

Developing entrepreneurial skills in Environmental Health at the Central University of Technology, Free State through a novel challenge-oriented pedagogic approach

Thesis submitted to the Faculty of Health and Environmental Sciences, Central University of Technology, in fulfilment of the requirements for the degree of Doctor of Philosophy in Environmental Health

ELVINA MELINDA SMITH

Promoter: Professor J.F.R. Lues (Central University of Technology, Free State)

Co-promoter: Professor J. Almqvist (Uppsala University)

Bloemfontein, South Africa

February 2020

DECLARATION OF INDEPENDENT WORK

I, E.M. Smith, identity number _____ and student number _____, do hereby declare that this research project submitted for fulfilment of the requirements for the degree Doctor of Philosophy in Environmental Health at the Central University of Technology, Free State, is my own independent work. This work complies with the code of academic integrity, as well as other relevant policies, procedures, rules and regulations of the Central University of Technology, Free State, and has to the best of my knowledge not been submitted before to any institution by me or anyone else as part of any qualification.

E.M. Smith

.....

SIGNATURE OF STUDENT

.....

DATE

I dedicate this, with love, to my late parents

Jimmy and Joan Smith

Thank you.....

***“Let the wise hear and increase in learning, and the one who understands
obtain guidance.....”***

Proverbs 1:5

ACKNOWLEDGEMENTS

I am indebted to the following:

- Professor Ryk Lues, my promoter, for his willingness to take on the task, his time, expertise and patience. Thank you, also, for the opportunities created to develop my career.
- Professor Jonas Almqvist, co-promoter, for his insights and assistance during my time at Uppsala, Sweden.
- Central University of Technology, Free State, for allowing me to conduct my research, and the opportunity to work towards this qualification.
- The Research Office, especially Ms Edith Sempe, for all the support and assistance.
- Uppsala University: The Vice-Chancellor, Department of Education and staff for allowing me to spend six months on their campus to learn, collect data and widen my scope as a researcher.
- Erasmus – Mundus Aesop – Pus, for granting me a PhD exchange mobility scholarship to spend six months in Sweden.
- University of Mauritius: The Vice-Chancellor, two Deputy Vice-Chancellors, Dean of the Faculty of Agriculture, staff of the faculty, especially Ms B Aumjaud, for the invitation, hospitality, cooperation, time and assistance.
- My dearest family and friends, for all the love, encouragement, support and assistance.
- Lastly, but not the least, our Heavenly Father, for blessings, grace and guidance.

ABSTRACT

25 years since the inception of democracy South Africa is fighting unemployment, poor economic growth, political instability and educational instability. Since the formation of the Government of National Unity in 1994, the South African economy has been unpredictable and unsound. It shrunk by 2.2% in the first few months of 2018, whilst unemployment reached an all-time high percentage above 27%. Higher Education in South Africa, especially universities of technology, face diverse challenges coupled with a reduced chance of employment amongst graduates due to inadequate or lack of the necessary workplace (cognitive; soft) and entrepreneurial skills. The industry demands a more innovative education and training system to ensure a competitive and trend-setting workforce. Due to the increase in economic and social risk, a relevant higher education qualification becomes necessary. This education system should specifically address developing employable graduates, the growing unemployment rate, and the decline in the economy.

To initiate possible alternative ways in which teaching, and learning is conducted at higher education institutions, research was conducted amongst academics at Uppsala University, Sweden, University of Mauritius, Mauritius and Central University of Technology, Free State, South Africa. The main aim of the study was to utilise problem-based learning (PBL) and knowledge-based learning (KBL) as teaching methodologies to create a novel teaching and learning methodology referred to as challenge-oriented learning (COL). COL was proposed as methodology for a new blended syllabus for the training of entrepreneurs in a second-year model in Environmental Health. The study is based on an interpretive paradigm with an

exploratory nature. A desktop study and document analysis provided a foundation and working framework for the study. The research utilised a mixed methods methodology involving interviews and questionnaires for descriptive and empirical findings.

The study revealed that the rigorous transformation efforts in basic education to eradicate the effects of an apartheid government is, after 25 years, characterised by uncertain educating practices, a non-contextualised basic education system and a growing articulation gap between basic and higher education. Furthermore, the formation of universities of technology with a vocational mandate to advance technology transfer for a skilled workforce was a pivotal change in the higher education landscape of South Africa. For universities of technology to produce graduates with an effective technological skill set, a more student-centred teaching and learning methodology is required. The objectives of PBL and KBL were found to express the active knowledge transfer, critical thinking, desire for problem-solving and self-directed study skills required to address employability and unemployment.

Through the delineation of entrepreneurship, it was concluded that entrepreneurship contributes to economic and social development; it improves the socio-economic conditions of a community, generates wealth and offers a solution for unemployment. The discipline of entrepreneurship education is a specialised training regime which requires an appropriate teaching methodology and a more constructivist pedagogic approach. The study puts forth a novel teaching and learning methodology called COL.

The triangular study conducted between Uppsala University, Sweden, University of Mauritius and Central University of Technology, Free State revealed that there is a pressing need to shift traditional teaching methodologies, and to adopt a more student-centred, active teaching and learning methodology. This methodology would be appropriate to educate the workforce of the future, whilst lecturers should embrace the value of being coordinators and designers of curricula and the courses that they teach. Furthermore, it became evident through this study that the importance of academic freedom that allows lecturers to function relatively autonomously by amending or adjusting course content as market needs fluctuate, needs to be acknowledged and, if needs be, campaigned for. Also, utilising industry as a partner in teaching and learning processes will render subject content valid, reliable and up to date. By applying design thinking, a syllabus for entrepreneurship education was constructed. This syllabus was fused with a second-year Environmental Health module: Food and Meat Hygiene 2. By using COL as teaching methodology, a blended syllabus incorporating the subject outcomes with the outcomes of entrepreneurship was designed to teach entrepreneurship together with subject content.

Keywords:

Entrepreneurship; Challenge Oriented Learning; Blended syllabus; Design thinking

Table of Contents

• DECLARATION OF INDEPENDENT WORK	ii
• DEDICATION	iii
• ACKNOWLEDGEMENTS	iv
• ABSTRACT	v
• KEYWORDS	vii
CHAPTER 1	1
INTRODUCTION AND BACKGROUND TO THE STUDY	
1.1. Introduction	2
1.2. Entrepreneurship	5
1.3. Entrepreneurship and innovation	5
1.4. Teaching strategies and methodologies	6
1.4.1. Problem-based learning and knowledge-based learning as teaching methodologies	6
1.4.2. The nature and skill of critical thinking	8
1.4.3 The selection of the Environmental Health occupation and food and meat safety challenges	9
1.5. Rationale for the study	11
1.5.1. Problem delineation	11
1.5.2. Research problem and sub-problem	11
1.5.3. Main research questions	13
1.5.4. Subsidiary questions	14
1.6. Aim and objectives of the study	14
1.6.1. Aim	14
1.6.2. Objectives	14
1.7. Research design	15
1.7.1. Research paradigm	15

1.7.2. Methodology	16
1.7.3. Sampling protocol and demarcation	16
1.7.4. Research instruments	17
1.7.5. Desk-top analysis	17
1.7.6. Validity and reliability	18
1.8. Chapter layout	18
1.9 Conclusion	20
1.9. References	22
CHAPTER 2	26
HISTORICAL OVERVIEW OF THE SOUTH AFRICAN EDUCATION SYSTEM, ECONOMY AND UNEMPLOYMENT POST-1994	
2.1 South Africa post-1994	27
2.1.1 Political and economic history	27
2.1.2 Education reform in post-apartheid South Africa	28
2.2 The challenges in education	30
2.3 Curriculum reform in South Africa post-1994	32
2.4 The South African economy	34
2.4.1 Economic and financial growth post-1994	34
2.4.2 Higher education and its role in the developing economy	36
2.5 Tertiary Education and the demands from industry	37
2.6 The employability of graduates	38
2.7 Employers' and industry's response to worker employability	41
2.8 The unemployment challenge in South Africa	43
2.9 Entrepreneurship education at institutions of higher learning in South Africa	45
2.10 Concluding remarks	45
2.11 References	48

CHAPTER 3	54
UNIVERSITIES OF TECHNOLOGY: THEIR INCEPTION, MANDATE, CHARACTER AND TEACHING AND LEARNING METHODOLOGIES	
3.1 The curriculum in higher education	55
3.1.1 The status of the higher education landscape in South Africa	55
3.1.2 The new higher education landscape in South Africa	55
3.1.3 Curriculum restructuring in higher education	56
3.2 Universities of technology	57
3.2.1 History	57
3.2.2 Positioning universities of technology in the tertiary education landscape	58
3.3 Teaching and learning at universities of technology	60
3.3.1 The pedagogic process of teaching and learning	60
3.3.2 Teaching methodologies	60
3.3.3 Teaching and learning methodologies at Universities of Technology	62
3.3.4 Problem-based learning as a teaching methodology	65
3.3.5 Knowledge-based learning as a teaching methodology	69
3.3.6 Challenge-oriented learning (COL)	70
3.4 Entrepreneurship and entrepreneurship education as a teaching discipline	71
3.5 Conclusion	72
3.6 References	74
CHAPTER 4	78
ENTREPRENEURSHIP, IT'S PURPOSE AND IMPORTANCE IN EDUCATION: A UNIVERSITY OF TECHNOLOGY OFFERING	
4.1 Introduction: the nature of entrepreneurship	79

4.2	The purpose of entrepreneurship	81
4.2.1	Driving economic development	81
4.2.2	Investment in products, services and employment	81
4.2.3	Economic integration of small enterprises	82
4.2.4	New technologies and environmental challenges	82
4.2.5	Innovation and competition in business	83
4.2.6	The importance of entrepreneurship	83
4.3	The relationship between the government and entrepreneurship	84
4.4	The modern world and entrepreneurship	87
4.5	South Africa and entrepreneurship	88
4.5.1	An overview of research on entrepreneurship	88
4.5.2	Entrepreneurship and South African economic development	91
4.6	Entrepreneurship education	93
4.6.1	Institutional characteristics required for entrepreneurship education	95
4.6.2	Important pedagogic aspects of entrepreneurship education	99
4.7	Potential disadvantages of entrepreneurship education	100
4.8	Concluding remarks	101
4.9	References	103
CHAPTER 5		109
ACADEMIC EXPERIENCE, TEACHING METHODOLOGIES AND THE LEVEL OF DEVELOPMENT OF ENTREPRENEURSHIP EDUCATION AMONGST SELECTED EUROPEAN AND SADC UNIVERSITIES: A TRIANGULAR STUDY		
5.1	Introduction	110
5.2	Aims and objectives	111
5.3	Literature review	112
5.4	Methodology	115
5.4.1	Selection of methodologies	115
5.4.2	Sampling protocol and interviews	116

5.4.3	Analysis of interview data	117
5.4.4	Electronic surveys: questionnaires	118
5.4.5	Analysis of responses to the questionnaire	118
5.5	Results and conclusions	118
5.5.1	The interviews	118
5.5.2	Analysis of questionnaire data	127
5.6	Conclusion	144
5.7	References	150
 CHAPTER 6		 154
DESIGNING AND TEACHING ENTREPRENEURSHIP THROUGH A NOVEL PEDAGOGIC INSTRUCTIONAL METHODOLOGY AT UNIVERSITIES OF TECHNOLOGY		
6.1	Introduction	155
6.2	The nature of entrepreneurship education	155
6.3	Drawing from established Entrepreneurship modules	158
6.4	The model of design thinking	158
6.4.1	The choice and delineation of design thinking as developmental methodology	158
6.4.2	The application of design thinking for innovation	160
6.4.3	Application of the model of design thinking for the study	161
6.5	Ideate: A solution through entrepreneurship education	162
6.5.1	Objectives	162
6.5.2	Requirements, credits and duration	163
6.5.3	Specific outcomes	165
6.5.4	Assessment models	166
6.6	Towards a framework for an Entrepreneurship Education module for an incorporated/blended syllabus	166
6.7	The design of a challenge-oriented teaching and learning methodology	178
6.7.1	Problem-based learning	178

6.7.2	Knowledge-based learning as a teaching and learning methodology	180
6.7.3	Challenge-oriented learning as a novel teaching methodology	182
6.7.4	Proposed syllabus for Entrepreneurship Education in Food and Meat Safety utilising the COL model	185
6.8	Discussion and conclusion	185
6.9	References	199

CHAPTER 7 **203**

SUMMATIVE REMARKS, CONCLUSIONS AND RECOMMENDATIONS

7.1	Summative remarks	204
7.2	Conclusions, recommendations and future research	211
7.3	Conclusion: a thought for the future	214

APPENDICES

Appendix 1:	UU Ethical clearance and Permission	217
Appendix 2:	UoM – Faculty of Agriculture – Invitation	218
Appendix 3:	CUT: Teaching and Learning Plan 2014-2020	220
Appendix 4:	CUT: Vision 2020	240
Appendix 5:	CUT: WIL Policy	244
Appendix 6:	CUT: WIL Procedure	247
Appendix 7:	Invitation for Interviews and Interview Questions	252
Appendix 8:	Electronic Questionnaire Questions	254
Appendix 9:	UU: Entrepreneurship UU – 21020 (2019/2020)	257
Appendix 10:	UoM: BSc (Hons) Agricultural Science and Technology – A312/15	261
Appendix 11:	UoM: BSc (Hons) Management (Minor – Entrepreneurship LM323)	270
Appendix 12:	UoM: BSc (Hons) Food Science and Technology (Minor –	

	Entrepreneurship) A307	274
Appendix 13:	UoM: BSc (Hons) Fashion Technology (Minor – Entrepreneurship) E307	279
Appendix 14:	Syllabus/Learner guide: Food and Meat Safety 2 (BSc Environmental Health; CUT)	285

LIST OF FIGURES

Figure 1.1:	“Knock-on” effect of the university of technology student	4
Figure 1.2:	Number of laboratory-confirmed cases of Listeriosis by week of sample collection and province, South Africa, 01 January 2017 to 12 March 2018	12
Figure 2.1:	Trends in International Mathematics and Science Study (TIMMS) (Sourced from: The Economist, 7th November 2017)	31
Figure 2.2:	The South African GDP growth rate 2014 – 2017 (Trading Economist, May 2017)	35
Figure 2.3:	A diagrammatic representation of the skills set for employability of graduates	40
Figure 2.4:	The unemployment of South Africa between July 2015 and July 2018 (Trading Economics, Online, August 2018)	44
Figure 2.5:	A flow diagram representing the sequential transformation strategies in Basic Education – South Africa Post 1994	47
Figure 3.1:	A diagrammatic representation of the five beams on which universities of technology rest in South Africa	59
Figure 3.2:	A diagrammatic representation of the key components of the teaching and learning process	61
Figure 3.3:	A diagrammatic representation of Bloom’s taxonomy indication - the hierarchy of cognitive thinking (adapted from Anitescu <i>et al.</i> , 2016)	64
Figure 3.4A:	A visual representation of the differences in approach to teaching and learning between traditional learning and PBL (Sahoo, 2014)	66
Figure 3.4B:	A diagrammatic representation of the objectives of	

Problem-Based Learning as a Teaching and Learning Methodology	67
Figure 4.1: A diagrammatic representation of the criteria making up the principle of entrepreneurship	80
Figure 4.2: The Entrepreneurial Ecosystem (Adapted from Mazzarol 2014)	86
Figure 4.3: The diagrammatic representation of the results of the study: real state of entrepreneurship 2017	90
Figure 5.1(1): A graphical representation of the comparison of the results from the three institutions for question 1 of the electronic questionnaire	128
Figure 5.1(2): A graphical representation of the comparison of the results from the three institutions for question 2 of the electronic questionnaire	129
Figure 5.1(3): A graphical representation of the comparison of the results from the three institutions for question 3 of the electronic questionnaire	130
Figure 5.1(4): A graphical representation of the comparison of the results from the three institutions for question 4 of the electronic questionnaire	131
Figure 5.1(5): A graphical representation of the comparison of the results from the three institutions for question 5 of the electronic questionnaire	131
Figure 5.1(6): A graphical representation of the comparison of the results from the three institutions for question 6 of the electronic questionnaire	131
Figure 5.1(7): A graphical representation of the comparison of the results from the three institutions for question 7 of the electronic questionnaire	132
Figure 5.1(8): A graphical representation of the comparison of the results from the three institutions for question 8 of the electronic questionnaire	133
Figure 5.1(9): A graphical representation of the comparison of the results from the three institutions for question 9 of the electronic questionnaire	134
Figure 5.1(10): A graphical representation of the comparison of the results from the three institutions for question 10 of the electronic questionnaire	135
Figure 5.1(11): A graphical representation of the comparison of the results	

from the three institutions for question 11 of the electronic questionnaire	136
Figure 5.1(12): A graphical representation of the comparison of the results	
from the three institutions for question 12 of the electronic questionnaire	137
Figure 5.1(13): A graphical representation of the comparison of the results	
from the three institutions for question 13 of the electronic questionnaire	138
Figure 5.1(14): A graphical representation of the comparison of the results	
from the three institutions for question 14 of the electronic questionnaire	139
Figure 5.1(15): A graphical representation of the comparison of the results	
from the three institutions for question 15 of the electronic questionnaire	139
Figure 5.1(16): A graphical representation of the comparison of the results	
from the three institutions for question 16 of the electronic questionnaire	141
Figure 5.1(17): A graphical representation of the comparison of the results	
from the three institutions for question 17 of the electronic questionnaire	141
Figure 5.1(18): A graphical representation of the comparison of the results	
from the three institutions for question 18 of the electronic questionnaire	142
Figure 5.1(19): A graphical representation of the comparison of the results	
from the three institutions for question 19 of the electronic questionnaire	143
Figure 5.1(20): A graphical representation of the comparison of the results	
from the three institutions for question 20 of the electronic questionnaire	144
Figure 5.2: A diagrammatic representation of a construct for the	
scholarship integration at UoTs as formulated from the findings of the	
TRIANGULAR study	148
Figure 6.1: A visualisation of the 5 stages of design thinking	
(adapted from Cleverby, 2018).	159
Figure 6.2 (A): A schematic representation of the 5 pillars	
of Problem-based Learning	179
Figure 6.2 (B): A schematic representation of the synopsis	
of Knowledge-based Learning	181

Figure 6.2 (C):	A schematic representation of the combination of Problem-based Learning (PBL) and Knowledge-based Learning (KBL) to yield Challenge-oriented Learning (COL).	183
Figure 6.3:	A diagrammatic representation of selected key principles of Challenge-oriented Learning (COL)	184
Figure 7.1:	A diagrammatic representation of the four scientific contributions from the study	212

LIST OF TABLES

Table 4.1:	A depiction of success factors of entrepreneurs versus those of managers (adapted from Nieman and Nieuwenhuizen, 2009)	81
Table 5.1:	A table representing a summary of the salient findings of interviews conducted with 12 academics from Uppsala University, University of Mauritius and Central University of Technology, Free State	120
Table 6.1:	A summary of specific outcomes for the five selected courses represented in Appendices 9 – 13	167
Table 6.2:	A summary of all the assessment models and criteria for entrepreneurship of the selected courses and modules	172
Table 6.3:	An entrepreneurship education syllabus for a hybrid/blended syllabus for Food and Meat Hygiene 2 in Environmental Health at universities of technology in South Africa.	174
Table 6.4:	A proposed novel syllabus for Entrepreneurship Education in Food and Meat Safety utilising the principle of COL	186
Table 7.1:	A comparison between the characteristics of a traditional university and the characteristics of an ideal university of technology	215

LIST OF ABBREVIATIONS

AAC&U	Association of American Colleges and Universities
AIDS	Autoimmune Deficiency Syndrome
ANC	African National Congress
ARV	Antiretroviral
ASGISA	Accelerated and Shared Initiative of South Africa
CAPS	Curriculum and Assessment Policy Statement
CDE	Centre for the Development of Enterprise
CHE	Council on Higher Education
COL	Challenge-oriented Learning
CoSATU	Congress of South African Trade Unions
CNBC	Cable - National Broadcasting Company
CPUT	Cape Peninsula University of Technology
CSE	Centre for Social Entrepreneurship
CUT	Central University of Technology, Free State
DHET	Department of Higher Education and Training
DoE	Department of Education
DoH	Department of Health
DUT	Durban University of Technology
EC	European Commission
EHEA	European Higher Education Area
EU	European Union
GEM	Global Entrepreneurship Monitor
GDP	Gross Domestic Product
GNU	Government of National Unity

IFP	Inkatha Freedom Party
HE	Higher Education
HEQC	Higher Education Quality Committee
HIV	Human Immunodeficiency Virus
HPCSA	Health Professions Council of South Africa
KBL	Knowledge-based Learning
LEAP	Liberal Education and America's Promise
LMIP	Labour Market Intelligence Partnership
MUT	Mangosuthu University of Technology
NCS	National Curriculum Statement
NCHE	National Commission on Higher Education
NGO	Non-Governmental Organisation
NICD	National Institute for Communicable Diseases
NP	National Party
NSC	National Senior Certificate
NQF	National Qualifications Framework
OECD	Organisation for Economic Co-operation and Development
OBE	Outcome-based Education
PBL	Problem-based Learning
RDP	Reconstruction and Development Programme
PhD	Doctor of Philosophy
RNCS	Revised National Curriculum Statement
RSA	Republic of South Africa
SA	South Africa
SADC	Southern African Development Community
SADTU	South African Democratic Teachers Union
SASUF	South Africa-Sweden University Forum
SAQA	South African Qualifications Authority

SEAANZ	Small Enterprise Association of Australia and New Zealand
SoI	Scholarship of Integration
SoTL	Scholarship of Teaching and Learning
SRIP	Science, Research and Innovation Performance
TEC	Tertiary Education Commission
TIMMS	Trends in International Mathematics and Science Study
TUT	Tshwane University of Technology
UES	Unit for Enterprise Studies
UK	United Kingdom
UNSDG	United Nations Sustainable Development Goals
UoT	University of Technology
UoM	University of Mauritius
UU	Uppsala University
VUT	Vaal University of Technology
WHO	World Health Organization
WIL	Work-integrated Learning
WSU	Walter Sisulu University

CHAPTER 1

INTRODUCTION AND BACKGROUND TO THE STUDY

1.1. Introduction

South Africa, which is one of the most dominant economies in Africa, has a largely diversified economy that is dependent on natural resources. Since the advent of democracy in 1994, the country has experienced marked political changes, and efforts have been made to address long standing disproportions in the social and educational landscape, in particular. However, economic growth has not followed this trend, and job creation and economic security continue to be fragile and unstable (Du Plessis & Smit, 2006). South Africa has a population of over 55.32 million (Worldmeter, 2017), and the vast majority of its citizens still carries the burden of the social and economic legacy of apartheid. A large proportion of the Black working class continues to be excluded from the labour market, partly because increasing numbers of learners leave high school with poor or no literacy and numeracy skills, and very few possess market-related job skills.

In an era of fast-growing knowledge, the demands by industry for a well-equipped and skilled workforce have become more complex and diverse. This necessitates a cutting-edge education and training system that will develop and equip a competitive and trend-setting workforce. Twenty-first century South Africa exhibits a complex job market and an equally complex desire for skilled workers. Unfortunately, the job market requires qualifications that are either irrelevant, or it is flooded with graduates with limited employability. According to the British Council (2014), graduates in Sub-Saharan Africa, and especially in South Africa, do not possess essential workplace and transferable skills. As a result, economic and social risk is developing. This clearly demands that graduates with relevant higher education qualifications be equipped with transferable skills and competence. It is undeniably the mandate of the education system, and the higher education sector, to ensure that these demands are met.

Even though the National Senior Certificate (NSC) pass rate has escalated in recent years, statistics related to this secondary school qualification should be interpreted with caution when it is considered as an indication of the quality of education in the country. The reason for this is that the NSC pass rate reflects the achievement of only 50% of the learners who entered Grade 12 (CDE, 2013). Various critics of the

NSC suggest that the pass requirements are sub-standard, and that it is this factor, and not real achievement, that has led to the increase in the pass rate (Crouch, 2005; Spaul, 2013). Eventually, school leavers enter tertiary institutions, including universities of technology, which may not have been their first choice. Inadequately skilled learners, in turn, exert both a financial and academic burden on these institutions, and this burden reaches the workplace or industry with a knock-on effect (Figure 1.1).

Universities of technology originated in the 2004/5 period when they were established through the merger of erstwhile technikons (this matter is explained in more detail in Chapter 3). Ideally, universities of technology are expected to provide a specialised regime of vocational and technical education with the intention that students should acquire skills, ideas and competencies (CHE, 2000). However, in some instances these institutions are not adequately preparing students for the workplace or instilling analytical or high-level skills in them. The warning signals have been there for some time (University World News, 2017), as this dearth of skills may be ascribed to, amongst others, increasing student numbers without a corresponding increase in staff numbers, which has naturally led to quality being sacrificed for quantity. Poorly skilled and unemployable graduates have thus been entering the workplace, and universities of technology are expected to address the many challenges associated with this phenomenon.

When considering tertiary education, and especially universities of technology, it is important to ask the following questions:

- Is the traditional focus of a university qualification still valid?
- Are we educating South African students in a manner that will address South Africa's needs? (African Economic Outlook, 2012).

The labour market is becoming more critical and rigidly selective of worthy graduates in all sectors, and employability is a major challenge that industry is facing. The key challenges lie in how we measure and remedy the incongruence between supply and demand (University World News, 2017). The mismatch between employer

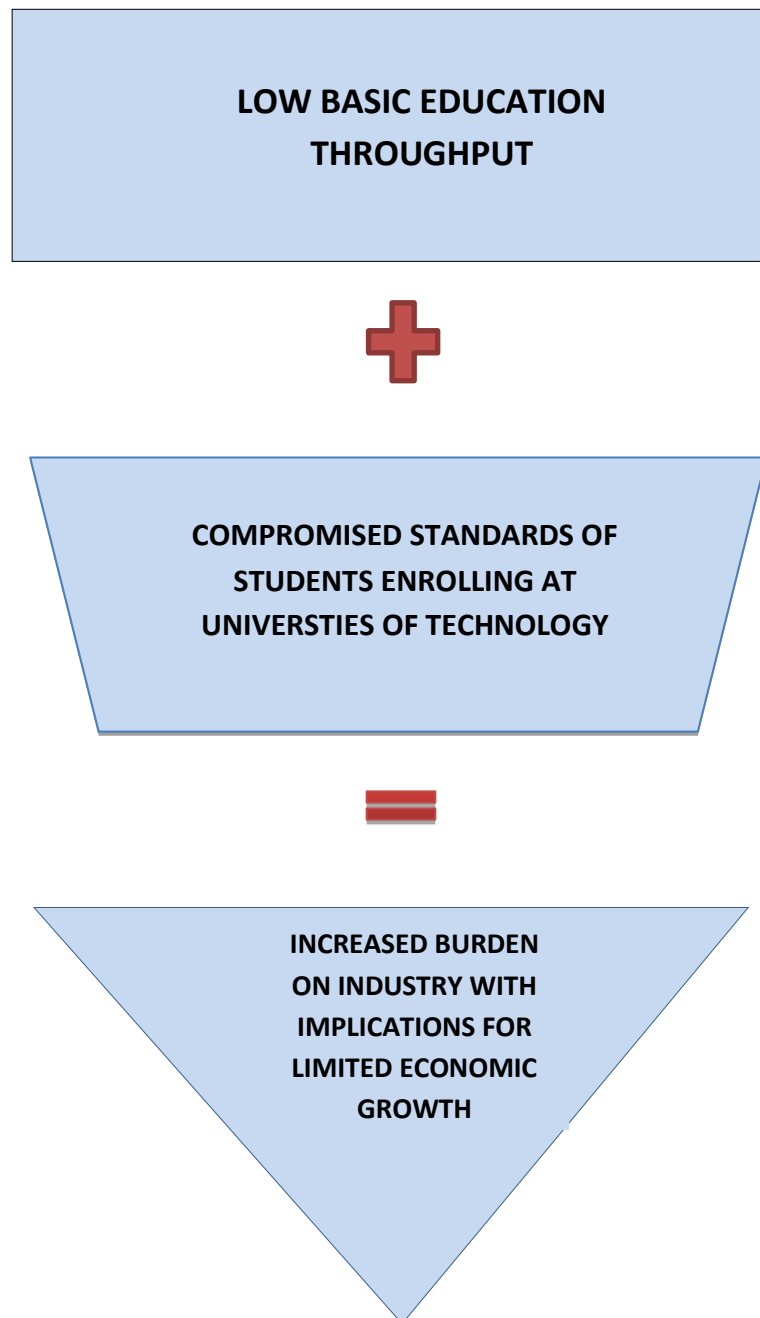


Figure 1.1: Knock-on effect associated with university of technology qualifications

expectations and higher education outputs makes it necessary for employers and universities to address and reduce this chasm. A major challenge is that higher education values conceptual foundations, knowledge and an intellectual approach, whereas industry requires analytical, critical and innovative thinking, creativity, and problem-solving ability, and higher education institutions are expected to deliver skilled graduates (SAQA, 2009). This has become of greater importance, as the unemployment rate in South Africa is increasing since industry finds it harder to fill positions with skilled trade-workers. This escalation in unemployment is followed by a negative economic growth (SAQA, 2015).

Apart from the skills that are required, there should also be a relationship between education and ‘the greater good of society’. If this is achieved, education will be the mechanism through which socio-economic issues are addressed, societal skills are enhanced, and technology transfer becomes a key focus (Hensley *et al.*, 2013). According to the latter authors, United States universities are traditionally focused on equipping students with skills that are directly aimed at the workplace. If this model is followed, South African universities of technology should aim towards ‘value-addition’ to society at large. This social innovation requires collaboration among all stakeholders in their quest to find sustainable ways of addressing the challenges faced by the tertiary education sphere.

