in business and sustainability.

3.1 The Pillars of the Framework

The proposed Entrepreneurial Resilience Framework for research-based learning consists of four key pillars:

Artefact-Centred Research and Learning

Defining the Approach: Traditional academic models often prioritise conceptual knowledge transfer. However, entrepreneurship education benefits from artefact-based learning, where students create tangible outputs such as prototypes, business plans, or digital solutions (Iandoli, 2023).

Application in Higher Education:

- Encouraging students to develop low-fidelity prototypes that align with their research.
- Introducing design-driven entrepreneurial education (DDEE) approaches that incorporate both scientific inquiry and business modelling.
- Using AI-driven tools to lower failure costs, a frequent barrier in emerging markets.

Integrated Business Model and Research Methodology

The Role of the Business Model Canvas (BMC): BMC is not merely a tool for start-ups but an analytical framework that helps students structure their research and entrepreneurial ideas.

Key elements of BMC relevant to research-based learning:

- Problem Identification: Aligning research with sustainability challenges.
- Value Proposition Development: Creating solutions with real-world applicability.
- Customer and Stakeholder Mapping: Integrating transdisciplinary perspectives to enhance research impact.
- Revenue Streams and Feasibility: Assessing financial and societal sustainability.

Research and Entrepreneurship Through Design Thinking

Human-Centred Design as a Research Methodology:

- Students define research questions based on real-world needs.
- They engage in iterative learning, refining ideas through feedback.
- They apply storytelling methodologies to articulate research findings in a structured, impactful manner.

Design-Thinking Stages in Research Education:

1. Empathise—Understanding user needs and research contexts.
2. Define—Refining research questions based on stakeholder insights.
3. Ideate—Exploring innovative solutions through an entrepreneurial lens.
4. Prototype—Testing low-fidelity models within academic and business environments.
5. Test & Reflect—Synthesising feedback to improve research impact.

3.2 AI Integration and Digital Tools in Research

The Role of AI in Modern Research: Artificial intelligence has transformed research processes, from literature reviews to data synthesis.

- AI-powered research tools streamline rapid review methodologies.
- Digital prototyping reduces the time and cost of testing business ideas.
- AI-driven thematic analysis supports students in synthesising large data volumes.

However, AI should not replace critical thinking. Students are encouraged to:

- Use AI tools strategically rather than relying on them for conclusions.
- Engage in peer-to-peer learning to balance AI-generated insights with human judgement.

This framework provides a structured pathway to enhancing entrepreneurship education through research, innovation, and problem-solving methodologies.

This Entrepreneurial Resilience Framework, as seen in Fig. 1, advances higher education pedagogy by embedding artefact-driven learning, iterative research, and AI-powered methodologies. By integrating design thinking, the Business Model Canvas, and rapid review techniques, this framework fosters academic resilience, critical problem-solving, and entrepreneurial competence—key attributes for navigating complex, uncertain business, and sustainability landscapes.

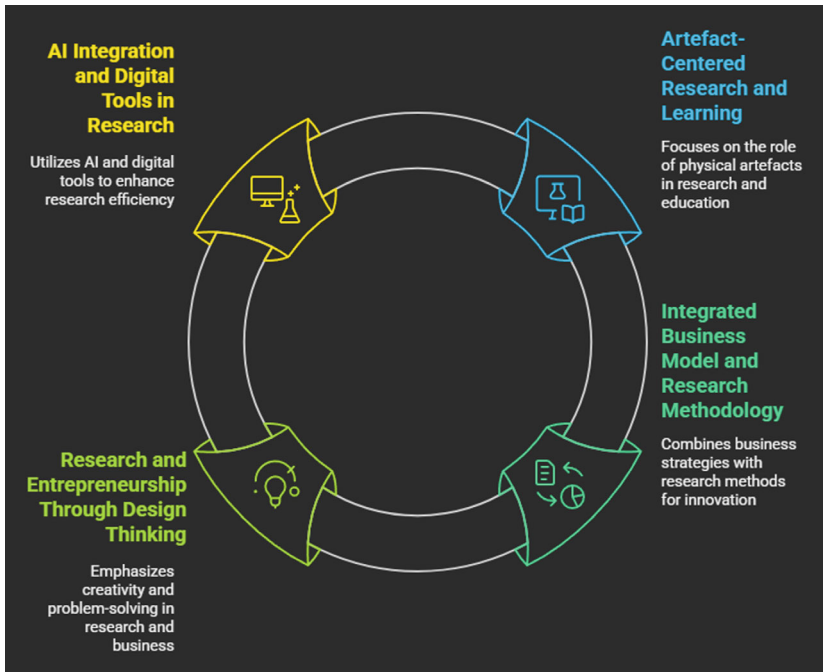


Fig. 1 Entrepreneurial resilience framework

The case module stands as a testament to the potential of entrepreneurial education in addressing pressing economic and social challenges. Rooted in the philosophy of teaching individuals to become self-sufficient rather than merely imparting theoretical knowledge, this module is designed to equip students with the research, problem-solving, and business acumen necessary to navigate an uncertain job market.

The high unemployment rate among educated individuals, coupled with sustainability challenges, brings the need for practical, research-driven, and entrepreneurship-oriented education. By leveraging university-based entrepreneurial ecosystems, fostering real-world business development, and incorporating cutting-edge technological tools, the case module bridges the gap between academic learning and professional application. Through innovative pedagogy and practical engagement, this initiative empowers students to become leaders,

entrepreneurs, and changemakers, actively shaping sustainable and impactful futures.

References

- Abo-Khalil, A. (2024). Integrating sustainability into higher education challenges and opportunities for universities worldwide. *Helicon*, 10, Article e29946. <https://doi.org/10.1016/j.helicon.2024.e29946>
- Adair, J., Sharpe, D., & Huynh, C. (1989). Hawthorne control procedures in educational experiments: A reconsideration of their use and effectiveness. *Review of Educational Research*. <https://doi.org/10.3102/00346543059002215>
- Arthur, W. B. (2007). The structure of invention. *Research policy*, 36(2), 274–287.
- Barber, N., Wilson, F., Venkatachalam, V., Cleaves, S., & Garnham, J. (2014). Integrating sustainability into business curricula: University of New Hampshire case study. *International Journal of Sustainability in Higher Education*, 15, 473–493. <https://doi.org/10.1108/IJSHE-06-2013-0068>
- Becker-Blease, J. R., & Sohl, J. E. (2015). New venture legitimacy: The conditions for angel investors. *Entrepreneurship Theory and Practice*, 39(4), 839–863.
- Berg, S. (2011). Current poverty and income distribution in the context of South African history. *Economic History of Developing Regions*, 26. <https://doi.org/10.2139/ssrn.1727599>
- Berglund, H., & Glaser, V. (2022). The role of artifacts in entrepreneurship education. *Entrepreneurship & Regional Development*, 34(1), 1–23.
- Bhatti, A. J., Shah, M. A., & Hussain, M. (2022). Improving methods of measuring curriculum alignment. *Journal of Computing*. <https://doi.org/10.3102/00346543059002215>
- Bhorat, H., & Van Der Westhuizen, C. (2012). *Poverty, inequality and the nature of economic growth in South Africa* (Working Papers 12151). University of Cape Town, Development Policy Research Unit.
- Biggs, J. (1996). Enhancing teaching through constructive alignment. *Higher Education*. <https://doi.org/10.1007/BF00138871>

- Carvalho, L., Costa, T., & Dominguihos, P. (2010). Creating an entrepreneurship ecosystem in higher education. *New Achievements in Technology, Education and Development*, 1–19.
- Denicolo, P., Long, T., & Bradley-Cole, K. (2016). Introduction and orientation to constructivist research. In *Constructivist Approaches and Research Methods: A Practical Guide to Exploring Personal Meanings* (pp. 3–12). SAGE Publications.
- Ferraro, F., Etzion, D., & Gehman, J. (2015). Tackling grand challenges pragmatically: Robust action revisited. *Organization Studies*, 36(3), 363–390.
- Fisher, G., Kuratko, D. F., Bloodgood, J. M., & Hornsby, J. S. (2017). Legitimate to whom? The challenge of audience diversity and new venture legitimacy. *Journal of Business Venturing*, 32(1), 52–71.
- Gartner, W. B. (2010). A new path to the waterfall: A narrative on a use of entrepreneurial narrative. *International Small Business Journal*, 28(1), 6–19.
- George, G., Howard-Grenville, J., Joshi, A., & Tihanyi, L. (2016). Understanding and tackling societal grand challenges through management research. *Academy of Management Journal*, 59(6), 1880–1895.
- Hailikari, T., Virtanen, V., Vesalainen, M., & Postareff, L. (2021). Student perspectives on how different elements of constructive alignment support active learning. *Active Learning in Higher Education*. <https://doi.org/10.1177/1469787421989160>
- Hameed, M., Rahman, M., & Khanam, R. (2023). Analyzing the consequences of long-run civil war on unemployment rate: Empirical evidence from Afghanistan. *Sustainability*, 15, 7012. <https://doi.org/10.3390/su15087012>
- Hamel, C., Michaud, A., Thuku, M., Skidmore, B., Stevens, A., Nussbaumer-Streit, B., & Garritty, C. (2021). Defining rapid reviews: A systematic scoping review and thematic analysis of definitions and defining characteristics of rapid reviews. *Journal of Clinical Epidemiology*, 129, 74–85.
- Hendrasto, N., Chairiyati, F., Haidar, A., Herindar, E., & Rehman, H. M. (2024). The impact of knowledge about Business Model Canvas (BMC) on Entrepreneurial Interest of Young Generation in Jabodetabek: Knowledge About Business Model Canvas (BMC) on Entrepreneurial Interest. *Indonesian Journal of Business and Entrepreneurship*, 10(1), 146–153.
- HEQSF. (2013). *Higher Education Qualifications Sub Framework*. Council of Higher Education, South Africa. https://nr-online-1.che.ac.za/html_documents/6.PUB_HEQSF.PDF
- Iandoli, L. (2023). Annual review article: The dual mindset of design-driven entrepreneurship: The case for a pedagogy of making and artefact-centred

- entrepreneurship education. *International Small Business Journal*, 41(4), 349–370.
- Ilonen, S. (2021). Creating an entrepreneurial learning environment for entrepreneurship education in HE: The educator's perspective. *Industry and Higher Education*, 35(4), 518–530.
- Kramer, M. R., & Porter, M. (2011). Creating shared value. *Harvard Business Review*, 89(1/2), 62–77.
- Larkin, H., & Richardson, B. (2013). Creating high challenge/high support academic environments through constructive alignment. *Teaching in Higher Education*. <https://doi.org/10.1080/13562517.2012.696541>
- Lu, H., & Smiles, R. (2022). The role of collaborative learning in the online education. *International Journal of Economics, Business and Management Research*, 6, 125–137. <https://doi.org/10.51505/IJEBMR.2022.6608>
- Lupton, E. (2017). *Design is storytelling*. Cooper Hewitt, Smithsonian Design Museum.
- Mlambo, V. H., & Mpanza, S. (2024). Exploring the challenges of higher education in South Africa: A comprehensive literature review. *Alustath Journal for Human and Social Sciences*, 63, 22–40. <https://doi.org/10.36473/ujhss.v62i4.2261>.
- Osberg, L., & Sharpe, A. (2012). Measuring economic insecurity in rich and poor Nations. *Review of Income and Wealth*, 60. <https://doi.org/10.1111/roiw.12114>.
- Østergaard, E., Lieblein, G., Breland, T. A., & Francis, C. (2010). Students learning agroecology: Phenomenon-based education for responsible action. *Journal of Agricultural Education and Extension*, 16(1), 23–37.
- Osterwalder, A., & Pigneur, Y. (2010). *Business model generation: A handbook for visionaries, game changers, and challengers* (Vol. 1). Wiley & Sons.
- Pak, K., Polikoff, M. S., Desimone, L., & García, E. S. (2020). The adaptive challenges of curriculum implementation. *Review of Educational Research*. <https://doi.org/10.3102/0034654309341375>
- Pedro, A. (2020). Key stakeholders' lived experiences while implementing an aligned curriculum. *The Qualitative Report*. <https://doi.org/10.46743/2160-3715/2020.3924>
- Pillay, E., & Tlale, L. (2024). The implementation of the screening, identification, assessment and support policy to manage and support teaching and learning processes in KwaZulu-Natal. *E-Journal of Humanities, Arts and Social Sciences*, 2040–2055. <https://doi.org/10.38159/ehass.20245132>

- Quote Investigator. (2023). *Give a man a fish, and you feed him for a day. Teach a man to fish, and you feed him for a lifetime.* <https://quoteinvestigator.com/2015/08/28/fish/>
- Rittel, H. W., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy sciences*, 4(2), 155–169.
- Schlegel, M., & Sattler, K. (2022). Management of machine learning lifecycle artifacts. *ACM SIGMOD Record*. *Doi*, 10(1145/3582302), 3582306.
- Silander, P. (2019). *Phenomenal education: Rethinking from Finland.* <http://www.phenomenaleducation.info/home.html>
- Statistics South Africa. (2023). *Improving lives through data ecosystems.* <https://www.statssa.gov.za/>
- Symeonidis, V., & Schwarz, J. F. (2016). Phenomenon-based teaching and learning through the pedagogical lenses of phenomenology: The recent curriculum reform in Finland. *Forum Oświatowe*, 28(2), 31–47.
- Val, E., Gonzalez, I., Lauroba, N., & Beitia, A. (2019). How can design thinking promote entrepreneurship in young people? *The Design Journal*, 22(sup1), 111–121.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes.* Harvard University Press.
- World Bank. (2023). *Unemployment, total (% of total labour force) (modeled ILO estimate)—South Africa.* <https://data.worldbank.org/indicator/SL.UEM.TOTL.ZS>

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits any noncommercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if you modified the licensed material. You do not have permission under this license to share adapted material derived from this chapter or parts of it.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.



Part V

Framing the Future of Entrepreneurship Education

21

Leading Entrepreneurship Ecosystems in Higher Education: A Case of Universities South Africa's EDHE as an Ecosystem Coordinator and Enabler

Edwell Gumbo  and Thea van der Westhuizen 

1 Introduction

In a South African context, higher education is currently navigating a dynamic and complex landscape shaped by profound global, economic, and technological transformations. According to Mokoqama (2025), universities are increasingly compelled to respond to forces such as globalisation, technological advancement, rising unemployment, and enduring economic instability. These external pressures necessitate continual reinvention, as institutions grapple with the imperatives of digital transformation, evolving knowledge paradigms, financial sustainability, and the rising demand for lifelong learning. The nature and purpose of higher education are being fundamentally redefined in

E. Gumbo

Universities South Africa USAf, Pretoria, South Africa

e-mail: edwell@usaf.ac.za

T. van der Westhuizen (✉)

University of KwaZulu-Natal, Durban, South Africa

e-mail: vanderwesthuizent@ukzn.ac.za

response to these multifaceted challenges, with significant implications for institutional goals, structures, and decision-making processes.

Mokoqama (2025) highlights that the scale and depth of these changes are transformational, permeating every organisational layer and prompting urgent reflection on the meaning of being educated in an increasingly turbulent world. While universities are expected to be agile, forward-looking, and resilient—capable of anticipating emerging trends and responding to uncertainty—there remains scepticism about their capacity to adapt effectively. In this context, the rise of entrepreneurship within universities emerges as both a strategic and timely development. Entrepreneurship in higher education is not only associated with innovation and creativity but also reflects a broader institutional shift towards community engagement and societal relevance. As universities move beyond their traditional role as knowledge transmitters, they are increasingly adopting entrepreneurial orientations through partnerships, collaborative initiatives, and impact-driven activities—hallmarks of what is now widely recognised as the entrepreneurial university (Mokoqama, 2025).

2 Background

South Africa faces pressing challenges of increasing youth (Malcolm et al., 2024; Ndlovu et al., 2024; Statistics South Africa, 2025) and graduate unemployment (MacGinty, 2024; Mseleku, 2022), prompting a heightened emphasis on entrepreneurship as a catalyst for economic development (Gumbo & Moos, 2024). Higher education institutions (HEIs) are increasingly called upon to contribute to this agenda by equipping students with entrepreneurial mindsets and skills (Nhleko & Van der Westhuizen, 2022). The transformative impact of HEIs extends beyond traditional pedagogical roles, positioning universities as pivotal agents of economic growth and innovation in their regions. The concept of university entrepreneurial ecosystems has gained traction, emphasising the interplay of institutional structures, stakeholder interactions, and external influences that optimise universities' contributions to entrepreneurial ventures. This evolution is significant, as it highlights

the necessity of creating conducive environments for entrepreneurship through academic entrepreneurship, technology transfer, and the establishment of spin-offs (Lehmann et al., 2020). The shift from a national to a regional perspective on entrepreneurial ecosystems underscores the need for local contextualisation, integrating aspects such as culture, networks, and mentorship essential for fostering entrepreneurship (Malecki, 2018).

Research indicates that successful ecosystems depend on sustained community involvement, adequate resources, and adaptive strategies that cater to diverse entrepreneurial types, including support for women entrepreneurs and under-represented communities who face particular barriers in accessing entrepreneurial opportunities (Malecki, 2018; O'Brien et al., 2019). Lehmann et al., (2020) highlight the role of university autonomy in promoting entrepreneurial activities. For example, HEIs often act as connectors within their local ecosystems by enabling knowledge transfer and facilitating collaboration among various actors in the entrepreneurial landscape. However, gaps remain in the empirical understanding of how these ecosystems function across different contextual backgrounds, particularly as researchers have focused primarily on high-growth startups while neglecting the broader spectrum of entrepreneurship within HEIs (Malecki, 2018; O'Brien et al., 2019).

In recent years, the importance of fostering innovation and entrepreneurship within higher education institutions has garnered increasing attention from policymakers and academics alike. Universities are emerging as critical hubs where knowledge, talent, and resources converge, facilitating the creation of dynamic entrepreneurial ecosystems. These ecosystems comprise a network of actors, including students, faculty, industry partners, and policymakers, whose interactions drive innovation and economic development. Understanding the complexities and effectiveness of these ecosystems requires a comprehensive approach that considers local culture, institutional frameworks, and evolving policy landscapes. Universities have increasingly become pivotal hubs fostering innovation and economic growth by nurturing entrepreneurial activities within their communities.

These environments, known as university entrepreneurial ecosystems, encompass a complex network of relationships among students,

faculty, industry partners, and institutional support systems that collectively promote the creation and development of new ventures. Understanding these ecosystems requires a dynamic perspective that recognises how entrepreneurial efforts evolve through various stages, transitioning between phases of startup creation and internal commercialisation within established organisations (Cantner et al., 2021). Moreover, the intricate social and institutional contexts within universities significantly influence the success of these entrepreneurial endeavours (Franco-Leal et al., 2020).

Recent scholarship highlights that entrepreneurship education and support within universities play a critical role in fostering job creation, driving innovation, and contributing to poverty alleviation. In response, the South African Department of Higher Education and Training (DHET), in partnership with Universities South Africa (USAf), launched the Entrepreneurship Development in Higher Education (EDHE) programme in 2016 to promote and coordinate entrepreneurship across all public universities (De Beer, 2024). EDHE's establishment aligns with universities' "third mission" of societal impact, aiming to transform campuses into hubs of entrepreneurial activity and thus address systemic economic challenges (De Beer, 2024; Gumbo, 2024). This chapter outlines the concept of entrepreneurship ecosystems in higher education, examines the South African context, and analyses how EDHE functions as a national ecosystem coordinator and enabler, drawing on recent South African scholarly insights from 2020–2025.

3 Entrepreneurship Ecosystems in Higher Education: Conceptual Framework

3.1 Entrepreneurial Ecosystems Defined

Understanding the intricate dynamics within higher education institutions necessitates exploring the multifaceted environments that foster entrepreneurial activity. University entrepreneurial ecosystems are complex networks shaped by a confluence of actors, resources, policies, and institutional cultures that collectively stimulate innovation and

venture creation. These ecosystems extend beyond mere support structures to encompass spatial relationships and governance mechanisms that influence entrepreneurial behaviours and outcomes. Recent developments emphasise measuring these ecosystems through spatial analysis and incorporating new actors such as local governments and gender-focused initiatives, which enrich the ecosystem's inclusivity and functionality (Schäfer, 2021). Thus, defining university entrepreneurial ecosystems requires acknowledging their systemic and contextual nature, driven by innovation and collaborative governance that transcends traditional academic boundaries.

An entrepreneurial ecosystem (EE) refers to the network of interdependent actors, institutions, and cultural factors that collectively support entrepreneurial activity within a region or context (Van der Westhuizen, 2023). In the context of higher education, the ecosystem encompasses universities (as knowledge and talent sources), students and academics (as potential entrepreneurs), industry partners, government agencies, funding bodies, and support infrastructure (incubators, hubs) that interact to nurture venture creation and growth (Van der Westhuizen, 2023). Several essential factors for a thriving entrepreneurial ecosystem in South Africa are identified, including access to finance, markets, human capital, a supportive culture, education and training, and enabling policy (Nieuwenhuizen et al., 2022). These factors must align within the university environment to foster entrepreneurial outputs (Nieuwenhuizen et al., 2022). Recent South African research emphasises that a supportive campus culture and leadership, entrepreneurship curricula, mentorship programmes, and linkages to external networks are critical ingredients of an effective university-based entrepreneurial ecosystem (Meyer & Meyer, 2020; Van der Westhuizen, 2024a, 2024b).

3.2 Universities as Entrepreneurial Ecosystem Actors

The evolution of university entrepreneurial ecosystems internationally has undergone significant transformation over the past few decades, shaped by broader shifts in policy, academic focus, and entrepreneurial

practices. Initially, the role of universities in entrepreneurship was largely peripheral, with limited focus on commercialising research. However, by the early 2000s, the concept of entrepreneurial ecosystems began to gain traction, replacing older notions of entrepreneurial environments (Lado et al., 2024). This shift was highlighted by Malecki (2018), who emphasised the growing relevance of regional contexts in fostering entrepreneurship, especially within university settings. Malecki (2018) analysis underscored the interconnectedness of actors and resources within these ecosystems, advocating for a broader perspective that considers the contributions of diverse institutional stakeholders (Patrício & Ferreira, 2024).

With entrepreneurial ecosystems gaining prominence, universities across Europe began redefining their roles as active players in economic development, leading to a surge in academic entrepreneurship and innovation (Grande et al., 2023). Recent studies, such as Owen et al. (2024) analysis of UK Innovation Knowledge Centres, reflect an ongoing commitment to improve public–private partnerships in facilitating entrepreneurial finance and research commercialisation. They highlight how these partnerships have emerged as critical components in creating vibrant ecosystems conducive to innovation. The cumulative insights from these works reflect a paradigm shift in how universities approach entrepreneurship, portraying a trajectory towards inclusivity, collaboration, and sustained economic impact that continues to evolve in response to emerging challenges and opportunities within the entrepreneurial landscape.

The literature on university entrepreneurial ecosystems reveals several interrelated themes essential for understanding their impact on regional economic growth and entrepreneurial dynamics. A significant focus is placed on the role of HEIs in transforming from traditional universities to proactive participants in economic development, where academic entrepreneurship and technology transfer are pivotal (Grande et al., 2023). This shift underscores the importance of aligning internal mechanisms, including governance and teaching methodologies, with external factors such as policy frameworks and public–private partnerships, which are crucial for enhancing entrepreneurial contributions. Furthermore, the evolving concept of entrepreneurial ecosystems has sparked recent

advances in research, where scholars like Malecki (2018) highlight the interconnectedness among cultural, social, and economic components as vital for fostering robust entrepreneurship. They argue that mentorship, local culture, and the recycling of entrepreneurial talent create innovative environments that enhance startup emergence (Prokop, 2022).

Another critical aspect involves the examination of barriers faced by under-represented populations in entrepreneurship. O'Brien et al. (2019) stress the necessity of inclusive practices within university frameworks to democratise access to resources and support, particularly for marginalised groups (Grande et al., 2023). Additionally, the facilitative role of university-led initiatives, such as Innovation Knowledge Centres in the UK, showcases the ways public funding can bridge financing gaps for early-stage enterprises while highlighting the need for cohesive policy environments to stimulate innovation (Padilla-Meléndez & del-Aguila-Obra, 2022). Through synthesising these themes, the literature illustrates a complex landscape where universities serve as crucial nodes in entrepreneurial ecosystems, necessitating ongoing adaptation and collaboration among diverse stakeholders to maximise their economic impact.

The exploration of university entrepreneurial ecosystems is enriched by diverse theoretical perspectives that collectively illuminate their complex dynamics. The foundational work of Malecki (2018) emphasises the interconnectedness of elements within entrepreneurial ecosystems, arguing for a transition from national to local analyses that capture the specificity of place and culture in fostering entrepreneurship (Prokop, 2022). This perspective aligns with the findings of O'Brien et al (2019), who propose a model that recognises the critical role universities play in supporting under-represented communities, thereby challenging the traditional elite focus on high-growth firms. Their emphasis on community engagement and tailored educational approaches reflects socio-cultural theories that stress the importance of context in entrepreneurial development. Conversely, Owen et al. (2024) present a framework assessing public investment in university research commercialisation, highlighting the role of public policy in bridging funding gaps and fostering university-industry collaboration. This aligns with economic theories that advocate for governmental intervention to create conditions

conducive to innovation, particularly through public–private partnerships. Together, these perspectives underpin a comprehensive understanding of university entrepreneurial ecosystems, illuminating how institutional structures, regional dynamics, and financing frameworks interact.

By integrating these theoretical insights, it becomes evident that the success of entrepreneurial ecosystems is contingent upon a confluence of factors, including community engagement, supportive policies, and the cultivation of diverse entrepreneurial talent. Padilla-Meléndez and del-Aguila-Obra (2022) reinforces this notion by illustrating how universities can transition from traditional educational roles to becoming vital agents of economic development through enhanced autonomy and strategic engagement with local communities. Thus, examining university entrepreneurial ecosystems through these multifaceted theoretical lenses provides a robust framework for understanding their influence on both local economies and broader entrepreneurial landscapes.

Universities, therefore, play a dual role in entrepreneurial ecosystems: internally, by producing skilled entrepreneurs through education and training, and externally, by acting as collaborators in regional development. Over the last few years, South African scholars have increasingly explored the “entrepreneurial university” concept, universities that systematically promote entrepreneurial behaviour among students and staff (Guerrero et al., 2020). Such institutions integrate entrepreneurship into their teaching, research, and community engagement missions. For example, incorporating entrepreneurial education across disciplines and encouraging student startups can significantly enhance graduates’ self-employment and venture creation prospects. However, as Nieuwenhuizen et al. (2022) note, merely adding entrepreneurship courses is not enough; a holistic ecosystem approach is needed, including practical support, incubation, and an entrepreneurial mindset embedded in campus culture. South African universities have begun adopting this approach, establishing innovation hubs, entrepreneurship centres, innovation challenges, and competitions to create a pipeline from ideas to viable enterprises. These efforts align with global best practices while responding to local challenges such as resource constraints and the need for socio-economic inclusion (Nhleko & Van der Westhuizen, 2022).

Recent data from the Global Entrepreneurship Monitor indicate that despite improvements, South Africa's overall entrepreneurial ecosystem remains challenging, with gaps in support and cultural norms. This underscores the importance of targeted initiatives within HEIs to bolster ecosystem factors from the ground up (Bowmaker-Falconer & Meyer, 2022).

4 The South African Higher Education Entrepreneurship Landscape

4.1 Context and Policy Imperatives

In South Africa's emerging economy context, nurturing entrepreneurship in higher education has become a national priority. Policymakers recognise that universities are well-placed to produce graduates who are not only job seekers but job creators, thus contributing to economic growth and employment (De Beer, 2024). Over the past five years, government and academic leaders have launched collaborative efforts to create enabling conditions for student and graduate entrepreneurship.

The EDHE programme stands as a flagship initiative within South Africa's higher education landscape, operating under the Department of Higher Education and Training's (DHET) University Capacity Development Programme (UCDP). EDHE is strategically anchored on three core pillars: (1) the development of student entrepreneurship, aimed at nurturing entrepreneurial mindsets and ventures among students; (2) the advancement of entrepreneurship in academia, by integrating entrepreneurial thinking into curriculum design, teaching methodologies, and research agendas; and (3) the creation and strengthening of entrepreneurial universities, focused on embedding innovation, enterprise, and entrepreneurship into institutional strategies, operations, and cultures. This triadic framework reflects a holistic and systemic approach to entrepreneurship development, positioning universities not only as knowledge producers but also as catalysts for economic and social change. By fostering individual student entrepreneurs,

reshaping academic offerings, and transforming institutional environments, EDHE plays a critical role in building an integrated and sustainable entrepreneurship ecosystem within South African higher education.

According to De Beer (2024), the establishment of the EDHE programme in 2016 was driven by a convergence of critical national and institutional needs. Chief among these were the alarmingly high levels of youth unemployment, which called for urgent, innovative solutions to economic participation; the growing imperative for universities to diversify their income streams through third-stream income generation; and national policy directives aimed at fostering small business creation and broader job opportunities as engines of economic growth.

At that time, the higher education sector was characterised by a fragmented landscape where many universities had implemented isolated entrepreneurship initiatives without a coherent, sector-wide strategy. As Universities South Africa (USAf, 2020) notes, there was an evident lack of coordination, common frameworks, and strategic alignment across institutions. This disjointed approach limited the potential for systemic impact. EDHE was thus launched to address these gaps, providing a unified platform to harness, strengthen, and scale entrepreneurship development efforts across South Africa's 26 public universities, thereby positioning higher education as a central player in tackling South Africa's socio-economic challenges.

4.2 Challenges in the Status Quo

Recent studies highlight both progress and persistent challenges in South Africa's higher education entrepreneurship ecosystem. On the positive side, all public universities have introduced entrepreneurship activities (such as courses, incubators, or student societies), and awareness of entrepreneurship as a career option is rising among students (Gumbo, 2024; Herrington et al., 2021). However, significant gaps remain. EDHE's 2020 Baseline Report on university entrepreneurial ecosystems revealed a lack of clarity and common definitions around "entrepreneurship" across institutions, leading to inconsistent objectives and evaluation metrics. Many universities struggle to measure the outcomes of their

entrepreneurship initiatives, for instance, there is no standard way to track how many startups or student entrepreneurs a university produces (De Beer, 2024). Moreover, cultural barriers persist: traditionally, South African graduates tended to seek formal employment rather than venture creation, a mindset that is only slowly changing. Gumbo (2024) observes that students often do not view entrepreneurship as a viable path, seeing themselves as job seekers rather than potential business owners, which underscores the need to “normalise entrepreneurship as a career choice” within higher education.

Another challenge is the historical legacy in the tertiary sector, the merger of universities and technikons (vocational colleges) in the early 2000s has in some cases weakened alumni networks and funding support for entrepreneurship, as many newer comprehensive universities lack wealthy, established alumni to champion entrepreneurial ventures. Despite these challenges, there is strong commitment at national and institutional levels to bolster the ecosystem. The South African government, through entities like the Small Enterprise Development Agency (SEDA) and Technology Innovation Agency (TIA), has partnered with universities on various programmes (e.g., student incubator funding, hackathons), indicating a multi-stakeholder push to improve conditions for university entrepreneurs. The EDHE programme operates at the centre of this landscape, attempting to coordinate and amplify these disparate efforts.

A major challenge within universities prior to the establishment of EDHE’s Economic Activation Offices (EAOs) was the lack of a central coordinating mechanism for entrepreneurship development. Entrepreneurial activities were often fragmented, operating in isolated pockets across faculties, departments, and student units without a cohesive strategy or institutional ownership. This fragmentation resulted in duplication of efforts, missed opportunities for collaboration, limited visibility of available support for aspiring entrepreneurs, and a weakened institutional impact on economic activation. Without a dedicated structure to consolidate, drive, and strategically position entrepreneurship activities, universities struggled to fully harness their potential to contribute to job creation, innovation, and third-stream income generation.

5 EDHE as an Ecosystem Coordinator and Enabler

5.1 Mandate and Strategic Role

The EDHE programme serves as a coordinating backbone of South Africa's higher education entrepreneurial ecosystem. Housed within USAf which is a representative body for all 26 universities in South Africa and DHET, EDHE works across all 26 public universities, transcending institutional and regional boundaries. The primary role of EDHE is to “provide strategic focus, create enabling environments, and collaborate” among ecosystem stakeholders.

In practical terms, EDHE acts as a national hub that brings together students, academics, university leadership, industry partners, and government agencies to share resources and knowledge in entrepreneurship (Gumbo, 2024). A signature strategy has been the establishment of Communities of Practice (CoPs) aligned with EDHE's pillars: for example, the CoP for Student Entrepreneurship, CoP for Entrepreneurship Learning and Teaching, CoP for Entrepreneurship Research, CoP for Entrepreneurial Universities, and the CoP for Economic Activation Offices. These CoPs convene representatives from each university (and often experts and practitioners) to co-create initiatives, disseminate best practices, and jointly address common challenges. By leveraging existing university structures and encouraging peer learning, EDHE enables even resource-constrained campuses to benefit from nationwide expertise.

As part of its strategic expansion to drive entrepreneurship development within universities, the EDHE programme introduced the EAOs. These offices serve as dedicated institutional coordinating offices aimed at catalysing entrepreneurship and innovation activities across campuses. Their primary objective is to operationalise and localise EDHE's broader mission by creating direct access points where students, academics, and external stakeholders can engage in entrepreneurial opportunities. EAOs are designed to foster a vibrant entrepreneurial ecosystem within universities by supporting student entrepreneurs, facilitating enterprise development, coordinating entrepreneurship-focused programmes

and competitions, and connecting universities with external partners, including industry, investors, and government agencies.

Functionally, EAOs play a multifaceted role. They are supposed to act as incubators for early-stage business ideas, providing business development support, mentorship, and access to networks. They also serve as capacity builders, delivering training workshops, pitching sessions, and skills development programmes aimed at enhancing entrepreneurial competencies among students and staff. Additionally, EAOs function as ecosystem integrators, aligning university activities with regional and national entrepreneurship agendas, facilitating third-stream income generation opportunities for institutions, and embedding entrepreneurship into the academic and research culture. By establishing EAOs, EDHE not only strengthens the entrepreneurial infrastructure within universities but also enhances their contribution to economic growth, job creation, and societal transformation.

In addition to its ongoing programmes, EDHE actively fosters a national culture of entrepreneurship through the organisation of key annual events that bridge the gap between academia and practical entrepreneurial action. One of the flagship events is the EDHE Lekgotla, a national conference that serves as a critical convergence point for thought leaders, academics, policymakers, and practitioners to engage in dialogue, share research, and collaborate on advancing entrepreneurship development within higher education. Positioned at the intersection of theory and practice, the Lekgotla stimulates strategic thinking and influences the integration of entrepreneurship into university ecosystems.

Complementing this is the EDHE Entrepreneurship Intervarsity competition, a platform where student entrepreneurs from across South Africa's 26 public universities are given the opportunity to develop, pitch, and showcase their business ideas and ventures. The competition not only identifies and celebrates outstanding student entrepreneurs but also strengthens the pipeline of entrepreneurial talent by providing mentorship, exposure to investors, and access to broader entrepreneurial networks. Together, these initiatives are instrumental in cultivating an entrepreneurial mindset, reinforcing the value of innovation-driven enterprise among students and institutions alike, and positioning

entrepreneurship as a viable and celebrated pathway within the higher education sector (EDHE, 2023).

According to EDHE's progress reports, this collaborative model has led to greater communication and partnership among universities, for instance, institutions now routinely share curricula and materials for entrepreneurship courses and co-host events, reflecting a more integrated ecosystem approach (De Beer, 2024). As Gumbo (2024) notes, EDHE explicitly seeks to "create a more inclusive and supportive entrepreneurial ecosystem within higher education institutions," ensuring that previously marginalised groups (such as women student entrepreneurs through the Student Women Economic Empowerment Programme (SWEEP) are given targeted support.

The SWEEP is an initiative launched in 2021, created in response to two critical national challenges: the under-representation of women in entrepreneurship and the pervasive issue of gender-based violence (GBV) within South Africa's higher education institutions. The programme's primary objective is to raise awareness about entrepreneurship among female students and recent graduates, foster a culture that promotes the creation of businesses with a positive societal impact, and connect young women with mentors. Through these mentorships and a range of targeted activities, SWEEP seeks to equip student women with the confidence, skills, and support systems necessary to actively participate in and contribute to the entrepreneurial economy (EDHE, 2024).

5.2 Impact and Initiatives

Over the last five years, EDHE's enabling role has yielded tangible outcomes and important lessons. On the student front, EDHE's National Entrepreneurship Intervarsity has engaged thousands of students across universities in entrepreneurial training and pitch competitions, resulting in increased student-led startup activity (EDHE, 2025). Several winning student businesses have gone on to secure funding or incubation, demonstrating the value of early-stage ecosystem support. In academia, EDHE's CoP for Entrepreneurship Learning & Teaching has facilitated curriculum development, a notable development was

the integration of entrepreneurship modules into non-business degrees at multiple universities between 2020 and 2022 (Nhleko & Van der Westhuizen, 2022).

Research output on entrepreneurship in higher education has also grown, partly encouraged by EDHE's annual Research Conferences and the CoP for Entrepreneurship Research, which connect academics and share data. Importantly, EDHE has championed the concept of the "entrepreneurial university" in South Africa. Through the EDHE CoP for Entrepreneurial Universities and partnerships with international bodies; e.g., the British Council and the United Nations Economic Commission for Africa (UNECA), EDHE contributed to a framework for universities to assess and improve their entrepreneurial orientation. This led to a 2021 UNECA study on Advancing Entrepreneurial Universities in Africa (EDHE, 2021a, 2021b), which provided South African institutions with benchmarks and recommendations for institutional reform. For example, universities have begun establishing "economic activation offices" or dedicated entrepreneurship centres on campus to coordinate internal ecosystem activities, a model EDHE advocates and supports (De Beer, 2024). The formation of SWEEP was informed by research commissioned by USAf, which revealed significant barriers hindering female students' participation in entrepreneurship. Among these were low self-esteem, societal stereotypes, limited exposure to entrepreneurial training, and the lack of enabling environments within universities (EDHE, 2024). In response to these findings, SWEEP was designed around a three-tier model focusing on (1) professional and employability skills and opportunities, (2) entrepreneurship and economic activation skills and opportunities, and (3) sustainability and survival skills and opportunities. These pillars guide the programme's interventions, which include webinars, workshops, skills development sessions, and structured mentorship opportunities.

Additionally, SWEEP has led to the establishment of chapters across various public universities, creating localised centres where female students can access peer support, mentorship, and practical business development resources. By empowering young women through entrepreneurship, SWEEP contributes directly to national goals of economic growth, job creation, and social transformation, while also

advancing broader international efforts to promote gender equity. Through initiatives like SWEEP, EDHE and USAf are positioning South African universities as catalysts for building a more inclusive and dynamic entrepreneurial ecosystem.