1.2. Entrepreneurship

Having alluded to the challenges regarding unemployment and job creation in South Africa, it must be emphasised that entrepreneurship skills are vital for the future of the South African economy and the ability of the country to sustain job creation. This can only be accomplished by developing new educational methodologies and skills (see Chapter 3). Such methodologies will have to be embedded in quality teaching and learning with concomitant academic support of students (Kuratko, 2005; Owusu-Dankwa, 2013). Traditional education methods do not necessarily teach such skills; on the contrary, they may in fact hamper them. The focus of this study was thus to explore a novel methodology to provide valuable entrepreneurial learning techniques in a higher education context (see Chapter 4).

1.3. Entrepreneurship and innovation

Educators often believe that preparing students to be working professional employees is enough. However, the education dilemma in South Africa (as discussed in Chapter 2) necessitates a reminder to young individuals that they can adopt alternative ways of thinking about their career paths and ambitions. Young students should also be reminded that it is within their power to be entrepreneurs, to create careers and jobs for others, and to survive in a struggling economy. To promote entrepreneurship, several strategies may be implemented, including sharing knowledge on how innovation benefits society, identifying opportunities, and the ability to recognise individual entrepreneurial ability (see Chapter 4).

The relationship between innovation and entrepreneurship is underpinned by two paradoxical schools of thought, namely: ‘innovation before entrepreneurship’ and ‘entrepreneurship before Innovation’ (Miller & Friesen, 1982). These two schools of thought will be unpacked in terms of their application to entrepreneurial education at institutions of higher education in South Africa, with specific reference to universities of technology. When embarking on entrepreneurship education, institutions may have to decide on an effective vehicle (i.e. a teaching methodology) to facilitate the process. To this end, problem-based learning (PBL) and knowledge-based learning (KBL) are used to design challenge-oriented learning (COL) as an alternative instructional methodology.

1.4. Teaching strategies and methodologies

1.4.1. Problem-based learning and knowledge-based learning as teaching methodologies

At present, the desired and preferred methodology of instruction at universities of technology in South Africa is the lecturing (‘sage on the stage’) strategy, which is supported by work-integrated learning (WIL). A detailed expose of this will be presented in Chapter 3. However, the proposed alternative methodology is a fusion of problem-based learning and knowledge-based learning. A central feature of

problem-based learning and/or knowledge-based learning is its student-centeredness, which means that learning opportunities should be relevant to the students and, in this case, to the well-being of society. At the same time, it should address national economic challenges. The goals that drive the learning process are partly determined by the students themselves (Baker, 2000). These goals are derived from real-life challenges as related to the study discipline. This does not mean that the lecturer renounces her/his mandate for making judgements regarding what might be important for students to learn; rather, this feature places fractional and unambiguous responsibility on the students' shoulders. Creating assignments and activities that require student input presumably also increases the likelihood of students being motivated to learn (Hanke *et al.*, 2005; Moutinho *et al.*, 2015). The instructor is not passive during student learning, but neither does he/she take the traditional role of 'sage on the stage'. For instance, the instructor's role can be to model different kinds of problem-solving strategies - a process that is sometimes referred to as cognitive apprenticeship learning (Collins, Brown & Newman, 1989; Ulger, 2018). Students may also model a variety of problem-solving strategies that they present to one another. The instructor's role is to question the students' learning processes by asking meta-cognitive questions; for example: "How do you know that?", or "What assumptions may you be making from that?" These questions are meant to enable students to become self-reflective about their learning processes. Another primary feature of PBL, KBL and COL is that these learning methods are process-centred rather than product-centred. This may seem contradictory, as solving a problem is an important and critical aspect of COL. However, the problem becomes the challenge to find a solution, hence the term "challenged-oriented learning".

A common criticism of student-centred learning is that students, as novices, cannot be expected to know what might be important for them to learn, especially in a subject where they appear to have had no prior exposure. The literature on novice-expert learning does not entirely dispute this assertion; rather, it does emphasise that students come to lecturers not as the proverbial blank slates, but as individuals whose prior learning can greatly impact their current learning (Pintrich, 2002). Students have greater content and skills knowledge than we might think. This is the basis of KBL and, depending on the state of their prior learning, it can both aid and

hinder attempts to learn new information. It is therefore imperative that instructors have knowledge of the intellectual currency the students possess. One way to determine this is by witnessing how students go about addressing intellectual challenges, especially those that seem at variance with their current understanding (O'Neill and McMahon, 2005).

Active, interactive and collaborative learning, on which teaching strategies such as PBL and KBL are based, allow an instructor the rare opportunity to observe students' learning processes. The context for learning in PBL and KBL is highly context-specific (Barrows & Kelson, 1993), and content is taught by presenting the students with real-world challenges similar to those challenges they might encounter as practitioners of a discipline. Teaching content through skills is one of the primary distinguishing features of PBL. Usually, instructors introduce students to teacher-determined content via lectures and texts. After a specific body of content has been presented, students are tested on their understanding in a variety of ways. PBL/KBL, in contrast, is more inductive: students use what they already know and learn the content as they attempt to address a problem. The problems in PBL are typically in the form of cases that are narratives of complex, real-world challenges common to the discipline being studied. There is no right or wrong answer; rather, there are reasonable solutions based on the application of knowledge and skills that are deemed necessary to address the issue. The solution therefore is partly dependent on the acquisition and comprehension of facts, and partly on the ability to think critically. This will be elaborated on and clearly unpacked in Chapter 3.

1.4.2. The nature and skill of critical thinking

One of the motives behind the introduction of an alternative methodology of instruction is the need for a workforce with improved critical thinking ability. However, before we can propose a solution, we need to ask ourselves: "What does critical thinking refer to?" In brief, critical thinking simply refers to the ability to analyse, synthesise and evaluate information, and to apply that information appropriately to a given context (McPeck, 2016). It is both critical and creative in that synthesis, in particular, requires the learner to take what information is known, reassemble it with information not known, and to derive a new body of knowledge (Bailin, 2002). It

does not necessarily require students to create new knowledge in the way a practicing scholar does; instead, students are asked to create something that is new to them. It is thus not uncommon for undergraduates to develop some highly sophisticated and ingenious solutions.

Since content changes fast in a rapidly changing technological world, the ability to solve problems needs to be highly portable. No one set of skills will suffice for all time, but the ability to generate problem-solving strategies is a skill that should be sustained. Information transferability is limited by the information available, but how to find and create information is limited only by the learner's willingness to participate. Challenge-oriented learning, where students demonstrate their capabilities to themselves, can enhance their motivation to tackle challenges. Challenge-oriented learning is also experiential in that the participants experience what it is like to think as a practitioner or a prospective entrepreneur.

Apart from a seeming lack of critical thinking, industry has also indicated that graduates have been found lacking in terms of the required writing, verbal and communication skills (Lowden *et al.*, 2011). The inability to solve problems, exhibit deductive thinking and efficiently collaborate in a team has also been observed amongst new graduates (see Chapter 2). COL can and should address these gaps in training, and it should therefore pave the way towards sound entrepreneurial education in the quest to alleviate unemployment and contribute towards a healthier economy.

1.4.3 The selection of the environmental health occupation and food and meat safety challenges

The study concentrated on environmental health, and more specifically food safety. In terms of climate, South Africa is regarded as a water scarce country, which puts environmental health at the forefront of preventative health care (Mudaly, 2018). Furthermore, a heavy burden related to climate change will be the failing of public health systems. This may include challenges such as infectious diseases and water and food contamination (Mathee and Wright, 2014). The strong link between people and the environment has caused a revival in environmental health in South Africa

and globally, and therefore the scope of practice provided by environmental health practitioners are essential elements in building healthy populations (DOH, 2013). In addition to this motivation, the challenge with regards to unemployment in South Africa affects the food services sector directly. The distribution of employment in the South African economic sectors indicates an employment of 71,6 per cent by the services sector (Pletcher, 2019). The food, water and beverage divisions form part of this economic sector. These statistics imply that an increase in unemployment has a more than noticeable impact on food service workers.

The BSc Environmental Health qualification is an offering that is unique to universities of technology in South Africa. It is a qualification that has its origin in a diploma course in Environmental Health that was also previously offered at universities of technology. The qualification was historically developed to qualify erstwhile health inspectors - a designation that was later renamed environmental health practitioners. The unique nature and mandate of universities of technology are discussed in Chapter 3. In redesigning a syllabus of which the subject content would blend with the outcomes for entrepreneurship education at universities of technology, it was deemed appropriate to select a course that is unique to universities of technology. Furthermore, vocational training, with an infusion of technology from industry, drives and supports the effort to enhance job creation and economic upliftment in South Africa.

A course (or courses) in Food and Meat safety is/are offered at universities of technology with a WIL component, as this has become crucial in the fight for food safety in South Africa, particularly in view of the recent outbreak of Listeriosis, which is a foodborne disease that can be fatal. The outbreak was first detected in the beginning of 2017, and it has shown steady growth from 1 January 2017 through to 14 March 2018. Throughout this time, 978 laboratories confirmed Listeriosis cases were reported to the National Institute for Communicable Diseases (NICD) (Figure 1.2) (WHO, 2018). Additional motivation for selecting this course was the global focus on food security and, more specifically, Goal 2 of the United Nations Sustainable Development Goals (UNSDG, 2015). Goal 2 states: “Zero Hunger: The food and agriculture sector offer key solutions for development and is central to hunger and poverty eradication” (UNSDG, 2015:). This goal underscored two

objectives of this study, namely poverty eradication through entrepreneurship, and using a relevant qualification as a working module for a blended syllabus.

1.5. Rationale for the study

1.5.1. Problem delineation

The South African economy had shrunk by 2.2% by the first few months of 2018 in conjunction with unemployment that had reached an all-time high (above 27%) (Businessstech, 2018). Therefore, Higher Education in South Africa, especially universities of technology, face diverse challenges such as below-standard university entrants and the throughput of graduates who lack workplace skills. It is therefore not surprising that the labour market has become more discerning, and the selection of graduates has become more stringent. Poorly skilled graduates have a knock-on effect on unemployment figures, and unfortunately the chasm between the supply by universities of technology and the demand from industry is widening, and economic growth and social well-being have plummeted accordingly. To remedy the problem, the curricula at universities of technology need to be revisited to establish their relevance. Moreover, the vocational mandate of tertiary institutions needs to be re-examined, whilst the quality of graduates should be scrutinised. It is inarguable that graduates should have innovative abilities to address the demands of the 21st century, and they should be able to compete in the global arena. The South African workforce therefore needs to turn towards 'self-job-creation' and a national economic revival.

1.5.2. Research problem and sub-problems

Based on the background that was presented above and the rationale for the study, the following research problems were identified:

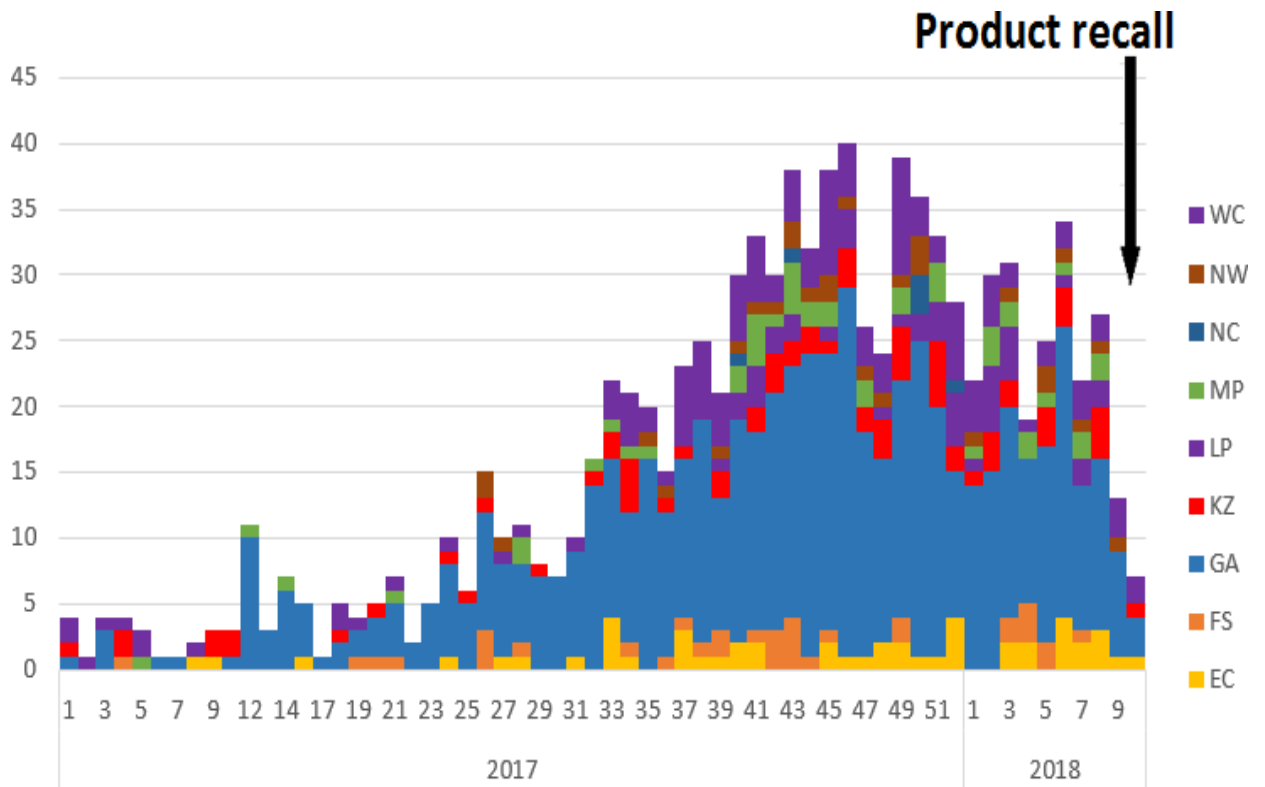


Figure 1.2: Number of laboratory-confirmed cases of Listeriosis by week of sample collection and province, South Africa, 01 January 2017 to 12 March 2018 (n=978)
Source: National Institute for Communicable Diseases (NICD), WHO, 2018

- South Africa's employment figures and economic growth are both at disconcertingly low levels and may experience only slow growth in the next few years.
- Employment opportunities will remain limited for graduates due to inadequate workplace (cognitive, soft) and entrepreneurial skills.
- Universities of technology have been debating the challenges associated with their ability to fulfil their mandate and the concomitant understanding of the attributes of their graduates in comparison with those of graduates from traditional universities.
- Students at universities of technology have been ineffectively exposed to the concept and practices of knowledge/problem-based learning as a tool towards entrepreneurial understanding.
- The Environmental Health learning programme that is offered at universities of technology has been identified as one of the traditional offerings that is unique to these universities. However, this field seems to be in a predicament, as it has a very wide scope of practice and contains both the components of public administration and commercialisation in its curriculum.

Contemporary, responsive models on PBL and KBL do not effectively address the predicaments that universities of technology face, and therefore a novel model is needed to provide solutions for the pedagogy of entrepreneurship and cognitive and soft skills.

1.5.3. Main research questions

The research problem and subproblems informed the following research questions:

- How could entrepreneurial education be infused in a syllabus module of Environmental Health?

- Can challenge-oriented learning (COL) be used as a pedagogic tool for teaching and learning at a university of technology?

1.5.4. Subsidiary questions

In addition to the main research questions, the following subsidiary questions were formulated to guide the research process:

- In what manner do current or traditional teaching and learning methodologies develop entrepreneurship and the cognitive development of students?
- How do current teaching methodologies develop the progression of learning in real-world environmental health problems?
- How can existing national and international modules and strategies of entrepreneurial education be used as a substrate towards the redesign of a module in the Environmental Health discipline as a means of developing entrepreneurial and cognitive skills?

1.6. Aim and objectives of the study

1.6.1. Aim

In view of the rationale, the research problems and the research questions, the overarching aim of the study was formulated as follows:

To utilise problem-based learning (PBL) and knowledge-based learning (KBL) as teaching methodologies in the creation of a novel challenge-oriented teaching and learning methodology in a new blended syllabus for the training of entrepreneurs in environmental health.

1.6.2. Objectives

Derived from the aim of the study, the following objectives were formulated:

- To delineate the South African education system in terms of historical, technical and present challenges; to evaluate the post-apartheid standing of the SA economic milieu with regards to unemployment, the evolution of higher education and its role in economic development.
- To investigate the origins of universities of technology in South Africa with reference to their mandate and role within the higher education sphere.
- To evaluate the post-apartheid standing of the South African economic milieu, with reference to unemployment and the evolution of higher education institutions' mandate to address economic development.
- To explore present and alternative teaching methodologies that would be appropriate for teaching and learning at universities of technology.
- To compile a critical review and unpack entrepreneurship education as an international and national higher education offering by focusing on the implementation, successes and failures of this discipline.
- To draw comparisons between a selected European university, a fellow SADC university and a South African university by observing the differences and similarities in their institutional character, academic experiences, challenges, and views on entrepreneurship education.
- To design a novel teaching and learning methodology for a second-year model in Environmental Health at universities of technology by blending subject content and entrepreneurship education.

1.7. Research design

1.7.1. Research paradigm

The study was based on the interpretive paradigm to examine the development of cognitive and entrepreneurial skills in a current Environmental Health model by

means of narrative and discursive methods. A paradigm refers to the lens through which a phenomenon is examined, and often involves “a loose collection of logically related assumptions, concepts or propositions that orient thinking” (Mackenzie & Knipe, 2006:3). The motivation for choosing an interpretive paradigm was that the data to be collected for the study would mainly be of a qualitative nature, even though some instruments normally used in normative/quantitative studies are used to complement qualitative data sets. A mixed methods approach was also utilised, as the data were mainly of a qualitative nature, but it was necessary to complement this data with data collected by means of instruments that are normally used to collect quantitative data (Creswell & Plano Clark, 2011).

1.7.2. Methodology

The study was exploratory in nature. This approach was appropriate, since a novel interest characterised by a limited scientific or concrete knowledge on the topic was investigated (Saunders *et al.*, 2000; Brown *et al.*, 1989). All the results were presented in the form of tables and graphs to illustrate the findings qualitatively. These results were evaluated and used to draw conclusions and make recommendations.

The novel findings of the study are discussed, and recommendations are made for future research relating to the pedagogy of entrepreneurship. Furthermore, the use of a novel teaching and learning methodology for the development of cognitive and soft skills in students in the higher education setting, with specific reference to universities of technology, is proposed.

1.7.3. Sampling protocol and demarcation

The research focused on a second-year module in Environmental Health, which is unique to universities of technology. The researcher was granted permission to conduct a case study at the Central University of Technology, Free State. For comparative purposes, academics at the UU, UoM and CUT were targeted.

A large body of research exists that defines and explains the teaching of entrepreneurship; yet the debate is still on-going as to whether teaching entrepreneurship is possible (Gibb, 2002). Given the lack of consensus in this field, the current study unpacked a broad picture regarding a methodology to teach entrepreneurship, with the focus on a fusion of entrepreneurial and subject outcomes. The study attempted to illuminate a novel approach to the pedagogy of entrepreneurship that will instil cognitive and soft skills in students studying in Environmental Health at the CUT, and possibly among those who study at all universities of technology in South Africa, should the data be disseminated as envisaged.

1.7.4. Research instruments

The data collection instruments that were used included interviews, document analysis and questionnaires. These instruments were used to collect both qualitative and quantitative data. The literature review explored various journal articles as well as modules for entrepreneurship that were in use nationally and internationally at the time of the study. Policies and procedures that guided relevant academic programmes of study at the institutions partaking in the study were also perused.

1.7.5. Desktop analysis

The following documents were analysed to collect data that served as a background to the study:

- curriculum of Environmental Health: BSc Environmental Health at universities of technology;
- module for Food and Meat Hygiene 2;
- CUT institutional Teaching and Learning Plan;
- policy on work-integrated learning (WIL);
- policy documents of the Department of Higher Education, South Africa;
- module outlines, subject content and outcomes of entrepreneurship being used and followed at Uppsala University, Sweden; and
- module outlines, subject content and outcomes of entrepreneurship being used and followed at the University of Mauritius.

1.7.6. Validity and reliability

In accordance with the selected interpretive paradigm, the validity and reliability of the study were enhanced by using the guidance of the interpretive paradigm. The trustworthiness, credibility, transferability and dependability of the data and the findings were ensured by duplicating all analyses.

Achieving reliability pertains to an entire research process; that is, to the overall design, sampling and data collection methods, and the data analysis procedure. Reliability thus means that similar results will be achieved should the measurement process be applied repeatedly (Babbie & Mouton, 2001). The researcher thus made every effort to ensure that the research was meaningful and replicable, and that it would make a valuable contribution to the existing body of knowledge in the Environmental Health discipline as offered by universities of technology.

1.8. Chapter layout

This study report comprises seven chapters that are structured as follows:

Chapter 1: Introduction

- Entrepreneurship
- Entrepreneurship and innovation
- Rationale for the study
- Aims and objectives of the study
- Research design
- Chapter layout

Chapter 2: Historical overview of the South African education system, economy and unemployment post-1994

- South Africa post-1994
- The challenges in education
- Curriculum reform in South Africa post-1994
- The South African economy
- Tertiary education and the demands from industry

- The employability of graduates
- Employers' and industry's response to worker employability
- The unemployment challenge in South Africa
- Entrepreneurship education at institutions of higher learning in South Africa

Chapter 3: Universities of technology: their inception, mandate, character and teaching and learning methodologies

- The curriculum in Higher Education
- Teaching and learning at universities of technology
- Entrepreneurship and Entrepreneurship Education as a teaching discipline
- Problem-based learning
- Knowledge-based learning

Chapter 4: Entrepreneurship: its purpose and importance in education. A university of technology offering

- The nature of entrepreneurship
- The purpose of entrepreneurship
- The relationship between government and entrepreneurship
- The modern world and entrepreneurship
- South Africa and entrepreneurship
- Entrepreneurship education
- Possible disadvantages of entrepreneurship education

Chapter 5: Academic experience, teaching methodologies and the level of development of entrepreneurship education amongst selected European and SADC universities: a triangular study

- Academic experiences, attitudes and challenges
- An academic approach to entrepreneurship education

Chapter 6: Design and teaching Entrepreneurship through a novel pedagogic methodology at universities of technology

- The model of design thinking

- An investigation of the content of Entrepreneurship modules offered at UU and the UoM
- Designing a syllabus for Entrepreneurship at universities of technology by drawing from existing modules
- The design of a challenge-oriented teaching and learning methodology
- Designing a blended syllabus merging subject content and entrepreneurship education

Chapter 7: Conclusions and recommendations

1.9 Conclusion

In view of what has been elucidated in the introduction chapter, the discussion and argument throughout the study will be structured as follows: Chapter 2 will provide a comprehensive overview of South Africa, post 1994, by creating a bases for the discussion. The South African economy, education reform and a possible solution to unemployment linked to entrepreneurship education is discussed. In chapter 3 further elucidation will be provided about the reform in higher education by focusing on the inception of Universities of Technologies, its mandate, teaching and learning methodologies as well as the concept of entrepreneurship education as a new pedagogic discipline. Chapter 4 unpacks the nature of entrepreneurship, the role of all stake holders and entrepreneurship as a recognised pedagogic discipline to address a failing economy and unemployment. Chapter 5 as a research chapter, outlines the experiences, comparisons, findings and lessons learnt at a selected European and fellow SADC universities with regards to teaching methodologies, lecturer experiences and entrepreneurship. Chapter 6 will then take together all the information, findings and experiences to design a novel teaching methodology, Challenge Oriented Learning. This novel methodology will then be used as a vehicle

to design a blended/fused syllabus combining subject content and entrepreneurship education outcomes. Chapter 7 will provide summative remarks, conclusions and recommendations from the study.

1.10 References

- African Economic Outlook**, 2012. *Africa's Macroeconomic Prospects*. (www.africaneconomicoutlook.org/en)
Accessed on 19 November 2017.
- Babbie**, E. & Mouton, J. 2001. *The practice of social research*. South African Editions. Cape Town: Oxford.
- Bailin**, S. 2002. Critical thinking and science education. *Science & Education* 11(4): 361-375.
- Baker**, C.M. 2000. Problem-based learning for nursing: integrating lessons from other disciplines with nursing experiences. *Journal of Professional Nursing* 16(5):258-266.
- Barrows**, H.S. & Kelson, A.M. 1993. Problem-based learning: A total approach to education. Monograph: Southern Illinois University School of Medicine, Springfield, Illinois.
- Blessinger**, P. 2017. *Transforming higher education's creative capacity*. *University World News*.
(<https://www.universityworldnews.com/post.php?story=20170410233217814>)
Accessed on 22 November 2017.
- Brown**, J.S., Collins, A. & Duguid, P. 1989. Situated cognition and the culture of learning. *Educational Researcher* 18(1):32-42.
- BusinessTech**. 2018. *South Africa's economy shrunk 2.2% in the first quarter of 2018*.
(<https://businesstech.co.za/news/business/249603/south-africas-economy-shrunk-2-2-in-the-first-quarter-of-2018/>)
Accessed on 26 August 2018.
- Council on Higher Education (CHE) Size and Shape Task Team**. 2000. *Towards a new higher education landscape: meeting the equity, quality and social development imperatives of South Africa in the 21st century*. ([http://www.dhet.gov.za/Reports%20Doc%20Library/Council%20on%20Higher%20Education%](http://www.dhet.gov.za/Reports%20Doc%20Library/Council%20on%20Higher%20Education%20))
Accessed on 20 November 2017.

- Creswell, J.W. & Plano-Clark, V.L.** 2011. *Designing and conducting mixed methods research (2nd ed.)*. Thousand Oaks, CA: Sage.
- Crouch, L.** 2005. South Africa equity and quality reforms: possible lessons. *Journal of Education for International Development* 1(1):1-18.
- Du Plessis, S. & Smit, B.** 2006. Economic growth in South Africa since 1994. Stellenbosch University. Economic Working Papers, 1.
- Gibb, 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.
- Hanke, M., Elizabeth, C., & Kisenwether, A.W.** 2005. The Pennsylvania State: A scalable and adaptable problem-based learning course in entrepreneurship. The NCIAA 9th Annual Meeting, 17-19 March 2005.
- Hensley, B., Galilee-Belfer, M., & Lee, J.** 2013. What is the greater good? The discourse on public and private roles of higher education in the new economy. *Journal of Higher Education Policy and Management* 35(5):553-567.
- Kuratko, D.F.** 2005. The emergence of entrepreneurship education: development, trends and challenges. *Entrepreneurship Theory and Practice* 29(5):577-598.
- Lowden, K., Hall, S., Elliot, D. & Lewin, J.** 2011. *Employers' perceptions of the employability skills of new graduates*. London: Edge Foundation.
- Mackenzie, N. & Knipe, S.** 2006. Research dilemmas: paradigms, methods, and methodology. *Issues in Educational Research* 16(2):1-13.
- Mathee, A. & Wright, C.** 2014. *Environmental Health in South Africa*. In *South African Health Review 2013/14*. Health Systems Trust. (<http://www.hst.org.za/publications/southafrica-healthreview-2013/14>) Accessed on 31 July 2019.
- McPeck, J.E.** 2016. *Teaching critical thinking: dialogue and dialectic*. London: Routledge.
- Miller, D. & Friesen, P.H.** 1982. Innovation in conservative and entrepreneurial firms: two models of strategic momentum. *Strategic Management Journal* 3(1):1-25.
- Mohamed, N.** 1996. Competence: past debates and future problems. EPU Working Paper No. 10. University of Natal, Durban.

- Moutinho, S., Torres, J., Fernandes, I. & Vasconcelos, C.** 2015. Problem-based learning and the nature of science: A study with science teachers. *Procedia - Social and Behavioral Sciences* 191:1871-1875.
- Mudaly, S.** 2018. *South African Institute of Environmental Health*. (<https://www.saieh.co.za/presidentsmessage.aspx>)
Accessed on 31 July 2019.
- National Institute for Communicable Diseases (NICD).** 2018. *Situation report on Listeriosis outbreak, South Africa, March*. (http://www.nicd.ac.za/wp-content/uploads/2018/03/Listeria-Sitrep-13Mar2018_finalapproved.pdf)
Accessed on 6 March 2019.
- O'Neill, G. and McMahon, T.** 2005. Student-centred learning: *What does it mean for students and lecturers. Emerging Issues in the Practice of University Learning and Teaching. Dublin: AISHE*. (<http://www.aishe.org/readings/2005-1/>)
Accessed on 9 April 2019.
- Owusu-Dankwa, I.** 2013. Entrepreneurship education: A study of selected private higher educational institutions in Ghana. *Journal Issues* 2350:157.
- Pletcher, H.** 2019. South Africa: *Distribution of employment by economic sector from 2008 to 2018. Statista*. (<https://www.statista.com/statistics/578944-employment-by-economic-sector-in-south-africa>)
Accessed on 18 August 2017.
- Pintrich, P.R.** 2002. The role of metacognitive knowledge in learning, teaching, and assessing. *Theory into Practice* 41(4):219-225.
- Saunders, M., Lewis, P. and Thornhill, A.** 2000. *Research methods for business students*. 2nd edition. Harlow: Pearson Education.
- SAQA.** 2015. Annual Report 2008/2009. *Mail & Guardian*. (www.saqa.org.za/docs/rep_annual/2009/annual09.pdf)
Accessed on 17 November 2017.
- Spaull, N.,** 2013. South Africa's education crisis: The quality of education in South Africa 1994-2011. *Johannesburg: Centre for Development and Enterprise*, pp.1-65.

Ulger, K. 2018. The effect of problem-based learning on the creative thinking and critical thinking disposition of students in visual arts education. *Interdisciplinary Journal of Problem-Based Learning* 12(1):10.

UNDSG; United Nations. 2015. Development goals
(<https://www.un.org/sustainabledevelopment/sustainable-development-goals/>)
Accessed on 6 March 2019.

WHO: World Health Organization. 2018. *Listeriosis, South Africa. Disease Outbreak News.*
(<https://www.who.int/csr/don/28-march-2018-listeriosis-south-africa/en/>)
Accessed on 6 March 2019.

Worldmeter, 2017. *Worldmeters.info.*
(www.Worldmeters.info)
Accessed on 17 November 2017.