EDHE's multi-pronged approach addresses ecosystem needs at multiple levels: policy (advising on national entrepreneurship in HE policy), institutional support (capacity-building workshops for university entrepreneurship champions), and student empowerment (mentorship, funding linkages, and network-building for young entrepreneurs). This approach has started to yield a cultural shift, anecdotal evidence suggests more students now perceive entrepreneurship as a viable path, and several universities report increased internal support from leadership for entrepreneurship initiatives (De Beer, 2024; Gumbo & Moos, 2024).

5.3 Challenges and Ongoing Developments

Despite its successes, EDHE faces ongoing challenges in its coordinating role. A key hurdle identified is the need for clearer metrics and data to evaluate impact. EDHE's leadership has found it difficult to quantitatively track how its interventions translate into entrepreneurial outcomes across universities (e.g., number of startups formed, jobs created, investment funding raised by startups, etc.). Efforts are underway to develop a unified monitoring and evaluation system, in consultation with researchers and global frameworks (De Beer, 2024). Funding is another concern: EDHE has largely been government-funded with some external sponsorship, but scaling up entrepreneurship support (such as seed funding for student ventures or larger incubation programmes) will require sustainable financing. The challenge of fundraising is compounded by limited alumni philanthropy for entrepreneurship in SA, as noted earlier.

To tackle this, EDHE is exploring partnerships with the private sector and international donors. Additionally, bridging the gap between policy and implementation remains a work in progress. While universities may commit on paper to fostering entrepreneurship, translating that into day-to-day academic and administrative practice is slow. For

instance, revising rigid curricula, altering faculty reward systems to value entrepreneurship engagement, or providing physical innovation spaces on campus are complex tasks that require high-level buy-in and resources (Nieuwenhuizen et al., 2022). EDHE serves as an advocate and consultant in this regard, but individual institutions must ultimately drive these changes.

On a broader scale, EDHE's experience points to the importance of cultivating an entrepreneurial mindset at all levels of the university—from top management to lecturers to students. This cultural change is gradual; however, EDHE's initiatives (like awareness campaigns and success stories of student entrepreneurs) are helping normalise entrepreneurship. As the EDHE Director has emphasised, creating an inclusive ecosystem means addressing societal biases (e.g., gender stereotypes in entrepreneurship) and ensuring every student regardless of background, can access support to pursue entrepreneurial opportunities (Gumbo, 2024). This ethos of inclusion is now embedded in EDHE's newer programmes, such as SWEEP for female students and dedicated tracks for historically disadvantaged institutions.

5.4 Student Voices in University Entrepreneurial Ecosystem Design

In building effective university entrepreneurial ecosystems, the perspectives and lived experiences of students are critical yet often under-represented. Students are the primary stakeholders and end-users of campus entrepreneurship initiatives, so their insights can illuminate gaps that administrators might overlook. Recent South African scholarship emphasises that students (youth) must be more than passive beneficiaries—they should actively share experiences and insights with other ecosystem actors. Therefore, an entrepreneurial ecosystem thrives when it is dynamic, interactive, and reflective, with students' voices helping to shape and refine the support structures around them (Van der Westhuizen, 2023). This focus on student agency aligns with the “bottom-up engagement” that experts have identified as essential for ecosystem. Yet,

much of the policy and programming to date has been top-down, coordinated by university leadership and national bodies like EDHE. A gap remains in directly engaging student voices in the design, evaluation, and improvement of these ecosystems.

6 Lived Experiences and Challenges from the Student Perspective

South African research from 2021 to 2025 offers qualitative insights into how students experience current university entrepreneurship ecosystems. These studies highlight persistent barriers and challenges that students face on the ground. A notable example is a 2024 EDHE-sponsored study on female student entrepreneurs, which revealed obstacles ranging from low self-confidence and cultural bias to practical support gaps (EDHE, 2024). Many participants described a lack of self-esteem and fear of failure, often rooted in societal stereotypes that cast doubt on young women's entrepreneurial abilities. This echoes longstanding cultural norms in South Africa that traditionally steered graduates towards formal employment rather than venture creation. One student in the EDHE study admitted, "they might be giving us the answers and the steps—we just don't know how to implement them," underscoring how even when training is provided, students can struggle to translate knowledge into action without adequate guidance.

Mentorship and network gaps are another recurring theme. Students often lack access to mentors, role models, and professional networks that can nurture their entrepreneurial ideas (EDHE, 2024). Female students in particular reported feeling intimidated in male-dominated fields and noted a shortage of relatable mentors. Limited networking opportunities and exclusion from informal business networks leave many student entrepreneurs isolated. In a 2020 national survey of university students, respondents cited the lack of funding and networks as the top barriers to pursuing entrepreneurship, alongside an unsupportive regulatory environment and family discouragement (EDHE, 2024). This finding, coming from over 3,200 student voices, shows that resource constraints

and social support deficits critically shape the student entrepreneurial experience.

Students also face institutional challenges within their universities. Many struggle to navigate bureaucratic processes when seeking support. For example, one student entrepreneur recounted spending “about a month being sent from office to office” trying to get help to start a business on campus. Such experiences point to fragmented support systems and poor awareness of where students can turn for assistance. In some cases, university policies themselves may unwittingly hinder student entrepreneurship. At one university, students proposed allocating a portion of on-campus vendor stalls to student-run businesses, only to have the idea rejected by administrators as potentially “chaotic.” The students were told that peers wouldn’t pay rent, even though the suggested rent was as high as the entire profit a student vendor might earn. This disconnect between student realities and institutional policies highlights an unsupportive campus culture that can dampen entrepreneurial initiative. It reinforces findings from the EDHE Baseline Report that many universities still lack an enabling environment and cohesive support for student entrepreneurs.

Another significant challenge is balancing academic obligations with venture development. Students frequently report tension between coursework and their startups. Female student entrepreneurs in the 2024 EDHE study mentioned difficulty “multitasking” and, in some cases, having to pause or give up their businesses to focus on degrees. Without flexible academic policies or integration of entrepreneurship into curricula, enterprising students feel they must choose one path or the other. This indicates a need for more entrepreneurial-friendly academic cultures where pursuing a startup is not seen as detracting from one’s studies (or vice versa). While some South African universities have introduced innovation hubs and credit-bearing entrepreneurship modules to ease this tension, student feedback suggests these efforts are not yet sufficient (Nhleko & Van der Westhuizen, 2022). In sum, students often experience university entrepreneurial ecosystems as fragmented, difficult to access, and not fully attuned to their needs. These lived experiences underline why student input is vital: who better to

pinpoint what's working and what isn't than the students navigating these systems daily?

7 The Case for Student Agency in Ecosystem Design

Given these challenges, there is a growing recognition that students must be empowered as co-creators of the entrepreneurial ecosystem, not just recipients of its services. When students have agency—the ability to influence decisions, design programmes, and tailor support—the ecosystem becomes more responsive and inclusive. For instance, Van der Westhuizen (2023) argues that youths should be central actors who offer feedback that shapes the evolving ecosystem. Embracing student agency can correct mismatches between institutional offerings and student needs. The success of EDHE's own initiatives hints at the potential: the annual Entrepreneurship Intervarsity competition, which engaged thousands of students across all 26 universities, has led to a surge in student-led startups and heightened entrepreneurial interest on campuses (EDHE, 2025). This demonstrates that when given platforms to actively participate (in this case, via competitions and showcases), students respond enthusiastically—and outcomes improve. Yet competitions and hackathons are just one form of engagement. Deeper inclusion of student voices in governance and design is needed.

One avenue is involving students in the governance of entrepreneurship programmes. Universities can establish student advisory boards or committees attached to entrepreneurship centres and incubators. These bodies, comprised of student entrepreneurs or student society leaders, can provide regular input on programming, funding priorities, and rules. For example, if a policy (like banning student vendors on campus) is adversely affecting student businesses, a student advisory board could flag this and co-develop a solution with staff. Some South African universities have taken steps in this direction by supporting student entrepreneurship societies and including student representatives in Entrepreneurship Development offices (Mokoqama, 2025). Such representation ensures that student perspectives inform strategic decisions and that initiatives

are designed “with” students rather than “for” students. It also builds a sense of ownership and accountability among the student body, strengthening the entrepreneurial culture on campus. As the ecosystem literature notes, inclusive practices that empower under-represented groups—in this case, students as stakeholders—are key to democratising access to resources (Grande et al., 2023; O’Brien et al., 2019). This could mean students helping to co-create entrepreneurship events, peer mentorship programmes, or startup funding mechanisms that speak to their realities.

8 Towards Student-Inclusive Evaluation and Feedback Frameworks

Incorporating student voices is not only important at the design stage, but also in evaluating and iterating entrepreneurship initiatives. A clear lesson from recent studies is that many universities struggle to measure the outcomes and effectiveness of their entrepreneurial programmes. Common metrics are lacking—there is “no standard way to track how many startups or student entrepreneurs a university produces. This absence of data makes it hard to tell whether student needs are truly being met” (De Beer, 2024). To address this, evaluation frameworks must become more student-inclusive, gathering feedback from students as a core indicator of ecosystem health.

Encouragingly, new tools are emerging in South Africa to fill this gap. In 2022, researchers from Nelson Mandela University and partners unveiled a Student Entrepreneurship Support (SES) self-assessment tool for universities, designed to gauge the quality of support from the student perspective. This tool—piloted in 2023—prompts institutions to reflect on various support dimensions (from mentorship availability to administrative ease) and collect student input on each. By systematically capturing student satisfaction levels, usage rates of services, and perceived barriers, universities can identify weak points in their ecosystem. The development of the SES tool aligns with EDHE’s own vision for a unified monitoring and evaluation system across campuses (De Beer, 2024). Going forward, student-centric metrics (such as the

number of students engaging in entrepreneurship activities, their demographic spread, their feedback on support usefulness, and longer-term outcomes like ventures launched or skills gained) should complement traditional outcome metrics. Incorporating these into annual reviews or “entrepreneurship ecosystem report cards” for each institution would ensure that student voice is embedded in accountability processes. In essence, students should be treated as key informants in evaluating what works, creating a feedback loop that drives continuous improvement. This approach resonates with calls in the literature for more holistic, inclusive ecosystem assessments that go beyond top-down indicators (Nieuwenhuizen et al., [2022](#)).

9 Integrating Student Voices: Strategies for Policy and Practice

To create a truly inclusive and effective entrepreneurial ecosystem, universities and policymakers must actively integrate student voices into both policy formulation and institutional practice. Below are some strategies and best practices—drawn from recent South African insights—for achieving this integration:

Establish Formal Student Feedback Channels: Universities should institute regular forums (surveys, focus groups, town halls) where students can share their experiences with entrepreneurship programmes. For example, the Voices Unite survey commissioned by EDHE in [2020](#) provided valuable data on student-perceived barriers. Such feedback exercises should be conducted periodically (e.g., annually) and the results used to adjust strategies. Making feedback loops an official part of programme evaluation signals that student input is valued and acted upon.

Include Students in Ecosystem Governance: As a policy, universities can mandate student representation in structures that oversee entrepreneurship development—from advisory boards at incubators to national forums like EDHE’s Communities of Practice. When students sit alongside academics, industry partners, and officials, they can directly influence decisions. This co-governance approach empowers students to

advocate for their peers (e.g., pushing for more seed funding for student startups or simpler procurement rules for campus entrepreneurs) and ensures policies are checked against on-the-ground realities.

Support Student-Led Initiatives and Peer Mentorship: Often, students themselves are best positioned to design activities that resonate with their interests. Institutions should therefore back student-led entrepreneurship clubs, innovation challenges, and hackathons. Providing modest funding, space, or mentorship for these student-driven initiatives can yield high engagement. Likewise, facilitating peer mentorship—for instance, connecting successful student entrepreneurs or recent alumni with newcomers—leverages student voice in a practical way. Peers can offer relatable advice and serve as role models, addressing the mentorship gap identified in studies (EDHE, 2024). Some universities have begun appointing “student entrepreneurship ambassadors” to champion startup culture on campus and relay student concerns to faculty (Meyer & Meyer, 2020), a practice that could be expanded.

Adapt Institutional Policies to be Student-Friendly: University leadership and policymakers should review rules through a student lens. This might include revising strict intellectual property policies that deter student innovation, allowing flexible academic schedules or credits for entrepreneurs, and creating avenues for students to commercialise ideas on campus (e.g., approving student vendor stalls or pop-up markets). The institutional culture must encourage entrepreneurial attempts (including the possibility of failure) rather than solely prioritise academic results. As one recommendation from the EDHE Barriers Study put it, universities should “review and amend their policies to eliminate bias” and foster a supportive environment for student entrepreneurs. Changes like streamlined bureaucracy for starting a campus project or seed fund, and explicit protection for students taking entrepreneurial leaves of absence, can remove structural impediments to student agency.

Recognise and Reward Student Contributions: Finally, integrating student voice means celebrating its impact. Universities might institute awards for student entrepreneurs who not only build businesses but also actively contribute feedback or mentorship in the ecosystem. National bodies like EDHE could showcase examples of policy or programme changes made in response to student input, reinforcing that listening to

students leads to tangible improvements. By acknowledging students as partners in ecosystem development, stakeholders signal a cultural shift towards genuine inclusivity.

Integrating these strategies will help embed student voices at the heart of entrepreneurship development policy and practice. South Africa's experience thus far shows promise—initiatives like the Student Women Economic Empowerment Programme (SWEEP) were a direct response to student feedback and have started to chip away at barriers (EDHE, 2024; Gumbo, 2024). Still, there is ample room to expand student-inclusive approaches across all institutions. By co-designing ecosystems with students, universities can cultivate more relevant support structures, from mentorship programmes to incubators, that truly meet students' needs. In turn, this should boost student participation and success in entrepreneurship, creating a positive feedback loop. As students feel heard and empowered, their entrepreneurial confidence grows, further enriching the ecosystem with new ventures and innovation.

In summary, amplifying student voices in the design and evolution of university entrepreneurial ecosystems is not a token gesture but a strategic necessity. It ensures that the ecosystem remains adaptive, equitable, and driven by real-world insights from those it aims to serve. South African higher education stands to gain immensely from this inclusive approach: not only more student startups and job creators, but also the development of a generation of graduates who see themselves as active shapers of the economic landscape. Embracing student agency and feedback will ultimately strengthen the very fabric of the entrepreneurial university—making it a collaborative enterprise where students, academics, industry, and government co-innovate to drive socio-economic progress.

10 Conclusion

It is evident that HEIs are transitioning from traditional roles in education to becoming pivotal catalysts for economic growth and innovation. This transformation is deeply anchored in the concept of entrepreneurial

ecosystems, which underscores the importance of institutional structures, stakeholder interactions, and the influence of external factors on the success of entrepreneurial ventures. South Africa's experience with building entrepreneurship ecosystems in higher education, exemplified by the EDHE programme, offers valuable insights for other emerging economies aiming to leverage universities as engines of entrepreneurship. In the past five years, South African scholars and practitioners have laid a stronger scholarly foundation for understanding how universities can coordinate and enable entrepreneurial ecosystems.

The literature from 2020 onwards highlights that a successful higher education entrepreneurship ecosystem requires both top-down coordination (strategic support, policies, and structures like EDHE) and bottom-up engagement (active participation of students and faculty in entrepreneurial activities). EDHE's role as an ecosystem coordinator illustrates the impact of a dedicated intermediary that aligns efforts across multiple institutions, fosters communities of practice, and addresses systemic barriers. According to De Beer (2024), the EDHE case study demonstrates that even in a resource-constrained environment, a collaborative platform can drive significant progress in entrepreneurship development in the higher education sector.

Key lessons include the importance of clarity in goals and metrics (so that universities can measure entrepreneurial outcomes), the need to integrate entrepreneurship into the core functions of universities (teaching, research, community engagement), and the benefit of inclusivity—ensuring diverse participation to enrich the ecosystem. Moving forward, sustaining and scaling such ecosystems will require continuous adaptation and learning. South Africa's entrepreneurial universities are still an evolving narrative; however, the trajectory is positive. Initiatives like EDHE have begun to transform mindsets, increasingly, graduates view entrepreneurship as a plausible and even desirable career path, and universities see entrepreneurial success among their students as a marker of institutional achievement (Gumbo & Moos, 2024; Nhleko & Van der Westhuizen, 2022). In conclusion, the entrepreneurship ecosystem in higher education thrives when there is a strong coordinating mechanism, supportive policy environment, and committed stakeholders.

The EDHE programme, as a coordinator and enabler, has spearheaded this approach in South Africa, providing a model that blends scholarly insight and practical action. As South African scholars continue to study and refine this ecosystem, their findings will further strengthen the academic discourse and inform effective practice. South Africa's journey thus far affirms that cultivating entrepreneurship in higher education is a powerful strategy to unlock youth potential and drive socio-economic development (Bowmaker-Falconer & Meyer, 2022; De Beer, 2024). Other countries with similar developmental challenges may draw inspiration from the EDHE model and the growing body of knowledge around it to build their own robust entrepreneurship ecosystems in higher education.

References

- Bowmaker-Falconer, A., & Meyer, N. (2022). *Global entrepreneurship monitor South Africa 2021/2022: Fostering entrepreneurial ecosystem vitality*. University of Stellenbosch Business School.
- Cantner, U., Cunningham, J. A., Lehmann, E. E., & Menter, M. (2021). Entrepreneurial ecosystems: A dynamic lifecycle model. *Small Business Economics*, 57, 407–423.
- De Beer, C. (2024). Evaluating the South African entrepreneurial ecosystem: The entrepreneurship development in higher education case study. In V. Ratten & P. Jones (Eds.), *Entrepreneurial ecosystems* (pp. 93–112). De Gruyter.
- EDHE. (2020). National university entrepreneurship ecosystem baseline report. Pretoria: Entrepreneurship Development in Higher Education (EDHE) programme, department of higher education and training.
- EDHE. (2021a). Background on the EDHE programme. [Online]. Available: <https://edhe.co.za/about/> (Accessed 10 March 2025).
- EDHE. (2021b). United nations economic commission for Africa study on advancing entrepreneurial universities in Africa. [Online]. Available: <https://edhe.co.za/wp-content/uploads/UNECA-Report.pdf> (Accessed 07 April 2025).
- EDHE. (2024). Barriers faced by student women in higher education institutions in South Africa to participate in entrepreneurship and business, and

- challenges experienced during participation. [Online]. Available <https://usaf.ac.za/a-research-study-highlights-key-impediments-to-student-women-participation-in-entrepreneurship-at-sa-universities/> (Accessed 13 May 2025).
- EDHE. (2025). Impact report 2024. [Online]. Available: https://edhe.co.za/wp-content/uploads/EDHE_ENTREPRENEURSHIP-DEVELOPMENT-LANDSCAPE.pdf (Accessed 13 May 2025).
- Entrepreneurship Development in Higher Education (EDHE). (2023). EDHE Entrepreneurship Intervarsity 2023. Universities South Africa. <https://edhe.co.za/entrepreneurship-intervarsity-2023/>
- Franco-Leal, N., Camelo-Ordaz, C., Dianeze-Gonzalez, J. P., & Sousa-Ginel, E. (2020). The role of social and institutional contexts in social innovations of Spanish academic spinoffs. *Sustainability*, 12(3), 1–24.
- Grande, S., Bertello, A., De Bernardi, P., & Ricciardi, F. (2023). Enablers of explorative and exploitative intellectual capital in entrepreneurial ecosystems. *Journal of Intellectual Capital*, 24(1), 35–69.
- Guerrero, M., Urbano, D., & Gajón, E. (2020). Entrepreneurial universities and employability of graduates: The role of academic programmes and extracurricular activities. *Entrepreneurship Research Journal*, 10(3), 1–20.
- Gumbo, E., & Moos, M. (2024). Integrating ecosystems: The synergistic effects of digital innovation hubs on start-up growth. *Southern African Journal of Entrepreneurship and Small Business Management*, 16(1), 1–11.
- Gumbo, E. (2024). Universities South Africa News – EDHE seeks to create a more inclusive and supportive entrepreneurial ecosystem within HEIs, 26 August 2024. [Online]. Available: <https://usaf.ac.za/a-research-study-highlights-key-impediments-to-student-women-participation-in-entrepreneurship-at-sa-universities/>
- Herrington, M., Kew, P., & Mwanga, A. (2021). *GEM South Africa 2020/21 report: Igniting startups for economic growth and social change*. Global Entrepreneurship Monitor.
- Lado, A., Castro-Abancens, I., Moreno-Menéndez, A. M., & Casillas, J. C. (2024). Traditional and digital entrepreneurial ecosystems: A framework of differences and similarities. *Journal of Global Entrepreneurship Research*, 14(1), 1–15.
- Lehmann, E. E., Meoli, M., Paleari, S., & Stockinger, S. A. (2020). The role of higher education for the development of entrepreneurial ecosystems. *European Journal of Higher Education*, 10(1), 1–9.
- MacGinty, H. (2024). *Graduate unemployment in South Africa. Unpublished research report*. Labour Market Intelligence.

- Malcolm, R. W., Sherwyn, S. W., Simbanegavi, P., & Ndlovu, P. (2024). Investing in the future: A comparative analysis of green technology investments and youth unemployment in the US and South Africa. *The International Journal of Sustainability in Economic, Social and Cultural Context*, 15(1), 169–205.
- Malecki, E. J. (2018). Entrepreneurship and entrepreneurial ecosystems. *Geography Compass*, 12(3), 1–21.
- Meyer, N., & Meyer, D. F. (2020). A thematic analysis of essential entrepreneurial ecosystem factors: An economic growth and development perspective. *Journal of Contemporary Management*, 17(2), 346–369.
- Mokoqama, M. (2025). Developing an entrepreneurial university in South Africa: A change management approach. Ph.D. thesis. University of KwaZulu-Natal. Supervised by Thea van der Westhuizen.
- Mseleku, Z. (2022). From workplace to joblessness: The determinants of post-internship graduate unemployment in South Africa. *Academic Journal of Interdisciplinary Studies*, 11(2), 330–330.
- Ndlovu, S. G., Radebe, T. N., Mlambo, V. H., & Nkonde, S. D. (2024). Contextualising entrepreneurship as a pacacea to youth unemployment in South Africa. *Prizren Social Science Journal*, 8(1), 48–57.
- Nhleko, Y., & Van der Westhuizen, T. V. (2022). The role of higher education institutions in introducing entrepreneurship education to meet the demands of Industry 4.0. *Academy of Entrepreneurship Journal*, 28(S1), 1–23.
- Nieuwenhuizen, C., Krüger, N. A., Meyer, D. F., & Meyer, N. (2022). A thematic analysis of essential entrepreneurial ecosystem factors: An economic growth and development perspective. *Journal of Contemporary Management*, 19(2), 609–653.
- O'Brien, E., Cooney, T. M., & Blenker, P. (2019). Expanding university entrepreneurial ecosystems to under-represented communities. *Journal of Entrepreneurship and Public Policy*, 8(3), 384–407.
- Owen, R., Vedanthachari, L. N., & Hussain, J. (2024). The role of the university entrepreneurial ecosystem in entrepreneurial finance: Case studies of UK innovation knowledge centres. *Venture Capital*, 26(3), 351–375.
- Padilla-Meléndez, A., & del-Aguila-Obra, A. R. (2022). Governance of entrepreneurial universities in the context of entrepreneurial ecosystems: The perspective of the university technology transfer offices. *Studies in Higher Education*, 47(5), 973–981.
- Patrício, L. D., & Ferreira, J. J. (2024). Unlocking the connection between education, entrepreneurial mindset, and social values in entrepreneurial activity development. *Review of Managerial Science*, 18(4), 991–1013.

- Prokop, D. (2022). The composition of university entrepreneurial ecosystems and academic entrepreneurship: A UK study. *International Journal of Innovation and Technology Management*, 19(06), 1–33.
- Schäfer, S. (2021). Spatialities of entrepreneurial ecosystems. *Geography Compass*, 15(9), 1–10.
- Statistics South Africa. (2025). Quarterly labour force survey – Quarter 4: 2024. Pretoria. Statistics South Africa. <https://www.statssa.gov.za/publications/P0211/P02114thQuarter2024.pdf>
- Van der Westhuizen, T. (2023). Youth entrepreneurship: An ecosystem theory for young entrepreneurs in South Africa and beyond. Springer Nature. <https://link.springer.com/book/10.1007/978-3-031-44339-8>
- Van der Westhuizen, T. (2024a). Youth entrepreneur ecosystem. In *Practical tools for youth entrepreneurs: An applied approach for South Africa and beyond* (pp. 57–114). Springer Nature Switzerland.
- Van der Westhuizen, T. (2024b). *Practical tools for youth entrepreneurs: An applied approach for South Africa and beyond* (p. 223). Springer Nature.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits any noncommercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if you modified the licensed material. You do not have permission under this license to share adapted material derived from this chapter or parts of it.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.





22

Innovative Pedagogies Showcasing Excellence in University Entrepreneurship Learning and Teaching

Thea van der Westhuizen 

1 Introduction: A Dynamic Landscape of Entrepreneurial Education

Entrepreneurial education has become a critical component of the higher education landscape, not only in South Africa but globally. The traditional models of education, which often focused on preparing students for employment in established fields, have been gradually supplanted by new pedagogical approaches aimed at fostering innovation, creativity, and self-employment. This shift is largely in response to rapid global economic changes, the digital revolution, and the pressing need for solutions to complex social and economic challenges.

In South Africa, the landscape of entrepreneurial education is uniquely shaped by the country's socio-economic context. High youth unemployment, significant socio-economic inequalities, and the lingering effects

T. van der Westhuizen (✉)

University of KwaZulu-Natal, Durban, South Africa

e-mail: vanderwesthuizent@ukzn.ac.za

of apartheid on education access and quality have made it imperative for institutions to embrace entrepreneurship as a pathway to economic empowerment. The country's National Development Plan (NDP) 2030 places significant emphasis on entrepreneurship as a key driver for reducing unemployment and fostering inclusive economic growth (CDE, 2020; Herrington & Kew, 2018). Consequently, South African universities have had to rethink their educational frameworks to align with these national priorities.

Entrepreneurial education in South Africa has thus evolved from being a niche subject within business schools to a cross-disciplinary and integrative field that spans engineering, health sciences, social sciences, and even the arts. Institutions such as the Durban University of Technology (DUT), University of Cape Town (UCT), Stellenbosch University, and North-West University have developed innovative programmes that blend traditional academic knowledge with real-world problem-solving, collaboration, and community engagement. These programmes aim to equip students with the skills to not only survive in an increasingly competitive job market but to create opportunities for themselves and others. These learning and teaching innovative cases were peer-reviewed and received a national Excellence Award for its contributions.

This chapter provides a synthesis of the innovative approaches showcased in the case studies presented in this anthology, highlighting how South African institutions are redefining entrepreneurial education. The synthesis draws attention to key themes such as experiential learning, interdisciplinary collaboration, community engagement, the creation of entrepreneurial ecosystems, and the alignment of education with sustainability goals. Each of these themes is explored in depth, illustrating how they are contributing to the development of a vibrant entrepreneurial education landscape in South Africa.

2 Experiential Learning and Problem-Based Approaches

One of the most significant trends in entrepreneurial education, particularly in the South African context, is the shift towards experiential learning. Traditional lecture-based methods, where students passively absorb information, are increasingly being replaced by active learning models where students engage directly with real-world problems. This shift is informed by educational theories such as John Dewey's experiential learning theory, which emphasises the importance of learning through experience, and David Kolb's learning cycle, which describes how knowledge is created through the transformation of experience (Van der Westhuizen, 2016, 2023).

In entrepreneurial education, experiential learning plays a crucial role in developing the practical skills that are essential for business creation and growth. Entrepreneurs must be able to navigate uncertainty, adapt to changing market conditions, and make decisions with incomplete information—all skills that are difficult to teach through traditional methods. Instead, they are best learned by doing (Botha & Rasool, 2021; Smith, 2020).

3 Problem-Based Learning (PBL) as a Catalyst for Innovation

Problem-Based Learning (PBL) has emerged as one of the most effective pedagogical tools in entrepreneurial education. In PBL, students are presented with complex, real-world problems that lack straightforward solutions. They must then collaborate, research, and innovate to devise workable solutions, often while working under constraints that mimic those they would encounter in a real entrepreneurial environment.

One notable example of this approach is the DUT-Ngodini Bunduz Entrepreneurship Advancement Project, described in Chap. 2. In this project, students are not merely learning entrepreneurship in the classroom; they are actively working as business consultants for local

entrepreneurs in the Ngodini community. The students conduct in-depth business needs analyses, design interventions, and collaborate with the local entrepreneurs to implement these solutions. This real-world engagement allows students to experience firsthand the challenges of running a business in a rural context, such as limited access to resources, fluctuating market demand, and the need for community buy-in.

In this case, students also learn how to balance social and environmental considerations with business imperatives, as the project focuses on both economic advancement and environmental sustainability. The project aligns with Sustainable Development Goals (SDGs), such as promoting decent work and economic growth (SDG 8) and fostering innovation and sustainable cities and communities (SDG 11). By engaging in such projects, students not only develop entrepreneurial skills but also gain a deep understanding of the social and environmental contexts in which their businesses will operate.

Similarly, the EX-CELL Workshop, as presented in Chapter 11, uses a problem-based learning approach to teach entrepreneurship to youth from underserved communities. The workshop provides a structured environment in which participants work on real business challenges, develop solutions, and receive feedback from mentors and peers. The focus on practical, hands-on learning ensures that participants not only acquire theoretical knowledge but also the practical skills needed to navigate the entrepreneurial landscape. By solving real problems, they gain confidence in their ability to create and manage a business, which is crucial for fostering long-term entrepreneurial success.

4 Design Thinking: A Structured Approach to Innovation

In addition to PBL, many entrepreneurial programmes in South Africa incorporate design thinking, a methodology that encourages students to focus on the needs of the end user when developing solutions. Design thinking emphasises empathy, ideation, prototyping, and testing, encouraging students to iterate on their ideas and refine them based on

feedback. This iterative process is particularly important in entrepreneurship, where the ability to pivot and adapt to new information is often the key to success.

For example, in Chapter 12: Youth entrepreneurship development through design thinking and business model innovation, students are taught to use design thinking as a framework for developing innovative business models. They are encouraged to approach problems from the perspective of the customer, asking questions like: What are the customers' pain points? What solutions will make their lives easier? How can the business model be adjusted to better meet their needs? By focusing on the user, students learn to develop businesses that are not only viable but also responsive to market demands.

The Genesis Project at the University of Cape Town takes this concept further by integrating design thinking into every stage of the entrepreneurial process. Students are tasked with developing a business idea, prototyping it, and testing it with potential customers. Through this process, they receive ongoing feedback, which allows them to refine their ideas and improve their business models. This iterative approach mirrors the real-world process of product development, where continuous learning and adaptation are essential for success.

Design thinking also helps students develop the soft skills that are critical for entrepreneurship, such as creative problem-solving, communication, and collaboration. By working in teams and engaging with multiple stakeholders (e.g., customers, mentors, peers), students learn how to navigate complex social dynamics, manage conflict, and build consensus—skills that are essential for building and leading a successful business.

5 Kolb's Learning Cycle in Action

David Kolb's learning cycle—which consists of concrete experience, reflective observation, abstract conceptualisation, and active experimentation—provides a useful framework for understanding how experiential learning works in entrepreneurial education. In many of the programmes

highlighted in this anthology, students move through the stages of Kolb's cycle as they develop their entrepreneurial projects.

For instance, in the Stellenbosch University's Masters in Engineering Management programme, students are required to engage in concrete experience by identifying real-world engineering challenges that could be solved through innovative business solutions. They then engage in reflective observation, where they analyse their experiences, identify what worked and what didn't, and consider how their actions could be improved. Next comes abstract conceptualisation, where they draw on theoretical knowledge to refine their ideas, and finally, they engage in active experimentation, where they test their solutions and make adjustments based on the results.

This cycle is not linear but continuous. As students iterate on their business ideas, they move through the cycle multiple times, each iteration bringing them closer to a viable business solution. This process not only deepens their understanding of entrepreneurship but also instils the growth mindset that is essential for entrepreneurial success. By learning to see failure as an opportunity for learning rather than as a setback, students are better prepared to navigate the uncertainties of the entrepreneurial journey.

6 Interdisciplinary Collaboration and Cross-Pollination of Ideas

Entrepreneurship, by its very nature, is a multidisciplinary endeavour. Entrepreneurs must often draw on knowledge from various fields—whether it be finance, marketing, product development, or legal expertise—to develop and sustain successful ventures. Recognising this, South African universities have embraced interdisciplinary collaboration as a cornerstone of entrepreneurial education. This approach encourages students from different academic disciplines to work together, share knowledge, and develop innovative solutions to complex problems (Naude, 2021; Ncube & Zondo, 2019).

6.1 Breaking Down Silos: The Value of Interdisciplinary Education

In many traditional higher education systems, academic disciplines are often siloed. Business students learn about entrepreneurship from a financial and managerial perspective, while engineering students focus on technical problem-solving, and students in the arts might explore creativity from an aesthetic angle. While each of these fields offers valuable insights, entrepreneurial success often requires a blending of these perspectives. A product, for example, might be technologically innovative, but without a solid business model or effective marketing strategy, it will struggle to succeed in the market.

Recognising this, South African institutions have taken steps to break down these silos and foster collaboration across disciplines. This interdisciplinary approach reflects broader global trends in higher education, where institutions are increasingly recognising the value of integrated learning. By encouraging students to engage with peers from different academic backgrounds, universities are creating environments that more closely mirror the complexities of the real world.

In the Durban University of Technology (DUT), the Ngodini Bunduz Entrepreneurship Advancement Project as presented in Chapter 2, serves as a prime example of how interdisciplinary collaboration can enhance entrepreneurial learning. In this project, students from the departments of Applied Management, Ecotourism, Entrepreneurial Studies, and Horticulture work together to develop solutions for local entrepreneurs in the Ngodini community. Each department brings a unique perspective to the table: the management students contribute their business acumen, the ecotourism students focus on sustainable tourism practices, and the horticulture students address environmental considerations related to local agricultural practices.

This cross-pollination of ideas leads to more holistic and innovative solutions. For instance, when designing a business model for a local tour operator in Ngodini, the management students may focus on profitability, while the ecotourism students ensure that the business aligns with principles of sustainability, and the horticulture students suggest ways to incorporate local flora into the tourism experience. By working

together, students are able to develop business models that are not only economically viable but also socially and environmentally responsible.

7 Entrepreneurship in Technical Fields: Engineering, Agrisciences, and Beyond

Interdisciplinary collaboration is also crucial in technical fields, where entrepreneurship often requires students to think beyond their traditional academic training. At Stellenbosch University, for example, the Masters in Engineering Management programme integrates entrepreneurial education into an engineering curriculum. Students in this programme are taught not only to solve technical challenges but also to think about how their innovations can be commercialised. This approach encourages engineers to think like entrepreneurs, blending their technical expertise with business acumen to bring their innovations to market.

The Structured Masters Degree in Engineering Management is particularly notable for its focus on sustainability and problem-based learning. Engineering students are tasked with identifying real-world challenges related to sustainability—such as water management, renewable energy, or urban infrastructure—and developing innovative solutions that can be turned into viable business ventures. By working alongside students from business and environmental studies, engineering students gain a more holistic understanding of the challenges they are addressing. This interdisciplinary approach ensures that their solutions are not only technically sound but also socially and environmentally sustainable.

Similarly, the Agrisciences programme at Stellenbosch University encourages collaboration between students studying agricultural sciences, business management, and environmental science. In this programme, students work together to develop sustainable agricultural practices that can be commercialised. For instance, an agriscience student might focus on developing a new crop variety that is more resistant to drought, while a business student works on creating a marketing strategy for the crop, and an environmental science student ensures that the farming practices are sustainable and compliant with environmental regulations. This

collaborative approach mirrors the complex nature of modern agriculture, where scientific innovation, business strategy, and environmental sustainability must be integrated to achieve long-term success.

8 Theoretical Foundations of Interdisciplinary Collaboration

The effectiveness of interdisciplinary collaboration in entrepreneurial education is supported by various theoretical frameworks. One such framework is knowledge integration theory, which suggests that innovation is most likely to occur when individuals from different knowledge domains come together to solve a problem. In entrepreneurial settings, this means that individuals from fields such as finance, engineering, marketing, and social sciences can collaborate to generate new ideas that would not have emerged within the confines of a single discipline (Van der Westhuizen, 2023).

Research on cognitive diversity also supports the idea that interdisciplinary teams are more likely to succeed in solving complex problems. Cognitive diversity refers to the differences in how individuals think, approach problems, and process information. In entrepreneurial teams, cognitive diversity often leads to more creative solutions, as team members bring different perspectives and ways of thinking to the table. By encouraging interdisciplinary collaboration, South African institutions are fostering cognitive diversity and, in doing so, enhancing their students' ability to think creatively and solve complex problems.

Another relevant theory is systems thinking, which emphasises the interconnectedness of different elements within a system. Systems thinking is particularly valuable in entrepreneurial education because it encourages students to consider how their business ideas will interact with broader social, economic, and environmental systems (Van der Westhuizen, 2018, 2024). For example, a new agricultural technology may have economic benefits, but it could also have unintended environmental consequences if not carefully managed. By working with students from other disciplines, future entrepreneurs can develop a more nuanced

understanding of these interconnections and design businesses that are both innovative and sustainable.

9 Community Engagement and Social Impact

Community engagement is a defining feature of entrepreneurial education in South Africa. In a country where socio-economic inequality remains a significant challenge, universities are increasingly recognising their role in community upliftment. Entrepreneurial education, in particular, is being leveraged as a tool for social change, with institutions developing programmes that encourage students to work closely with local communities to address pressing social and economic issues (Grobler, 2017; Groenewald, 2020).

9.1 Entrepreneurship as a Tool for Community Upliftment

One of the most compelling examples of community engagement in entrepreneurial education is the DUT-Ngodini Bunduz Entrepreneurship Advancement Project. This initiative is not just about teaching students how to start businesses; it is about using entrepreneurship to create lasting social and economic change in the Ngodini community. The project focuses on providing local entrepreneurs with the tools they need to build sustainable businesses, which in turn creates jobs, generates income, and stimulates local economic growth.

For students, this project offers a unique opportunity to apply their entrepreneurial skills in a real-world setting while making a tangible difference in the lives of community members. They learn how to conduct business needs assessments, develop business plans, and implement strategies that take into account the specific challenges faced by rural entrepreneurs. This hands-on experience is invaluable in preparing students for future entrepreneurial ventures, but it also fosters a deeper

understanding of the role that entrepreneurship can play in addressing social and economic inequalities.

The EX-CELL Workshop, as presented in Chapter 11, offers another example of how entrepreneurial education can be used to empower communities. The workshop targets youth from underserved communities, providing them with the entrepreneurial skills they need to start their own businesses. The focus on inclusivity and diversity is particularly important in the South African context, where many young people, especially those from disadvantaged backgrounds, struggle to access higher education and employment opportunities. By providing these young people with the skills and confidence to start their own businesses, the EX-CELL Workshop is helping to create a new generation of entrepreneurs who can drive economic growth and social change in their communities.