CHAPTER 2

HISTORICAL OVERVIEW OF THE SOUTH AFRICAN EDUCATION SYSTEM, ECONOMY AND UNEMPLOYMENT POST-1994

A review article for submission partially or in full to the SA Journal of Higher Education (ISSN: 1011-3487)

Post-apartheid, democratic South Africa has been characterised by political, economic and educational reform. The chapter will aim to unpack the resulting questionable economic growth, social decay and a failing education system. The steps of the changing education curricula and policies are addressed. From these and combining different schools of thought an attempt will then be made to plan to eradicate poverty, alleviating unemployment by considering entrepreneurship.

2.1 South Africa Post-1994

2.1.1 Political and economic history

In 1994, the Republic of South Africa successfully achieved transition from an apartheid political system to a non-racial democracy through a process of national elections. After this historic event, South Africa was governed by the Government of National Unity (GNU) which ruled under an Interim Constitution that remained valid until the 1999 national elections. The parties that comprised the GNU were the African National Congress (ANC), the National Party (NP), and the Inkatha Freedom Party (IFP). These parties collectively shared decision making and had the policy-making power (RSA 1993; Kesselring, 2017). The agenda of this newly formed government was mainly to orchestrate social and educational reform.

The post-apartheid period was marked by skilled, White South Africans leaving the country in large numbers. The primary reason for this was most likely safety concerns and the belief that there was the likelihood of losing their former privileged standing. According to the South African Institute of Race Relations (2006), of the approximately 4 000 000 White people living in South Africa towards the end of apartheid, in excess of 800 000 emigrated overseas between 1995 and 2008. This 'brain drain' created a void in the skilled labour force across all sectors of society (White flight from South Africa, 2008). Immediately after apartheid, the South African economy was still characterised by the effects of international economic isolation and worldwide economic sanctions. To reconstruct and renovate the economy, the Reconstruction and Development Programme (RDP), which had been part of the election platform of the African National Congress in the 1994 elections, was the socio-economic intervention programme of preference. However, even though the RDP was considered as the basis of the government's development policy, it did not engender the much-anticipated economic growth. In summary, the RDP challenges, amongst others, were the following: overlooking the collection of new taxes and making fiscal prudence the focal point; the reassignment of already present income; and a lack of sufficiently skilled managers (Pettersson, 2013).

In addition to the financial burdens of the post-apartheid government, the Human immunodeficiency virus - Acquired immunodeficiency syndrome (HIV-AIDS), pandemic swept across the country. At this time South Africa had the highest prevalence of HIV-AIDS when compared to other countries in the world, with as many as 5 600 000 people infected by the disease, and 270 000 HIV-related deaths by 2011. The fallout of this pandemic was that more than 2 000 000 children were orphaned in a very short space of time. It became the government's responsibility to provide antiretroviral (ARV) treatment to underprivileged victims and, at the same time, design a social development policy to take care of these orphans (White flight from South Africa, 2008). The economic challenges of post-apartheid South Africa were exacerbated by labour unrest amongst Black miners. Migrant labour during the apartheid years was the cornerstone of the South African mining industry that employed half a million miners. Thus, labour unrest in this sector resulted in the Marikana massacre in 2012, during which 34 mineworkers were killed by members of the South African Police Service. The apartheid-born migrant labour system was labelled as a principal cause of the tragedy. Blame was also placed on multinational mining corporations such as Anglo-American Corporation, Lonmin, and Anglo Platinum for failing to address the lasting legacies of apartheid (South African mining stuck in the past, 2014). The incident threatened gold and platinum production and chances of foreign investment. In 2014, approximately 47% of South Africans, mostly Black, endured poverty, and South Africa was regarded as one of the most unequal countries in the world in terms of race relations (Gibson, 2015). At this point, there was countrywide discontent with socio-economic transformation, government ineptitude and maladministration. The protests that erupted in response to the dissatisfaction were generally of a violent nature (Powell, O'Donovan, De Visser, 2015), which was reminiscent of the apartheid era. During all this upheaval, the eradication of mass poverty through nationalisation was never implemented.

2.1.2 Education reform in post-apartheid South Africa

The education system in the post-apartheid era was another area that required stringent reform. The Ministry of Education within the new Government of National Unity was responsible for establishing new national policies that were then developed and had to be implemented by the National Department of Education.

Policies were spiralled down and had to be implemented at provincial level. Institutions of higher learning fell directly under the Ministry of Education, but were afforded autonomous status (Crouch & Lombaard, 2000), yet all institutions of higher learning, like those in basic education, depended directly on the Ministry within the national government for funding.

For higher education to bring about the necessary transformation for the system to meet the growth demands of equity and quality, additional costs were required. The question at the time was how these costs could be met while there was an increase in public expenditure nationwide. At the time, this dilemma directly influenced the rate of economic growth (RSA, 1997a). As a result, a system was implemented for institutional reforms to reduce wasteful expenditure, improve efficiency, and enhance quality. However, irrespective of how the newly established institutions managed themselves, the goals that were set for educational transformation were viewed as guidelines (RSA, 1997b).

The education reform that resulted also required curriculum reform, particularly in basic education which had been impacted by no fewer than three curriculum reforms in a period of a few years. The first of these reforms was the immediate eradication of an apartheid-based curriculum that was perceived oppressive and racist and deemed antiquated for the New South Africa (Jansen and Christie, 1999). The second attempt at curriculum reform with a focus on continuous assessment was introduced thereafter. The third and probably the boldest curriculum policy redesign took the form of outcomes-based education (OBE). The principles of OBE will be elaborated on later in this chapter. The assertions, assumptions and mostly uncommunicativeness of this initiative were later proven to have been a political response to apartheid schooling, instead of an approach to consider modalities which would bring about the necessary change at classroom level (Jansen, 1998(a)). In addition to these claims, the OBE policy was suggested to offer a solution to the economic challenges in South Africa and in turn enhance economic development (Mohamed, 1996). This was significant, since there is a consistent and/or constant correlation between all education and training policy documents and economic growth, technological development and global competitiveness. In terms of investment in human capital and social development, curriculum revision

underscores the alignment between education and economic development. Between 2010 and 2014, the South African economy was typified by low economic growth which led to low employment growth. To this day, low employment growth has failed to soak up the increasing numbers of school leavers that wish to enter the labour market for the first time. The result has been a growth in the unemployment rate (LMIP, 2016).

2.2 The challenges in education

The literature claims that South Africa has the most unequal schooling system in the world. It is also documented that the schooling system post-1994 replaced a school system segregated by race with one divided by wealth or financial privilege (Spaull, 2015). In practice, this means the establishment of strongholds for the privileged regardless of race, while some schools are still built from mud, and with no running water or electricity (Spaull, 2015). Public spending on education in South Africa is on average 6.4% of the GDP, compared to an average of 4.8% in European Union countries. There are only a few countries that spend so much with such a minimal effect as South Africa does (White flight from South Africa, 2008). Other important education issues are the absence of accountability throughout the education money hierarchy system, and the questionable quality of most teachers. A role-player in this scenario is the South African Democratic Teachers Union (SADTU), which is an ally of the ruling ANC party. SADTU was exposed in a report by Volmink, Gardiner, Msimang, Nel, Moleta, Scholtz, & Scholtz (2016) as corrupt and exploitative. This union's ability to sway government thinking resulted in changes that were neither positive nor progressive, as unreasonable and illogical decisions were taken amidst an already decaying education system (Van der Berg, Spaull, Wills, Gustafsson, and Kotzé, 2016). For instance, in 2015 the Organisation for Economic Co-operation and Development (OECD) ranked the South African education system 75th out of a total of 76 countries. In addition to this low esteem, the findings of the Trends in International Mathematics and Science Study (TIMSS) found that South Africa was at the bottom of the ranking table (Figure 2.1). A direct result of this is that students at tertiary level experience challenges, particularly in Mathematics and Science. The fact that 25% of South African secondary schools do not offer pure Mathematics as a subject for learners in grades 10 to 12 adds to the problem (The Economist, 2017).

Moreover, the language barrier that impacts both educators and students is a predicament, as South Africa is linguistically diverse with 11 official languages (The Borgen Project, 2016), but only two languages of instruction are offered in the secondary school phase, namely English and Afrikaans. Most schools offer instruction in English, but students entering tertiary education remain at a disadvantage, and education standards lose ground in terms of global competitiveness. Evidence of this is the 213 000 out of a total of 800 000 learners who failed their matric academic year in 2015. The drop-out rate before the event of the final examination in Grade 12 reduces the number of candidates, so 800 000 is far fewer than the original number of learners who entered the system at Grade 1 level. For example, less than half of the 1.2 million school starters enrolled in 2002 passed their matriculation examination 11 years later (Nkosi, 2016). In view of this, a closer look at curriculum reform is required.

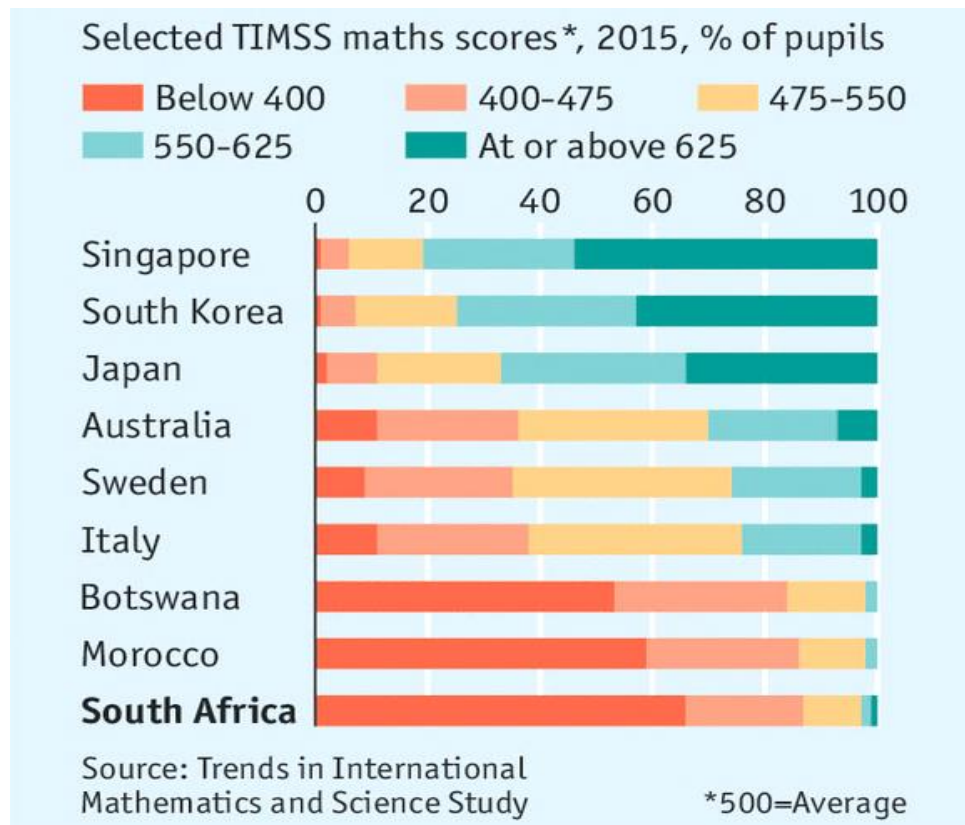


Figure 2.1: Trends in international Mathematics and Science study (TIMMS)

Source: Adapted from - The Economist, 2017.

2.3 Curriculum reform in South Africa post-1994

Major curriculum restructuring occurred in the South African education system post-1994. In March 1997, the then Minister of Education launched a new curriculum based on the outcomes-based model. This curriculum was referred to as Curriculum 2005 (or C2005), or OBE (RSA, 1997a). The inception of OBE occurred as a result of debates on the transformation of education between the Congress of South African Trade Unions (COSATU), the African National Congress (ANC), the private sector, and community-based stakeholders. The OBE policy lasted 12 years, during which it was criticised by academia and the political arena alike. The ensuing debate represented the most enthralling of its kind in the reform of educational policy in developing countries at the time (Jansen, 1998a). The failure of the OBE policy was characterised by several factors, and not all criticism was objective and constructive.

The criticism against Curriculum 2005 or OBE centred around the fact that OBE meant different things to different people in both theory and practice (Hargreaves & Moore, 2000). In addition, a ministerial committee that was established in 2000 to review the effectiveness of this policy revealed, amongst others, that there was a lack of alignment between the curriculum and relevant assessment policies; an absence of adequate teacher training and development; an inconsistent supply of resource material; inappropriate utilisation in the classroom, and a policy overkill accompanied by an incomplete transfer in the classroom (Chisholm, 2005). Moreover, this competence model did not acknowledge human behaviour as a series of steps, which complicated defining the learning outcomes. Therefore, OBE was found to be unsound, as it failed in illuminating complex human activities due to its outcomes-based focus (Mohammed, 1996). Moreover, a competence model such as OBE illustrates competence in exact, see-through and recognisable terms. This then suggests that a specific outcome may be predicted for a specific action and implies that human incorporation of knowledge that is characterised by engagement and comprehension can be explained precisely. Human knowledge, however, which includes human activity and comprehension, cannot be described with this kind of exactness (Kraak, 1999). Thus, because Curriculum 2005 fell short in satisfying the anticipated results, a Review Committee was established in 2000.

In 2000, under the leadership of the Minister of Education at the time, Professor Kader Asmal, the factors affecting the then education system were closely examined. The Review Committee recommended a revised curriculum structure that would be characterised by changes in teacher training, the provision of revised resource material, and the creation of provincial staffing structures nationally and at provincial level (Chisholm, 2005). This Review Committee proposed a re-examining of the curriculum in order to make it practical for South African classrooms. The findings of the review committee led to the establishment of the Revised National Curriculum Statement (RNCS), which was introduced as policy in 2002. So, collectively, C2005 and the RNCS in April 2002 represent two of the significant steps in the progression of national curriculum reconstruction embarked on since 1994 (Jansen & Christie, 1999; Chisholm, 2005).

The RNCS was institutionalised in Grades R-9 (Basic Education), and in the Foundation Phase (Grade R) in 2004. Facets of RNCS include comprehensive outcomes and assessment standards, which point out the knowledge and skills required for each grade and learning area and the way progress should be assessed. According to the DoE (RSA, 2002:), the aims of this curriculum were as follows:

“The curriculum aims to develop the full potential of each learner as a citizen of a democratic South Africa. It seeks to create a lifelong learner who is confident and independent, literate, numerate and multi-skilled, compassionate, with a respect for the environment and the ability to participate in society as a critical and active citizen.”

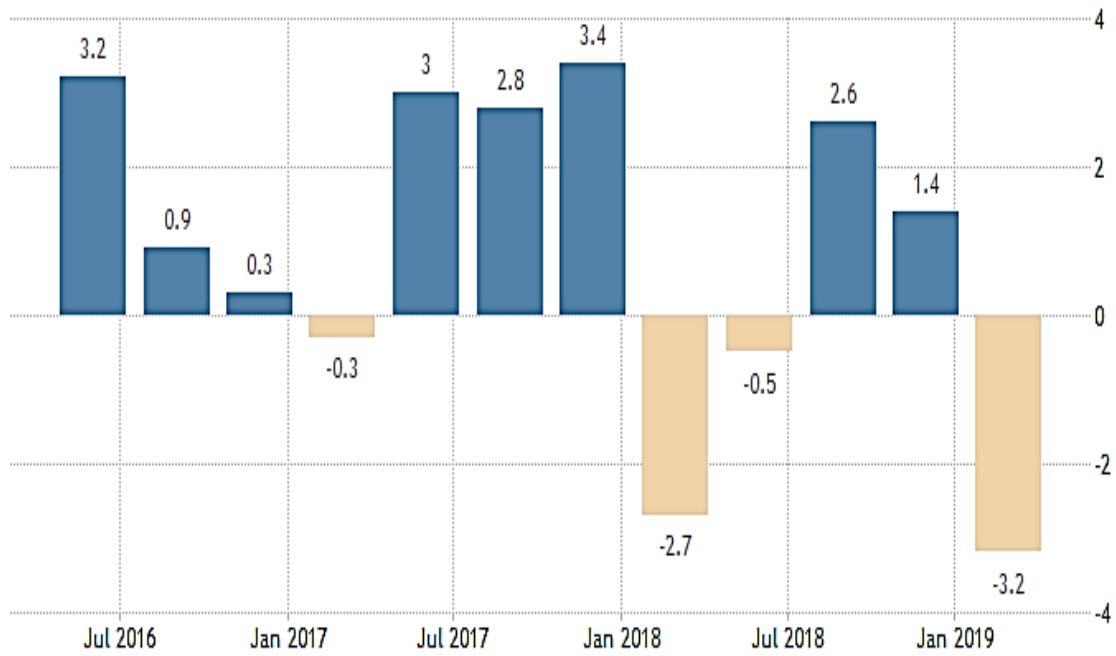
To enhance the way RNCS was driven, the National Curriculum Statement (NCS) was implemented between 2012 and 2014. This version of the curriculum was more focused on content delivery per grade, and its dissociation from OBE was noteworthy at the time. The NCS then became the policy statement for teaching and learning in South African schools. This curriculum underscores the different programmes that must be adhered to in each grade, starting from Grade R through to Grade 12. To streamline this policy document and to make it user-friendly for the teaching fraternity, the Curriculum and Assessment Policy Statement (CAPS) was

introduced. CAPS represent a separate, all-inclusive and succinct policy document, and has become the accepted curriculum for schools operating under the South African Department of Basic Education. CAPS is characterised by curriculum and assessment policies for all approved subjects and learning areas. It is a national policy which directs programmes of teaching and learning, as well as the promotion requirements for Grades R to 12 that are entrenched in the National Protocol for Assessment of these grades (RSA, 2011). At the introduction of this new curriculum South Africa, together with the rest of the world, was waiting in anticipation for the social and economic transformation that this curriculum envisaged.

2.4 The South African economy

2.4.1 Economic and financial growth post-1994

At the time of its implementation, the so-called Outcomes-based Education policy was proclaimed as an answer to the economic challenges of South Africa (Mohamed, 1996), and it was anticipated that the much-needed economic development would occur. It was argued that OBE would enable human resources development and, theoretically, that a flourishing economy would follow (National Curriculum Development Committee, 1996). However, this education and training system was outdated and did not match the unique demands of the South African society and its labour force, and thus did not address the need for economic advancement. There was an understanding that the economy should grow at approximately 6% to create an adequate number of jobs to reduce unemployment levels in the country, as school leavers and the unemployed cohort of society would be absorbed into the workforce. However, in response to this call the South African economy expanded by 2.5% annually until the end of the second quarter in June 2017. During the first quarter of 2019 it shrunk by 3.2%. This was the sharpest decrease in the economy since the first quarter of 2009. The recent decline could possibly be attributed to power cuts by Eskom and political uncertainty (Trading Economics, 2019: Online). The Gross Domestic Product (GDP), growth rates for the years 2016 to 2019 are depicted in Figure 2.2.



SOURCE: TRADINGECONOMICS.COM | STATISTICS SOUTH AFRICA

Figure 2.2: South Africa's GDP growth rate 2016 – 2019

Source: Adapted from Trading Economics, June 2019.

In July 2017, the Central Bank's Governor, Lesetja Kganyago, stated that the South African economy had recorded two consecutive quarters showing negative growth, and although the next quarter was predicted to show improvement, the general economic outlook for South Africa was bleak (CNBC, 2017). Considering this picture of the South Africa economy, the government needed to go back to the drawing board. A report by the Organization for Economic Cooperation and Development (OECD, 2017) stated that structural remodelling was needed to revive the South African economy.

The UN Secretary General, Angel Gurría, also stated that bolder action was needed from policy makers. Thus, to safeguard a positive economic future for all South Africans, an increase in access and delivery of quality higher education, an increase in the involvement in regional markets, and a supervisory scaffold that was intended to promote entrepreneurship and permit small businesses to prosper were introduced (CNBC, 2017).

2.4.2 Higher education and its role in the developing economy

Higher education has for some time been accepted as a platform for the economic security of a country. Economic growth literature isolates three processes through which economic growth may be affected. First, it is argued that higher education can boost the human capital component of the labour force and, in turn, increase national productivity (Mankiw, Romer, and Weil, 1992). Secondly, higher education may be the basis from which an increase in the innovative competence of the national economy may be generated. The new knowledge will in turn encourage the expansion of new technologies, inventions and practices (Aghion & Howitt, 1998). Thirdly, higher education could be the channel through which knowledge is disseminated and communicated, with the purpose of comprehending and processing new knowledge. New technology can therefore be applied, which in turn will promote economic growth (Benhabib & Spiegel, 1994).

Maintaining the human capital generated by higher education is a twofold human resource matter. First, competencies, skills and abilities need to be guaranteed to facilitate smooth entry into the labour market in order to address its needs and

requirements. Secondly, the goal or aim of higher education should be in line with the demands of society, with education provided at all levels and with local and global economic veracities (Neamtu, 2014). However, education at the level of middle-skilled workers has continued to show an imbalance when compared to supply. This is more evident in certain sectors of the economy than in others. As a means of remedying this situation, governmental investment was required to deliver education and training from semi skills right up to the top of the skills hierarchy (Holzer & Lerman, 2009).

Added to this is the fact that the cost of higher education and the exigency for this system are constantly under pressure. The reason for this is the belief that skills and knowledge acquisition at institutions of higher learning can be transformed into career and social success (Winston, 1999). Owing to this assumption, it is believed that the promise of socio-economic flexibility is attached to higher education (Hensley, Galilee-Belfer, and Lee, 2013). Higher education is considered the training ground for equipping students with the skills to market themselves, and to enter various professions. Higher education and training should therefore respond to changing domestic and global economies (Hensley *et al.*, 2013). At this point we need to ask ourselves: *Does higher education in South Africa have an answer to these strategic questions?* As part of the numerous ways in which to answer this question, we should investigate the employment/unemployment status in South Africa.

2.5 Tertiary education and the demands from industry

According to the Labour Market Intelligence Partnership (LMIP) (2016), the South African labour force comprised 15 million employed and 7.5 million unemployed people at the time. Two thirds of the employed cohort and an average of 90% of the unemployed cohort were from the Black population group. The age demographic of this unemployment cohort was between 15 and 34 years. An overview of the levels of education and the standard of the skills within the labour force showed below average rates when compared with international productive economies. It was also revealed that 20% of the employed component of the population possessed a tertiary qualification, 32% could show evidence of secondary school completion, and almost

half of this workforce did not have a Grade 12 qualification. This was representative of 11.75 million individuals having no high school qualification at the time (LMIP, 2016). The report also indicated that divisions within the job market changed constantly, and little or no growth was observed in most divisions, in contrast with a notable employment growth rate in the state sector. However, this growth could not be sustained (LMIP, 2016).

To align education on an academic level with vocational training, the National Qualifications Framework (NQF) was established in the mid-1990s. This body formed the central point of South Africa's national education policy framework. The purpose of the NQF was to influence and direct education policy makers towards a smooth alignment among education and training, academic training, everyday life, and different disciplines. Holistically, this structure represented the modernisation of an archaic industrial training system and was embedded in the modularisation of curricula and a system of credit accumulation. In support of the NQF, the National Commission on Higher Education (NCHE) was established in 1995. The purpose of the NCHE was, and still is, to address methods for the unification and transformation of South Africa's racially divided, exclusive, differentiated higher education system. The intention was to make higher education more responsive to South Africa's plan for economic and social reconstruction (Cloete, 2002). The NCHE addressed two theoretically contradictory burdens. Firstly, the pressure to prepare South Africa to enter a global economy; and secondly, the pressure to transform higher education to be more sensitive to local needs and challenges. This would put South Africa on a path towards skills acquisition, economic growth, and social development. In view of this, my discourse will take a global 'leap', which also refers to the Liberal Education and America's Promise initiative that was launched in 2005.

2.6 The employability of graduates

Employability is a complex and multi-faceted concept that presupposes different types of skills (Argosa & Ezquerra, 2014). Employability as a term is often used within all spheres of society, especially when considering the status of unemployment in the country. According to Yorke and Knight (2004), employability may be coined as follows: "Employability is a set of achievements, understandings

and personal attributes that makes [sic] individuals more likely to gain employment and be successful in their chosen occupations”. This brief definition of employability can therefore be broken up into the ability to secure any form of employment, the capacity to retain this employment, the talent to be able to move between numerous jobs and/or roles within society, and lastly the proficiency to secure and adapt to a new role with an alternative employer (Fugate, Kinicki, and Ashforth, 2004). In support of this, Malaysian academics focus on the ability to cooperate with others, being able to work with instruments of technology, the competence to make an informed decision under pressure, and productive time management. The training regime of students would therefore be built around these skills (Buntat *et al.*, 2013). Figure 2.3 illustrates these points graphically.

To contextualise the standard of employability of South African graduates, an outline of a strategy which originated in the USA is referred to. LEAP stands for the Liberal Education and America’s Promise, and it was launched in 2005. LEAP promotes the importance of a liberal education for students and the nation at large. LEAP also responds to the demands of the United States of America for more college educated workers and more participating and informed citizens. It functions on the premise that graduates need higher levels of learning and knowledge together with sound intellectual and practical skills. It does this by assisting an increasing number of campuses to direct their students towards acquiring higher order competencies and real-world experiences to flourish within a local and global economy (Association of American Colleges and Universities (AAC&U), 2005). In summary, LEAP argues that the broader purpose of higher education, outside the obvious preparation for employment, is to connect students with the real world, and to involve them in creative and critical thinking, as well as collaborative problem-solving. The world of work then merely becomes an extension or continuation of higher education and training. In view of this strategy, it is recommended that any graduate in South Africa who is regarded as employable should be trained and educated according to this strategy.

These skills or learning outcomes - as they are referred to by the academia - are respected by employers and are critical for employment. However, these outcomes are also fundamental in shaping and training an individual to become a ‘job creator’

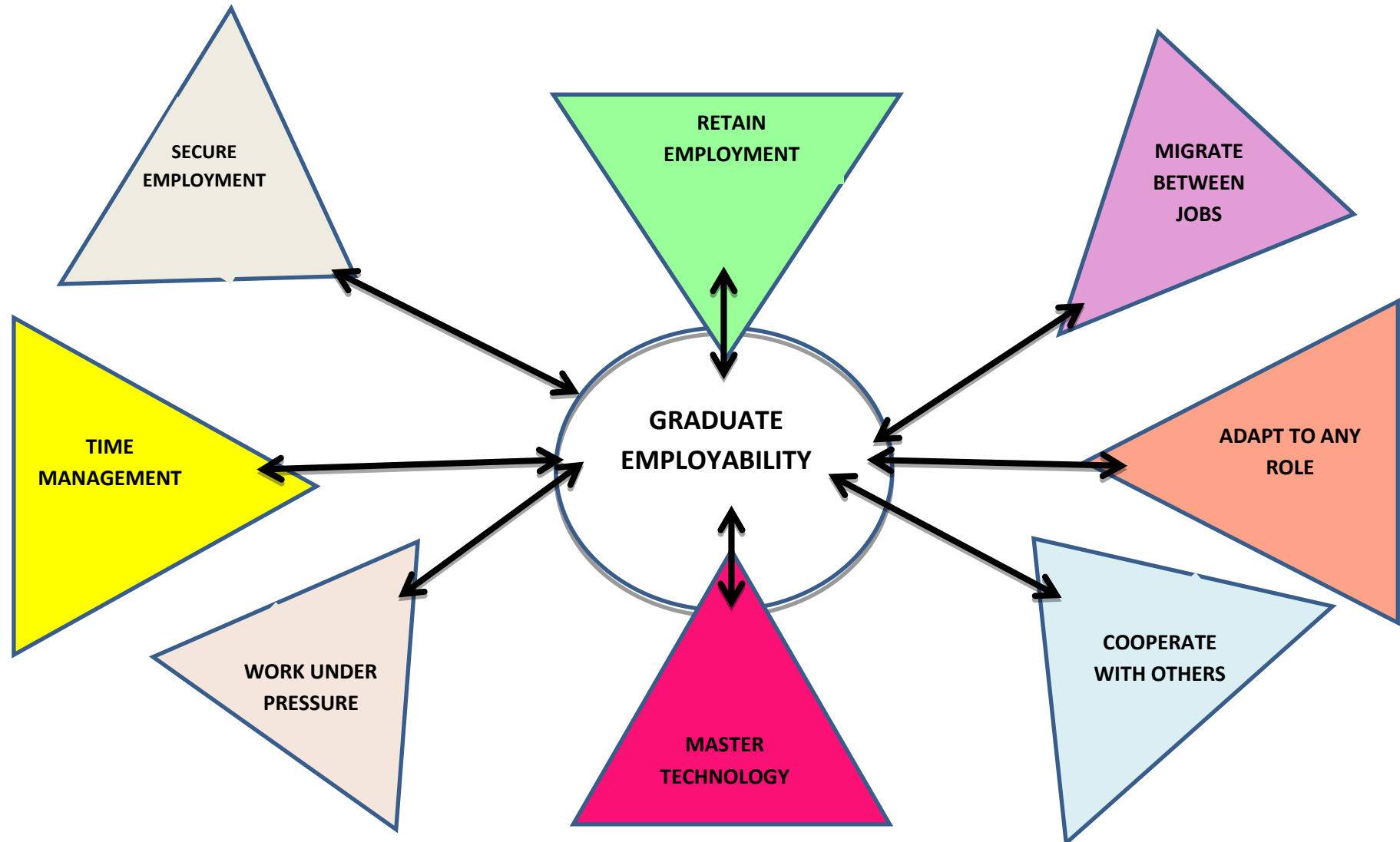


Figure 2.3: Diagrammatic representation of the skill set required for the employability of graduates

and future employer. Critical thinking, problem solving, working in diverse teams, ethical reasoning, communicating - these make both good employees and self-employed citizens. Higher or tertiary education in South Africa can liberate mind-sets by focusing on a narrowly defined goal of employment, but also on goals such as self-employment, a better life, better communities, and a healthier economy (Sutton, 2016).