10 The Role of Social Entrepreneurship in South Africa

In recent years, the concept of social entrepreneurship has gained traction in South Africa, as more entrepreneurs seek to address social and environmental issues through their businesses. Social entrepreneurs are often driven by a desire to create social value rather than simply generating profit. For example, a social entrepreneur might start a business that provides clean energy solutions to rural communities, or a company that uses recycled materials to create affordable housing.

Universities are increasingly incorporating social entrepreneurship into their curricula, recognising that many students are motivated by a desire to make a positive impact on society. The Stellenbosch University's Social Entrepreneurship Programme offers a prime example of this. In this programme, students are encouraged to think about how their business ideas can address pressing social challenges, such as poverty, inequality, and environmental degradation. The programme emphasises the triple bottom line approach to business, which focuses on people, planet, and profit. Students are taught to consider not only the financial viability of their business ideas but also their social and environmental impact.

Social entrepreneurship is particularly relevant in the South African context, where businesses that address social challenges can play a crucial role in supporting the country's development goals. By training students to think like social entrepreneurs, universities are helping to create businesses that can address systemic challenges such as unemployment, education gaps, and environmental degradation.

11 Universities as Anchors of Community Engagement

In many ways, South African universities are becoming community anchors, institutions that not only provide education but also actively engage with the communities in which they are situated. This shift reflects a broader global trend towards the civic mission of universities, where higher education institutions are seen as key players in local and national development efforts.

Through entrepreneurial education programmes, universities are positioning themselves as catalysts for change in their communities. For example, the DUT-Ngodini Bunduz project demonstrates how universities can support local entrepreneurs by providing them with access to knowledge, resources, and networks that they might not otherwise have. By partnering with local businesses and community organisations, universities are able to extend their impact beyond the classroom and into the broader community.

In this sense, entrepreneurial education is not just about teaching students to start businesses; it is about empowering communities and creating a more inclusive and equitable economy. South African universities are increasingly recognising this, and they are designing entrepreneurial education programmes that are explicitly geared towards social impact. Whether through direct engagement with local businesses or by fostering a culture of social entrepreneurship, these institutions are helping to shape the future of South Africa's economy in a way that is both inclusive and sustainable.

12 Entrepreneurial Ecosystems and Support Structures

In the world of entrepreneurship, success is rarely achieved in isolation. Entrepreneurs depend on a range of support structures—from mentorship and funding to networks of peers and access to industry expertise. In recognition of this, South African universities are developing entrepreneurial ecosystems that provide students with the resources they need to turn their business ideas into reality (Van der Westhuizen, [2023](#)).

12.1 Building Entrepreneurial Ecosystems: Mentorship, Funding, and Networking

At the heart of any entrepreneurial ecosystem is the idea of mentorship. Successful entrepreneurs often credit their success to the guidance and support they received from mentors—experienced business leaders who provide advice, feedback, and encouragement. Recognising the value of mentorship, South African universities are increasingly integrating mentorship programmes into their entrepreneurial education offerings.

The Genesis Project at UCT, for example, provides students with access to a wide network of mentors, including industry experts, successful entrepreneurs, and academic staff. These mentors play a critical role in helping students refine their business ideas, navigate challenges, and make connections with potential investors or customers. Mentorship is not just about providing advice; it is about creating a supportive environment where students feel confident to take risks, experiment, and learn from failure.

12.2 Entrepreneurial Ecosystems and Support Structures

In the journey of entrepreneurship, individual talent, drive, and innovation are vital, but they can only go so far without the support of a well-structured entrepreneurial ecosystem. Such ecosystems consist of

various elements, including mentorship, funding, networking opportunities, access to technology, and collaboration with industry players. South African universities are increasingly recognising the importance of cultivating these ecosystems to support student entrepreneurs, helping them transition from ideation to the development and scaling of their ventures.

12.3 Mentorship: Guiding the Entrepreneurial Journey

Mentorship plays a pivotal role in entrepreneurial ecosystems, providing students with practical advice, industry insights, and emotional support. In the Genesis Project at the University of Cape Town, mentorship is embedded into every aspect of the entrepreneurial process. Students are paired with industry experts who guide them through the various stages of starting a business—from conceptualising their ideas to developing prototypes and pitching to investors. This mentorship model offers students the opportunity to gain real-world insights, helping them avoid common pitfalls while also providing a sounding board for their ideas (Fatoki, 2020; Meyer & Surujlal, 2018).

For example, one of the case studies presented in the anthology highlights a team of students working on a sustainable fashion startup. Through the Genesis Project's mentorship programme, they were introduced to leaders in the fashion industry who helped them refine their business model, identify potential suppliers, and develop a marketing strategy that resonated with environmentally conscious consumers. Without the input and guidance of experienced mentors, the team would have struggled to navigate the complexities of the fashion industry, particularly when it came to sourcing sustainable materials and adhering to ethical labour practices.

In addition to individual mentorship, peer-to-peer mentorship is another valuable component of the entrepreneurial ecosystem. North-West University's Campus Market Day, as described in Chapter 3, provides a platform for students to showcase their entrepreneurial ventures and receive feedback from their peers. This environment fosters

collaboration and mutual learning, as students not only compete but also support each other, sharing their experiences and strategies for overcoming challenges. The combination of formal mentorship from industry professionals and informal mentorship among peers creates a dynamic ecosystem where students are continually learning and growing.

12.4 Access to Funding: Fueling Business Growth

Funding is a critical component of entrepreneurial ecosystems, enabling students to move their ventures from concept to reality. Many of the case studies in this anthology highlight the difficulties students face in securing funding, particularly in a country like South Africa where access to capital is often limited. Recognising this challenge, universities have developed innovative funding models to support student entrepreneurs.

For instance, the EX-CELL Workshop (Chapter 11) incorporates a competitive funding element, where students pitch their business ideas to a panel of judges, with the top-performing teams receiving seed funding to help launch their ventures. This model mimics the real-world process of securing investment and teaches students valuable skills in pitching and negotiation. The availability of seed funding has been instrumental in helping students overcome one of the biggest barriers to entrepreneurship—access to capital.

Similarly, the Genesis Project provides students with opportunities to pitch their businesses to angel investors and venture capitalists who are part of the broader university network. By creating direct connections between students and potential investors, the university is not only facilitating access to capital but also exposing students to the broader investment ecosystem, teaching them how to engage with investors and structure deals.

Another important aspect of funding within these ecosystems is the role of university-led incubators and accelerators, which often provide both financial support and access to additional resources. At Stellenbosch University, for example, the Structured Masters Degree in Engineering Management includes partnerships with industry leaders and investors

who provide funding for student-led innovations in fields such as renewable energy and sustainable engineering solutions. The integration of academic learning with real-world financial support creates an environment where students are not just learning about entrepreneurship in theory but actively participating in it by developing scalable, fundable business ventures.

12.5 Networking: Building the Right Connections

Networking is another essential pillar of entrepreneurial ecosystems, enabling students to build relationships with key stakeholders in their industry. The Genesis Project at UCT and Campus Market Day at North-West University both illustrate the power of networking in entrepreneurial success. Through these programmes, students are given the opportunity to meet with industry professionals, investors, and government representatives who can provide insights, resources, and potential partnerships.

At Campus Market Day, for example, students not only sell their products and services to the general public but also interact with local business leaders who attend the event to scout for new talent. This kind of exposure is invaluable, as it gives students a foot in the door to industries that may otherwise be difficult to access. The connections made during these events often lead to internships, business collaborations, and even long-term mentorships.

Beyond university-hosted events, many institutions are building broader ecosystems by forming partnerships with external incubators, technology hubs, and entrepreneurial networks. These connections provide students with access to specialised resources, such as co-working spaces, legal advice, and advanced technological tools, which are crucial for scaling their businesses. For example, the Stellenbosch Engineering and Business Development Programme has partnerships with local tech hubs that provide students with access to cutting-edge technology and expertise, enabling them to prototype and test their products in a professional setting.

12.6 Fostering Collaboration with Industry

A key strength of South Africa's entrepreneurial education ecosystem is the close collaboration between universities and industry. Many of the case studies in this anthology highlight how these collaborations are creating opportunities for students to gain hands-on experience while developing products and services that meet industry needs.

In the DUT-Ngodini Bunduz Entrepreneurship Advancement Project (Chapter 2), for example, students work directly with local entrepreneurs in the Ngodini community, providing consultancy services and helping to develop sustainable business models. This collaborative approach not only benefits the students, who gain real-world experience, but also the local entrepreneurs, who receive valuable insights and support that they might not have otherwise had access to. These mutually beneficial partnerships are a hallmark of successful entrepreneurial ecosystems, where academic knowledge is applied in practical, real-world contexts.

Similarly, the Masters in Engineering Management at Stellenbosch University (Chapter 8) integrates industry collaboration into its curriculum by partnering with engineering firms and renewable energy companies. These partnerships give students the opportunity to work on real-world projects, often leading to internships or job offers upon graduation. By aligning academic programmes with industry needs, universities are ensuring that their students graduate with not only theoretical knowledge but also practical experience and industry connections.

This collaborative model also helps to address a common criticism of higher education—that it is too focused on theoretical knowledge and disconnected from the needs of the real world. By integrating industry collaboration into their entrepreneurial ecosystems, South African universities are bridging this gap and ensuring that their students are well-prepared for the challenges of entrepreneurship in the modern economy.

12.7 Technology and Digital Tools: Enabling Innovation

Access to technology is another critical element of entrepreneurial ecosystems, particularly in today's digital economy. As many of the case studies in this anthology illustrate, students are using cutting-edge technology to develop innovative products and services that meet the needs of their communities and industries. For example, in the Work Integrated Learning in Medical Laboratory Science Programme (Chapter 4), students use advanced laboratory technology to develop new testing methods that can be commercialised. This hands-on experience with the latest technology not only enhances their technical skills but also gives them a competitive edge in the market.

The role of digital platforms is also becoming increasingly important in entrepreneurial education. With the rise of Generative AI and other digital tools, students are now able to automate many aspects of their businesses, from marketing to customer service. For example, in the Design Thinking and Business Model Innovation Programme (Chapter 12), students are encouraged to use digital tools to prototype and test their business models before launching them. This iterative process allows them to refine their ideas quickly and efficiently, reducing the risk of failure and increasing their chances of success.

South African universities are embracing the potential of digital tools to transform entrepreneurship education, providing students with the skills and resources they need to succeed in an increasingly digital world. By incorporating technology into the entrepreneurial ecosystem, these institutions are ensuring that their students are not only prepared for today's economy but are also equipped to lead in the economy of the future.

12.8 Sustainability and the SDGs

The concept of sustainability has become a central theme in entrepreneurial education, particularly in South Africa, where environmental and social challenges are intertwined with economic development. Many of the case studies in this anthology demonstrate how entrepreneurial education is aligning with the United Nations Sustainable Development Goals (SDGs), encouraging students to develop businesses that are not only financially viable but also socially and environmentally responsible.

12.9 Embedding Sustainability in Entrepreneurial Curricula

In the Durban University of Technology's Ngodini Bunduz Project (Chapter 2), sustainability is embedded in every aspect of the programme. Students work with local entrepreneurs to develop businesses that are economically sustainable while also considering the environmental and social impacts of their operations. This approach reflects the broader shift in entrepreneurial education towards triple bottom line accounting, which focuses on people, planet, and profit. By teaching students to consider the environmental and social consequences of their business decisions, South African universities are preparing them to become responsible entrepreneurs who can contribute to the long-term well-being of their communities.

In the Agrisciences programme at Stellenbosch (Chapter 15), sustainability is a central focus as students work on developing sustainable agricultural practices. By combining their technical knowledge of agricultural sciences with business principles, students are developing innovative solutions to food security and environmental challenges. For example, one student-led project focuses on the development of drought-resistant crops that can be commercialised, providing both environmental and economic benefits.

12.10 Sustainability in Agrisciences and Food Services

In Chapter 15, which focuses on Agrisciences at Stellenbosch, sustainability is not only about ensuring agricultural productivity but also about addressing food security and environmental degradation. The students working in this programme are encouraged to develop entrepreneurial solutions considering agricultural practices' environmental impact. A key example involves students experimenting with sustainable farming techniques, such as agroforestry and permaculture, which simultaneously promote biodiversity, soil health, and long-term agricultural profitability. This interdisciplinary approach ensures that agriscience students graduate with both the technical expertise and the business acumen to lead in the agricultural sector.

Similarly, in Chapter 9, Food Service Management Systems are presented as another area where sustainability plays a crucial role. In this case study, students are tasked with designing business models that optimise the supply chain for food services while reducing waste and promoting ethical sourcing. The course integrates the principles of circular economy, encouraging students to think about how to minimise the environmental footprint of the food services industry. Through this real-world application of sustainable principles, students learn how to balance profitability with environmental responsibility, preparing them to lead in sectors where sustainability is a growing concern.

12.11 Sustainability in Forestry and Natural Resource Management

Chapter 16 delves into Forestry Entrepreneurship and highlights how entrepreneurial education can contribute to the sustainable management of natural resources. In this case study, students are trained to think beyond immediate financial gain and to consider the long-term environmental impact of their businesses. Forestry students are tasked with developing ventures that promote sustainable logging practices, reforestation, and ecotourism. By integrating environmental education with

entrepreneurship, universities are ensuring that future forestry professionals can operate businesses that contribute to both environmental preservation and local economic development.

The role of environmental entrepreneurship is especially relevant in regions where natural resources are a key driver of local economies. In South Africa, where forestry contributes significantly to both the economy and the environment, these entrepreneurial education initiatives ensure that future entrepreneurs are equipped to manage the delicate balance between economic growth and environmental sustainability.

12.12 Sustainability in Engineering and Renewable Energy

Chapter 8, focusing on the Structured Masters in Engineering Management at Stellenbosch University, offers another example of sustainability being embedded in entrepreneurial education. This programme encourages students to design and develop engineering solutions that tackle environmental challenges, such as water scarcity, renewable energy generation, and waste management. Students are taught to think about how engineering innovations can be turned into scalable businesses that address both local and global sustainability challenges. The programme highlights how entrepreneurial thinking can be applied to engineering to create businesses that not only succeed financially but also contribute to solving pressing environmental issues.

The inclusion of sustainability as a core part of the engineering curriculum is particularly important in South Africa, where the demand for renewable energy and resource-efficient technologies is rapidly growing. By training students to be entrepreneurs who are also sustainability advocates, Stellenbosch University is preparing a generation of engineers who can contribute to the country's long-term economic and environmental goals.

12.13 Case Study on Circular Economies: Food Services and Agribusiness

In Chapter 13, innovative teaching in food product development and entrepreneurship for student success, students are tasked with developing new products in the food and agriculture sector that focus on sustainability. The case study involves students working on projects that address food waste, sustainable packaging, and ethical sourcing. By developing and testing new products that align with principles of the circular economy, students learn how to create businesses that not only reduce environmental impact but also open up new markets for eco-friendly products.

For example, one student-led project involved the development of biodegradable packaging for a local food company, which helped the business reduce its reliance on plastic while also tapping into a growing market of environmentally conscious consumers. This case illustrates how entrepreneurial education can foster innovation that is both profitable and sustainable, preparing students to lead in industries that are increasingly focused on environmental responsibility.

12.14 Fostering a Mindset of Responsibility and Impact

Across these case studies, it is clear that South African universities are fostering a mindset among students that entrepreneurship is not just about financial success—it is about making a positive impact on the world. The emphasis on sustainability in these programmes is aligned with the United Nations SDGs, which call for businesses to contribute to environmental sustainability, social equity, and economic development. By training students to think about the long-term impacts of their business decisions, universities are helping to create a new generation of entrepreneurs who are equipped to tackle some of the world's most pressing challenges (Mbeki & Letsoalo, 2020; Visser & Tolhurst, 2017).

12.15 Challenges and Opportunities in Entrepreneurial Education in South Africa

While South African universities have made significant strides in developing entrepreneurial education programmes, there are still numerous challenges that must be addressed. However, these challenges also present opportunities for innovation, collaboration, and growth. This section will explore some of the key challenges facing entrepreneurial education in South Africa and highlight the opportunities that arise from addressing them.

12.16 Access to Resources and Infrastructure

One of the primary challenges facing entrepreneurial education in South Africa is the unequal access to resources across different institutions. While universities like UCT, Stellenbosch, and North-West University have well-established entrepreneurship centres and access to industry partnerships, smaller and under-resourced institutions often struggle to provide their students with the same level of support. This disparity in resources limits the ability of students at these institutions to fully participate in entrepreneurial ecosystems.

For example, in Chapter 18, Effectiveness of Entrepreneurial Programmes as a Strategy to Curb Unemployment at the University of Limpopo, the case study highlights how students from less resourced backgrounds often face additional barriers in accessing funding, mentorship, and market opportunities. Despite these challenges, the university has developed innovative solutions to bridge these gaps, such as leveraging alumni networks and partnerships with local businesses to create mentorship opportunities. The case study also shows that even with limited resources, entrepreneurial programmes can make a significant impact, particularly when they are focused on addressing local economic challenges, such as high unemployment rates.

12.17 Socio-economic Barriers and Inclusivity

Socio-economic factors also play a major role in determining who can access and benefit from entrepreneurial education in South Africa. Many students from disadvantaged backgrounds face financial challenges that prevent them from fully engaging in entrepreneurial activities. This issue is particularly acute in rural areas, where access to higher education is often limited, and students may lack the financial means to participate in extracurricular activities like business competitions or startup incubators.

However, this challenge also presents an opportunity for innovation. In Chapter 10, the case study highlights a programme that specifically targets underrepresented students in the sciences, providing them with additional resources and support to help them transition into entrepreneurial careers. The programme includes scholarships, mentorship, and dedicated funding for student-led research projects that have commercial potential. By addressing the socio-economic barriers that often prevent students from pursuing entrepreneurship, the programme is helping to create a more inclusive entrepreneurial ecosystem.

12.18 Technological Barriers and Digital Divide

Another major challenge in entrepreneurial education in South Africa is the digital divide, which disproportionately affects students in rural and under-resourced areas. Many students do not have access to the digital tools and infrastructure needed to participate in online learning or to develop tech-based businesses. This issue was exacerbated during the COVID-19 pandemic, when many universities shifted to online platforms for teaching and learning.

In response to this challenge, universities are exploring ways to close the digital divide by integrating digital literacy and access to technology into their entrepreneurial programmes. For example, the Work Integrated Learning in Medical Laboratory Science case study (Chapter 4) explores how students are using digital tools to develop new medical technologies that can be commercialised. The programme provides students with access to cutting-edge technology and digital platforms,

ensuring that they are equipped to participate in the digital economy. This case study highlights the potential for digital tools to bridge gaps in access, while also preparing students for the growing tech-based economy.

12.19 Opportunities for Growth: Collaboration and Innovation

Despite these challenges, there are significant opportunities for growth in entrepreneurial education in South Africa. One of the most promising opportunities is the potential for collaboration between universities, government agencies, and private industry. Many of the case studies in this anthology highlight successful partnerships that have helped to enhance entrepreneurial education and support student ventures. For instance, the DUT-NGODINI BUNDUZ PROJECT at Durban University of Technology demonstrates how universities can collaborate with government agencies and NGOs to provide additional funding, mentorship, and support to student entrepreneurs.

Additionally, the rise of digital platforms and generative AI offers new opportunities for innovation in entrepreneurial education. These tools can help overcome some of the traditional barriers to entry by providing students with access to online learning resources, business development tools, and global networks. As digital platforms continue to evolve, they will play an increasingly important role in supporting student entrepreneurs, particularly those from disadvantaged backgrounds.

13 Conclusion: The Future of Entrepreneurial Education in South Africa

In conclusion, the case studies presented in this anthology illustrate the dynamic and evolving landscape of entrepreneurial education in South Africa. Through a combination of experiential learning, interdisciplinary collaboration, community engagement, and entrepreneurial

ecosystems, South African universities are preparing a new generation of entrepreneurs who are equipped to tackle the country's most pressing socio-economic challenges.

While there are significant challenges to overcome—such as unequal access to resources, socio-economic barriers, and the digital divide—there are also immense opportunities for growth and innovation. By continuing to foster collaborative partnerships between universities, industry, and government, and by leveraging new technologies to enhance access, South African institutions can ensure that entrepreneurial education continues to drive social and economic transformation.

The future of entrepreneurial education in South Africa lies in its ability to balance profitability with social impact, to innovate while remaining grounded in local contexts, and to create entrepreneurs who are not just successful in business but who are also responsible stewards of their communities and the environment. As the case studies in this anthology demonstrate, South Africa is well on its way to achieving these goals, and the lessons learned from these initiatives will undoubtedly contribute to global discussions on the future of entrepreneurship and education.

References

- Botha, M., & Rasool, H. (2021). The effectiveness of experiential learning in entrepreneurship education: A South African perspective. *Journal of Entrepreneurship Education*, 24(1), 1–15.
- CDE (Centre for Development and Enterprise). (2020). Youth unemployment: An agenda for action in South Africa. CDE Report.
- Fatoki, O. (2020). Mentorship, access to resources, and performance of small and medium enterprises: Evidence from South Africa. *African Journal of Economic and Management Studies*, 11(2), 187–203.
- Grobler, R. (2017). *Universities as agents of social change: Entrepreneurship and community engagement in South Africa*. University of Pretoria Press.

- Groenewald, D. (2020). Social entrepreneurship education in South Africa: Addressing the challenge of unemployment. *Journal of Social Entrepreneurship*, 11(3), 245–263.
- Herrington, M., & Kew, P. (2018). *Global entrepreneurship monitor: South Africa Report 2017/18*. UCT Development Unit for New Enterprise.
- Mbeki, N., & Letsoalo, R. (2020). Sustainability and entrepreneurship education in South Africa: Building future leaders. *African Journal of Management and Innovation*, 6(1), 53–67.
- Meyer, N., & Surujlal, J. (2018). An assessment of entrepreneurial ecosystems: A South African perspective. *South African Journal of Business Management*, 49(1), 1–9.
- Naude, W. (2021) *Entrepreneurship and innovation in Africa: The role of universities*. Stellenbosch University Press.
- Ncube, M., & Zondo, R. (2019). Cross-disciplinary collaboration in higher education: A focus on entrepreneurship and engineering in South Africa. *South African Journal of Higher Education*, 33(3), 121–135.
- Smith, R. (2020). *Problem-based learning in entrepreneurship education: A review of South African approaches*. HSRC Press.
- Van der Westhuizen, T. (2018). The SHAPE project: Shifting hope, activating potential entrepreneurship. In *Incubators for young entrepreneurs—20 case histories* (pp. 225–244). Reading: Academic Conferences and Publishing International Limited.
- Van der Westhuizen, T. (2023). Youth Entrepreneurship: An Ecosystem Theory for Young Entrepreneurs in South Africa and Beyond. Springer Nature. <https://link.springer.com/book/10.1007/978-3-031-44339-8>
- Van der Westhuizen, T. (2024). *Practical tools for youth entrepreneurs: An applied approach for South Africa and beyond* (p. 223). Springer Nature. <https://doi.org/10.1007/978-3-031-44362-6>
- Visser, W., & Tolhurst, N. (2017). *Sustainability and innovation: An African perspective*. Greenleaf Publishing.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits any noncommercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if you modified the licensed material. You do not have permission under this license to share adapted material derived from this chapter or parts of it.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.



Index

A

- academic entrepreneurship 4, 28, 29, 499, 502
- access to funding 107, 395, 541
- action learning 108, 181
- active experimentation 51, 53, 55, 82, 84, 87, 89, 187, 531, 532
- active learning 12, 17, 189, 371, 413, 422, 529
- adaptability 29, 41, 53, 54, 56, 58, 67, 68, 84, 87, 169, 256, 279, 389, 411, 416, 419, 421–423, 428–432, 440, 442, 444, 448, 452, 455, 458
- admission practices 373
- adult education 226, 228
- advanced 31, 35, 36, 158, 162, 175, 370, 412, 474, 542, 544
- affordability 264, 272
- Africa 1, 12, 20, 135, 258, 296, 297, 299, 375, 471, 511
- African 2, 4–7, 10, 21, 22, 129, 132, 227, 240, 258, 299, 300, 363, 364, 471
- African context 5, 12
- African perspectives 6, 21, 256
- agri/agriculture 136, 138, 141, 263, 265, 295, 296, 309–311, 315, 317, 329, 330, 346, 348, 395, 397, 535, 548
- agricultural intensification 138, 139
- agricultural value chain 314, 315, 329
- agrisciences 13, 274, 275, 282, 311, 313, 315, 321, 325, 327, 534, 545, 546
- AgriSciences Faculty 274, 275, 314, 327, 329
- AgriTech 395

- alignment 10, 16, 31, 84, 86, 89, 184, 195, 266, 331, 366, 368, 373, 385, 416, 425, 427, 432, 435, 443, 446, 461, 463, 506, 528
 - alternative 16, 121, 138–140, 159, 180, 195, 203, 218, 228, 270–272, 291, 293, 311, 338, 346, 357, 372, 373, 417, 418, 449, 450, 458
 - alternative assessment 365, 371
 - alumni feedback 216
 - alumni networks 103, 507, 549
 - analytical 16, 191, 251, 252, 349, 457, 486
 - angel investors 106, 541
 - apartheid 7, 129–131, 133, 147, 528
 - application 55, 57, 89, 111, 131, 136, 141, 156, 159, 166, 168–170, 172, 173, 179, 180, 229, 233, 254, 274, 279, 297, 348, 365, 374, 413, 430, 442, 457, 462, 470, 477, 481, 484, 485, 488, 546
 - article 251, 471, 476, 477, 481
 - artificial intelligence (AI) 65, 116, 130, 131, 141, 257, 318, 319, 321, 367, 371, 471, 475, 478, 484, 487, 544, 551
 - assessment 9, 16, 39, 40, 50, 51, 91, 161, 165, 176, 181, 192, 194, 195, 205, 253, 266, 267, 281, 293, 296, 311, 321, 324, 347, 366, 368, 371, 387, 390, 412, 415, 426–434, 436–440, 442–444, 446, 447, 452, 454, 455, 457, 460, 461, 478–481, 517, 518, 536
 - assessment criteria 60, 254, 415
 - assessment strategy 414, 432
 - assigned 254, 265, 281, 351, 353, 454
 - assignment 16, 144, 145, 157, 161, 163, 168, 169, 171, 173, 266, 297, 319, 347, 348, 351, 353, 354, 356, 357, 428, 429, 431, 432, 434, 440, 442, 443, 445, 447–450, 454–456, 460, 461, 479, 480, 484
 - attitudes 19, 76, 179, 231, 239, 252, 288, 340, 347, 353, 400
 - attributes 30, 363, 416, 425, 440, 487
 - authentic learning 376, 433, 476, 478
 - autonomy 204, 205, 209, 210, 213, 214, 310, 417, 429, 448, 499, 504
- B**
- background 30, 60–62, 68, 103, 119, 126, 157, 160, 163, 164, 168, 184, 189, 207, 208, 228, 233, 234, 237, 250, 253, 274, 275, 290, 320, 321, 325, 328, 341, 373, 383, 384, 389, 470, 478, 499, 513, 533, 537, 549–551
 - Bandura's social cognitive career theory 422, 433, 436, 446
 - barriers 17, 28, 29, 36, 44, 76, 87, 133, 218, 228, 276, 339, 384, 471, 486, 499, 503, 507, 511, 514, 517–521, 541, 549–552
 - benefits 20, 162, 168, 186, 208, 218, 219, 230, 232, 240, 253,

299, 328, 331, 332, 343, 383,
388–390, 400, 415, 425, 437,
440, 441, 443, 485, 508, 521,
535, 543, 545, 550

best 4, 8, 10, 14, 20, 105, 108, 119,
124, 136, 161, 188, 194, 213,
230, 280, 281, 341, 384–386,
394–396, 402, 403, 412, 421,
432, 441, 455, 484, 504, 508,
518, 519, 529

bioeconomy 343

black 104, 117, 130, 132, 147, 237,
272, 275, 414, 437

blended learning 143, 187

blockchain 130, 131

block teaching 366, 372

blogging 141, 142

body 4, 14, 18, 21, 77, 121, 294,
383, 402, 418, 420, 461, 501,
508, 511, 514, 516, 517, 519,
522

Boyer Commission 207

breakdown 351, 413

breaking down silos 424

business acumen 12, 51, 54, 235,
237, 239, 488, 533, 534, 546

Business Model Canvas 54, 367,
470, 476, 477, 481, 482,
484–487

business model innovation 13, 531,
544

business models 55, 57, 58, 65, 68,
76, 117, 138, 139, 156, 161,
165, 169, 174, 190, 252, 254,
294, 320, 355, 477, 531, 533,
534, 540, 544, 546

Business Needs Analysis (BNA) 33,
34, 36, 44, 530

business plan development 181

business strategy 52, 55, 535

C

campus 16, 18, 41, 51, 65, 105,
157, 180, 188, 192, 193, 253,
255, 275, 294, 296, 355, 371,
397, 400, 501, 504, 511, 513,
515–517, 519

campus market day 50–52, 54,
59–63, 66–68, 540, 542

canvas 319, 370

capacitation 255

capacity 2, 12, 20, 28, 33, 37, 44,
78, 116, 181, 184, 191, 194,
236, 255, 294, 327, 330, 340,
349, 350, 376, 418–421, 441,
456, 474, 498, 505, 509, 512

capacity building 33

capital 29, 105, 106, 111, 117, 119,
351, 541

capstone 264, 265, 267, 318–320,
322, 324, 327, 429, 431, 434,
445

capstone project 264, 312, 320, 321

careers 49, 58, 64, 69, 77, 85, 105,
145, 155–158, 160, 162–165,
167, 168, 170–172, 218, 275,
278, 288, 313, 314, 317, 318,
325, 332, 341, 347, 362,
372–375, 389, 397, 416–419,
422, 425, 428, 433, 436, 437,
439, 446, 460–463, 506, 507,
521, 550

case module 472, 473, 475–479,
481–483, 488

case studies 1, 4, 5, 7, 13, 16, 19,
30, 44, 61, 155, 156, 179,
181, 183, 193, 227, 234, 254,

- 311, 313, 314, 318, 320, 325,
332, 341, 344, 381, 382, 384,
385, 402, 411, 412, 437, 460,
461, 471, 521, 528, 540, 541,
543–546, 548–552
- centre 121, 253, 277, 315, 319,
339, 373, 391, 393–395, 397,
502–504, 507, 511, 516, 549
- centre for teaching and learning 277
- century 133, 135, 264, 342, 446,
472
- chains 139, 254, 269, 282, 293,
310, 311, 314, 315, 317, 318,
322, 326, 546
- champions 403, 507, 512, 519
- change agency 363
- circular agronomy/agriculture 315
- circular bioeconomy 315, 317
- circular economy 343, 346, 546,
548
- circularity 315, 318
- clearance 474
- clifton 161, 176
- climate action 103, 134, 135, 201,
270
- climate change 134, 148, 203, 263,
310
- clinical 398
- coffee 180, 271, 272
- collaboration with industry 219,
540, 543
- collaborative 14, 17, 33, 85, 87,
105, 188, 194, 203, 235, 250,
279, 328, 364, 365, 367, 414,
415, 424, 429, 438, 457, 473,
477, 479, 483, 498, 501, 505,
510, 520, 521, 535, 543, 552
- collaborative curriculum
development 422, 425, 433,
437, 460, 462
- collaborative learning 476–479
- collaborative projects 253, 370
- collection 8, 81, 254, 385, 426,
427, 474, 477
- colonialism 129, 130, 135, 147
- commitment 28, 30, 66, 105, 106,
163, 164, 196, 269, 275, 278,
310, 340, 362, 365, 368, 376,
383, 394, 396, 398, 428, 484,
502, 507
- communication 41, 55, 121, 169,
173, 176, 186, 188, 190, 191,
202, 205, 230, 242, 254, 255,
265, 266, 280, 281, 309, 369,
370, 403, 411, 412, 415, 416,
419, 421–423, 432, 439, 441,
446, 449, 452, 454, 457, 479,
480, 483, 510, 531
- communities of practice 17, 181,
508, 518, 521
- community 2, 7, 12, 13, 16–18, 20,
22, 27–31, 33, 41, 44, 56, 59,
69, 101, 130, 132–136,
138–146, 148, 180, 186, 189,
206, 209, 226–233, 235, 237,
238, 240, 250–253, 255, 275,
293, 296, 299, 301, 312, 313,
328, 339, 340, 349, 364, 368,
371, 376, 384, 389, 392, 394,
396, 398, 460, 473, 474, 476,
477, 499, 503, 504, 530, 533,
536–538, 543–545, 552
- community engagement 31, 105,
134, 138, 141, 252, 255, 396,
398, 498, 503, 504, 521, 528,
536, 538, 551

- community of practice 5, 208, 213, 214, 312, 321, 329, 374
- community readiness assessment 138, 140, 141
- community upliftment 474, 536
- comparison 292, 350, 473
- competence 66, 118, 162, 202, 209, 210, 213, 319, 367, 418, 487
- competencies 2, 31, 54, 76, 84, 91, 99, 103, 117, 118, 169, 182, 195, 205, 210, 279, 288, 300, 310, 318, 321, 329, 331, 363, 364, 368, 369, 410, 412–415, 419, 422, 428, 430, 432, 434, 435, 439–443, 446, 471, 473
- competition 16, 52, 55, 56, 65, 105, 107, 112, 117, 136, 137, 185–188, 263, 290, 294–297, 393, 394, 396, 397, 399, 403, 504, 509, 510, 516, 550
- components 28, 31, 56, 60, 68, 77, 99, 102, 120, 121, 124, 138, 146, 159, 160, 162, 180, 181, 203, 204, 207, 208, 210, 219, 236, 239, 339, 347, 348, 350, 354, 356, 372, 383, 427, 428, 440, 460, 475, 484, 502, 503, 527, 540, 541
- conceptual framework 13, 82, 471, 500
- concrete experience 51, 82–85, 88, 89, 531, 532
- conferences 135, 196, 296, 391, 509, 511
- confidence 2, 51, 56, 64, 86, 89, 90, 179, 182, 207, 208, 216, 218, 235, 253, 257, 276, 280, 399, 416, 422, 423, 425, 433, 436, 442, 443, 448, 452, 460, 462, 470, 484, 510, 514, 520, 530, 537
- consent 82, 474
- constraints 7, 16, 21, 61, 62, 81, 193, 218, 219, 242, 276, 291, 292, 422, 448, 452, 455–457, 459, 483, 529
- constructive alignment 361, 365, 368, 480–482
- constructivism 54, 476, 477
- constructivist 182, 470, 475, 476, 478
- constructivist learning theory 54
- constructivist pedagogy 8
- consultation 253, 255, 256, 266, 512
- consumer 53, 54, 62, 179, 183, 213, 264, 265, 267–270, 272, 277, 279, 288, 310, 318, 413, 540, 548
- content 4, 5, 11, 123, 141, 142, 144, 146, 157, 160, 165, 173, 195, 204, 219, 226, 232–234, 240–242, 280, 319, 321, 344, 346, 347, 350, 351, 354, 366, 373, 389, 415, 434–437, 439, 445, 455, 460, 461, 463, 469, 480, 482, 485
- continuous improvement 62, 173, 188, 452, 518
- correctional education 226
- course design 22, 213, 415, 416, 422, 425, 426, 428, 432, 434, 460, 461
- course evaluation 107, 426, 427, 434
- creation 28, 30, 99, 101, 102, 104, 111, 180, 242, 256, 325, 338, 363, 383, 386, 390–392, 394,

- 395, 397, 416, 418, 425, 437,
442, 460, 474, 477, 499–501,
504–507, 510, 514, 528, 529
- creativity 2, 12, 16, 50, 51, 54, 63,
84, 115–119, 122–124, 179,
180, 182, 189, 202, 205, 209,
252, 292, 347, 367, 372, 382,
383, 393, 397, 423, 431, 442,
444, 445, 448, 451, 470, 471,
527, 533
- credits 10, 18, 99, 120, 121, 157,
162, 168, 264, 274, 472, 515,
519, 539
- criteria 31, 101, 119, 136, 156, 163,
183, 237, 274, 278, 347, 459
- critical skills development 410
- critical thinking 41, 54, 85, 160,
170, 188, 190, 208, 269, 276,
293, 299, 368, 389, 413, 416,
421, 422, 430, 439, 455, 458,
482, 484, 487
- cultural diversity 7
- curriculum architecture 365
- curriculum design 2, 9, 10, 365,
382, 411, 424, 426, 429, 432,
433, 436, 444, 446, 505
- curriculum development 462, 510
- curriculum enhancement 403, 444
- curriculum innovation 18
- curriculum integration 393, 394,
400
- curriculum reform 4, 76, 79, 282
- curriculum renewal 266, 365
- customer 49–53, 56, 66, 68, 100,
137, 176, 191, 272, 315, 318,
319, 322, 355, 474, 486, 531,
539, 544
- D**
- data analysis 81, 132, 205, 210,
401, 481
- define stage 290, 291
- definition 312, 326, 339, 451, 477,
506
- degree 19, 81, 101, 121, 131,
156–160, 162–165, 167,
169–171, 173, 183, 213, 228,
249, 264, 274, 275, 310–312,
315, 320, 321, 325, 329, 373,
472, 473, 511, 515, 534, 541
- delivery 77, 79, 164–166, 169, 172,
173, 195, 226, 357, 388, 398,
412, 414, 416, 436, 438, 445,
450, 485
- demographics 83, 100, 104, 111,
158, 328, 401, 518
- Department of Correctional Services
225, 226, 234, 241
- design thinking 13, 28, 31, 33, 36,
102, 103, 111, 121, 194, 250,
252, 254, 272, 277, 288–290,
292, 293, 296, 300, 301, 312,
318, 319, 326, 367, 470, 471,
475, 485, 487, 530, 531, 544
- devices 255, 395, 419
- diffusion 161
- digital 9, 45, 130–132, 134, 147,
169, 184, 186, 257, 310, 403,
479, 480, 484, 485, 487, 497,
527, 544, 550, 551
- digital apartheid 130, 145, 147
- digital divide 130, 147, 550, 552
- digital marketing 144, 146
- digital tools 226, 476–478, 487,
544, 550, 551
- diploma in sustainable development
361, 375

disciplined entrepreneurship 104,
111
disciplines 1, 64, 80, 117, 118, 122,
123, 157, 163, 164, 168, 208,
239, 265, 267, 310, 314, 325,
326, 328, 342, 383, 384, 389,
393, 396–398, 411, 418, 456,
504, 532, 533, 535
disorienting dilemma 229
disruptive 103, 161, 174
distance 50, 301, 480
diversity 33, 59, 61, 68, 103, 119,
156, 164, 168, 170, 183, 239,
310, 328, 329, 535, 537
Durban University of Technology
(DUT) 11, 28–35, 37–45,
299, 528, 529, 533, 536, 538,
543, 545, 551