2.7 Employers' and industry's response to worker employability

It is necessary to understand employability and to steer higher education towards producing employable graduates. However, the question is: what would be the response from industry or current and future employers in this regard? Having outlined what is required, it is important to determine what employers and industry are articulating in this regard. A baseline study on the attributes of South African graduates from the employer's point of view was done by Hanlie Griesel and Ben Parker in January 2009. This study revealed the following:

- Employers agreed unanimously that proficiency in English and communication skills are of importance. This foundation is usually laid by the schooling system, but the South African Basic Education system might be found wanting in this regard. If this is the case, it becomes the responsibility of higher education institutions to try and bridge this skills gap.
- With regards to the importance of basic skills and understanding the gap of having access to information, written communication (writing skills) and the ability to use existing information require attention.
- With regards to the importance of knowledge and intellectual ability, the biggest gaps were found in terms of complex problem-solving skills, understanding the workplace, integrating data, and grasping knowledge instantly from the workplace experience.
- In terms of the importance of workplace skills and knowledge, employers found that new employees who have recently graduated experienced

problems with hard cognitive skills, the ability to choose appropriate information to address problems, and the ability to complete tasks independently.

- Regarding the importance of personal and interactive skills, the biggest gap was found to be a lack of openness and flexibility.

The above employer opinions are supported by Jansen (2012):

This huge gap between what the university diploma says and what graduates can actually do in the real world has a negative effect on the workplace. We regularly talk to employers about 'the graduateness' of university students; I have not yet heard a positive comment about readiness for work.

To find reasons for this challenge, it might be appropriate to take a closer look at a possible disconnection between the desired skills of the current job market and what universities of technology are teaching. Secondly, it would be irresponsible not to mention financial, expert human and training resources, and the fact that institutional infrastructure is lagging and not keeping up with the rapid increase in student numbers. This has a direct impact on the quality of student progress and the qualifications that they bring to the job market. The overall reason might be the manner in which students are educated. The methodology and teaching strategies used for the pedagogic process have a direct influence on the calibre of graduates, irrespective of the course or its constraints. This argument is consistent with the findings of a baseline study that was done by Griesel and Parker (2009) on the viewpoints of employers. Their findings suggest that the way in which students learn or are taught impacts on how they will think and perform in the workplace. It is for this reason that employers are no longer sifting for outstanding and impressive degree certificates, but rather for the aforementioned skills. This is apparent in pioneering and large corporates where a degree qualification is no longer a prerequisite, as these employers have come to learn that academic success is no guarantee for professional or workplace success. Workplace success is, of course,

only possible for the fortunate few who have been able to secure a job in South Africa.

2.8 The unemployment challenge in South Africa

Within the current economic climate, being employed has become a privilege rather than a right. Unemployment is usually accompanied by social ills such as poverty, crime, violence, loss of self-confidence and self-esteem, and all-round ruin. The reason why employment becomes pivotal in combatting and preventing the social ills referred to is not necessarily about earning an income, but also about the unquantifiable benefits such as human dignity and a sense of accomplishment that come with having a job (Levinsohn, 2008). The degree or status of unemployment of a country may therefore be regarded as a variable that indicates the current and future position of the economy (Mosikari, 2013).

The rate of unemployment in South Africa escalated to 27.2% during the second quarter of 2018 (see Figure 2.4). This was an increase from 26.7% earlier in the same year. In terms of numbers, the former percentage represents an increase of 103 000 to 6.08 million, with employment figures declining with 90 000 to 16.29 million. Job losses were registered as 73 000 in the informal sector, 35 000 in the formal sector, and approximately 3 000 in the agricultural sector (Moya, 2018). These figures include people who were actively seeking employment, people who had stopped looking for a job (there were several reasons for this), individuals who had never worked before, and the elderly who had lost their jobs or had been retrenched. The youth who were unemployed at the time represented roughly 60% of these statistics, which means that this sector of society is now regarded as economically inactive. To remedy the situation and revive the country's economy, the government would have to make difficult and radical decisions. Moreover, against the backdrop of this scenario within education and higher education, the problem would have to be addressed by government, and sustainable means of turning the situation around should be found.

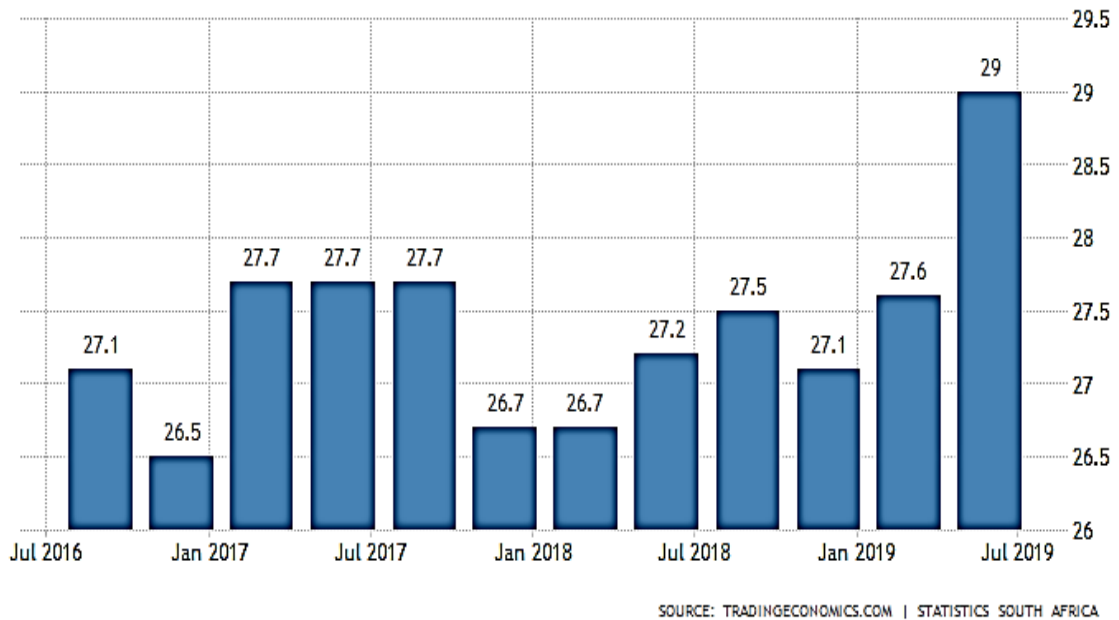


Fig 2.4: Unemployment rates in South Africa between July 2016 and July 2019. Source: Adapted from Trading Economics, 2019.

2.9 Entrepreneurship education at institutions of higher learning in South Africa

The discourse has revealed that South Africa is a country that finds itself in challenging times. Unemployed youths are now faced with this reality, and this undeniably leads to growing frustration, discouragement and a downward spiral. An urgent solution to this problem is required. Diphoko (2017) argues that “university rethink on job creation is required as the current economic situation means that young people who are currently studying have limited chances of getting jobs, even if they are qualified”. Universities can no longer just prepare young people to be employed. There should be a shift towards preparing young graduates to be entrepreneurs and job creators, as opposed to being job seekers. The South African economy is not able to accommodate all the job seekers, especially young graduates. The market is saturated, and the private sector is running on full capacity. It is imperative that collaborative work is done towards growing an economy and youth entrepreneurship that represents a possible solution. Added to becoming job creators, entrepreneurs in general can aid economic growth, competitiveness within the market, independence, and self-esteem. Social welfare as an added benefit will be a result, together with political stability and national security (NGM, 2017). However, to achieve a revival of economic growth through youth entrepreneurship, effective government policies and productive partnerships among businesses, large corporations and universities are pivotal. The boundary between universities and businesses needs to become more porous so that, before graduating, students have a clear idea of the expectations of their future employers, or of becoming self-employed individuals. These concepts will be unpacked in Chapter 4. Higher education institutions have a responsibility to ensure that students who enter the job market have had educational experiences that have prepared them for more than a job - in fact, for more than a career (Sutton, 2016).

2.10 Concluding remarks

The South African government was effectively transformed from an oppressive apartheid government to a democratically elected, representative government in 1994. The period that followed was characterised by political, economic and

educational changes. The Government of National Unity at the time instituted radical changes to South African curricula, but these did not always have the desired effect. The financial burden on the country was loaded with the cost of economic and social reform, attempts to overcompensate for the discrepancies caused by apartheid, and the ineffectiveness and maladministration of government. Some of the resulting effects were questionable economic growth, social and community decay, political unrest, and a failing education system.

The transformation within the education system was typified by several policy changes. The first attempt was to eradicate an apartheid-based system by changing the syllabi. The second attempt focused on curriculum reform through continuous assessment. The third (and probably the boldest) curriculum policy redesign took the form of outcomes-based education (OBE), also known as Curriculum 2005. This initiative was launched in 2000. After a dismal response, OBE was replaced by the Revised National Curriculum Statement (RNCS) in 2002. The RNCS was re-examined, and the National Curriculum Statement (NCS) was introduced in 2012. To make the curriculum more user-friendly for teachers, the NCS was streamlined to introduce the Curriculum and Assessment Policy Statement (CAPS) initiative (Figure 2.5).

Several schools of thought have worked together towards the eradication of poverty, creating economic development, improving social welfare, and alleviating unemployment by addressing curriculum reform, and establishing what industry required in terms of the desired skill set of the ideal 'employable' employee. Additionally, the strategy to engage in entrepreneurship education was proposed as an avenue to contribute to economic development, self-employment and job creation. Considering the above, the journey of South Africa post-apartheid may be summarised as follows: democracy → efforts to right wrongs of the past → new challenges → economic decline + decline in social welfare + political unrest + failing education system + unemployment. The suggested solutions to the challenges are: a functional education system, higher education filling the required niche, producing an employable workforce, and generating jobs to initiate economic growth (or entrepreneurship).

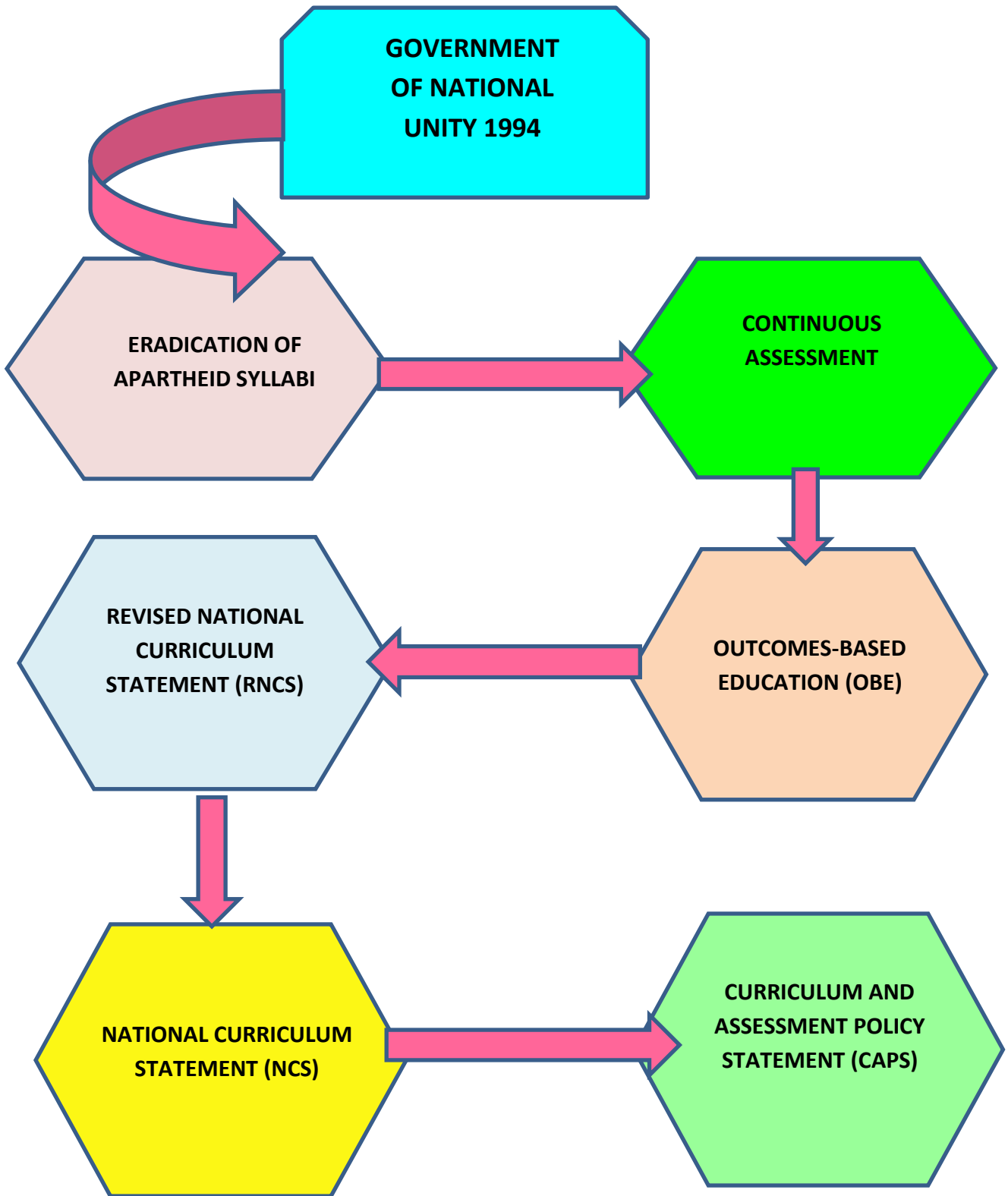


Figure 2.5: A Flow diagram representing the sequential transformation strategies in Basic Education in South Africa post-1994

2.11 References

- AAC&U (Association of American Colleges & Universities).** 2005.
(<https://www.aacu.org/leap>)
Accessed on 30 July 2018.
- Aghion, P. & Howitt, P.** 1998. Market structure and the growth process. *Review of Economic Dynamics* 1(1):276-305.
- Aids Foundation of South Africa.** N.d.
(<http://www.aids.org.za/hiv-aids-in-south-africa/>)
Accessed on 20 July 2018.
- Argosa, J. & Ezquerra.** 2014. Universities and skills for employability. *Procedia - Social and Behavioral Sciences* 139:290-296.
- Benhabib, J. & Spiegel, M.** 2002. Human capital and technology diffusion: FRBSF Working Paper No 2003-02. New York University and Federal Reserve Bank of San Francisco.
- BUSINESSTECH,** 2018. *South Africa's economy shrunk 2.2% in the first quarter of 2018, 5 June 2018.*
(<https://businesstech.co.za/news/business/249603/south-africas-economy-shrunk-2-2-in-the-first-quarter-of-2018/>)
Accessed on 26 August 2018.
- Chisholm, L.** 2005. The politics of curriculum review and revision in South Africa in a regional context. *Compare: A Journal of Comparative and International Education* 35:79-100.
- Cloete, N.** 2002. Policy Expectations. In Cloete *et al.* (Eds). *Transformation in Higher Education: Global Pressures and Local Realities in South Africa.* Cape Town: Juta and Company.
- CNBC,** Consumer News and Business Channel, 2017. *Political and policy uncertainty weigh on South Africa's economy: SARB.*
(<https://www.cnbc.com/news/southern-africa/2017/10/05/political-policy-uncertainty-weigh-south-africas-economy-sarb/>)
Accessed on 24 November 2017.
- Crouch, L. & Lombard, C.** 2000. *Funding transformation in Further Education and Training.* Pretoria: Government Printer.

- Diphoko, W.** 2017. *Township Economy Report: It's time to recognise Township Economy.*
(<https://www.iol.co.za/business-report/townshipeconomyreport-its-time-to-recognise-township-economy-10286926>)
Accessed on 1 October 2018.
- Fugate, M., Kinicki, A.J. & Ashforth, B.E.** 2004. Employability: A psycho-social construct, its dimensions, and applications. *Journal of Vocational Behavior* 65: 14-38.
- Gibson, J.** 2015. Apartheid's long shadow. *Foreign Affairs.*
(<https://www.foreignaffairs.com/articles/south-africa/2015-02-10/apartheid-s-long-shadow>)
Accessed on 27 July 2018.
- Griesel, H. & Parker, B.** 2009. *Graduate attributes: A baseline study on South African graduates from the perspective of employers.*
(http://www.saqa.org.za/docs/genpubs/2009/graduate_attributes.pdf)
Accessed on 07 August 2018.
- Hargreaves, A. & Moore, S.** 2000. Educational outcomes, modern and postmodern interpretations: Response to Smyth and Dow. *British Journal of Sociology of Education* 21(1):27-42.
- Hensley, B., Galilee-Belfer, M. & Lee, J.J.** 2013. What is the greater good? The discourse on public and private roles of higher education in the new economy. *Journal of Higher Education Policy and Management* 35(5):553-567.
- Holzer, H.J. & Lerman, R.I.** 2009. *The future of middle-skill jobs* (Vol. 41). Brookings: Center on Children and Families.
- Jansen, J.** 2012. Employers dismayed by graduates' lack of basic skills. Mail and Guardian, January 2012.
(<https://mg.co.za/article/2012-01-19-graduates-lack-of-skills-affect-workplace-says-jansen/>)
Accessed on 17 November 2017
- Jansen, J.** 1998a. Curriculum reform in South Africa: A critical analysis of outcomes-based education. *Cambridge Journal of Education* 28(3):321-331.
- Jansen, J.** 1998b. Curriculum reform since apartheid: Intersections of policy and practice in the South African transition. *Journal of Curriculum Studies* 31(1):57-67.

Jansen, J. & Christie, P. 1999. *Changing curriculum: Studies on outcomes-based education in South Africa*. Kenwin: Juta and Company.

Kesselring, R. 2017. *Bodies of truth: Law, memory and emancipation in post-apartheid South Africa*. Stanford: Stanford University Press.

Kraak, A. 1999. Competing education and training policy discourses: A “systematic” versus “unit standards” framework. In: D.J. Jansen & P. Christie (Eds). *Changing curriculum: Studies on outcomes-based education in South Africa*, pp. 21-58. Kenwyn: Juta & Company.

Levinsohn, J. 2008. Two policies to alleviate unemployment in South Africa. *CID Working Paper No. 166*. Center for International Development, Harvard University.

LMIP: Labour Market Intelligence Partnership – Report, 2016.

<http://www.hsrc.ac.za/en/departments/education-and-skills-development/lmip>

Accessed on 30 July 2018

Mankiw, N.G., Romer, D. & Weil, D.N. 1992. A contribution to the empirics of economic growth. *The Quarterly Journal of Economics* 107(2):407-437.

Mohamed, N. 1996. Competence: Past debates and future problems. *EPU Working Paper No. 10*. Durban: University of Natal.

Mosikari, T.J. 2013. The effect of unemployment rate on gross domestic product: Case of South Africa. *Mediterranean Journal of Social Sciences* 4(6):429.

Moya, S. 2018. Trading Economics. Statistics South Africa. (<https://tradingeconomics.com/south-africa/unemployment-rate>)

Accessed on 31 July 2018.

National Curriculum Development Committee (NCDC). 1996. A Framework for Life-Long Learning. Pretoria, Department of Education.

Neamtu, D.M. 2015. Education, the economic development pillar. *Procedia-Social and Behavioral Sciences* 180:413-420.

NGM - New Generation Mindset. 2017, July. *Tackling youth unemployment through entrepreneurship*.

(<https://www.ngmindset.co.za/tackling-youth-unemployment-through-entrepreneurship/>)

Accessed on 8 August 2018.

Nkosi, M. 2016. Ukuthwala and Ukubeleka: Is there a difference in terms of the role in Education? *Towards Excellence in Educational Practices*. South African International Conference on Education Proceedings. Cape Town: African Academic Research Forum.

OECD. 2017. *OECD Economic Surveys, South Africa, July 2017*.
(<http://www.oecd.org/economy/south-africa-economic-snapshot/>)
Accessed on 17 November 2017

Ornstein, A.C. & Hunkins, F.P. 1988. *Curriculum: Foundations, principles, and issues* (pp. 1-348). Englewood Cliffs, NJ: Prentice Hall.

Petersson, L. (Ed.). 2013. *Post-apartheid Southern Africa: Economic challenges and policies for the future*. London: Routledge.

Powell, D.M., O'Donovan, M. and De Visser, J. 2015. Civic protests barometer 2007-2014. *Multilevel Government Initiative 1-4*.

Reddy, V., Bhorat, H., Powell, M., Visser, M. & Arends, F. 2016. *Labour market intelligence partnership project (LMIP)*.
(<http://repository.Hsrc.ac.za>)
Accessed on 4 August 2018.

RSA - Republic of South Africa. 1993. *Interim Constitution of the Republic of South Africa Act 108 of 1996*. Pretoria: Government Printer.

RSA - Republic of South Africa. 1997a. Department of Education. *Curriculum 2005: Lifelong learning for the 21st century: A user's guide*. Pretoria: Government Printer.

RSA - Republic of South Africa. 1997b. Department of Education. Programme for the transformation of higher education. *Education White Paper 3, General Notice 1196 of 1997*. Pretoria: Government Printer.

RSA - Republic of South Africa. 2002. *Department of Education. Revised National Curriculum Statement Grades R-9 Schools*.
(<http://education.pwv.gov.za>)
Accessed on 21 October 2017.

Republic of South Africa (RSA). 2011. *Department of Education. Curriculum Assessment Policy Statements (CAPS)*.
([https://www.education.gov.za/Curriculum/CurriculumAssessmentPolicyStatements\(CAPS\).aspx](https://www.education.gov.za/Curriculum/CurriculumAssessmentPolicyStatements(CAPS).aspx).)

Accessed on 30 September 2017.

Revised National Curriculum statement (RNCS). 2010.

(<http://education.pwv.gov.za>)

Accessed on 4 September 2017.

South African Institute of Race Relations. 2006. [South African mining stuck in the past](https://www.ft.com/content/e0b9bee0-b0e4-11e3-bbd4-00144feab7de#axzz3Ze1AyNHG). 2014. *Financial Times*. (<https://www.ft.com/content/e0b9bee0-b0e4-11e3-bbd4-00144feab7de#axzz3Ze1AyNHG>)

Accessed on 30 July 2018

South African mining stuck in the past. 2014. *Financial Times*.

(<https://www.ft.com/content/e0b9bee0-b0e4-11e3-bbd4-00144feab7de#axzz3Ze1AyNHG>)

Accessed on 30 July 2018.

Spaull, N. 2015. Schooling in South Africa: How low-quality education becomes a poverty trap. *South African Child Gauge* 12:34-41.

Sutton, B. 2016. *Higher education's public purpose. Association of American Colleges & Universities: A voice and a force for liberal education in the 21st Century.*

(<https://www.aacu.org/leap/liberal-education-nation-blog/higher-educations-public-purpose>)

Accessed on 6 August 2018.

The Borgen Project. 2016. *Ending the south African Education Crisis.*

(<https://borgenproject.org/south-african-education-crisis/>)

Accessed on 19 August 2017.

The Economist. 2017. *South Africa has one of the world's worst education systems.*

(<https://www.economist.com/middle-east-and-africa/2017/01/07/south-africa-has-one-of-the-worlds-worst-education-systems>)

Accessed on 18 August 2018.

Trading Economics, 2019.

(<https://tradingeconomics.com/south-africa/unemployment-rate>)

Accessed on 6 July 2019.

Van der Berg, S., Spaull, N., Wills, G., Gustafsson, M. and Kotzé, J. 2016. Identifying binding constraints in education. A study financed by PSPPD (Project to Support Pro-Poor Policy Development). Research on Socio-Economic Policy (ReSEP), Stellenbosch.

Volmink, J., Gardiner, M., Msimang, S., Nel, P., Moleta, A., Scholtz, A., & Scholtz, G. 2016. Report of the Ministerial Task Team appointed by Minister Angi Motshekga to investigate allegations into the selling of posts of educators by members of teachers' unions and departmental official in provincial education departments. South Africa: Department of Basic Education: Republic of South Africa.

White flight from South Africa. 2008. *The Economist*. 25 September 2008. (<https://www.economist.com/briefing/2008/09/25/between-staying-and-going>) Accessed on 18 July 2018.

Winston, G.C. 1999. For-profit higher education: Godzilla or Chicken Little? *Change: The Magazine of Higher Learning* 31(1):12-19.

Yorke, M. & Knight, P.T. 2004. Learning and employability. *Embedding employability into the Curriculum* 3:1-28.

CHAPTER 3

UNIVERSITIES OF TECHNOLOGY: THEIR INCEPTION, MANDATE, CHARACTER AND TEACHING AND LEARNING METHODOLOGIES

A review article for submission partially or in full to the Journal of Higher Education

Research and Development

Print ISSN: 0729-4360 Online ISSN: 1469-8366

The structure and the challenges of the new education landscape of South Africa is unpacked by discussing curriculum changes, the inception of Universities of Technology and the role of these institutions in skills development and knowledge transfer. The position and role played by these institutions in addressing economic upliftment by providing a productive workforce is discussed. To achieve this alternative student-centred teaching methodologies are explored as well as the use of these towards developing entrepreneurship education.

3.1 The curriculum in Higher Education

3.1.1 The status of the higher education landscape in South Africa

The post-1994 education system in South Africa has experienced difficulties for various reasons (Spaull, 2013; Roodt, 2018). For example, it has been reported that an increasing number of students graduating from universities have questionable literacy and numerical skills, and it has been suggested that these graduates are not employable. Feedback from industry regarding university graduates has highlighted poor writing, verbal and communication skills and a lack of the ability to solve problems and apply deductive thinking (Spaull, 2013). Graduates also reportedly experience difficulty to work in a team and collaborate with other professionals. It is undeniable that these problems need to be addressed by the education authorities. The scholarship of teaching and learning concept lends itself to providing an avenue to address these problems, and the lack of skills might be remedied through facilitation and training (John, 2012).

3.1.2 The new higher education landscape in South Africa

During the last 20 years, consultation in the higher education landscape has been an ongoing process. It has generally been argued that the most important reason for the challenges experienced in this education sphere is the segregated education system of the past (see Chapter 2). The understanding that certain institutions were higher on a hierarchical scale necessitated urgent dialogue, as the perception existed that the erstwhile technikons (now universities of technology) were inferior to universities (Kraak, 2006). In 2002, the Council on Higher Education (CHE) released a report in which the size, shape and character of institutions of higher learning were the focus. The report precipitated extensive debates around this topic, and the CHE Task Team advised a top-to-bottom differentiation in higher education. It was then accepted that differentiation would be based on historical evidence rather than on new missions and visions. Currently, three categories of universities exist, namely traditional universities, comprehensive universities, and universities of technology. The White Paper for Post-school Education and Training that was issued in 2013 reinforced the continuation of this categorisation by the CHE). The nature, character and mandate

of universities of technology are very different from those of more traditional universities (see section 3.2). The new higher education landscape is thus guided by several policy documents and curriculum restructuring initiatives.

3.1.3 Curriculum restructuring in higher education

The White Paper referred to above was published in November 2013. It set out stratagems to enhance the capability and scope of the post-school education and training system to address the needs of South Africa. This document presented guidelines to the Department of Higher Education and Training (DHET) to, among other initiatives, develop a system that would be responsive to the needs of employers in both the private and public domains. It also considered societal and developmental goals as an answer to South Africa's needs (DHET, 2013). These guidelines, initiated curriculum restructuring.

The term 'curriculum' has different definitions for different schools of thought; however, primarily a curriculum is represented by an educational plan that contains a set of aims and goals that should be achieved. Furthermore, it includes topics and subject matter that need to be covered, and the methods to be employed in a particular discipline or field (Ornstein & Hunkins, 2012). Curricula are mostly policy documents that indicate how an education policy should be executed through a series of activities. A curriculum should therefore be seen "as the public appearance of the profession's educational rationale" (Fish, 2003). Important issues pertaining to curriculum reform are the nature of knowledge and the nature of teaching and learning. Such a curriculum document thus answers questions such as: *How will we teach? How will the students learn?* and *Which activities or strategies will allow students to engage and assimilate knowledge?* Therefore, the implication is that somebody needs to be coached in the arena of teaching in order to appreciate and comprehend the practice of the pedagogical methodologies (Maphosa, Mudzielwana, and Netshifhefhe, 2014). There is presently a need for courses and programmes to train skilled workers and, understandably, much emphasis is placed on the pedagogical value of these. The envisaged pedagogical value will thus have an impact on the structure and content of curricula, with a corresponding change in methodology (Staley & Trinkle, 2011).

3.2 Universities of Technology

3.2.1 History

As was alluded to in section 3.1.2 that the inception of universities of technology has heralded changes to the higher education platform in South Africa. These institutions came into existence in 2004 as part of the reconfiguration of the higher education sphere. Through a process of mergers and reassignments, South Africa's 36 higher education institutions (21 traditional universities and 15 technikons) were pruned down to 23. The result was eleven 'traditional' universities, six 'comprehensive' universities, and six universities of technology. The name changes from "technikons" to "Universities of Technology" generated an array of expectations, spanning from positive to negative. To support this transformation, it was suggested that universities of technology should, amongst other things, be supportive of and promote the concept that transferable skills are more important than subject knowledge. In addition, it was articulated that "it was no longer important what you know but rather what you can do with the knowledge" – SATN (Du Pré, 2010). In 2006, the CHE published a document reiterating the need for change in higher education and the positive effect it would have on the higher education landscape. After a few years, universities of technology became an integral part of the South African higher education landscape. However, questions about the need for institutions of this nature arose, with concerns about ways to convert the initial thinking about these institutions into practice. In 2010, an attempt was made to give a clearer perspective on the operations of universities of technology by highlighting the implementation of suitable teaching and learning strategies, the nature of research at these specialised institutions, the brand of technology transfer, the catchment area or target students, and how their impact would be assessed and monitored (Du Pré, 2010). Furthermore, a global view of universities of technology has highlighted their contribution towards national and regional economic development, particularly in terms of the way their graduates are prepared for the workplace, and how they could and should use research skills to identify the challenges and needs in industry and society at large (Du Pré, 2010). The understanding at this point was that all universities in South Africa "were equal, with the only difference being their focus".

3.2.2 Positioning universities of technology in the tertiary education landscape

It is generally accepted that economic advancement is the driving force behind technical universities with the aim of producing students who can function effectively in the job market, and earn a good, sustainable income. In the modern world, it is imperative to make technology a productive commodity, as being in control of technology makes economic sense. The technical university student ideally can understand the real world, design strategic plans, design and produce technological advancements, and is able to apply various skills. An underlying principle is not to duplicate the foci of traditional universities, but to maintain a clear area of expertise that is in no way inferior to any other tertiary field of study; thus, no institution of higher learning has the monopoly on knowledge anymore. It is an accepted fact that knowledge generation is often found outside the education sphere in laboratories in industry, and it is thus the duty of universities to produce programmes that will contribute towards knowledge-based professions (Gamble, 2009). Moreover, universities of technology must function on the understanding that knowledge is a commercial commodity (McKenna & Sutherland, 2006), and there is a call for knowledge transfer with universities becoming enterprises that promote entrepreneurship (see Chapter 4). The accent is on delivering work-ready graduates/employees through curricula that are application driven. Universities of technology thus represent a fusion of academic activities and the needs of the place of work and industry. This mission rests on six pillars, namely excellence in teaching and learning, applied research, technology transfer, innovation and entrepreneurship, developing leadership in technology, and partnerships with industry (see Figure 3.1). Universities of technology therefore need to respond timeously to the swift advancement of an information-based society. Moreover, they should strive to stay ahead by utilising teaching and learning strategies that are infused with technology in order to ensure that their original calling or mandate is satisfied (Du Pré, 2010).

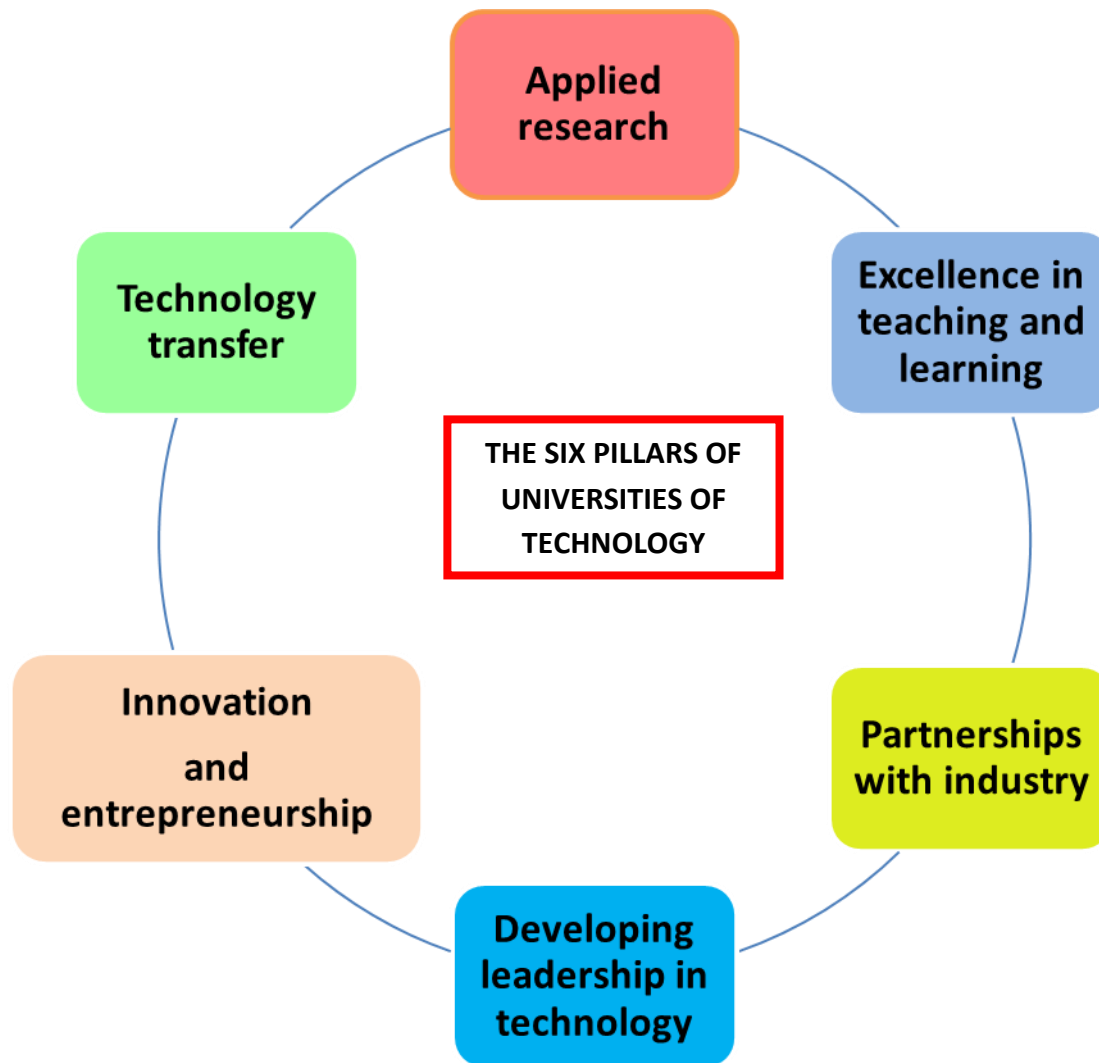


Figure 3.1: Diagrammatic representation of the six pillars that support universities of technology in South Africa

3.3 Teaching and learning at universities of technology

3.3.1 The pedagogic process of teaching and learning

The process of teaching and learning is never neutral, as each component of the process is ethical in nature. The process commences with the admission of students, and proceeds to the design and selection of subject content, the selection of learning materials, the application of teaching methodologies, and various types of assessment and reflection (see Figure 3.2). When a country experiences political and social change, demands are inadvertently placed on the processes of teaching and learning the lay the groundwork for development (Bajinath, 2016).

Learning is about how we perceive the world and form meaning from old and new information. The process is not one-dimensional, and it may include grasping abstract concepts, remembering facts, and developing new methods and techniques. The process may also be characterised by reasoning about and debating various ideas (Marton & Booth, 1997). It is undeniable that we are at an exceptional point in the history of higher education where information is readily available. Giant leaps have been made in recent years in understanding the brain and the processes of learning, and these advances have collectively contributed to the way we perceive and comprehend teaching and learning in the higher education context. In the traditional university model, 'learning' implied the right to information, knowledge and resources related to pedagogic processes. However, technology has shifted this understanding somewhat, since information, knowledge and learning resources are now far more readily available and accessible than ever before. Universities of technology are required to structure learning to address the needs of society and industry. The learning process at these universities should therefore be a constant skills revolution (Parker, 2018: Online).

3.3.2 Teaching methodologies

According to Hernández-López, García-Almeida, Ballesteros-Rodríguez, and De Saá-Pérez, 2016, who studied undergraduate management students at a Spanish university, the choice of suitable teaching methodologies have a direct bearing on

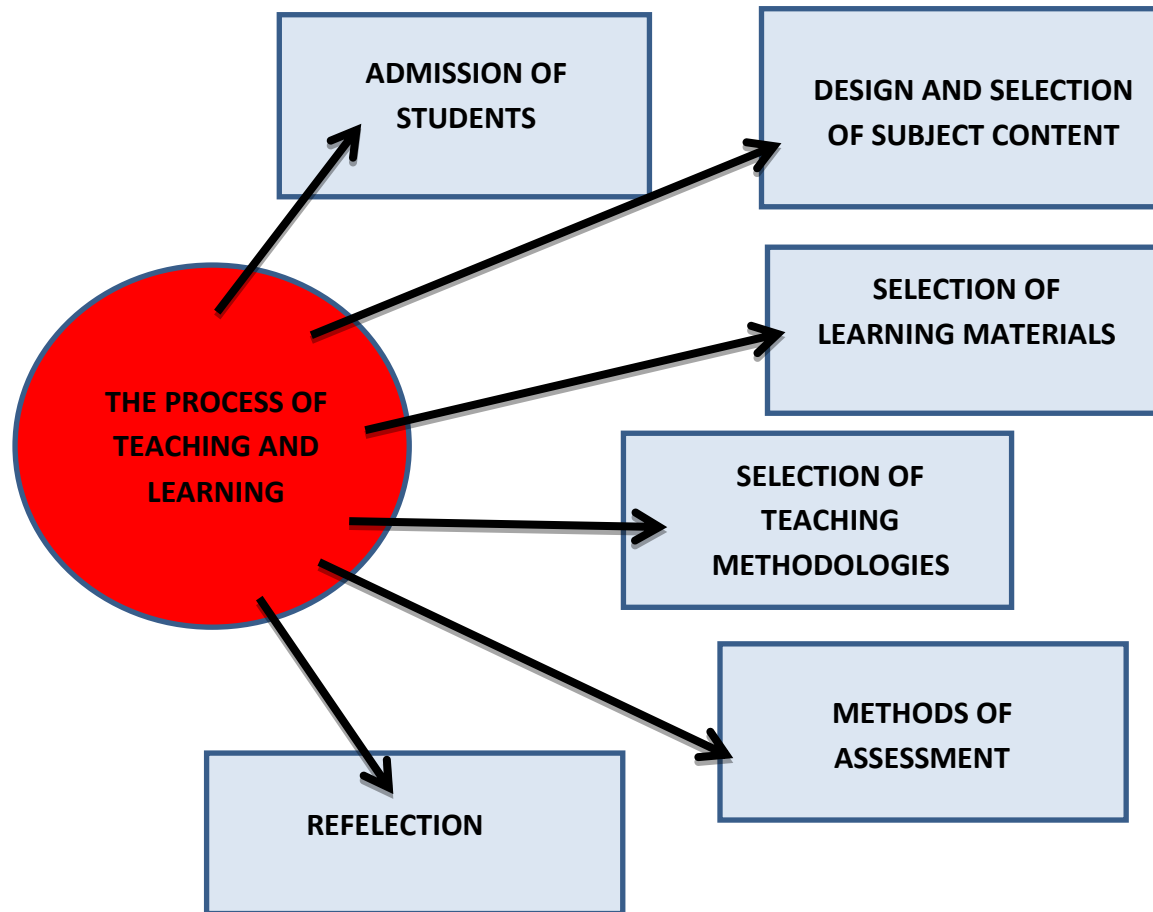


Figure 3.2: Diagrammatic representation of the key components of the teaching and learning process

students' ability to acquire knowledge and their competency in developing skills. Various teaching methodologies act together as students work towards acquiring new knowledge, behaviours and skills. In recent times, several perspectives on teaching and learning have emerged, such as the cognitive and constructivist theories. Cognitive learning refers to a mental process, whereas the constructivist process refers to the construction of knowledge through the process of learning. These theories should be utilised in combination, as they both underpin a range of outcomes that need to be integrated into the learning process. During this integration process, several other factors such as learning styles, diverse intelligences, special needs, and diverse cultural backgrounds should be considered as well (Doraiswamy, Chilukuri, and Krishnan, 2016).

3.3.3 Teaching and learning methodologies at universities of technology

It is against a national and global backdrop that various environmental demands are placed on universities of technology such as the need to change, functionality within a competitive environment, and the need to produce appropriately qualified and skilled graduates for economic growth. A university of technology thus represents a blend of academic activities and modalities that are needed to address the needs of the place of work and/or industry. Governmental authorities and professional bodies such as the Council on Higher Education (CHE), the Department of Higher Education and Training (DHET), and the Health Professions Council of South Africa (HPCSA) underscore this principle and are the guardians of curricula and the content of syllabi. For example, the HPCSA monitors the functioning of tertiary institutions through regular audits.

The purpose of Universities of Technology, as defined by and through various structures, is to prepare students for the world of work by using an appropriate teaching methodology, together with a supportive philosophy, and creating an enabling environment for them to succeed. Having said this, and following guidelines set out by literature, the rules of teaching and learning are nonetheless still applicable. Bloom's taxonomy of learning is generally followed to create a framework for classifying educational goals (see Figure 3.3). This modern taxonomy of teaching, learning and assessing comprises six levels. The first three levels namely

remembering, understanding and applying are the lower levels of thinking skills. The following three levels (analysing, evaluating and creating) are the higher levels of thinking skills (Adams, 2015; Anitescu & Kenny, 2016). One important outcome of the teaching and learning process is to develop students to reach the top of this hierarchy.

In consideration of the position and methodologies used at the Central University of Technology, Free State (CUT) in Bloemfontein as an example of a university of technology, a few noteworthy observations were made. For example, the institute has a comprehensive Teaching and Learning Plan for the period 2014 – 2020 (see Appendix 3). The document outlines the institute's philosophy on teaching and learning and what it intends to achieve by the year 2020. This document also explains how the outcomes of the plan fit in with the university's 'Vision 2020' (see Appendix 4). In terms of its philosophy, CUT places emphasis on student-centred practices and principles. The document also outlines the desired scenarios for the classroom and elucidates what it considers graduate attributes and the characteristics of the ideal graduate. In line with modern theories, the guidelines of the Teaching and Learning Plan are underpinned by constructivist theories that steer the education of students towards the needs of the modern world. In practice, however, it was found that lecturers still favoured traditional lecturing or frontline teaching methodology was in line with the student-centred philosophy, as outlined by the Teaching and Learning Plan. This issue will be addressed in Chapter 5.

Classroom activities at universities of technology should be driven by the principle of work-integrated learning (WIL). This form of cooperative learning promotes learning based on cooperation between institutions of higher learning and industry, commerce and the public sector (HEQC, 2004). CUT, as part of its Institutional Regulatory Code, established an institutional procedural template which outlines the policies and procedures for WIL (see Appendices 5 and 6). WIL describes an assortment of approaches, strategies and methods to fuse theory with practice. Furthermore, WIL operates on the principle of using several teaching methodologies such as workplace learning, work-directed theoretical learning, and problem-based learning.

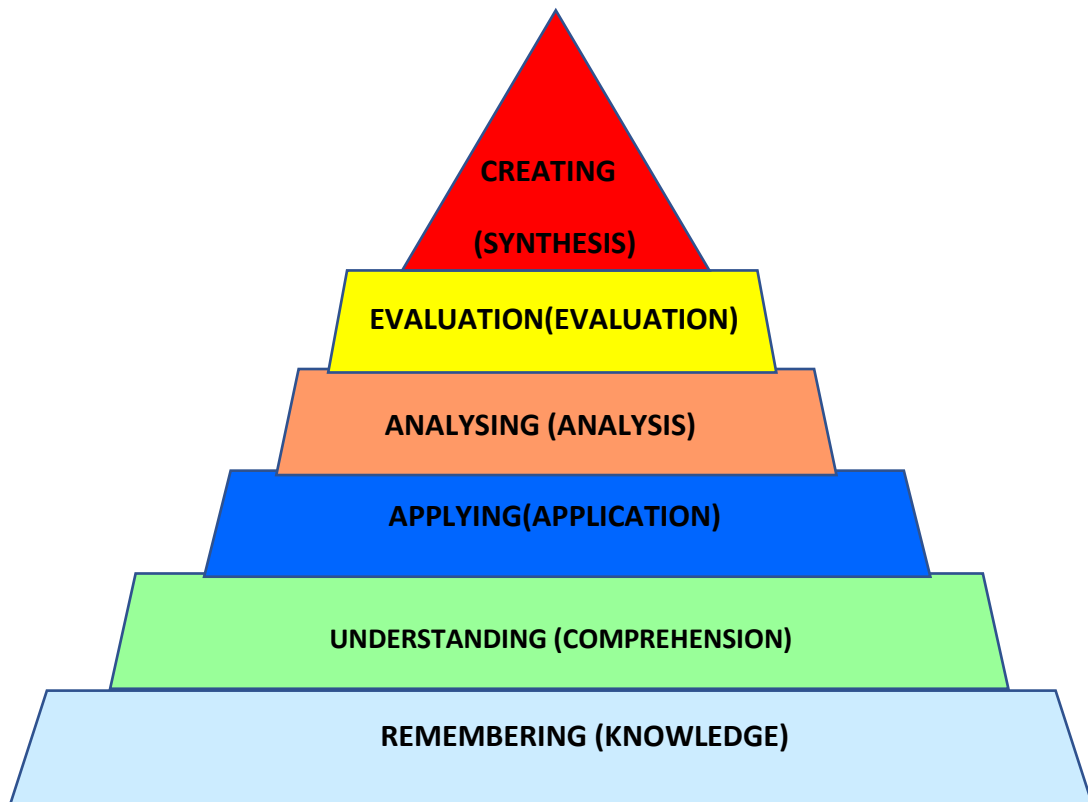


Figure 3.3: Diagrammatic representation of Bloom's taxonomy indicating the hierarchy of cognitive thinking
Source: Adapted from Anitescu & Kenny, 2016

The assessment of students is based on regular monitoring of students, completion of logbooks by students and officials in industry, and reports submitted to employers and CUT. However, it seemed that the backbone of teaching and learning at CUT was the lecturing methodology in combination with WIL (CUT, 2010).

In corroboration, Hay (2008) states that the lecturing methodology seems to be the preferred vehicle for the transfer of knowledge at institutions of higher learning in South Africa. This method is characterised by the lecturer taking a position in front of the class and sharing information with students by using a whiteboard, slide shows, videos, and talking. The students listen and take notes and, in so doing, remain passive (Schmidt, Cohen-Schotanus, Van der Molen, Splinter, Bulte, Holdrinet, and Van Rossum, 2010). This orthodox lecturing methodology is effective only to a limited extent in achieving important curriculum objectives. It does not promote critical thinking, and therefore students become mere consumers of already fabricated knowledge. The attendance of students tends to be low, which is matched by limited cognitive engagement. A vital challenge associated with lectures is that they are based on the misconception of information transmission, as students are expected to learn what they are told (Arshad, Mamede, and Schmidt, 2014). This study therefore investigated an alternative approach to teaching (or lecturing) that involves active learning in the classroom (see Figure 3.4 A) where students are confronted with a relevant real-world problem or challenge that is embedded within the subject domain or scope of practice. In this approach, students engage in a structured way as individuals or in groups to formulate solutions to the problems or challenges presented to them. This process is facilitated by the lecturer. The literature generally supports this active learning process as a means of supporting learning at institutions of higher learning (Schmidt *et al.*, 2015).

3.3.4 Problem-based learning as a teaching methodology

The problem-based learning (PBL) system originated at McMaster University in Hamilton, Ontario in Canada in 1969. The approach is based on the educational theories of Vygotsky, Dewey and others (Husain, 2011). Problem-based learning (PBL) is offered as an alternative to lecturing and is a student-centred teaching and

learning methodology. It has roots in the constructivist epistemology, or study of knowledge. The objective is to challenge students with problems experienced in

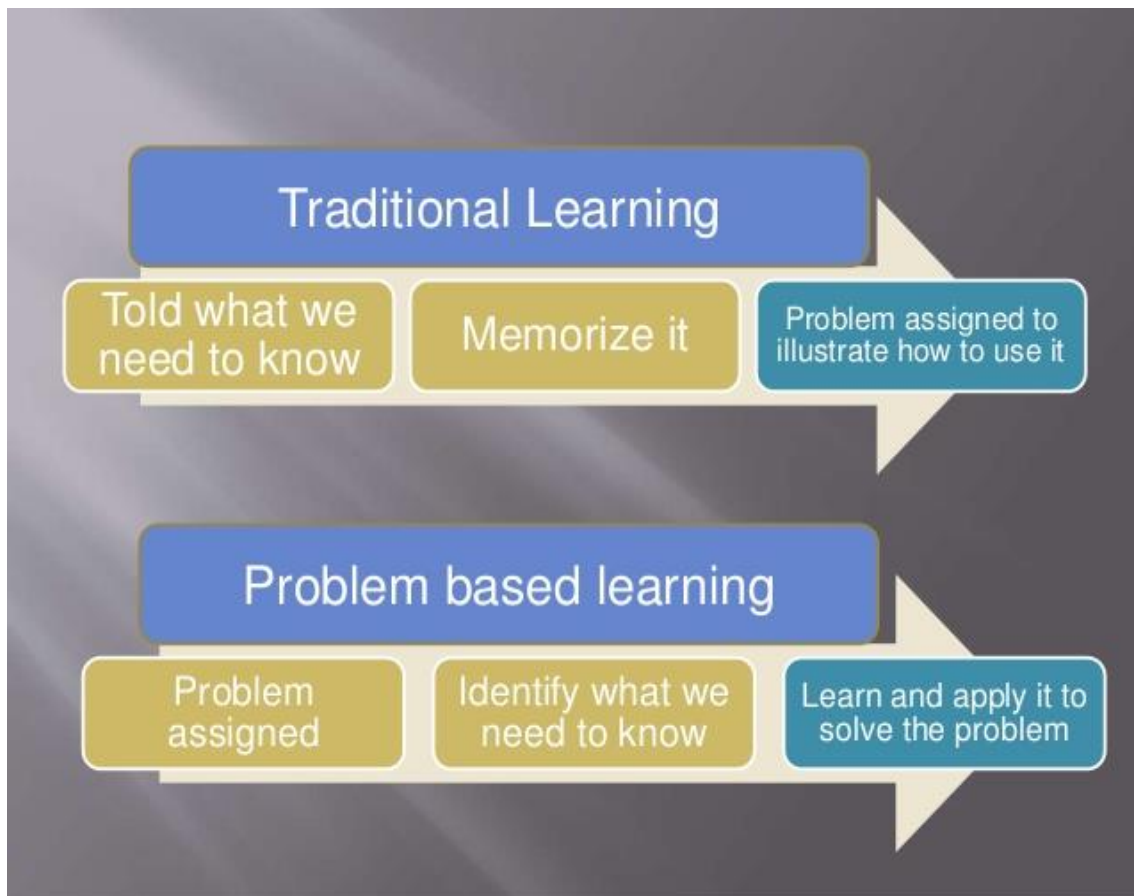


Figure 3.4 A: Visual representation of the differences in approach to teaching and learning between traditional learning and problem-based learning

Source: Adapted from Sahoo, 2014

practice, and to allow them to view these issues as stimuli for learning and organisation of what has been learned. The body of knowledge and new understanding may later be recalled and applied to future work (Barrows, 1996). The objectives may be listed as follows: (a) development of critical reasoning skills; (b) development of self-directed study skills; (c) determination of depth and focus of knowledge required and acquired; (d) development of conceptual skills; and (e) development of team skills (Barrows, 1994) (see Figure 3.4 B). The process is initiated by the introduction of an ill-structured problem that the students must solve. The lecturer operates as the facilitator, while the students are actively engaged in constructing knowledge while solving the problem. They do this by familiarising themselves with the learning goals, recalling prior knowledge, and searching for information to build on their existing knowledge base.

The entire process is driven through 'scaffolding' by the facilitator and entails strategic reflection and cooperative and collaborative learning.

PBL as a pedagogic tool appeals to educators because it offers a framework that supports active and group learning. The belief exists that effective learning occurs when students both construct and co-construct ideas through social interaction and self-directed learning (Yew & Goh, 2016). The application of PBL may vary from one institution to the next, which is the same with different learning programmes, but it should always be viewed as an interactive process with a problem analysis phase that is followed by self-directed learning, as well as a reporting and a reflection phase. The facilitator scaffolds the learning process in the problem analysis, reporting parts of the PBL process, and encourages students' investigative skills through discussion and sharing (Yew & Goh, 2016).

The literature suggests that this process allows students to acquire competencies across a range of curricular fields. This is deemed more beneficial than when students memorise and reproduce facts for assessment based on traditional teaching. The surface learning which results from the latter processes is only useful in the instructional context. In the South African context, it could be more beneficial if students are encouraged to search, attempt, test, investigate and rediscover compared to just listening and reproducing knowledge (Daniela & Lytras, 2018). PBL creates a framework according to which students can identify, define and

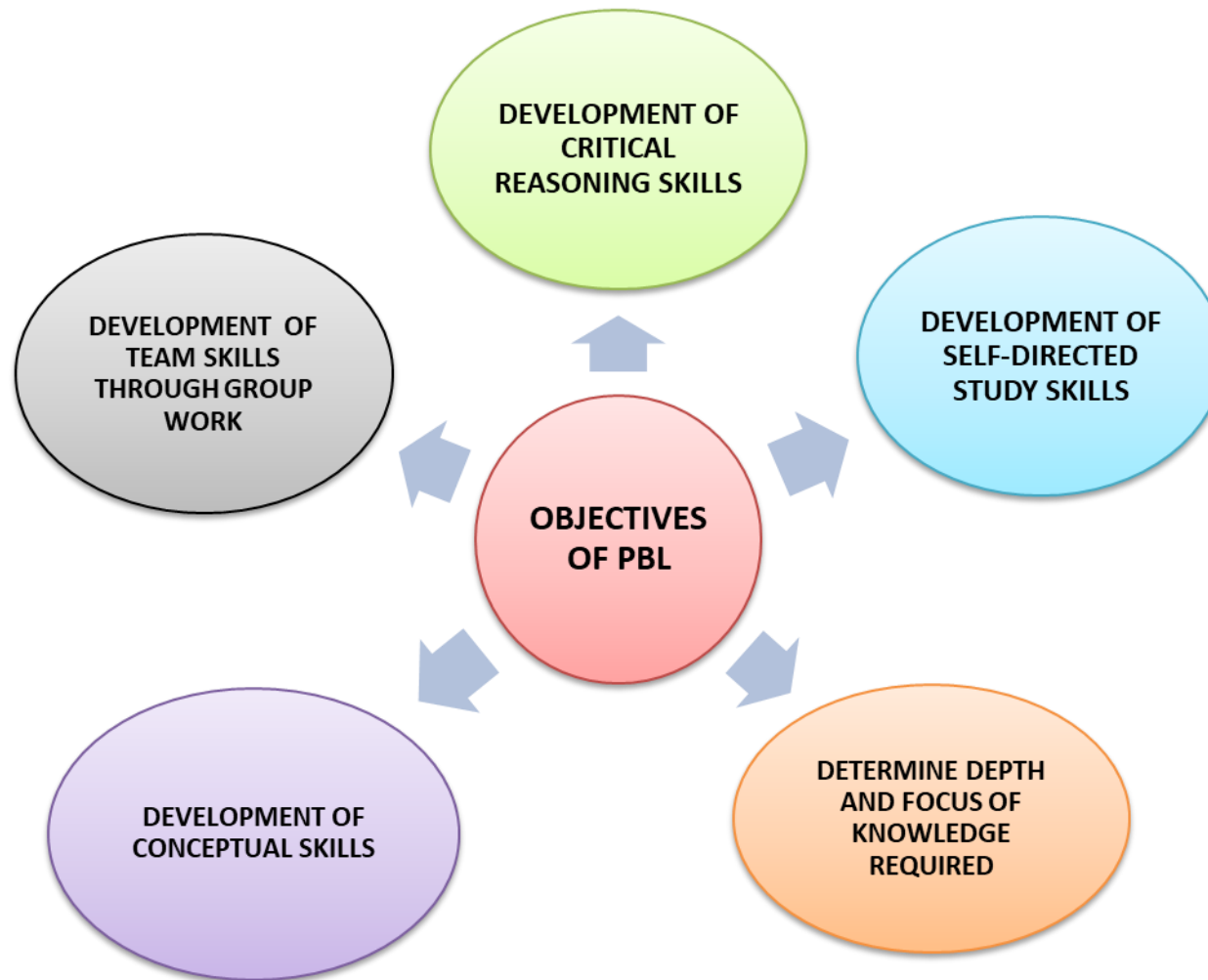


Figure 3.4 B: Diagrammatic representation of the objectives of problem-based teaching and learning

conceptualise a real-life problem. By presenting students with an ill-structured problem that they need to solve, or a variety of comprehension skills they need to acquire, they are pointed towards the way forward, and this allows for the conjugation of knowledge and the acquisition of various learning skills. There is thus never a single thought avenue to confront a challenge, while collective thinking leads to group learning and the acquisition of skills according to group dynamics (Hoskins & Fredriksson, 2008). However, the capacity to solve problems should not be reduced to the ability to solve a single type of problem, but it should open doors to the ability to recognise hurdles to the process, and to construct an effective way in which these hurdles may be overcome. The learning process is thus underpinned by maintaining a high level of thinking and the application of different strategies. This approach to finding solutions for real-world challenges encourages the acquisition of lifelong learning skills such as the capacity to identify a problem and procuring the resources to solve it. This ability may become the foundation on which entrepreneurship is built. The concept of entrepreneurship education will be discussed in more detail in Chapter 4.

3.3.5 Knowledge-based learning as a teaching methodology

Knowledge-based learning (KBL) is similar to PBL, as it is also a student-centred approach to learning, but it is less content centred with subtle differences to PBL. Traditional teaching and learning methodologies usually aim to devise a learning process for students that is derived from an objective (i.e. the lecturer's point of view). Students receive and interpret new knowledge in the context of their own knowledge and experiences. They subsequently construct meaning in relation to their needs, backgrounds and interests (Jonassen, 1992). For this reason, it is suggested that students should build on an existing reality and on their prior knowledge base. The creation of a new reality is a constructivist way of developing and acquiring new knowledge and understanding. This pedagogic approach is known as knowledge-based learning (KBL). Through this process, students become the best evaluators of the construction of new knowledge while the facilitator is the guide and scaffolder.

For example, let us consider science as a teaching domain. It is commonly accepted that the subject content of science is challenging and difficult to grasp. A possible reason is that science is often taught through a content-driven and lecturing approach (Welling & Osborne, 2001). Students thus often question the relevance or usefulness of the subject or its contents for everyday life. The results are low motivation and limited interest in the subject, which in turn stunt the learning process. At institutions of higher learning, lecturers often find themselves facing this challenge, as the old-fashioned belief prevails that students will not learn if you are not taught all the time. A gradual shift towards discussions and self-exploration of scientific principles is thus suggested. For this purpose, KBL may present a solution, as it utilises existing knowledge to understand new knowledge in the real world. Thus, KBL may be a method to improve students' motivation and their attitude towards learning (Eilks, 2002). However, research results have shown that students in problem-oriented learning environments often experience challenges, as they find it difficult to identify and use suitable additional information (Gräsel, Fischer, and Mandl, 2000). It is against this background that the current study explored a new teaching and learning methodology that is referred to as challenge-oriented learning, or COL.