E

ecobags 394
Economic Activation Offices (EAO)
507–509, 511
economic inclusion 226–228, 504
economic insecurity 473
economic sustainability 181, 228,
269, 330
ecotourism 36, 39, 533, 546
EDHE Lekgotla 509
EDHE Programme 104, 105, 294,
505–508, 521, 522
education models 4, 134, 148
education systems 10, 20, 118, 130,
147, 182, 288, 349, 533
edutainment 250
effectiveness of entrepreneurial
programmes 13, 382, 386,
402, 549

effectuation 5
effectuation theory 7, 55, 67,
86–89, 91
emerging technologies 58, 131, 161,
176
emotional 290, 368, 458, 540
empathize stage 290, 291
employability 76, 84, 162, 213, 249,
257, 339, 382, 390, 402, 410,
411, 414–422, 424–428, 432,
434, 436–438, 440, 443, 445,
446, 454–459, 476, 478, 511
employer 162, 164, 167, 168, 293,
390, 409, 410, 415, 419, 422,
425, 428
employment 27, 77, 80, 86, 168,
182, 193, 226, 228, 230, 231,
234–237, 239, 250, 251, 253,
309–311, 314, 317, 322, 329,
337–340, 381, 382, 384, 386,
396, 402, 409–411, 416, 417,
420, 424, 430, 432, 445, 446,
460, 504, 505, 507, 514, 527,
537
employment challenges 80
ENACTUS 104, 105, 107, 186,
187, 295, 399
Enactus South Africa 295
engineering and renewable energy
547
engineering entrepreneurship 12
engineering management 156, 157,
159, 162, 163, 167, 169, 170,
172–174, 176, 534, 541
enrolment 19, 31, 156, 170, 202,
362, 473
enterprises 101, 103, 132, 193, 295,
297, 313, 320, 330, 339, 373,

- 375, 397, 398, 503–505,
507–509, 520
- entrepreneurial ability 49, 181, 287,
294, 514
- entrepreneurial competencies 2, 13,
29, 66, 76, 77, 79, 87, 102,
185, 282, 309, 390, 420, 430,
442, 509
- entrepreneurial ecosystem 11, 12,
28, 29, 44, 50, 56, 63, 64, 67,
87, 91, 106, 176, 185, 187,
192, 256, 257, 313, 392, 393,
482, 483, 488, 498–506, 508,
510, 512, 513, 515, 516, 518,
520, 521, 528, 539–544, 549,
550, 552
- entrepreneurial education 12, 56,
57, 59, 60, 66, 102, 180, 186,
188, 192, 231, 252, 269, 287,
309, 340, 382, 400–402, 471,
482, 486, 488, 504, 527–529,
531, 532, 534–539, 543–552
- entrepreneurial experimentation 86,
90
- entrepreneurial initiatives 44, 185,
186, 382–385, 390, 396, 398,
515
- entrepreneurial intention 4, 76, 78,
187, 232, 251, 252, 357, 385,
418, 420, 426, 431, 436, 471
- entrepreneurial law clinic 134
- entrepreneurial learning 7, 13, 14,
19, 22, 51, 89, 156, 180–182,
184, 190, 435, 533
- entrepreneurial mindset 7, 12, 13,
28, 49, 61, 78, 80, 81, 86, 91,
102, 176, 180, 181, 202, 231,
267, 276, 278, 292, 311, 332,
361, 363, 372, 373, 392, 414,
446, 470, 498, 504, 505, 509,
513
- entrepreneurial opportunities 141,
142, 182, 226, 310, 315, 317,
383, 386, 387, 391, 418, 499,
508, 513
- entrepreneurial principles 78, 87,
160, 282
- entrepreneurial resilience 56, 430,
475–477, 485, 487, 488
- entrepreneurial skills 5, 51, 76, 77,
79, 80, 84, 89, 132, 134, 148,
179–181, 184, 185, 187, 191,
231, 235, 236, 266, 276, 279,
311, 321, 370, 376, 382, 384,
387, 394, 427, 440, 442, 445,
470, 481, 530, 536, 537
- entrepreneurial thinking 12, 62, 68,
75, 78–80, 82, 84, 85, 87, 88,
90, 91, 331, 342, 383, 397,
432, 505, 547
- entrepreneurial university 14, 133,
311, 498, 504, 505, 508, 511,
520, 521
- entrepreneurial venture 56, 156,
161, 252–257, 315, 329, 386,
391, 403, 471, 498, 507, 521,
536, 540
- entrepreneurship competitions 136,
297, 375, 384, 393, 396, 403
- entrepreneurship confidence 180
- entrepreneurship curriculum 328,
339, 501
- entrepreneurship development 13,
105, 227, 252, 255, 328, 420,
505–509, 516, 518, 520, 521,
531
- Entrepreneurship Development in
Higher Education (EDHE) 5,

- 14, 17, 18, 105, 107, 187,
294, 297, 500, 505–522
- entrepreneurship ecosystems 14,
392, 482, 500, 506, 514, 518,
521, 522
- entrepreneurship education 2, 4–14,
16–18, 20–22, 50, 54, 57, 59,
66–69, 103, 148, 181, 187,
193, 194, 196, 229–231, 236,
242, 287, 288, 292, 293, 301,
310, 312, 318, 319, 325, 327,
330, 338–342, 344–346, 348,
350, 353, 354, 357, 366, 373,
382–394, 399–401, 403, 404,
418, 442, 470, 471, 473, 480,
484, 485, 487, 500, 544
- entrepreneurship environment
framework 338
- entrepreneurship in higher education
340, 498, 505, 511, 522
- entrepreneurship opportunities 329,
353, 355, 398
- entrepreneurship program 187
- entrepreneurship training 12, 13,
182, 183, 203, 227, 229, 231,
232, 236, 325, 341, 398, 418
- entrepreneurship workshops 183,
297
- environmental sustainability 41,
101, 267, 269, 530, 535, 547,
548
- ENVISION 31, 101
- equity 29, 30, 383, 512, 548
- ethics 83, 110, 144, 146, 355, 370,
484
- evaluation 17, 22, 45, 50, 66, 100,
107, 123, 341, 371, 426, 427,
438, 443, 445, 446, 458, 460,
479, 506, 514, 517, 518
- events 31, 51, 53, 56, 62, 63,
65–67, 86, 105–107, 117,
210, 275, 277, 278, 296, 321,
364, 365, 367, 370, 371, 393,
397, 399, 432, 509, 510, 517,
542
- experiential 13, 16, 17, 31, 33, 50,
101, 180, 182, 192, 229, 276,
278, 353, 371, 375, 422, 435,
442, 460
- experiential learning 4, 8, 9, 12, 13,
20, 28, 36, 51, 58, 66, 134,
180, 183, 185, 186, 188, 195,
229, 266, 279, 361, 365, 371,
382, 410, 422, 424, 425,
431–435, 444, 446, 460, 462,
475, 528, 529, 531, 551
- experiential learning theory 187,
192, 529
- experimental design 205
- exposure 7, 19, 62, 66, 85–87, 90,
130, 202, 234, 254, 313, 355,
393, 397, 399, 400, 403, 422,
431, 436, 437, 442, 461, 470,
478, 483, 509, 511, 542
- extension 41, 179, 183, 195, 325
- external 8–10, 17, 30, 106, 107,
116, 141, 168, 192, 195, 225,
232, 233, 299, 316, 328, 331,
332, 355, 365, 374, 391, 432,
433, 439, 442, 445, 448, 449,
455, 456, 460, 462, 463, 497,
498, 501, 502, 508, 509, 512,
521, 542
- external partnerships 404, 446

F

- faculties 8, 10, 17, 18, 56, 63, 64, 99, 101, 105, 106, 110, 111, 118–120, 124, 141, 142, 164–167, 184, 187, 204–206, 254, 274, 282, 293, 296, 300, 311–313, 321, 325–332, 382–385, 388–390, 392, 394–401, 403, 404, 415, 480, 482, 499, 500, 507, 513, 519, 521
- faculty development 4, 5
- faculty of health sciences 396, 398
- faculty of humanities 396, 397
- faculty of science and agriculture 396
- fava-bean 272, 277
- feedback loops 9, 413, 414, 433, 456, 476, 477, 481, 518, 520
- fellowship 20, 327
- financial 36, 50, 51, 53, 56, 59, 60, 62, 105, 131, 190, 193, 194, 227, 231, 252, 279, 330, 337, 340, 343, 363, 372, 397, 413, 417, 423, 424, 447, 449, 451, 452, 486, 497, 533, 537, 541, 542, 546, 548, 550
- financial inclusion 227
- financial literacy 30, 33, 181, 183
- flexible 10, 18, 20, 155, 161, 213, 455, 515, 519
- flexible lab access 204, 210
- fly 272
- food 61, 116, 136, 138, 141, 144, 188, 190, 263–272, 276–280, 297, 315–317, 346, 371, 545, 546, 548
- food industry 264, 269, 270, 278, 279
- food product development 13, 264, 271, 548
- food science 157, 164, 264, 265, 267, 269, 274, 275, 278, 282, 329
- food security project 138, 140
- food service management systems 179, 183, 546
- food services 180, 183, 546, 548
- forest 314, 325, 342, 343, 345, 351–353, 355–357
- forest and wood science 314, 325
- forest project 141
- forestry 141, 314, 315, 325, 326, 342–351, 353–357, 546, 547
- forestry industry 325, 346, 354, 356
- formalisation 252, 253
- formative assessment 50, 51, 414
- fourth industrial revolution 130–132, 134, 147, 173, 362
- freeware 250
- Freire, Paulo 132, 133, 362
- FRT 345, 347, 350, 351
- future now summit 365, 370, 372
- future of grapes and wine 312, 323, 332
- futures 8, 11, 21, 50, 53, 56, 58, 62, 68, 69, 79–82, 84, 86, 90, 131, 132, 135, 144, 156, 159, 160, 164, 165, 169, 170, 173, 184, 187, 192, 202, 213, 214, 219, 239, 251–254, 257, 266, 275, 278, 280, 282, 288, 293, 301, 309–312, 314, 318, 321, 322, 325, 327, 329–331, 357, 361, 363, 368, 371, 373, 375, 376, 400, 425, 437, 439, 443, 446, 460, 461, 489, 535, 536, 538, 544, 547, 551, 552

future skills 309
futures thinking 315

G

Gantt charts 413, 450
gender 33, 61, 83, 85, 103, 111,
119, 134, 148, 255, 341, 501,
510, 512, 513
Genesis 28, 99, 100, 102–112, 120,
121
Genesis Project 99–102, 104–111,
120, 121, 531, 539–542
geriatric 272
government 18, 77, 202, 251, 270,
294, 295, 338, 383, 391, 415,
501, 505, 507–509, 512, 520,
542, 551, 552
graduate attributes 213, 363–365,
368
graduate employability 410, 411,
416, 420, 422, 426, 445
graduate entrepreneurship 417, 418,
505
grand challenges 14, 469–471, 473,
475, 477, 485
grape and wine sciences 314, 320
green economy 102, 136, 139, 343,
362, 370
Green Incubator 134–136, 138,
139, 141, 148
group(s) 61, 100, 120, 160, 169,
182, 184, 188–190, 204, 205,
209, 210, 218, 226, 227, 232,
253, 281, 292, 322, 399, 401,
473, 474, 478, 503, 510, 517,
518

group work 17, 100, 108, 143, 159,
218, 230, 321, 329, 367, 443,
448, 454, 457, 473, 478, 479

H

healthcare 75–80, 84–91, 201, 395,
398
hemp 271
Higher Education Institutions 4,
110, 228, 229, 234, 236, 239,
242, 296, 311, 337, 339, 344,
349, 350, 357, 382, 383, 392,
394, 402, 410, 411, 418, 430,
469, 485, 498–500, 510, 538
holisticity 477
horizontal alignment 368
horticulture 36, 40, 533
hospitality 12, 179, 181, 183, 184,
189, 192
hospitality education 12, 181, 187
hub 30, 63, 107, 188, 371, 390,
393, 395, 397, 482, 499–501,
508, 542
human capital 106, 387, 388, 501
human capital theory 162, 387, 418
hybrid 8, 90, 155, 157, 164–166,
169, 172, 175, 180, 238, 255,
256, 276, 373, 420, 479
hybrid wil models 87, 90

I

idea fest 370, 372
idea generation 63, 108, 281, 291,
442
ideate stage 291

- ideation 55, 60, 104, 105, 136, 252, 291, 364, 367, 368, 443, 446, 471, 482, 530, 540
- identity 36, 61, 202, 213, 216, 235, 364, 367, 436, 446
- imagination 116, 118, 119, 362
- imperatives 1, 10, 31, 61, 253, 255, 266, 382, 497, 505, 506, 528, 530
- implementation 29, 31, 33, 130, 134, 140, 142, 184, 191, 193, 195, 207, 226, 232, 243, 254, 293, 299, 314, 322, 325, 328, 339, 344, 351, 353, 354, 387, 399, 410, 411, 450, 457, 478, 512
- implications 9, 14–20, 52, 76, 80, 269, 312, 402, 462, 498
- importance 2, 5, 14, 16, 19, 20, 41, 56, 60, 67, 78, 82, 86, 119, 163, 168, 174, 183, 185, 189, 191, 216, 226, 227, 233, 242, 251, 293, 313, 315, 327, 339, 388, 403, 499, 502, 503, 505, 513, 521, 529, 540
- incarcerated 225–234, 236, 240, 242, 243
- incarceration 225, 230, 231, 233
- inclusive 2, 7, 14, 57, 62, 134, 139, 148, 161, 180, 193–195, 202, 213, 227, 251, 275, 299, 469, 485, 503, 510, 512, 513, 516–518, 520, 528, 538, 550
- inclusive education 134, 148
- inclusive entrepreneurship 227
- inclusivity 33, 50, 60–63, 68, 132–134, 226, 234, 239, 275, 373, 501, 502, 520, 521, 537, 550
- incubation 64, 134, 136, 137, 277, 319, 392, 394–396, 418, 482, 504, 510, 512
- incubators 10, 17, 18, 56, 65, 67, 167, 327, 328, 383, 384, 391, 482, 484, 501, 506, 507, 509, 516, 518, 520, 541, 542, 550
- indigenous knowledge 4, 8, 371
- industry collaboration 67, 103, 397, 432, 463, 503, 543
- industry engagement 196, 410, 425, 433, 434, 436, 444, 445, 460, 462
- industry mentors 462
- industry partnerships 10, 67, 87, 90, 394, 403, 425, 434, 436, 461, 463, 482, 549
- informal 31, 100, 187, 250, 252, 253, 255, 256, 461, 514, 541
- informal sector 27, 253, 310
- infrastructure 17, 27, 31, 58, 90, 103, 104, 107, 119, 134, 141, 162, 165, 184, 186, 194, 202, 255, 270, 275, 299, 348, 391, 482, 509, 534, 549, 550
- infrastructure and support 237
- infrastructure barriers 44
- innovation and creativity 108, 185, 191, 498
- innovation ecosystem 203, 364
- innovation hubs 355, 383, 384, 391, 397, 504, 515
- innovation in healthcare 77, 87
- innovation management 161, 169, 173
- innovation pedagogy 288, 301
- innovation strategy 175, 367, 374
- INNOVUS 205, 277, 328, 332

inquiry 8, 22, 52, 76, 203, 204,
 209, 471, 476, 477, 486
 institutional challenges 515
 institutional structures 498, 504,
 521
 institutional support 17, 156, 326,
 373, 500, 512
 institutional theory 387
 integrative thinking 421, 430, 440,
 456, 458
 intentions 2, 294, 340, 341, 443
 interactive 40, 146, 219, 250, 275,
 339, 444, 480–482, 513
 interdepartmental collaboration 195
 interdisciplinary 12, 13, 18, 195,
 365, 366, 375, 389, 390, 395,
 410, 456, 476, 533, 535
 interdisciplinary approaches 1, 202,
 533, 534, 546
 interdisciplinary collaboration 9, 62,
 184, 195, 366, 389, 396, 470,
 528, 532–535, 551
 interdisciplinary learning 361, 365,
 366
 internal 10, 30, 107, 110, 141, 232,
 294, 299, 328, 331, 342, 355,
 439, 449, 500, 502, 511, 512
 international 7, 22, 45, 103, 104,
 156, 163, 168, 174, 181, 185,
 236, 252–254, 256, 277, 287,
 295, 319, 375, 412, 483, 511,
 512
 internationalisation 251, 253, 256
 internet 116, 118, 130, 145, 479
 internship 4, 16, 19, 80, 206, 207,
 322, 324, 368, 372, 374, 393,
 397, 403, 422, 425, 460, 462,
 542, 543
 intervarsity 294, 509, 510, 516

interventions 2, 9, 11, 140, 141,
 145, 148, 165, 167, 179, 183,
 193, 203, 205, 219, 311, 321,
 325–327, 331, 332, 371, 419,
 475, 503, 511, 512, 530
 iterative 36, 184, 204, 365, 366,
 371, 414, 420, 439, 442, 449,
 470, 481, 484–487, 531, 544
 iterative feedback 531

J

job creation 103, 339, 390, 391,
 500, 507, 509, 511

K

knowledge transfer 9, 390, 474,
 476, 477, 485, 499
 Kolb, D.A. 8, 51, 53–56, 78, 82,
 180, 187, 188, 529, 531, 532
 Kolb's experiential learning cycle 88,
 91
 Kolb's experiential learning theory 7,
 51, 55, 56, 78, 82
 Kolb's learning cycle 529, 531

L

laboratory techniques 202
 large class sizes 207, 218, 219
 larvae 272
 launch 62–64, 105, 111, 156, 167,
 188, 191, 362, 374, 482, 541
 LaunchLab 277, 328, 332
 Launchlab incubator 312, 328
 launch phase 192
 leadership 9, 14, 17, 85, 101, 102,
 159, 162, 165, 169, 175, 191,

- 251, 266, 275, 276, 309, 321,
363, 364, 367–370, 373–375,
411, 412, 419–422, 439, 440,
442, 445, 448, 451, 454, 457,
501, 508, 512, 514, 519
- leadership development 441, 446,
483
- lean 111, 139, 203, 319, 326, 367,
370
- lean startup 5, 190, 319, 326
- lean startup method 86–89, 91
- lean startup methodology 319
- learning outcomes 8, 16, 33, 111,
195, 209, 210, 212, 239, 264,
267, 353, 354, 363, 364, 366,
368, 370, 371, 412, 413, 460,
480, 481
- learning through experience 85, 180,
529
- lecturer competency 2
- lekker 271
- lifelong learning 162, 163, 165, 169,
170, 191, 194, 251, 265, 411,
419, 424, 425, 432, 433, 437,
444, 446, 461, 463, 469, 485,
497
- likert 81, 256, 400
- Lindt 412, 415, 435
- living labs 28–30
- Lynedoch Ecovillage 371
- M**
- machine learning 131
- Mamelodi 253, 255
- mandate 7, 99, 103, 134, 156, 234,
239, 263, 345, 473, 474, 518
- manufacturing 264, 271, 314, 346,
351, 353, 355
- marginalised communities 138, 141,
142, 145, 227
- marketing 16, 33, 53, 56, 102, 104,
112, 121, 186, 191, 254, 255,
296, 321, 322, 355, 532–535,
540, 544
- market research 111, 181, 188, 190,
195, 265, 267, 355, 356
- market structure 41–44, 417
- masters 102, 156, 157, 159, 163,
167, 171, 173, 470, 472, 475,
534, 541
- Masters in Engineering Management
155, 532, 534, 543, 547
- MBA 121, 159
- measurement 432
- Medical Laboratory Science (MLS)
12, 75–81, 83–91, 544, 550
- meetings 100, 104, 105, 107, 110,
112, 140, 141, 209, 264, 276,
288, 312, 403, 479
- mentoring 64, 67, 107, 181, 185,
204, 205, 210, 279, 367, 391
- mentorship 5, 8, 19, 61, 65, 77, 90,
181, 207, 257, 266, 278, 282,
368, 374, 391, 394–397, 418,
422, 424, 425, 436, 460, 462,
482, 483, 499, 501, 503,
509–512, 514, 517, 519, 520,
539–542, 549–551
- mentorship and industry
partnerships 90
- metacognitive skills 433
- methodology 2, 36, 101, 111, 143,
144, 146, 175, 188, 277, 293,
356, 370, 400, 401, 412–414,
426, 471, 486, 487, 530
- microbial ecology 202, 205
- microbiology 202, 219, 276