3.3.6 Challenge-oriented learning (COL)

To propose a new teaching and learning methodology that can be effectively utilised at universities of technology (or similar institutions of learning), I fused PBL and KBL, and devised an approach that I refer to as challenge-oriented learning (COL). This is a pedagogical methodology that may be used to challenge students to find solutions for a problem within a problem-oriented environment using the principles of PBL. Like PBL and KBL, this approach is student-centred and will provide students with opportunities to collectively reflect on real-life challenges or problems by drawing from their own knowledge and understanding. Thus, an ill-structured problem in a typical PBL setting will trigger the need for a solution. The learning process is, as always, characterised by cognitive constructivism, individual and collective thinking, finding and making use of resources, and learning about the self. The word 'challenge' that is key to this approach refers to an ill-structured challenge/problem and a societal real-life challenge that requires a solution. The decision to use the

word 'challenge' was two-fold. First, the word 'problem' has a negative connotation, whereas 'challenge' has an exciting connotation that implies a contest. Also, a challenge is open for wide possibilities and solutions. The purpose of COL is thus to engage students in the real-life challenges that South African communities face, such as difficult socio-economic conditions, unemployment, and poor economic growth. Moreover, we need to educate South African students to function in South Africa, and higher education should therefore address the inequalities that exist in society. It should also be cognisant of the country's need for a skilled labour force and should pave the way to economic growth.

3.4 Entrepreneurship and entrepreneurship education as a teaching discipline

To address the challenges that higher education institutions face, entrepreneurship and entrepreneurship education need to be explored in greater depth. According to the BusinessDictionary, 2018, entrepreneurship is:

The capacity and willingness to develop, organize and manage a business venture along with any of its risks to make a profit. The most obvious example of entrepreneurship is the starting of new businesses. In economics, entrepreneurship combined with land, labour, natural resources and capital can produce profit. Entrepreneurial spirit is characterized by innovation and risk-taking and is an essential part of a nation's ability to succeed in an ever changing and increasingly competitive global marketplace.

It is widely thought that entrepreneurship is an unattainable, distant dream. It is also often viewed as something special to aspire to – a goal achieved only by people in movies or in books. However, a spirit of entrepreneurship can be taught and cultivated. The aim of entrepreneurship education is therefore to empower students with the competencies (knowledge, values and skills) that are necessary to optimally start and manage an enterprise as a path toward economic growth. Students are taught to investigate the uniqueness of the relationship between the different roles a business can play, and the milieu that it operates in. For example, students can be taught to discover the competencies necessary for sound management, to

understand innovation as the basis for entrepreneurship, and to develop an entrepreneurial culture that may steer them towards wealth creation (Gautum & Singh, 2015).

Reflecting on what has already been discussed, it seems important to venture into a territory where entrepreneurship may be coupled with a student-centred approach where real-world challenges may be addressed, particularly as such challenges become the bedrock for entrepreneurial opportunities. The pedagogy of entrepreneurship is often linked to knowledge creation, invention and the skill to manage risk. Students learn about the subject, but they also develop competencies to enhance entrepreneurship. The intention through this methodology is to create entrepreneurial students who are self-directed, knowledge creators, and problem solvers (Lindberg, Bohman, and Hultén, 2017).

3.5 Conclusion

This chapter touched on the challenges experienced by the education system in South Africa. The rationale for the inception of universities of technology in the South African context was discussed, and the need for such universities within the higher education landscape was elucidated. Furthermore, the need for technological skills development to uplift the South African economy through a productive workforce was put into perspective. In view of this purpose, the nature of an effective teaching and learning methodology, particularly within the context of universities of technology, was deliberated. It was shown that a student-centred, constructivist and active learning methodology would be ideal to address the mandate of universities of technology. The objectives of PBL and KBL were elucidated, and factors such as active knowledge transfer, critical thinking, self-directed study skills and the training of employable graduates were highlighted. It was explained that these objectives were fused in the design of a novel teaching and learning methodology in the quest to address the challenges experienced by modern-day higher education institutions in South Africa, with a focus on universities of technology. It was also suggested that entrepreneurship and entrepreneurship education be unpacked to formulate solutions to the many challenges that the country faces. It was thus proposed that

challenge-oriented learning (COL) be utilised as a suitable teaching methodology to achieve the educational mandate of universities of technology.

3.6 References

- Adams, N.E.** 2015. Bloom's taxonomy of cognitive learning objectives. *Journal of the Medical Library Association* 103(3):152.
- Anitescu, A. & Kenny, J.** 2016. Problem-based learning: The modern pain medicine in medical education. *American Society of Regional Anesthesia and Pain Medicine*. 11 February 2016.
(<https://www.asra.com/news/72/problem-based-learning-the-modern-pain-m>)
Accessed on 13 February 2019.
- Arshad, A., Mamede, S. & Schmidt, H.G.** 2014. Comparing knowledge acquisition based on lecture versus text. King Saud bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia.
- Baijnath, N.** 2016. *HE reviewed*. Pretoria: CHE, 143.
- Barrows, H.S.** 1994. *Practice-based learning: Problem-based learning applied to medical education*. Springfield: Southern Illinois University, pp. 62794-9230.
- Barrows, H.S.** 1996. Problem-based learning in medicine and beyond: A brief overview. *New Directions for Teaching and Learning* 68:3-12.
- BusinessDictionary.** 2018.
(<http://www.businessdictionary.com/definition/entrepreneurship.html>.)
Accessed on 2 September 2018.
- CUT - Central University of Technology.** 2010. CUT Teaching and Learning Plan. Bloemfontein: Central University of Technology, Free State.
- Daniela, L. & Lytras, M.** 2018. Learning strategies and constructionism in modern education settings. *Advances in Educational Technologies and Instructional Design (AETID) Book Series*. IGI Global.
- DHET - Department of Higher Education and Training.** 2013. White Paper for Post-school Education and Training. Building an expanded, effective and integrated post-school system.
(www.dhet.gov.za)
Accessed on 22 November 2017.
- Doraiswamy, M.P., Chilukuri, M., & Krishnan, K.R.** 2016. Revamping education: Why we don't learn from lectures. *Science* May 18(11):06.

- Du Pré, R.** 2010. Universities of technology in the context of the South African higher education landscape. In: R. Townsend (Ed.). *Universities of technology: Deepening the debate (Kagisano No. 7)*, 1-41. Pretoria: CHE.
- Eilks, I.** 2002. Teaching biodiesel: A sociocritical and problem-oriented approach to chemistry teaching and students' first views on it. *Chemistry Education Research and Practice* 3(1):77-85.
- Fish, D.** 2003. Education in a community of professional practice: A new approach to curriculum design. In: *Report of research for CR-UK on a base line of education for cancer care*. London: CR-UK.
- Gamble, J.** 2009. The relation between knowledge and practice in curriculum and assessment. Concept paper commissioned by the Council for Quality Assurance in General and Further Education and Training (Umalusi).
- Gautam, M.K. & Singh, S.K.** 2015. Entrepreneurship education: Concept, characteristics and implications for teacher education. *Shaikshik Parisamvad (An International Journal of Education)* 5(1):21-35.
- Gräsel, C., Fischer, F., & Mandl, H.** 2000. *Learning Environments Research* 3:287. (<https://doi.org/10.1023/A:1011421732004>)
Accessed on 24 November 2017.
- Hay, H.R.** 2008. If walls could speak: Reflections from visiting a South African higher education classroom. Editorial. Heltasa Conference. *South African Journal of Higher Education* 22(1):935-947.
- HEQC.** 2004. *Communiqué on plans and activities for 2004*. (<http://www.che.ac.za>)
Accessed on 22 November 2017.
- Hernández-López, L., García-Almeida, D.J., Ballesteros-Rodríguez, J.L. & De Saá-Pérez, P.** 2016. Students' perceptions of the lecturer's role in management education: Knowledge acquisition and competence development. *International Journal of Management Education* 14(3):411-421.
- Hoskins, B. & Fredriksson, U.** 2008. *Learning to learn: What is it and can it be measured?* European Commission JRC.
- Husain, A.** 2011. Problem-based learning: A current model of education. *Oman Medical Journal* 26(4):295.

- John, V.** 2012. Jansen: Employers dismayed by graduates' lack of basic skills. *Mail and Guardian*.
(<https://mg.co.za/article/2012-01-19-graduates-lack-of-skills-affect-workplace-says-jansen>)
Accessed on 17 November 2017.
- Jonassen, D.H.** 1992. Evaluating constructivist learning. *Constructivism and the technology of instruction: A conversation* 137-148. London: Lawrence Erlbaum Publishers.
- Kraak, A.** 2006. 'Academic drift' in South African universities of technology: Beneficial or detrimental? *Conversations. Perspectives in Education* 24(3):135-152.
- Lindberg, E., Bohman, H. & Hultén, P.** 2017. Methods to enhance students' entrepreneurial mindset: A Swedish example. *European Journal of Training and Development* 41(5):450-466.
- Maphosa, C., Mudzielwana, N.P. & Netshifhefhe, L.** 2014. Curriculum development in South African higher education institutions: Key considerations. *Mediterranean Journal of Social Sciences* 5(7):355.
- Marton, F. & Booth, S.** 1997. *Learning and awareness*. Mahwah, NJ: Lawrence Erlbaum Associates.
- McKenna, S. & Sutherland, L.** 2006. Balancing knowledge construction and skills training in universities of technology. *Perspectives in Education* 24(3):15-24.
- Ornstein, A.C. & Hunkins, F.P.** 2012. *Curriculum: Foundations, principles, and issues*. Boston, Mass.: Allyn & Bacon.
- Parker, B.** 2018. *Parent24.Com*.
(<https://www.parent24.com/Learn/Primary-school/future-skills-7-essential-skills-your-kids-should-learn-at-school-to-succeed-in-the-future-20180124>)
Accessed on 7 August 2018.
- Roodt, M.** 2018. The South African education crisis: Giving power back to parents. South African Institute of Race Relations (IRR).
(<https://irr.org.za/reports/occasional-reports/the-south-african-education-crisis-giving-power-back-to-parents>)
Accessed on 22 October 2018.

- Schmidt**, H.G., Cohen-Schotanus, J., Van der Molen, H.T., Splinter, T.A., Bulte, J., Holdrinet, R. & Van Rossum, H.J. 2010. Learning more by being taught less: A 'time-for-self-study' theory explaining curricular effects on graduation rate and study duration. *Higher Education* 60(3):287-300.
- Spaull**, N. 2013. *South Africa's education crisis: The quality of education in South Africa 1994-2011*, 1-65. Johannesburg: Centre for Development and Enterprise.
- Staley**, D.J. & Trinkle, D.A. 2011. The changing landscape of higher education. *FormaMente: Rivista internazionale di ricerca sul futuro digitale* 15:2016.
- Welling**, J. & Osborne, J. 2001. *Language and literacy in science education*. Buckingham: Open University Press.
- Yew**, E.H. & Goh, K. 2016. Problem-based learning: An overview of its process and impact on learning. *Health Professional Education* 2(2):75-79.

CHAPTER 4

ENTREPRENEURSHIP, IT'S PURPOSE AND IMPORTANCE IN EDUCATION: A UNIVERSITY OF TECHNOLOGY OFFERING

A review article for submission partially or in full to: Journal of Entrepreneurship
Education 10988394 (ISSN)

This chapter aims to address and unpack entrepreneurship, its meaning, different schools of thought and some global discourse in the approach to establishing a new enterprise. Entrepreneurship in South Africa is then discussed by highlighting policy formation, stake holders, the role of small and medium enterprises as well as the requirements for a successful upstart. Entrepreneurship as an accepted pedagogic discipline is outlined and examined.

4.1 Introduction: the nature of entrepreneurship

The purpose of this chapter is to explore the views of various scholars and researchers on entrepreneurship, and to discuss some topics characterising the concerns that inform debates about entrepreneurship as a field of study. An introductory question is: *What is entrepreneurship?* The answer is obvious, although academics often devise a variety of explanations. Thus, the term ‘entrepreneurship’ is flexible, but it is often misunderstood, which leads to an array of interpretations (Eisenmann, 2013). Drucker (1985) cites a quote from around 1800: “The entrepreneur shifts economic resources out of an area of lower and into an area of higher productivity and greater yield”. However, one may ask *who* the entrepreneur is and *how* this process of entrepreneurship should be brought about or measured. Yet, irrespective of how we define the term or how we choose to measure the concept, the focus of this study was on how entrepreneurship education at universities of technology may be delivered successfully to ultimately improve socio-economic conditions and contribute to national economic development. The study further explored a novel way in which entrepreneurship education can be taught to produce a workforce of the future.

Entrepreneurial orientation is sometimes seen as an innovative, driven, proactive approach to one’s life and career. Moreover, entrepreneurial thinking often has the predisposition of taking risks and exploiting opportunities whilst being achievement orientated. Entrepreneurship may be identified by the following criteria: (a) introducing a new product; (b) presenting a new method of production; (c) exploring the possibility of new markets; (d) utilising new resources or supply; and (e) redesigning business management processes (Petrin, 1994) (see Figure 4.1). Entrepreneurship may thus also be defined as “innovation to identify market opportunities and utilising them” (Smith & Chimucheka, 2014). In view of these criteria, the entrepreneur may have a distinct set of skills. These skills, which are a combination of entrepreneurial and managerial skills, inspire several success factors that could be instrumental in deciding whether an enterprise will be successful or not (Smith & Chimucheka, 2014) (see Table 4.1).

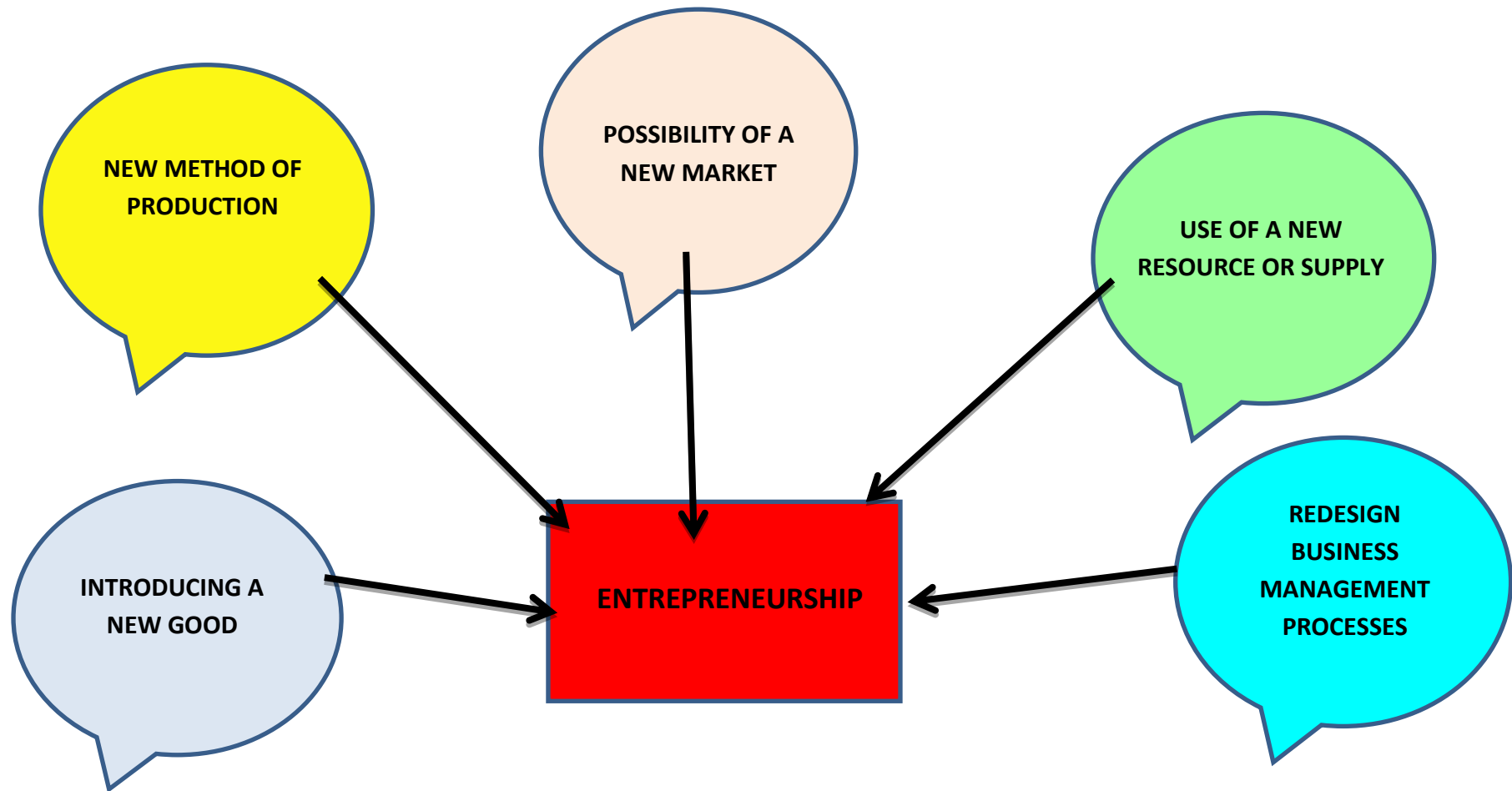


Figure 4.1: Diagrammatic representation of the criteria for the principle of entrepreneurship

Table 4.1: Success factors that define entrepreneurs versus managers

Entrepreneurial skills	Managerial skills
<ul style="list-style-type: none"> • Creativity and innovation • Orientation towards risk • Leadership • Good human or people relations • Positive attitude • Perseverance • Sense of commitment 	<ul style="list-style-type: none"> • Ability to plan • Knowledge of possible competitors • Market oriented and aware • Orientated towards client service • High quality work a priority • Financial and managerial prowess • Business knowledge and skills • Making use of experts

Source: Adapted from Nieman and Nieuwenhuizen, 2009

4.2 The purpose of entrepreneurship

4.2.1 Driving economic development

There has been wide discussion lately around the issue of the future of work and employment. These conversations have generally been driven by the concern many share in trying to grasp the impact technologies could have on industry. This concern is valid, but it is an oversimplification of a complex singularity. The fact is that entrepreneurship and innovation power economic growth which, in turn, is characterised by the creation of new businesses that generate jobs, reinforce market competition, and boost productivity. Entrepreneurism may therefore be a pathway to upward mobility or a means for average people to build wealth and prosperity.

4.2.2 Investment in products, services and employment

To understand entrepreneurship, one should, amongst others, ask why a person would start a business. When examining traditional models, it became evident that the inception of a new business is usually in response to a void in the market and/or a need that has not been met. In response to this, an opportunity arises to deliver a

product or a service that is lacking. From an economist's point of view, people who respond in such a manner are 'opportunity entrepreneurs', compared to entrepreneurs who start a business purely in response to a lack of employment. Opportunity entrepreneurs are vital role-players in economic growth, as they facilitate access to goods and services that are lacking. On the flip side, there are the "necessity entrepreneurs". This type of entrepreneur will launch an enterprise in response to having no other options (Block & Wagner, 2010). Irrespective of the driving force behind the initiation of an enterprise, both these types of entrepreneurs contribute to economic growth. Moreover, any new enterprise or business needs a workforce. The entrepreneur therefore needs to hire new or additional employees. These newly generated jobs open economic opportunities, are responsible for the upliftment and support of communities, and increase the quality of life and standard of living of numerous people.

4.2.3 Economic integration of small enterprises

Due to technological advancements, it is now possible for small entrepreneurs to enter regional and even global markets. A new business might export/sell goods and/or services within its region and, in so doing, it may make a direct contribution to the region's economic development (Thurik & Wennekers, 2004), while the resulting stronger economy in turn promotes the well-being of the local population. When enterprises and regional economies have trade relations, they promote investments in regional transportation, infrastructure, and stronger economic competitiveness. As we live in an interconnected global economy that is expanding daily, this has significant impact on economies globally.

4.2.4 New technologies and environmental challenges

In a developed country, the capacity to turn concepts into new products and services is regarded a key element towards socio-economic prosperity. Globally, it has been shown that economic growth can be driven by new technologies and the direct application thereof (Westphal, 2002). Historically, economic growth followed periods of precipitous innovation. Innovation is the ultimate natural resource, as it is conceived in the human mind (Kotler, Kartajaya, and Setiawan, 2010). However,

products and solutions stemming from innovation require a certain degree of education and a nurturing environment that is supported by collaborative work. Any reasonable education level in this context is good, as it encourages workforce creativity. Innovation is also pivotal when confronting modern-day challenges such as climate change, greenhouse gas emissions, preservation of biodiversity, and basic global sustainability (Efe, 2014). However, energy and water supply have become questionable and unreliable. However, apart from the damper this puts on economic development, it also offers avenues for innovation and new enterprises.

4.2.5 Innovation and competition in business

When innovative practices are combined with efficient business practices, the conservation of resources is generally achieved. Innovation in agriculture is pivotal in addressing the many socio-economic challenges that South Africa faces. A positive feedback loop exists that links innovation, entrepreneurship and economic development. In other words, innovation and new businesses are seen as the primary sources of job creation which, in turn, engenders positive activity within the economy. It is important to take note that entrepreneurship and innovation are dependent on access and participation (McDaniel, 2014). Therefore, to enable entrepreneurs to bring their innovative ideas to fruition, they require access to education and a level playing field that facilitates fair competition. Hence, governmental and public policy need to create a milieu that enables entrepreneurs to initiate new businesses that have the potential to grow. The uneven distribution of enterprise activities in the socio-economic, demographic and geographic spheres compromises economic growth. When and if conditions are optimal, the power of entrepreneurship could be invaluable in the way it assists communities to prosper and develop solutions for societal challenges (Sappin, 2016).

4.2.6 The importance of entrepreneurship

In the modern societal context, entrepreneurs may be regarded as national assets who need to be refined and encouraged. These entities or individuals may transform how people live and work now and in the future. In addition to the creation of self-wealth, entrepreneurial initiatives create much needed employment and a

platform for a thriving society. It is already generally accepted that the impact of entrepreneurship capital is more convincing than that of knowledge capital (Baijal, 2016).

4.3 The relationship between the government and entrepreneurship

In 2014, the G20 Leaders' Summit released a communiqué calling for improved economic growth through the promotion of competition, innovation and entrepreneurship. This summit also recommended the creation of strategies to reduce unemployment and the encouragement of youth entrepreneurship (Avais, 2014). This call was not a new twist in terms of governmental policy, as this had been a theme since the 1970s (Birch & Massachusetts Institute of Technology, 1979). A finding by Birch was that a significant proportion of employment creation was surprisingly not from large corporations, but from small and independent businesses. It was therefore recommended that government policy should be directed at the role of small businesses. Since then there has been a marked increase in government's interest in the role played by entrepreneurs, and in small business development. This has resulted in a fresh field of academic research and study. The research field was uplifted by the emergence of the 'technopreneurs' such as Steve Jobs (Apple), Bill Gates (Microsoft) and Larry Page and Sergey Brin (Google) (Abbas, 2018). These individuals, amongst others, have become the icons of the entrepreneurship movement. The geographical icon areas are California's Silicon Valley as well as science and technology parks around the world. These science parks are usually associated with a university that is engaged in research and development. Governments' policies usually support these 'entrepreneurship incubation' activities that are generally open to the public, and encourage venture financing (Jansen, Van de Zande, Brinkkemper, Stam, and Varma, 2015). This unique system is referred to as an 'entrepreneurial ecosystem'. However, the success rates of these ecosystems have varied to date.

The term 'entrepreneurial ecosystem' was first used by management scholars during the mid-2000s. For example, the Small Enterprise Association of Australia and New Zealand (SEAAANZ) published a white paper outlining what entrepreneurial

ecosystems are, how they stimulate economic growth through employment creation, and how government policy may and should play a role in their establishment and development (Isenberg, 2010) (see Figure 4.2).

Several recommendations towards the establishment of an entrepreneurial ecosystem were proposed by Isenberg (2010). The first was to discontinue using Silicon Valley as a blueprint, as he argued that similar success rates could not be guaranteed, and that it would be more beneficial to develop entrepreneurial ecosystems that took local conditions into consideration. He also advised that securing support from the private sector was vital right at the outset. This may be deemed important advice, as governments should guard against taking direct control; they should be key facilitators rather than 'directors'. Jansen *et al.* (2015) urge that governments should play a vigilant role to reduce challenges such as cultural competitiveness, over taxation of smaller enterprises, and bureaucratic formalities. Moreover, the assurance of skilled employees and investment capital will naturally boost any venture, but there is always the risk of making too much funding available too easily. This implies that the onus should be on new enterprises to establish strong foundations on which to build; thus, innovation and sustainability should be the order of the day. This could possibly ensure sound, profitable practices rather than an unfavourable success rate. Alternatively stated, sustainable small enterprises with innovative growth potential should be encouraged rather than promoting start-ups that are too small and doomed to fail.

A government should understand that starting a new venture is the least demanding part, but that sustaining and developing an enterprise is where the challenge lies. An added challenge might arise in that developed policies within this arena should encourage and support rather than bring about change or interfere (Mason & Brown, 2014). Mazzarol (2014) summarised some policy guidelines for governments that focus on entrepreneurial ecosystems:



Figure 4.2: The entrepreneurial ecosystem

Source: Adapted from Mazzarol, 2014

- Entrepreneurial activity within any society should be a government priority. It is advised that government ministers should be actively involved to assist in the moulding of and instilling of policies.
- Care should be taken that policies from government's side have a broad focus. This means policies should address all aspects of the development of the ecosystem, rather than focus on preferential areas of interest.
- A government should allow room for natural expansion and avoid trying to find solutions from the top down. It should explore the possibility to build from existing businesses before jumping to fresh sites or avenues.
- Government should avoid favouring any enterprise it might consider technologically advanced, and rather spread the interest shown across the spectrum from low to high tech companies.
- It is advised that governments should deliver leadership but ensure that responsibility and ownership are assigned. In a sense, the responsibility should become a local and regional one.
- Policies should ideally consider and address the requirements of the company and management alike. It is noteworthy that small business policy is 'transactional', while entrepreneurship policy is 'interpersonal' in nature (Adapted from Mazzorol, 2014).

4.4 The modern world and entrepreneurship

In view of previous discussions, it may be concluded that entrepreneurship is fundamental to national development and a solution to many problems in any country. Entrepreneurship may therefore be considered as a tree planting activity. The tree represents entrepreneurship, and therefore the tree provides healthy air for humans, fruit for eating, a home for birdlife and wood for structures and heat. This 'tree' may provide new solutions to existing challenges.

The modern entrepreneur may be characterised by the desire for freedom, flexibility and acquiring wealth (Fernandes, 2016). This individual always seeks new solutions and opportunities, and there is a constant fight with old traditions and formalities. Stated differently, the modern entrepreneur is driven to shift existing boundaries, and should have a strong sense of sustainability and, more especially, environmental conservation. Global sustainability goals could also form a framework within which to perform. The modern entrepreneur should rightfully develop his/her own abilities, have a belief in these, and cultivate a 'work hard' ethic. In a developing country such as South Africa, unemployment is on the rise, and therefore jobs need to be created for new graduates. New enterprises need skilled workers, and this can create a 'sponge' for unemployed graduates. The modern entrepreneur creates healthy competition in the market and could facilitate the provision of good quality goods and services at a reduced rate. Ultimately, success within any community will therefore stimulate social development, and a direct consequence of this is the rise in responsible young people. A large proportion is likely to feed into government initiatives such as educational and skills development. As taxation is mandatory, government revenue is boosted by the modern entrepreneur. This revenue, if managed responsibly, could be ploughed back in ways that will advance modern entrepreneurship. Individual skills and expertise that are usually applied to a day-to-day job may now be of direct benefit to the entrepreneur. These skills may then be managed and developed to produce significant rewards towards a better quality of life and independence (Sharma, 2017).

4.5 South Africa and entrepreneurship

4.5.1 An overview of research on entrepreneurship

An authoritative study entitled "The Real State of Entrepreneurship in South Africa", was conducted in 2017. The study was initiated by Seed Academy and is regarded as the most widely referenced at present (Brand South Africa, 2017). The targeted sample was 1 200 entrepreneurs whose most predominant observation was the discrepancy between male and female entrepreneurs. The figures showed that females represented 47% of the participants, which was an indication that programmes channelled towards the development of women-owned businesses

have had some impact. This finding suggests that a similar approach should be considered for the development of young entrepreneurs. The findings are presented in Figure 4.3.

In terms of the level of education and experience, the study referred to above found that 65% of the participants possessed a post-matric certificate, while 85% of these had at least one year's working experience. There was consensus among these new entrepreneurs that they required education and training that are linked to the specifics of their respective businesses. It may thus be deduced that, over and above the efforts of technical and vocational education and training colleges, both the public and private sectors need to explore ways to assist young and upcoming entrepreneurs. From a scholarly perspective, it is deemed appropriate to incorporate this type of training into basic and tertiary syllabi. (A discussion on this follows in section 4.6). The survey also revealed that 33% of the participants who had been managing a business for more than two years, ascribed their success to the development of strong personal networks. The reason for this was the trend that 95% of young businesses was collectively financed by the owners or by family, friends and acquaintances. This indicated that these young entrepreneurs-built businesses on associations of trust. This point is noteworthy, as challenges to access markets were experienced by 67% of the respondents, while gaining access to funding had been a challenge for 43%. One of the reasons for these challenges seemed to be rooted in the participants' initial ignorance about where or how to source funding. As most young businesses require funding below R100 000, it is suggested that funders revisit the stipulations for funding. Other than the funding challenge, it was found that the top sectors within the market represented by the participants were information technology, business services, advertising, and marketing. An unfortunate finding was that these sectors were not strongly aligned with South African priority sectors such as manufacturing, construction, service provision, and telecommunication. A recommendation was thus much needed entrepreneurial development in these priority sectors. In conclusion, the survey attempted to constructively affect the South African entrepreneurial ecosystem. The findings of the research provided a starting point for policy makers, and the study recommended up-to-date education for prospective entrepreneurs, transparency in



Figure 4.3: Diagrammatic representation of the results of the study by The Real State of Entrepreneurship in 2017
Source: Brand South Africa, 2017

businesses, attention to existing challenges, and the exploitation of available opportunities (Brand South Africa, 2017).

Other reports highlighted different findings, although there were also similarities. Brand South Africa reiterated many of the findings listed by The Real State of Entrepreneurship in South Africa (2017), such as the noticeable drop in youth entrepreneurs. This was also confirmed in the Global Entrepreneurship Monitor (GEM) report for 2015 – 2016, which indicated a drop of 40% in young entrepreneurs (GEM, 2017) (see Figure 4.3). Brand South Africa (official custodian of South Africa's nation brand) also highlighted a few other aspects based on the survey (Brand South Africa, 2017). These included the reasons why the participants started a business, business distribution throughout South Africa, the rural-urban ratio, and the number and type of employees. The top five challenges experienced by entrepreneurs from the most extreme to the least extreme were: (i) finding clients or customers (47%); (ii) inability to raise funds (43%); (iii) lack of guidance (31%); (iv) wearing too many hats (30%); and (v) slow or loss of sales (21%).

4.5.2 Entrepreneurship and South African economic development

The importance of and the positive role played by entrepreneurship and an entrepreneurial culture in social and economic development have often been discussed. Present-day South Africa needs new technologies, new markets, jobs, risk-takers, rule-breakers and innovators, and a strong drive towards converting ideas and innovations into economic opportunities. Recent figures have shown that roughly two million small businesses represent 98% of the total firms in South Africa. These small companies employ an estimated 55% of the country's workforce, and the national wage contribution is around 42% (Nicolaidis, 2011). These figures might look somewhat promising, but the downside is that 87% of entrepreneurs function on a survival basis. Most of these are black-owned enterprises run by women, and many of these small businesses are fragile and lack sustainability.

The 10-Year Vision for Accelerated and Shared Initiative of South Africa (ASGISA) indicates that this country should be an entrepreneurial country, to recognise those with business ideas, and to establish a highly competitive small enterprise sector,

together with a turnover generating employment. Kongolo (2010) found that small and medium enterprises in South Africa contributed an estimated 52% to the national employment figures. This figure was regarded low in comparison to other sub-Saharan countries, where the overall entrepreneurial activity was roughly four times higher. Moreover, the GEM (2017) listed poor infrastructure and a lacking banking system as business development challenges. Inadequate education levels, questionable government organisations, high crime levels, and stringent labour laws also added to the challenges. Apart from addressing these pressing constraints, South Africa should alter the population's perception of limited opportunities for starting a business.

A noticeable advantage of small businesses in South Africa is that they are channelled towards global growth, which allows for elevated levels of diversification and revenue. The GEM (2017) states that more than 25% of entrepreneurial income is from international deals. This represents more than twice the overall African average. As is evident in countries all over the world, South Africa is advised to view economic decline as a stimulus for small business development. Thus, under challenging economic conditions such as those that are currently experienced, solutions bred from innovation may easily find a niche for a novel enterprise in the market (Packirisamy, 2016).

After opportunities have been identified and the possibility of an enterprise has been formulated, does the new entrepreneur enjoy the necessary support in present day South Africa? The answer seems to be 'No' as, according to the GEM Report 1 (GEM, 2017), South Africa is ranked at number 42 out of a total of 54 countries in this regard. It may be deduced that this low ranking is due to a void in the groundwork for entrepreneurship. Even though an increase of 4% in early-stage enterprising has been recorded since 2016, South Africa is still ranked amongst the lowest in Africa in terms of entrepreneurial growth. Moreover, the GEM report concludes that the quality of entrepreneurship in South Africa remains insignificant in comparison to the rest of Africa. It is therefore suggested that the total mind-set around entrepreneurship in South Africa needs a shift. This would require going back to the drawing board to address policies and the way we educate the nation for an

entrepreneurial revolution (Entrepreneurship needs more support in South Africa, 2018: Online).

4.6 Entrepreneurship education

In general, the literature distinguishes between business entrepreneurship and business education. Business education deals with how to manage a business, whereas entrepreneurship education is about training to create and facilitate entry into a new business (Katz, 2003). In a dynamic and public education system such as in South Africa, the system should be quick to respond to fluctuations in the needs of students, communities and the economy. This is imperative, as education institutions are permanent institutions that do not open and close in response to how well they are serving national and market needs, and thus the education system should be aligned with demand. Institutions of learning are usually well-balanced institutions where there is a strong pull towards system rules to maintain routine activities as the norm. There is usually a high degree of accountability associated with such an established system, as these systems are highly structured. However, bureaucratic systems and processes can be detrimental to the pace demanded by entrepreneurship activities. This has often led to a disengagement of goals and delivery. As South Africa has a fragile economy with limited financial resources, students are reluctant to be risk-takers. Apart from this, South Africa tends to hold on to its conservative education practices of the past. As mentioned in Chapter 2, the back and forth reform of curricula since 1994 has placed a burden on educators, and this has resulted in some resistance to any innovation or change. Moreover, the strict organisational structure of higher education institutions and their relatively low risk appetite allow limited room for creative processes. Thus, if there is a possibility for venturing into unexplored or untested methods, it might also raise issues with professional bodies (Xaba & Malindi, 2010).

It has been established that there is a global trend for government policy to promote entrepreneurship education. The GEM report (2017) highlights the need for formal learning in this area. Even though many governments have accepted the functional economic theory of entrepreneurship, it requires foundation building and formal skills transfer (Jennings, Perren, and Carter, 2005). The global trend towards

entrepreneurship education is growing globally and in South Africa. In the hope of encouraging a growth in entrepreneurship, many countries have invested in entrepreneurship education at all levels, including tertiary level. However, the possibility of entrepreneurship education and how this may be implemented to initiate, and nurture entrepreneurial skills were questioned as early as in 1990 by Contrugli (Maresch, Harms, Kailer, and Wimmer-Wurm, 2016). Entrepreneurship education as a discipline has, however, evolved from these historical roots and is now accepted as a recognised field of research and study.

The discipline of entrepreneurship education is a collection of different specialities that include education, management, and the study of technology and economics (Davidsson, 2008). There is a general understanding amongst scholars in this field that entrepreneurship education is based on the understanding that fruitful entrepreneurship is influenced by the character, skills and abilities of the entrepreneur, and scholars of entrepreneurship education believe that these elements may be taught and moulded by education and teaching. Several researchers such as Kuratko (2005), Bae, Qian, Miao, and Fiet (2014) agree with this proposal, which suggests that entrepreneurship education is not only desirable, but also greatly encouraged.

The research avenue of what makes entrepreneurship education effective has been discussed in several intention-based models. For example, Kuehn (2008) states:

If entrepreneurial intentions precede entrepreneurial behaviour, then entrepreneurship educators should benefit from intentions-based research in entrepreneurship.

If this thinking is accepted, then educators involved in entrepreneurial education should build on the drivers of entrepreneurial intention. Some authors list these as attitudes, subjectivity and apparent behavioural control (Schlaegel & Koenig, 2014). However, research thus far has not always agreed on how to implement entrepreneurship in practice (Lourenço, Jones, and Jayawarna, 2013), and there is no real toolkit available to educate students in entrepreneurship (Neck & Greene, 2011). A pedagogic deduction thus is that entrepreneurship education confronts

established and traditional teaching methodologies. For this reason, there has been a plea for novel and innovative teaching techniques to match the outcomes to achieve entrepreneurial intentions. The nature of these techniques should entail active and interactive learning, as well as the creation of awareness (Miller, Wesley, and Williams, 2012).

Sarasvathy (2001) devised a theory that is embedded in the multimedia approach that he coined the 'theory of effectuation'. This theory has opened thinking in support of a more action-oriented pedagogic approach. The result is that most researchers of late have shown an overall acceptance that the teaching of entrepreneurship should be on an experimental basis, and that it should make use of suitable pedagogic tools (Mayer, Kortmann, and Wenzler, 2014). Unfortunately, there is a limited body of information about the impact of entrepreneurial courses offered, and only isolated incidents may have been recorded. It is also not precisely known how entrepreneurship courses influence the willingness of students to engage in entrepreneurship and, more importantly, what type of learning processes could be used for maximum effect. What the literature does show, however, is that the analysis is 'up and down', which is a way of focusing on outcomes but not on how to achieve such outcomes (Von Graevenitz, Harhoff, and Weber, 2010). Considering the above discourse, a focus of this study, namely the teaching of entrepreneurship by using a more student-centred approach that is embedded in real-life challenges, is reiterated.

4.6.1 Institutional characteristics required for entrepreneurship education

As the need for entrepreneurship education expands, the role of start-up ventures, science parks and incubators, which have their origin at universities, is better understood. First, there are academic entrepreneurs. It is suggested that they tend to employ more people than entrepreneurs who have a non-academic foundation (Von Graevenitz *et al.*, 2010). It is believed that a university education inspires bigger investments in a new business, and it is noted that these businesses usually fare better than non-academic start-ups. Also, academic-based start-ups spread positive effects into regional economies. Knowledge about this has influenced policy makers

to target institutions of higher education. Policies have thus been formulated to sensitise these institutions to advance entrepreneurship and innovation as a primary goal. The result is that several South African institutions of higher education have made the effort to initiate entrepreneurship education (Kuratko, 2005).

As an overview of entrepreneurship activity at universities of technology, the following extracts are listed, as they represent the terminologies and narratives posted by various universities of technology online:

- Central University of Technology, Free State (CUT)
The university offers an academic course in Entrepreneurship as part of the Bachelor of Technology degrees in Business Administration and Project Management. CUT also has a Unit for Enterprise Studies (UES), which covers research in areas such as public, private and social enterprises. The unit also works in conjunction with socio-economic development and has a well-established En•act•us-group. This is an international non-profit organisation made up of students, academics and business leaders. The group aims to use entrepreneurial activities to improve the quality of life of people in need. CUT has recently launched an idea generator. This is a developmental focus point where students, staff as well as the public develop innovative ideas. This is done with the assistance of lecturers and experts to facilitate the commercialisation of projects and products (<https://www.cut.ac.za>).
- Cape Peninsula University of Technology (CPUT)
The university has a Department of Entrepreneurship and Business Management. The courses offered are: Diploma in Entrepreneurship, Bachelor of Technology in Management and Entrepreneurship, and a Master's programme in Technology for Administration, with Entrepreneurship as a major subject (<https://www.cput.ac.za>).
- Durban University of Technology (DUT)
The university has a Department of Entrepreneurial Studies that focuses on curriculum development, teaching excellence, the needs of students,

engagement with communities, and discussions with industry. It thus represents the regional centre for excellence. DUT also has a Centre for Social Entrepreneurship (CSE) that was established in 2015. The main aim of the centre is to stimulate social entrepreneurship in order to address socio-economic challenges within surrounding communities. CSE usually partners with industry, government departments and other educational institutions (<https://www.dut.ac.za>).

- Mangosuthu University of Technology (MUT)

The university has an established Technology Station that provides services to small, medium and micro enterprises (SMMEs) in the chemical research sector (<https://www.khabza.com/mangosuthu-university-technology-mut>).

- Tswane University of Technology (TUT)

TUT has a Department of Management and Entrepreneurship. The department offers a four-year degree in Entrepreneurship, which includes an extended curriculum bridging year. The department aims to draw new students with a Matric level commercial subject combination. The department also offers a Magister Technologiae in Entrepreneurship. This is a structured master's qualification that focuses primarily on entrepreneurship (<https://www.tut.ac.za>).

- Vaal University of Technology (VUT)

VUT has a well-established Centre for Innovation and Entrepreneurship. The aim of the centre is to assist potential start-up entrepreneurs. The assistance is in the form of getting a new business established, providing the required skills, and ensuring a sustainable enterprise. The centre is funded to train SMMEs. Several of these companies are run by students and staff members. The centre works in close collaboration with the Gauteng Entrepreneurship Propeller to embed a culture of innovation and entrepreneurship across the university. Two courses in entrepreneurship training are offered by the centre and its satellite campus in Upington, Northern Cape. The two courses are

Offered on a part-time basis, and are eight weeks and six months long, respectively. This training is supported by SASOL, and the project is known as the VUT-SASOL Entrepreneurship Programme (<https://www.vut.ac.za>).

- Walter Sisulu University (WSU)

WSU, unlike the aforementioned universities, is a comprehensive university with a dual nature, as it functions as a university of technology and a traditional university. The official information for this university does not list entrepreneurship as a course or part of a course. However, the institution has a functioning En•act•us-group (www.universityportal.co.za/university/detail/id/24).

The above synopsis of the existence of entrepreneurship training at universities of technology in South Africa reveals that the degree of functional entrepreneurial activity varies from institution to institution. A common feature is that, wherever entrepreneurship is an academic offering, it is offered as a free-standing module that is not integrated or fused with any subject content. One of the objectives of the current study was to fuse entrepreneurship objectives with subject content. However, the effectiveness of any of the programmes, curricula and initiatives was beyond the scope of this study, which is a valuable avenue for future research.

It is suggested that any country should have an institutional profile for the regulation of entrepreneurship education based on five characteristics. These are: regulations that are friendly towards entrepreneurs; the availability of financial capital; the availability of educational capital; control measures to prevent corruption; and the exhibition of a good public image of entrepreneurs (Walter & Block, 2016). It has been argued that these characteristics have financial and non-financial benefits and that, at institutions that are entrepreneurship friendly, motivation and qualifications may be acquired from other sources in conjunction with entrepreneurship education.

The literature reports that entrepreneurship and the development of entrepreneurship are essential to many government policies. Policy makers have therefore considered entrepreneurship education and training as an effectual process for increasing entrepreneurial activity (Martinez, Levie, Kelley, Sæmundsson, and Schøtt, 2010.) These supportive policies have resulted in an

excess of entrepreneurial courses offered globally and nationally (Atherton, 2004). A direct result of this is the existence of the Entrepreneurship Education Project, 2016. This is a global initiative which represents longitudinal research whereby university students offer entrepreneurship educators and researchers an understanding of the effect of entrepreneurial education on motivational processes, and the metamorphosis from student to entrepreneur. This initiative, which is driven through data collection, is the most far-reaching study of its kind internationally. Conclusions are drawn from roughly 18 000 student responses from approximately 70 countries and 400 universities spread across these countries (Vanevenhoven & Liguori, 2013). Findings across an assortment of global institutions involved in entrepreneurship education have shown that a wide variety of pedagogic methodologies has been used, and that a variety of programmes exists. Such programmes are different in content, instructional methodology and duration.

4.6.2 Important pedagogic aspects of entrepreneurship education

Previous discussions have shown that an efficient education may bring a variety of benefits to any society (Bazaz, 2016). The quality and the type of education influence the contribution it can make to society. Therefore, if the education or training regime is aligned with the needs of the country, it may be instrumental in ensuring sustainable economic and social development. However, critical educational and didactical uncertainties remain that need to be addressed. Stated differently, there is a need to clarify what is being done when students are educated in entrepreneurship. The key areas are the appropriateness of what is taught, the relevancy of the subject content, articulation from start to finish, social effectiveness, and the efficiency of the practices employed (Fayolle, 2013).

Based on a study that was conducted in Finland to implement entrepreneurship in schools, it was found that educators lacked the necessary knowledge of how to implement entrepreneurship education on their own, and they found it difficult to convert the subject content into practice. The result is the thinking that a free-standing subject with generic aims and outcomes lends itself to imparting an abstract concept. It was suggested that such curricular reforms should be done in partnership with educators to enable the curriculum and educators' expertise to evolve together

(Seikkula-Leino, 2011). A question that the educators asked was whether entrepreneurship could be taught, or not. This has engendered an on-going debate amongst entrepreneurship scholars. Another way of asking this question is: “Are entrepreneurs born or made?” (Henry, 2005). This question could just as well be asked about several other professions such as engineering and medicine, as it is an undisputed fact that professionals from these disciplines also need to be taught (Fayolle, 2013). This brings us back to the questions of ‘what’ and ‘how’ with regards to teaching entrepreneurship.

In terms of methodology, research suggests that active learning is a useful methodology to teach entrepreneurship, as it creates a platform for problem solving. It also creates opportunities whereby the individual may engage in developing self-sufficiency and personal reflection (Klapper & Tegtmeier, 2010). Therefore, the educational methodologies of preference include real-life scenarios, role playing, real-life business experience, case studies, projects combining traditional teaching with inspirational talks, peer- and self-assessment, and research and data collection (Corbett, 2005; Heinonen & Poikkijoki, 2006; Chang & Rieple, 2013).

Considering the above discussion, we can describe the entrepreneurship educator as a person who dares to deviate from the norm, and who thinks innovatively to create change (Leffler, 2009). The present age of knowledge has created a state where change is the new constant, and this is characterised by the continual cycles of improved technology and the generation of new knowledge. Thus, entrepreneurship education may bring critical and dynamic change to higher education and, in so doing, put it on a path that will align it with the Fourth Industrial Revolution (Malan, 2016).

4.7 Potential disadvantages of entrepreneurship education

Most literature and views on entrepreneurship are conspicuously positive, and the reasons for that have been discussed throughout the chapter. To satisfy a truly objective research approach, it is necessary to also look at the possibility of any negative implications associated with the global and national drive for more entrepreneurs. The first question is: “Is there perhaps a maximum limit of

entrepreneurs any country can accommodate or sustain?” An example where this has happened is Italy, where increasing levels of self-employment have had a negative effect on the county’s economic development (Baijal, 2016). This may be attributed to a loss in the supply of a traditional workforce for established industries. Moreover, policies and regulations are needed to ensure that fair practices are maintained, and this creates an opportunity for human nature to be challenged. Stated differently, governments need to exercise control while also encouraging entrepreneurship development; they therefore must reach a balance between the two to prevent unfair market practices, corruption and even criminal activity, while not compromising initiatives for start-ups (Miller, 2015). In addition, entrepreneurs need to be self-efficient and self-assured, but it has been shown that these characteristics could evolve into an unhealthy desire for power and prestige, and ultimately a loss of the healthy initiatives the business was founded on (Engelen, Neumann, and Schmidt, 2016). Having said this, several other negatives may be highlighted, but such a discourse was beyond the scope of this study.

4.8 Concluding remarks

The discourse that was presented in this chapter presented an overview of different interpretations of entrepreneurship by scholars and researchers. Historically, the concept was derived from a philosophical point of view, but in more recent times it has evolved into a definition more suitable for the modern world. All the definitions of entrepreneurship have the following in common: entrepreneurship contributes to economic and social development; it improves the socio-economic conditions of a community; and it generates wealth and offers a solution to unemployment. Becoming an entrepreneur requires a special skill set which includes, amongst others, innovative ability; willingness to be a risk-taker; the ability to resource funding; managerial skills; and the ability to assess market needs. Having said this, the role of small and medium enterprises should not be underestimated, as these structures contribute to the national revenue and the alleviation of unemployment.

Literature on the state of entrepreneurship in South Africa has revealed that most entrepreneurs do not function within priority sectors in South Africa. Thus, policy formulation should attempt to shift this emphasis. On a positive note, it has been

reported that most youthful entrepreneurs are inspired by the possibility of seizing an opportunity. Since the global increase in 'technopreneurs', the South African government, just like many governments across the globe, has adjusted its policies to favour small business development and to encourage institutions of higher learning to embark on promoting entrepreneurship. An important mandate is to devise guidelines for an entrepreneurial ecosystem that address and promote entrepreneurial awareness and advancement. Thus, government policies and parameters should advise and encourage, but care should be taken to avert interference or the monopolisation of new ventures. Various reports and global listings have indicated that South Africa will benefit from a structured regime that focuses on entrepreneurship education.

The discipline of entrepreneurship education is characterised by topics pertaining to management, technology and economics, and special characteristics, skills and abilities should form part of the training regime. In terms of an appropriate teaching methodology, it was established that it should be of a novel and innovative nature. The components of the discipline clearly demand a methodology that involves active learning, interactive inquiry and awareness creation. Having said this, it is evident that traditional teaching techniques will not be appropriate and will not achieve the objectives of entrepreneurship education, as real-life scenarios need to be addressed to ensure that the dynamic character of the entrepreneurial process is acknowledged in training programmes. Therefore, although not disregarding the possible disadvantages of the process, entrepreneurship education is critical in attempting to transform the economy, uplifting socio-economic conditions, and addressing unemployment. Ultimately, the success of the process will rely on collaboration among all stakeholders such as government, the private sector, higher education and affected communities.

4.9 References

- Abbas,** A.A. 2018. *The bright future of Technopreneurship.* (<https://www.researchgate.net/publication/329715398>)
Accessed on 23 August 2018.
- Atherton,** A. 2004. Unbundling enterprise and entrepreneurship. *Entrepreneurship and Innovation* 5(2):121-127.
- Avais,** M. 2014. Financial innovation and poverty reduction. *International Journal of Scientific and Research Publications* 4(1):2250-3153.
- Bae,** T.J., Qian, S., Miao, C. & Fiet, J.O. 2014. The relationship between entrepreneurship education and entrepreneurial intentions: A meta-analytic review. *Entrepreneurship Theory and Practice* 38:217-254.
- Baijal,** R. 2016. *Entrepreneur India.* (<https://www.entrepreneur.com/article/269796>)
Accessed on 23 August 2018.
- Bazaz,** R. 2016. Right to education: An analysis of the role of private and public schools in upholding educational rights of marginalized group. *Education* 6(2): 40-47.
- Birch,** D.L. & Massachusetts Institute of Technology. 1979. Program on neighborhood and regional change: The job generation process, M.I.T. Cambridge, Mass: Program on Neighborhood and Regional Change.
- Block,** J.H. & Wagner, M. 2010. Necessity and opportunity entrepreneurs in Germany: Characteristics and earning differentials. *Schmalenbach Business Review* 62(2):154-174.
- Brand South Africa** (Brand SA). 2017. State of entrepreneurship in South Africa. (<https://www.brandsouthafrica.com/investments-immigration/state-of-entrepreneurship-in-south-africa>)
Accessed on 23 August 2018.
- Chang,** J. & Rieple, A. 2013. Assessing students' entrepreneurial skills development in live projects. *Journal of Small Business and Enterprise Development*, 20, 225-241.
(<http://dx.doi.org/10.1108/14626001311298501>)
Accessed on 21 August 2018.

- Corbett, A.** 2005. Experiential learning within the process of opportunity identification and exploitation. *Entrepreneurship: Theory and Practice* 29:473-491.
- Davidsson, P.** 2004. What is entrepreneurship? Researching Entrepreneurship. *International Studies in Entrepreneurship Vol. 5*. Boston, MA: Springer.
- Drucker, P.F.** 1985. Entrepreneurial strategies. *California Management Review* 27(2):9-25.
- Efe, A.J.** 2014. Entrepreneurship education: A panacea for unemployment, poverty reduction and national insecurity in developing and underdeveloped countries. *American International Journal of Contemporary Research* 4(3):124-136.
- Eisenmann, T.R.** 2013. Entrepreneurship: A working definition. *Harvard Business Review*.
(<https://hbr.org/2013/01/what-is-entrepreneurship>)
Accessed on 28 August 2018.
- Engelen, A., Neumann, C. & Schmidt, S.** 2016. Should entrepreneurially oriented firms have narcissistic CEOs? *Journal of Management* 42(3):698-721.
- Entrepreneurship Education Project,** 2016. *Studying, designing and exploring the next generation of entrepreneurship education*.
(<http://www.trepeducation.com>)
Accessed on 21 August 2018.
- Entrepreneurship needs more support in South Africa.** 2018. *The Mercury*.
(<https://www.iol.co.za/mercury/entrepreneurship-needs-more-support-in-south-africa-14378169>)
Accessed on 24 August 2018.
- Fayolle, A.** 2013. The myths of entrepreneurship: Exploring assumptions in entrepreneurship research. *Entrepreneurship & Regional Development* 25(7-8):692-701.
(<https://www.tandfonline.com/doi/abs/10.1080/08985626.2013.821318>)
Accessed on 24 August 2018.
- Fernandes, P.** 2016. Entrepreneurship defined: What it means to be an entrepreneur. *Business News Daily*. May 15 2019.
(<https://www.businessnewsdaily.com/7275-entrepreneurship-defined.html>)

Accessed on 27 May 2019.

GEM - Global Entrepreneurship Monitor. 2017. Global Report 2016/2017. (<https://www.gemconsortium.org/report/49812>)

Accessed on 26 August 2018.

Heinonen, J. & Poikkijoki, S. 2006. An entrepreneurial directed approach to entrepreneurship education: Mission impossible? *Journal of Management Development* 25:80-94.

Henry, C., Hill, F. & Leitch, C. 2005. *Entrepreneurship education and training: Can entrepreneurship be taught? Part I.* Dundalk, Co Louth, Ireland: Dundalk Institute of Technology.

Isenberg, D. 2010. The big idea: How to start an entrepreneurial revolution. *Harvard Business Review*.

(<https://hbr.org/2010/06/the-big-idea-how-to-start-an-entrepreneurial-revolution>)

Accessed on 14 April 2019.

Jansen, S., Van de Zande, T., Brinkkemper, S., Stam, E. & Varma, V. 2015. How education, stimulation, and incubation encourage student entrepreneurship: Observations from MIT, IIT, and Utrecht University. *International Journal of Management Education* 13(2):170-181.

Jennings, P.L., Perren, L. & Carter, S. 2005. Guest editor's introduction: Alternative perspectives on entrepreneurship research. *Entrepreneurship: Theory and Practice* 29(2):145-152.

Katz, J. 2003. The chronology and intellectual trajectory of American entrepreneurship education. *Journal of Business Venturing* 18:283-300.

Klapper, R. & Tegtmeier, S. 2010. Innovating entrepreneurial pedagogy: Examples from France and Germany. *Journal of Small Business and Enterprise Development* 17:552-568.

Kongolo, M. 2010. Job creation versus job shedding and the role of SMEs in economic development. *African Journal of Business Management* 4(11):2288-2295.

Kotler, P., Kartajaya, H. & Setiawan, I. 2010. *Marketing 3.0: From products to customers to the human spirit.* New Jersey: John Wiley & Sons.

- Kuehn, K.W.** 2008. Entrepreneurial intentions research: Implications for entrepreneurship education. *Journal of Entrepreneurship Education* 11:87.
- Kuratko, D.F.** 2005. The emergence of entrepreneurship education: Development, trends, and challenges. *Entrepreneurship Theory and Practice* 29:577-597.
- Leffler, E.** 2009. The many faces of entrepreneurship: A discursive battle for the school arena. *European Educational Research Journal* 8(1):114-116.
- Lourenço, F., Jones, O. & Jayawarna, D.** 2013. Promoting sustainable development: The role of entrepreneurship education. *International Small Business Journal* 31(8):841-865.
- Malan, J.H.** 2016. An assessment of the impact of entrepreneurial orientation on the success of selected public secondary schools. (Unpublished PhD thesis.) Potchefstroom, North West University.
- Maresh, D., Harms, R., Kailer, N. & Wimmer-Wurm, B.** 2016. The impact of entrepreneurship education on the entrepreneurial intention of students in science and engineering versus business studies university programs. *Technological Forecasting and Social Change* 104:172-179.
- Martinez, A.C., Levie, J., Kelley, D.J., Sæmundsson, R.J. & Schøtt, T.** 2010. *Global Entrepreneurship Monitor special report: A global perspective on entrepreneurship education and training.*
(<http://www.gemconsortium.org/download/1271392126157/GEM%20Special%20Report%20on%20Ed%20and%20Training.pdf>)
Accessed on 22 August 2018.
- Mason, C. & Brown, R.** 2014. Entrepreneurial ecosystems and growth-oriented entrepreneurship. *Final Report to OECD, Paris* 30(1):77-102.
- Mayer, I., Kortmann, R. & Wenzler, I.** 2014. Game-based entrepreneurship education: Identifying enterprising personality, motivation and intentions amongst engineering students. *Journal of Entrepreneurship Education* 17(2):217-244.
- Mazzarol, T.** 2014. *Ways governments can encourage entrepreneurship.*
(<https://www.weforum.org/agenda/2014/12/6-ways-governments-can-encourage-entrepreneurship/>.World Economic Forum)
Accessed on 19 August 2018.
- McDaniel, B.A.** 2014. *Entrepreneurship and innovation: An economic approach.* London: Routledge.

- Miller, D.** 2015. A downside to the entrepreneurial personality? *Entrepreneurship Theory and Practice* 39(1):1-8.
- Miller, T.L., Wesley, C.L. & Williams, D.E.** 2012. Educating the minds of caring hearts: Comparing the views of practitioners and educators on the importance of social entrepreneurship competencies. *Academy of Management Learning and Education* 11(3):349-370.
- Neck, H.M. & Greene, P.G.** 2011. Entrepreneurship education: Known worlds and new frontiers. *Journal of Small Business Management* 49(1):55-70.
- Nicolaidis, A.** 2011. Entrepreneurship-the role of higher education in South Africa. *Educational Research* 2(4):1043-1050.
- Nieman, G. & Neuwenhuizen, C.** 2009. *Entrepreneurship: A South African perspective*. Pretoria: Van Schaik.
- Packirisamy, S.** 2016, 24 October. *Entrepreneurship News*. (<http://www.bizcommunity.com/Article/196/713/152688.html>)
Accessed on 23 August 2018.
- Petrin, T.** 1994. Entrepreneurship and supporting institutions: An analytical approach. Herrsching, Germany: Seventh FAO/REU International Rural Development Summer School (FAO).
- Sappin, E.** 2016. *Entrepreneur*. (<https://www.entrepreneur.com/article/283616>)
Accessed on 24 August 2018.
- Sarasvathy, S.D.** 2001. Causation and effectuation: Toward a theoretical shift from economic inevitability to entrepreneurial contingency. *Academy of Management Review* 26(2):243-263.
- Schlaegel, C. & Koenig, M.** 2014. Determinants of entrepreneurial intent: A meta-analytic test and integration of competing models. *Entrepreneurship Theory and Practice* 38:291-332.
- Schumpeter, J. A.** 1934. *The theory of economic development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle*. Cambridge, MA: Harvard University Press.