Microsoft 81, 474, 479
 mindfulness 122
 mindset 12, 16, 17, 21, 30, 58, 68,
 76, 117, 122, 126, 158, 170,
 233, 254, 312, 313, 381, 382,
 384, 391, 418, 425, 434, 437,
 442, 461, 463, 507, 521, 532,
 548
 misalignment 389
 mission 28, 138, 278, 300, 311,
 373, 445, 473, 500, 504, 508,
 538
 monitoring and evaluation 19, 367,
 512, 517
 MTN 295–297
 multimodal 480, 481
 Musk, Elon 116, 118

N

narrative inquiry 31
 natural 135, 203, 266, 342, 343,
 546, 547
 networking 33, 85, 107, 111, 181,
 184, 185, 187, 191, 253, 355,
 367, 391, 393, 399, 403, 423,
 431, 432, 441, 449, 452, 514,
 539, 540, 542
 new media 141, 142, 144, 146
 New Media and Transmedia Clinic
 134, 141, 148
 new product development (NPD)
 264, 266–271, 275–282, 329,
 413, 442
 Ngodini 27–31, 33, 34, 39–41, 43,
 44, 530, 533, 536, 543
 Ngodini Bunduz 30, 36, 40, 42

Ngodini Bunduz Entrepreneurship
 Advancement Project 28, 31,
 45, 529, 533, 536, 543
 Ngodini Bunduz Project 11, 34, 35,
 37–40, 42, 43, 538, 545, 551
 NQF 144, 157, 163, 471
 nutritions 276
 nutritional 265, 276

O

offices 18, 105, 327, 356, 393, 395,
 508, 515, 516
 online 65, 105, 107, 123, 132, 155,
 157, 164–166, 169, 172, 208,
 238, 250, 255, 276, 278, 281,
 294, 296, 328, 332, 366, 367,
 373, 403, 442, 473, 475,
 478–480, 483, 550, 551
 opportunities for growth 551, 552
 opportunity recognition 54, 88, 89,
 91, 231, 309, 418, 423, 430,
 431, 435, 442–445, 447, 451
 organisation 20, 101, 105, 140, 159,
 161, 175, 225, 253–255, 295,
 297, 300, 339, 341, 374, 399,
 400, 500, 509, 538
 originality 10, 22, 279, 448, 478
 outcome expectations 422, 425,
 433, 436, 437, 460, 462

P

participant profile 101
 passion 118, 207, 250, 256, 363,
 372
 pedagogical framework 2, 410, 414
 pedagogical innovation 1, 9, 12, 13,
 17, 21, 372, 411, 414

- pedagogical practices 1, 6, 181, 229, 362, 432
- pedagogical strategies 424, 432, 436
- pedagogy 1, 2, 4–14, 17–22, 105, 148, 181, 182, 192, 194, 276, 287, 288, 299, 350, 416, 420, 437, 438, 446, 470, 471, 487, 488
- peer 8, 55, 87, 89, 168, 172, 213, 230, 234, 250, 253, 258, 353, 354, 365, 366, 399, 414, 430, 438, 443, 444, 446, 449, 455, 456, 471, 472, 474, 476, 477, 479, 487, 511, 515, 519, 528, 530, 531, 533, 539–541
- peer assessment 371, 454
- peer collaboration 210
- peer feedback 365, 368, 370, 454
- peer learning 61, 250, 251, 366, 372, 399, 400, 471, 472, 487, 508
- peer mentorship 517, 519, 540
- personal reflection 452, 458
- phenomenology 472, 474–478
- pilot project 179
- pitching 107, 136, 180, 181, 188, 190, 192, 321, 322, 482, 509, 540, 541
- pitching phase 188, 190
- pitch training 55
- podcasting 141, 142, 144, 367, 370
- poetry 122
- policy 7, 9, 10, 14, 18–20, 22, 29, 63, 81, 130, 185, 194, 195, 226–228, 252, 274, 299, 300, 338, 362, 373, 383, 385, 386, 392, 394, 400, 402, 417, 474, 499–506, 512, 514–516, 518–521
- policy development 311
- postgraduate 31, 33–35, 101, 105–107, 115, 155, 157, 162, 165, 167, 172, 203, 204, 208, 213, 216, 327, 472
- poverty 27, 31, 41, 101, 116, 130, 134, 135, 147, 148, 227, 229, 236, 253, 264, 266, 297, 346, 363, 473, 483, 500, 537
- pracademics 365, 366, 374
- practical application 67, 103, 195, 256, 366, 386, 399, 400, 435, 443, 483, 485
- practical learning 373, 425, 461, 476
- practical skills 28, 254, 265, 266, 362, 383, 529, 530
- practical tools for youth entrepreneurs 30, 44
- problem-solving 12, 16, 30, 33, 36, 51, 53, 54, 57, 62, 64, 66, 84, 85, 87, 89, 91, 132, 134, 140, 146, 148, 155, 158, 169, 179, 180, 182, 188, 191, 216, 219, 254, 267, 276, 278, 318, 329, 346, 368, 370, 371, 389, 411, 415, 419, 421, 429, 432, 439, 451, 454, 457, 470, 473, 476, 477, 479, 482, 487, 488, 528, 531, 533
- profession 79, 85, 418, 419
- professional development 17, 18, 76, 77, 80, 82, 83, 85, 91, 415, 463
- professional skills 162, 309, 374, 421, 455
- profit 30, 53, 58, 59, 68, 117, 120, 191, 228, 266, 271, 295, 363, 515, 537, 545

progression 239, 301, 322, 369, 414
 project design 205
 project life cycle 354, 412
 project management 111, 169, 175,
 367, 409–415, 418–421, 423,
 426, 428–430, 432, 435, 437,
 439, 442, 446, 448
 project planning and execution 424,
 442, 450, 453
 protein 270–272
 prototype 9, 16, 55, 90, 111, 120,
 290–292, 296, 470–472, 475,
 485–487, 540, 542, 544

Q

qualitative 31, 160, 193, 256, 348,
 400, 401, 419, 426, 427, 434,
 435, 437, 440, 443–445, 474,
 476, 477, 481, 514
 quality education 1, 29, 30, 33, 41,
 57, 103, 134, 141, 161, 180,
 184, 186, 191, 194, 202, 236,
 296, 301, 469, 485
 quantum computing 130

R

racism 240
 recidivism 228–230, 235, 242
 recognition 17, 60, 75, 147, 216,
 226, 278, 328, 330, 411, 428,
 436, 437, 516, 539
 recruitment 274, 275, 373
 refinement 66, 292, 477
 reflective observation 51, 56, 82, 89,
 531, 532
 reflective practice 87, 91, 192, 371,
 446

reforesting 138, 141
 regional context 502
 regional development 382, 383, 389,
 398, 504
 rehabilitation 225, 226, 230, 235
 rehabilitation programmes 234, 235
 reintegration 226, 228, 230–232,
 235, 236, 242, 243
 research commercialisation 395,
 397, 502, 503
 research project 162, 166, 202, 219,
 393, 397, 473, 482, 550
 research questions 76, 209, 386,
 476, 477, 486, 487
 resilience 16, 29, 30, 36, 44, 50, 53,
 58, 67, 68, 87, 90, 103, 132,
 164, 180, 227, 251, 276, 279,
 329, 361, 418–421, 429, 438,
 439, 456, 458, 469, 485, 487
 resistance 330, 331, 388, 478
 resource constraints 19, 41, 504, 514
 revenue 53, 118, 179, 277, 393,
 395, 486
 risk 5, 17, 19, 55, 57, 64, 66, 68,
 89, 101, 106, 175, 176, 182,
 191, 232, 266, 270, 276, 347,
 413, 418–420, 423, 447, 451,
 456, 459, 473, 539, 544
 risk management 53, 67, 412, 413,
 418, 420, 423, 430, 432, 443,
 447, 451
 robotics 131
 rural 7, 22, 27, 29–31, 44, 45, 130,
 134, 142, 143, 145, 147, 255,
 383, 395, 530, 536, 537, 550
 Rush Accountants 181, 183

S

- safe 19, 106, 189, 266, 271, 276, 321, 364, 365, 372
- safety 50, 264, 265, 270, 276
- screening 147, 291
- seeditious change 117
- segmentation 320
- selection 61, 101, 175, 190, 205, 274, 320, 347, 354, 474, 479
- selection bias 183
- selection criteria 81, 183
- selection process 31, 60, 101
- sensory 265, 276
- service blueprinting 370
- service learning 275, 288
- SHAPE 30
- siloed 388, 456, 458, 533
- 6c's framework 2
- Siyaphakama Ngodini Business Forum 36–38, 41–43
- skills development 30, 77, 183, 195, 206, 446, 509, 511
- skills required 41, 118, 232
- skills transfer 84
- social activation 367
- social change 76, 190, 228, 370, 505, 536, 537
- social cognitive theory 187, 190
- social development 138, 295
- social entrepreneurship 13, 14, 75, 78, 87, 90, 186, 190, 227, 229, 251, 329, 330, 361, 363, 365, 366, 368, 370, 372, 375, 537, 538
- social impact 59, 78, 100, 101, 106, 227, 230, 234, 242, 366, 374, 482, 484, 536, 538, 545, 552
- social impact mandate 234, 239
- social innovation 132–134, 375
- social issues 231, 330
- social justice 141
- social responsibility 68, 234, 318, 355
- soft skills 266, 309, 332, 412, 531
- soldier 272
- South Africa 5–7, 13, 14, 20–23, 27, 30, 36, 76, 77, 79, 80, 91, 100–102, 110, 111, 129–132, 134, 135, 147, 156, 158, 162, 164, 173, 181, 185, 201–203, 225, 227, 228, 230, 234, 249–252, 257, 258, 263, 264, 266, 272, 294, 296, 299, 300, 310, 327, 329, 330, 337, 346, 348, 350, 351, 361, 362, 376, 382–386, 402, 409, 412, 416, 428, 439, 442, 470, 472, 473, 498, 501, 505, 506, 508–512, 514, 517, 520–522, 527, 528, 530, 536–538, 541, 543, 545, 547, 549–552
- South African 1, 4–6, 10, 12, 22, 77, 111, 130–132, 142, 147, 179–181, 192, 225, 230, 235, 240, 250, 252, 254, 256, 269, 271, 272, 278, 300, 331, 349, 362, 375, 381, 383, 473, 500, 501, 504–507, 511, 513, 514, 518, 520–522, 528, 533, 535, 552
- South African context 20, 21, 234, 255, 266, 267, 287, 301, 329, 349, 497, 500, 529, 537, 538
- South African universities 5, 10, 22, 163, 182, 193, 504, 512, 515, 516, 528, 532, 538–540, 543–545, 548, 549, 552
- Sporatec 206

- stakeholder 14, 20, 28, 30, 44, 55,
106, 141, 159, 175, 176, 190,
191, 225, 226, 233, 241, 264,
266, 268, 294, 299, 331, 338,
349, 364, 374, 386, 391, 401,
415, 421–423, 425, 432, 433,
439, 441, 444, 449, 452,
454–457, 459, 460, 462, 486,
487, 498, 502, 503, 507, 508,
513, 517, 520, 521, 531, 542
- startup 10, 16, 19, 62, 64, 86, 89,
90, 156, 161, 174, 191, 195,
270, 329, 339, 347, 351, 356,
499, 503, 504, 507, 510, 512,
515–517, 519, 520, 540, 550
- startup creation 500
- Stellenbosch University (SU) 155,
156, 164, 167, 202, 205, 206,
264, 277, 309, 311, 313, 321,
325, 346, 348, 350, 361, 364,
365, 375, 528, 532, 534, 537,
541, 543, 547
- stigma 225, 230, 231
- storytelling 31, 146, 367, 370, 373,
471, 472, 486
- strategic communication 363, 364,
368
- strategic planning 175, 412, 418,
446
- strategic vision 423, 430–432, 443,
447, 451
- strength, weakness, opportunities
and threats (SWOT) 87, 355,
447, 475
- student agency 513, 516, 519, 520
- student creativity 329
- student engagement 9, 20, 66, 205,
210, 371, 399, 400, 412, 414
- student entrepreneurship 18, 294,
505, 508, 515, 516, 519
- student experiences 166, 172, 218,
482
- student feedback 62, 434, 438, 440,
441, 443, 444, 483, 515, 520
- student motivation 33, 481
- student outcomes 22
- student presentations 353
- student reflections 436, 438, 440
- student support 482
- Student Training for Entrepreneurial
Promotion (STEP) 383, 384,
394
- student voices 514, 516–520
- Student Women Economic
Empowerment Programme
(SWEEP) 510–513, 520
- success stories 5, 106, 362,
394–396, 400, 513
- SUNLearn 277
- support infrastructure 194, 501
- support services 373
- support staff 203, 204
- support structures 30, 213, 328,
501, 513, 520, 539
- sustainability frameworks 361
- sustainability problems 115, 161,
181, 235, 267, 346
- sustainability reporting 363
- sustainability theory 29, 30, 44, 45,
184
- sustainable agricultural practices
201, 270, 534, 545
- sustainable business models 330, 543
- sustainable development goals
(SDGs) 1, 28–31, 33, 36, 41,
44, 45, 57, 58, 60, 68, 77, 78,
103, 134, 135, 139, 141, 161,

- 162, 180, 184–186, 190, 191,
193, 194, 201, 202, 236, 251,
269, 270, 288, 296, 297, 299,
301, 329, 342, 346, 349, 351,
374, 469, 473, 474, 476, 477,
485, 530, 545, 548
- SWOT analysis 87, 88, 355, 475
- synergy 29, 255, 389, 390
- systems thinking 175, 309, 363,
419, 422, 430, 440, 456, 459,
535
- T**
- teaching methodology 279, 293,
301, 350, 412, 502, 505
- teaching methods 4, 10, 12, 21, 181,
186, 194, 287, 475, 478, 481
- team building and communication
84, 85
- team leadership 423, 431, 441, 448,
451
- teamwork 51, 111, 159, 169, 188,
191, 265, 266, 282, 329, 411,
412, 416, 419, 421, 422, 428,
429, 438, 443, 446, 451, 454,
457, 478, 483
- Technological Higher Education
Network South Africa
(THENSA) 299, 300
- technology acceptance model (TAM)
186
- technology and digital tools 544
- technology support 186
- technology transfer 277, 327, 391,
392, 394, 395, 482, 499, 502
- tertiary education 161, 240, 294,
419
- testimonials 373
- test stage 292
- theoretical frameworks 7, 67, 82,
185, 188, 251, 387, 535
- Toronto Metropolitan University
(TMU) 133
- tourism 36, 179, 183, 398, 533
- traditional 12, 16, 21, 28, 49, 50,
55, 57, 65, 66, 75, 78, 79,
118, 133, 144, 159, 180, 182,
204, 207, 208, 218, 219, 228,
230, 287, 292, 293, 311, 315,
326, 341, 346, 357, 363, 371,
389, 392, 410, 411, 414, 417,
420, 430, 471, 474, 475, 478,
480–482, 485, 498, 501–504,
518, 520, 527–529, 533, 534,
551
- training and development 194
- train the trainers 312, 327, 328
- transdisciplinary 252, 486
- transferable skills 210, 418, 419, 476
- transformation 7, 13, 21, 104, 111,
229, 231, 242, 257, 264, 275,
293, 327, 362, 392, 411, 497,
501, 509, 511, 520, 529, 552
- transformative impact 66, 498
- transformative learning 12,
225–227, 229, 230, 234, 419,
439
- transformative learning theory 229,
230, 234
- transformative potential 45, 228,
229, 376
- transmedia for the creative economy
142, 144
- transmedia storytelling 141, 142,
144, 146
- transversal competencies 419

transversal skills 410, 411, 416, 418, 422, 428, 446
 triple bottom line (TBL) 29, 30, 41, 44, 58, 59, 67, 68, 184, 537, 545
 triple helix model 56, 67, 294, 295, 415, 446
 21st century 348, 357

U

Ubuntu 238, 240, 258, 364
 Undergraduate Research Experience (URE) 202, 207
 underrepresented 61, 440, 442, 444, 445, 550
 unemployment 7, 13, 20, 21, 27, 31, 58, 77, 101, 132, 181, 182, 227, 230, 235, 236, 249, 257, 287, 290, 296, 330, 337, 339, 346, 347, 362, 363, 372, 381–383, 386, 401, 402, 409, 410, 416–418, 428, 430, 439, 442, 445, 446, 470, 473, 483, 485, 488, 497, 498, 506, 527, 528, 538, 549
 United Nations (UN) 1, 57, 103, 135, 180, 201, 250, 263, 269, 270, 297, 299, 375, 484, 545, 548
 United States (US) 116, 158, 164, 173, 295, 310
 University Business Challenge (UBC) 297
 University of Cape Town (UCT) 99, 101, 102, 104–106, 110, 111, 115, 119, 121, 124, 412, 434, 437, 445, 528, 531, 539, 540, 542, 549

University of Limpopo 13, 381–388, 390, 394, 396, 398–403, 549
 University of Pretoria 346
 University of Venda 345, 346, 348, 350
 university programme 371, 373
 unstructured 160, 169, 172, 187, 432, 453, 454
 user experience 131

V

Vaal Technikon 507
 Vaal University of Technology (VUT) 299
 valorisation 315
 value addition 315
 value creation 169, 252, 315, 340, 415, 423, 424, 442, 447, 449, 451, 452
 value proposition 319, 486
 value proposition canvas 319, 326
 variable 265, 342, 421–434, 436–439, 441, 443, 444, 446–463
 vertical alignment 365, 368, 369
 Violence Prevention Through Urban Upgrading (VPUU) 140
 visual learning 414
 vlogging 141, 142, 252
 vocation 118
 volatile, uncertain, complex, and ambiguous (VUCA) 321, 361, 362, 373, 375
 Vygotsky, L.S. 54, 189, 474, 476, 477

W

waste 58–60, 191, 269–271, 315,
343, 371, 546–548
wifi 255
wood 343, 346, 351, 353, 355, 357
workbook reporting 84, 86
Work Integrated Learning 544, 550
workload 107, 354, 439, 479
workshop 5, 10, 12, 19, 33, 35, 44,
54, 61, 118, 143, 145, 146,
186, 187, 195, 229, 230,
233–243, 278, 294, 311–313,
322, 327, 328, 330, 331, 355,

365, 393, 397, 399, 403, 460,
483, 509, 511, 512, 530, 537,
541

Y

yeast 272, 277
youth entrepreneurship 4, 13, 27,
29, 45, 232, 251, 266, 531

Z

ZoneLearning@UWC 132, 134,
136–148