- Seikkula-Leino**, J. 2011. The implementation of entrepreneurship education through curriculum reform in Finnish comprehensive schools. *Journal of Curriculum Studies* 43:69-85.
- Sharma**, V. 2017. *Klient Solutech*.
(<http://www.klientsolutech.com/why-entrepreneurship-is-important-in-the-modern-world/>)
Accessed on 19 August 2018.
- Smith**, W. & Chimucheka, T. 2014. Entrepreneurship, economic growth and entrepreneurship theories. *Mediterranean Journal of Social Sciences* 5(14):160.
- Thurik**, R. & Wennekers, S. 2004. Entrepreneurship, small business and economic growth. *Journal of Small Business and Enterprise Development* 11(1):140-149.
- Vanevenhoven**, J. & Liguori, E. 2013. The Impact of Entrepreneurship Education: Introducing the Entrepreneurship Education Project. *Journal of Small Business Management* 51(3):315-328.
- Von Graevenitz**, G., Harhoff, D. & Weber, R. 2010. The effects of entrepreneurship education. *Journal of Economic Behavior & Organization* 76:90-112.
- Westphal**, L.E. 2002. Technology strategies for economic development in a fast changing global economy. *Economics of Innovation and New Technology* 11(4-5):275-320.
- Xaba**, M. & Malindi, M. 2010. Entrepreneurial orientation and practice: Three case examples of historically disadvantaged primary schools. *South African Journal of Education* 30(1):75-89.

CHAPTER 5

ACADEMIC EXPERIENCE, TEACHING METHODOLOGIES AND THE LEVEL OF DEVELOPMENT OF ENTREPRENEURSHIP EDUCATION AMONGST SELECTED EUROPEAN AND SADC UNIVERSITIES: A TRIANGULAR STUDY

An empirical article for submission partially or in full to: Journal of Studies in
International Education ISSN: 10283153

<https://uk.sagepub.com/en-gb/afr/journal/journal-studies-international-education>

5.1 Introduction

During the last 50 years, African universities have experienced several bends and curves as they developed and grew from their humble and diffident beginnings. In recent times, South African institutions of higher learning have established themselves as large enterprises that cater for thousands of students in a variety of educational disciplines and for various qualifications (Zezeza, 2009). These institutions have different characters and are termed as comprehensive, traditional or technological institutions with a traditional academic, research-intensive or vocational focus. Universities of technology originated due to a specified mandate which is to focus on technological training and skills transfer, and these institutions represent the vocational character of higher education in South Africa (see Chapter 3).

The practices and forms through which knowledge is produced have responded to extensive reform initiatives in higher education in South Africa that occurred in response to global trends. The challenges that have impacted this restructuring process have been internal, external, institutional, pedagogic and political in nature. Furthermore, these challenges have been strengthened and modified by globalisation and an attitude of economic *laissez-faire* (Zezeza, 2002). This approach to institutional differentiation has been a keenly debated topic in higher education contexts in South Africa over the last two decades (Moloi, Mkwanazi, and Bojabotseha, 2014). Globalisation may be evident in higher education in the form of entrepreneurship, managerialism and privatisation that all affect what is taught, how it is taught and why it is taught. In view of these distinctions, it has become apparent that institutions of higher learning are expected to respond to the social and economic needs of their immediate communities, and that they are additionally required to play a pivotal role in regional, national and even global economies (Currie, 1998). These are, in a nutshell, the characteristics of the entrepreneurial university.

Irrespective of the different characteristics and mandates of universities, the manner in which they respond to the impact of globalisation depends on the political climate of the country, its economy, its position within the global economy, and the measure

of its acceptance in terms of local and global reforms (Currie & Subotzky, 2000). It is against this backdrop that the focus of this chapter is to compare some elements of South African universities of technology with those of a European and a Southern African Developmental community (SADC) university. The elements of comparison are academic experience, dialogue with government and professional bodies, interaction with industry, and views on entrepreneurship.

5.2 Aims and objectives

The research that is reported in this chapter was conducted in the form of a triangular study. Academics from three universities were selected as respondents. The aim of the study was to triangulate and compare the data emanating from academics at these three selected universities in diverse global settings, see Chapter 1.

To achieve this aim, the following objectives steered the investigation:

- to investigate to what extent university academics' experiences, opinions on higher education, teaching methodologies and attitudes towards entrepreneurship education differed among a traditional European research university, a SADC university, and a South African university of technology;
- to investigate how these universities compared in terms of their character, collaboration with industry, and their response to entrepreneurship education;
- to observe which international demands for new kinds of knowledge, alternative methodologies for knowledge production, dissemination of knowledge and ways to improve effective networking and partnerships have impacted on these three universities; and
- to utilise the findings to create a template to support the development of the scholarship of integration at universities of technology through addressing the state entrepreneurship education at these institutions.

The investigation intended to highlight similarities and differences between universities of technology in South Africa and international universities, and to determine what can be learned and utilised towards designing a template for the scholarship of integration initiative.

5.3 Literature review

The occurrence of an increasingly competitive society due to knowledge explosion in the global higher education sphere in which African institutions must also participate has engulfed South African universities through processes of internationalisation and globalisation (Jowi, 2012). As universities are key drivers of economic advancement, their role encourages communication with industry, society, teaching and research (Kapetaniou & Lee, 2017). Numerous studies have thus concentrated on the goal of traditional universities such as teaching and research, with a pronounced shift towards innovation, knowledge transfer and entrepreneurship (Bozeman *et al.*, 2015).

Considering European universities, several distinctive characteristics and traits are observed. Each of the 33 countries that form part of the European Commission (EC) has its individual higher education system, but they all form part of the European Higher Education Area (EHEA), (EC, 2018: Online). There is mounting awareness in the United Kingdom (UK) and on the European mainland regarding the importance of higher education in the construction of a knowledge-based economy (Dunning, 2002; Harvey, Locke, and Morey, 2002). This is no different to what has already been argued about globalisation and the development of an international knowledge economy. Added to this, the speedy growth of higher education across Europe in recent times has resulted in concerns about the quality of the graduate labour market and the ability of new graduates to meet the needs of industry (Teichler, 2003; Elias & Purcell, 2004). This research finding is of interest to the South Africa scene, as the debate about higher education supply and the demands by industry is vociferous and widespread.

Research themes in the European context are varied, and so is this region's institutional basis as a national focus on research (Teichler, 2015). According to the Science, Research and Innovation Performance of the EU (SRIP) report of 2018, a few findings may be highlighted (EC, 2018). First, Europe is regarded as a research and development powerhouse, boasting 7% of the world's population and producing 20% of the world's research and development initiatives. It also contributes roughly one third of all high-impact scientific publications. At the same time, there is some concern that Europe has failed to transform leadership in science into leadership innovation and entrepreneurship. Secondly, the European Union has zero companies featuring in the top 15 companies by market capitalisation (EC, 2018).

To either corroborate or find exceptions to European research and innovation practices, this research project was conducted at a selected European university. Of late, European universities have transformed noticeably, yet they also continue being institutions of reason, knowledge, criticism and learning (Nybom, 2003). Uppsala University (UU) in Sweden was selected as the European university to be included in the study because of its high ranking, authoritative stature, and its commitment to and involvement with the SADC region through the South Africa-Sweden University Forum (SASUF) initiative. Founded in 1477, Uppsala University is a research university and not only the oldest university in Sweden, but also of all the universities in Nordic countries. It ranks among the world's 100 best universities in several high-profile international rankings (Ridder-Symoens, 2003). UU boasts several faculties, of which a large percentage is grounded in the sciences and science research. Findings pertaining to this European research university were compared with those related to a Southern African Development Community (SADC) university and a university of technology in South Africa.

The Southern African Development Community (SADC) is a Regional Economic Community that comprises 16 member states, including South Africa and Mauritius. It was established in 1992, and is committed to regional integration and poverty eradication within the Southern African region. Its aim is to achieve this through economic development and maintaining peace and security (SADC, 2012:Online). The SADC protocol on education and training, which promotes a regionally integrated education system, has a vision which aims to link access, equity,

relevance and quality of education. This protocol proposes to standardise education and training structures across the region by 2020 (Arnott, 2010: Online).

The Republic of Mauritius is situated in the South West Indian Ocean and comprises the major island, the small island Rodrigues, and the Cargados Carajos Archipelago (St. Brandon), (SADC, 2012: Online). This republic is moving towards a service-oriented economy that is driven by innovation. The financial services sector, which is the most important contributor to the Mauritian economy, occupies 13% of the Gross Domestic Product (GDP), and employs more than 15 000 skilled professionals. Knowledge generation (IT) and life sciences are two sectors that are rapidly developing (SADC, 2012: Online). In the late 1990s, Mauritius identified internationalisation as an important strategy to achieve the status as a knowledge centre and a regional core for excellence. This effort would align itself with global trends in higher education. The Tertiary Education Commission (TEC) was granted additional powers and, in 2010, there was a shift to transform Mauritius into a knowledge-based economy. A brash approach was embarked on to democratise higher education in order to have one graduate per family (Timol & Kinser, 2017). Of the institutions of higher learning, the University of Mauritius (UoM) is the national university of Mauritius and is the oldest and largest university in the country. The university has six faculties, of which the Faculty of Agriculture is the oldest. It operates on the UoM farm, which is an open laboratory of 21 acres (UoM, 2015: Online).

In South Africa, the Central University of Technology (CUT) is situated in the Free State Province. It is the youngest and smallest of the three universities that were the foci of this study. The nature and focus of this university of technology were discussed in Chapter 3. CUT has four faculties, and the study was done in the Faculty of Health and Environmental Sciences. The challenges experienced within higher education in South Africa have shown similarities with other SADC countries, but it also deals with hurdles that are unique to South Africa.

Since the study explored knowledge production, interaction with government and industry, the functioning within the local economy and the pedagogic approaches of academics, the scholarship of integration was explored. The debate about 'teaching

versus research' is delineated by the scholarship of teaching and learning, discovery, integration and application (Hoffmeyer, Newton, and Scott, 2007). As with the scholarship of learning and teaching (or SoLT), the scholarship of integration, which will now be referred to as SoL, refers to the process where educators engage in research about the 'how' and 'what' of their teaching (Marks, 2000). The findings of the said research inform the teaching and learning process and may also be reflective of teaching. SoL therefore addresses the role of all stakeholders in the pedagogic process working towards globalisation and internationalisation. Important aspects of higher education such as a knowledge-based economy, a workforce for the future, entrepreneurship and economic growth form the components of the scholarship of integration. This research investigation overlapped these academic domains, as the process involved research where the fields converged by looking at what, why and how teaching and learning took place. According to Marks (2000) and Simpson, Marcdante, Duthie, Sheehan, Holloway, and Towne (2000), the scholarship of integration gives meaning to defined discoveries by creating associations within and between disciplines, detecting knowledge in a broader context, and synthesising this knowledge. This process is addressed in this chapter.

5.4 Methodology

5.4.1 Selection of methodologies

This study was both descriptive and empirical in nature and utilised a mixed methods research paradigm by combining qualitative and quantitative approaches. The general aim of mixed methods research is to magnify and reinforce a study's conclusions and, in so doing, contributing to already published literature. In most studies, the use of mixed methods can contribute to answering the research questions. In essence, mixed methods research is about intensifying knowledge and its validity (Onwuegbuzie & Burke, 2006; Johnson & Christensen, 2017). Gorad (2004) argues that a mixed methods approach leads to a reduction in the waste of possible useful information. Also, researchers now believe that qualitative and quantitative methods are complementary rather than antagonistic (Jackson, 1991; Mingers & Gill, 1996; Thomas, 2003; Creswell, 2003; Jack & Raturi, 2006). Thus, data of a qualitative nature that are required will be complemented by data collected

through an instrument that is generally used to collect quantitative types of data. For purposes of this research, interviews were used for purposes of gathering qualitative data, whilst a questionnaire was used to gather quantitative data.

5.4.2 Sampling protocol and interviews

Conducting an interview is a systematic way of communicating, as it involves talking and listening and, in so doing, collecting data from persons of interest. The researcher would usually employ open or unrestricted questions and recognise that the responses are the personal views or beliefs of the respondents. The process involves

human-to-human interaction through which new knowledge is produced (Cohen, Manion & Morrison, 2000). For this study, the interview participants were strategically selected academics who had to:

- have knowledge of the subject matter pertaining to the study;
- be responsible for teaching first-year students;
- be coordinators within their programmes and faculties; and
- be central in selecting and defining course content.

At UU, 16 academics were identified, and 12 responded. Thus, the sample represented 75% of the pool. 12 academics therefore participated in the study. The same selection process and criteria were applied for the selection of participants at the two other institutions. There were 36 respondents from the three universities in total. The same respondents were used for the interviews and questionnaires. Participation was voluntary, and the participants were assured of their anonymity and unbiased reporting. An interview guide was designed containing a list of open-ended questions pertaining to various pertinent topics and issues relevant to the study (see Appendix 7). Care was taken to avoid ambiguity, illegal questions and personal enquiries.

Twelve academics each from Uppsala University, University of Mauritius and Central University of Technology were selected according to the sampling protocol. The participants were informed beforehand that the interviews would be face-to-face,

semi-structured and based entirely on their experiences and opinions. I conducted the interviews in a dedicated, quiet and comfortable space that had been chosen by each respondent. The nature of the questions was both open- and closed-ended, and care was taken to ask the questions in a non-directive way. In this manner the respondents were free to answer in their own words, and to contribute to new understanding with comparisons across the array of participants (Schlessinger *et al.*, 2010). Any discussion which resulted from questions asked was unhindered and encouraged. I thus followed a structured set of questions (see Appendix 7). Furthermore, all the interviews were audio recorded on an Olympus Note Corder DP-311 in the case of the Uppsala participants, and on an Olympus Digital Voice recorder DM-550 in the case of the University of Mauritius and the Central University of Technology participants. At the University of Mauritius, the participants were selected from the Faculty of Agriculture, and at the Central University of Technology they were selected from the Faculty of Health and Environmental Sciences. The same procedures and steps were followed before, during and after the interviews for all the participants. The audio recorded interviews were later transcribed. English was the preferred interview language.

5.4.3 Analysis of interview data

I analysed the audio transcripts but retained the comparative nature of the study in mind (Strauss & Corbin, 1998). An orderly method of qualitative research analysis was followed in order to develop type-sets from the data. The analysis was based on inductive thinking and documenting frequentative responses (Cresswell & Plano-Clark, 2011). The analysis was conducted by following a set of sequential steps: (1) salient and direct replies for each question were documented; (2) similarities and differences were noted; (3) findings from each institution were grouped for comparison; (4) noteworthy statements from each sample group were noted, and each audio recording was analysed a second time to ensure that no critical information had been omitted; and (5) the findings were then summarised to be compared and contrasted.

5.4.4 Electronic surveys: questionnaires

In addition to interviews, survey questionnaires are a useful data collection tool. The questionnaire was administered to the same academics who had participated in the interviews. This process took place after the interviews. The interview participants were requested to answer the questionnaire which was sent to them via e-mail. QuestioPro, a survey software tool, was used to design, distribute, capture and analyse the responses. The list of questions is presented in Appendix 8. The advantages of online questionnaires are their low cost, time-efficiency, and the relaxed environment within which respondents can answer the questions. Not feeling pressured allow participants to think deeper about and provide more accurate answers. However, the main disadvantage of questionnaires sent via e-mail is that respondents sometimes do not complete the questionnaire at all. However, all the respondents that had been approached completed the questionnaire in good time.

5.4.5 Analysis of responses to the questionnaire

The study opted for a descriptive design which was purposive. The questionnaire contained multiple-choice questions that were quick to answer, as possible answers were provided, and the respondents simply had to make a choice. A disadvantage, however, was that the respondents could find the answers confusing and restrictive. Also, the desire to choose more than one answer might have occurred. In some instances, the respondents mentioned that they would have appreciated the opportunity to qualify their answers. The researcher tried to allow the interview findings to complement the findings based on the questionnaire. The findings of the questionnaire are presented graphically, followed by a discussion of similarities, differences and trends.

5.5 Results and conclusions

5.5.1 The interviews

All forms of qualitative research (e.g. interviews) produce results and provide information that is abundantly laden with data and detail that are predominantly subjective (Cohen *et al.*, 2000). Such information was collected from the interview

transcripts and the observation notes of the interviewer. All this information was reworked and filtered to represent the direct responses and replies to the questions posed. The process of data collection was defined by the nature of the research and the aims and objectives of the study as described under the research methodology (5.4.1). All the interview recordings were transcribed, and the salient findings were documented. A comparative summary is presented in Table 5.1.

The following section delineates the findings from the summarised data. These will be discussed per question, and emphasis will be placed on emerging differences, similarities and trends. In addition, observations unique to any one of the institutions will be noted.

Question 1: *The lecturers' level of experience*

No real differences or similarities were observed other than the fact that at UU and UoM the academics had more years of experience in total. One of the reasons for this could be attributed to the fact that CUT is a relatively young university compared to UU and UoM. Moreover, the qualifications of the staff in the Faculty of Health and Environmental Sciences were generally 'inherited' when the former Technicon was transformed into a university of technology in 2004 (Chapter 3).

Question 2: *The teaching methodologies used: WHY? WHEN? and for WHAT reason?*

As this question addressed all the objectives of the study, it was important to observe all relevant information, and to draw as much from the responses as possible. Lecturing methodology was common to all three universities, but to a different extent. At CUT, lecturing was the predominant teaching methodology. At the UoM, lecturing was used as a point of departure, and other methodologies were subsequently infused. At UU, the choice of methodology was dictated by the nature of the subject and the primary intention of the academic (see Questions 7 and 8).

Table 5.1: Summary of the salient findings based on the interviews conducted with 12 academics from Uppsala University, University of Mauritius, and Central University of Technology, Free State

QUESTIONS	INSTITUTIONS		
	UPPSALA UNIVERSITY	UNIVERSITY OF MAURITIUS	CENTRAL UNIVERSITY OF TECHNOLOGY, FREE STATE
1. Number of years of lecturing experience	4 – 30+ years	4 – 30+ years	7– 20 years
2. Teaching Methodologies	<ul style="list-style-type: none"> - Lecturing - Seminars/videos - Class discussions - Field trips - Some eager to try problem-based learning 	<ul style="list-style-type: none"> - Lecturing - Discussion - Case studies – from industry - E-learning (Online platform) - Field trips 	<ul style="list-style-type: none"> - Lecturing - Group work - Videos - Demonstrations
3. Under-preparedness of students	<ul style="list-style-type: none"> - Fairly well prepared - Some lack knowledge of study techniques - Some students pampered at school - Variety of level of prior knowledge 	<ul style="list-style-type: none"> - Not ready in the beginning - Spoon-feeding at school - Need for study techniques - Some have low critical thinking - Immaturity - Lack of career guidance 	<ul style="list-style-type: none"> - Significantly under-prepared - Need for continuous remedial intervention - Language barrier has greatest impact - Gap between school and tertiary level growing
4. Impact of socio-economic conditions and cultural differences	<ul style="list-style-type: none"> - No real impact - Cultural background varies but no significant effect - Ethnicity with language may have 	<ul style="list-style-type: none"> - Culture has hardly any effect - Socio-economic status has hardly any effect - University assists where 	<ul style="list-style-type: none"> - Significant socio-economic differences with marked influence - Differences in prior knowledge, exposure and level of

	an influence	necessary	development
5. Inclusive teaching	<ul style="list-style-type: none"> - All learning challenges are dealt with by the university - People and processes are in place to deal with learning challenges 	<ul style="list-style-type: none"> - University assists - No need detected for special education 	<ul style="list-style-type: none"> - Poorer students need more advice and assistance; they have very little confidence - Culture occasionally exhibits unsettling male/female roles - If so, no time as classes are too big - Not formally applied - Not trained for this - If detected, adapt and accommodate student in class
6. Average pass rate	65%– 90%	65% – 100%	65% – 85%
7 + 8. What students are prepared for and your input	<ul style="list-style-type: none"> - Industry, mainly engineering and teacher education - Transferable skills - Holistic education - Green and white biology – research - Mostly: programme determines/dictates the focus 	<ul style="list-style-type: none"> - Mostly industry (associated with practical work placement) - Determined by strength of student 	<ul style="list-style-type: none"> - Mostly industry (expectation of the Health Professions Council of South Africa –HPCSA) - Prepare for life due to difficulty with employment - May be determined by study focus
9. Dialogue/interaction with Government	<ul style="list-style-type: none"> - Department, faculty and Programme Board determine content - No direct dialogue or interference from Government 	<ul style="list-style-type: none"> - No dialogue with ministry (only management) - No interference from ministry - Department develops courses according to national policy 	<ul style="list-style-type: none"> - No dialogue or do not know - Syllabi are re-curriculated Nationally determined or influenced by HPCSA and other professional bodies such as

10. Dialogue and interaction with Industry	<ul style="list-style-type: none"> - Goals and codes received from government - Syllabi and changes through working group - Engineering has good interaction - For research collaboration: Yes - Alumni in industry have strong connection with faculty 	<ul style="list-style-type: none"> - All stakeholders give input - Focus is changed as market needs change - Good and regular dialogue - Required for practical work placement - Work hand-in-hand with industry - Industry guides, since some academics have notable industry experience 	<p>Department of Higher Education and Training (DHET), and Council for Higher Education (CHE)</p> <ul style="list-style-type: none"> - Primarily no - To a certain extent through Advisory Committee - Liaise for work-integrated learning
11. Possible changes to teaching content.	<ul style="list-style-type: none"> - Yes: It is possible - Yes: It is done continuously 	<ul style="list-style-type: none"> - Yes: it is possible - Yes: it is done continuously 	<ul style="list-style-type: none"> - No: it is not possible. Only incorporate responses to market needs - Cannot deviate from approved outcomes - Some never consider it
12. Need and presence of entrepreneurship	<ul style="list-style-type: none"> - Yes, a need - University has Entrepreneurship School - Can be selected as a subject according to a point system - Structured Master's degree available 	<ul style="list-style-type: none"> - Yes - Part of curriculum - Promoted by ministry, university management and faculty - Feedback from alumni 	<ul style="list-style-type: none"> - Yes: much needed - Not present - Not considered

It was found that academics were generally comfortable with the way things were done, but some were open to change and innovative methodologies. This was particularly found at UU and UoM, where academics were keen to attempt problem-based learning as a teaching methodology.

Question 3: *Opinions regarding the level of preparedness of new students.*

In view of the challenges experienced in South Africa with an ever-changing education system, the findings based on the responses pertaining to this question were important, and conclusions could be drawn from a comparison among the different institutions. For instance, the under-preparedness of students at CUT was a noteworthy finding. Academics voiced their concern about the language barrier, the need for constant remedial intervention, and the lack of long-term memory and critical thinking skills and the students' inability to apply new knowledge. The academics at CUT also voiced their unanimous concern about the growing gap between secondary school and university. UU responded that some students are pampered at school, and that the adaptation at university takes time. This, however, did not have a lasting effect and was easily remedied. At UoM, the under-preparedness of students was based on the perceived 'spoon-feeding' at school and the lack of study techniques. These challenges are easily addressed, and they did not present a persistent impact on the overall success of the students.

Question 4: *Academics' opinion on socio-economic and cultural differentiation and the influence of this on academic success.*

As with question 3, the findings were quite one-sided. Academics at UU and UoM reported not to have observed any notable impact due to socio-economic and cultural differences on the degree of success of their students. An important point to note is that tertiary education is completely free in both these countries, and the institutions offer support in different forms to needy students. At CUT, however, academics voiced the same concerns throughout. There was a marked influence due to socio-economic background and cultural differences on the performance and degree of success of the students. Having said that, it was mentioned that there were exceptions to the rule. The CUT academics found a connection between low or

challenging socio-economic conditions and the level of prior knowledge, and what the students had been exposed to in their personal environments and their ability (or inability) to make informed decisions. A low level of confidence and a lack of soft skills were also associated with poorer backgrounds.

Question 5: *To what extent is the teaching approach inclusive?*

At UU and UoM the challenges associated with inclusive teaching were found to be minor, as these universities have a firm infrastructure for support and qualified professionals to provide the necessary support. The academics thus reported that the logistics associated with accommodating a student with a physical disability or a learning challenge became the responsibility of the institution and the faculty. At CUT, the academics reported that large groups and limited resources were a challenge. These issues were not formally addressed, and academics were not trained or equipped to deal with the challenges associated with physical or learning disabilities. However, some reported that when it was possible, they attempted to accommodate struggling students.

Question 6: *What is the overall degree of success in terms of pass or fail?*

The average pass rate reported by the academics of the three institutions was relatively similar, and no significant differences could be found. At CUT, however, the academics referred to the importance of throughput figures and their influence on the institution's financial support from government. They were concerned that this could perhaps lead to the possible lowering of standards to satisfy throughput figures.

Question 7: *What are the graduates prepared for? (e.g. further study, research or placement in industry)*

Question 8: *When you teach, what do you have in mind: future research, future academics or placement in industry/the workplace?*

The responses to these two questions indicated that the nature of, and the primary role the respective institutions played in the higher education sphere in their

respective countries informed their decisions. At UU, certain qualifications/graduates were channelled towards industry, while others were steered towards research. The nature of the subject and the focus of the qualification often determined whether the student would favour further study, research or industry. At UoM, there was strong emphasis on preparation for industry. This was ascribed to work placement during the study period, and the notable connection of academics with industry (see question 10). At CUT, academics mostly prepared their students for life, as they felt that graduates needed to follow any opportunity for employment, and this could be within or outside their field of study. Overall, it was expected of the CUT academics to prepare their students for industry, as this is prescribed by the Health Professions Council of South Africa (HPCSA), and because the HPCSA informs the content of the courses to be taught (see question 9).

Question 9: *What is the nature of the dialogue between the Department of Education and the institution, and who is responsible for the curriculum content?*

At UU and UoM dialogue and interaction with government or governmental bodies were limited and sometimes absent. The academics reported a large degree of autonomy with regards to the structuring of courses, designing qualifications, and changes to syllabi. These institutions adhered to policies, procedures and guidelines determined by governmental departments, but were not dictated to, nor were the syllabi determined for them. At CUT, the situation was somewhat different. Qualifications were determined, designed and audited by professional bodies associated with government. Dialogue occurred mostly between management and professional bodies such as the HPCSA, the DHET, and CHE.

Question: 10 *What is the nature of the dialogue between the institution/your department and industry?*

This question directly addressed the final objective of the study. The scholarship of integration happens when teaching and learning are based on the input of all stakeholders in the pedagogic process. There is therefore a requirement for the participation of industry as one stakeholder. At UU, it was found that the engineering

qualification was strongly linked with industry, and so was teacher education by virtue of the nature of the course. The academics reported that they made use of alumni to inform them of the trends in the economy and avenues of research. It was furthermore found that UoM had extensive connections with industry. The academics reported that dialogue with industry was regular, in-depth and hands on. The relationship of the faculty with industry also informed the structure of the modules, content of syllabi, and market needs in terms of jobs and the economy. The academics worked hand-in-hand with industry, and industry guided the direction of learning content and research. The fact that several academics had industry experience and invited alumni from industry as guest speakers, enabled them to channel graduates towards jobs needed and jobs available. At CUT, the academics responded by mentioning that dialogue with industry only occurred through advisory committees and the process of the logistics of work-integrated learning. This finding elucidated large gaps in the vocational mandate of this university of technology and the information feeding into the scholarship of integration.

Question 11: *Would the academic like to effect changes to the subject content, if possible?*

This question was closely related to question 9, and the findings were quite similar. Academics at UU and UoM reportedly had a large degree of freedom with the content of the courses they taught. The academics at UU designed and changed content within the communication structures of the faculty. Since the academics at UoM worked closely with industry, there was often a shift in focus in their responses to the changes in market trends and needs. The academics at CUT reported that they may bring about minor changes within the classroom setup, but overall, they have to adhere strongly to the outcomes of the course as set out by the relevant professional body. National recirculation workshops for each subject were held annually, and requests were lodged at these sessions for possible change.

Question 12: *Is there a need for entrepreneurship education or not? Is entrepreneurship in any way incorporated into the subject contents or applications?*

This question was received with great enthusiasm, and the academics of the three institutions responded unanimously in favour of the need for entrepreneurship education. However, there were differences in the offering of entrepreneurship training at these universities. The UU academics reported that UU has an Entrepreneurship School which functions independently from other departments. The school offers modules and courses that are available to any student at the university. As the university degrees are compiled on a point system by the student him-/herself, the student can select entrepreneurship courses as part of the degree structure. Engineering students are expected to enrol for a year course in entrepreneurship as part of the qualification. UoM academics responded strongly to the call from the ministry of education for entrepreneurship and innovation. The Faculty of Agriculture had designed all its curricula to include entrepreneurship subjects and modules. Alumni who had pursued a career in entrepreneurship presented guest lectures and information sessions to undergraduates. Similar to the first two institutions, all the academics at CUT were unanimous in their support of entrepreneurship training. However, it has not yet been considered within the faculty, and do not form part of the current curriculum, although the academics saw the need for entrepreneurship education due to the rising unemployment in South Africa.

5.5.2 Analysis of questionnaire data (See Appendix B)

The results of the responses to the questionnaire were combined and are presented graphically for comparative purposes (see Figures 5.1.1 – 5.1.20). The graphs depict the results of one question at a time. The complete set is therefore represented by 20 graphs, and each graph is discussed individually. The analyses were done using a descriptive statistical method. The overall findings based on the graphical comparisons are as follows:

Question1: *Please indicate your gender* (Figure 5.1.1)

The results showed a stronger female representation at CUT and UoM than at UU. This may have occurred purely as a result of the random selection of the participants. The intention with this question was to examine the possibility of the influence of gender on any of the other findings.

Q1

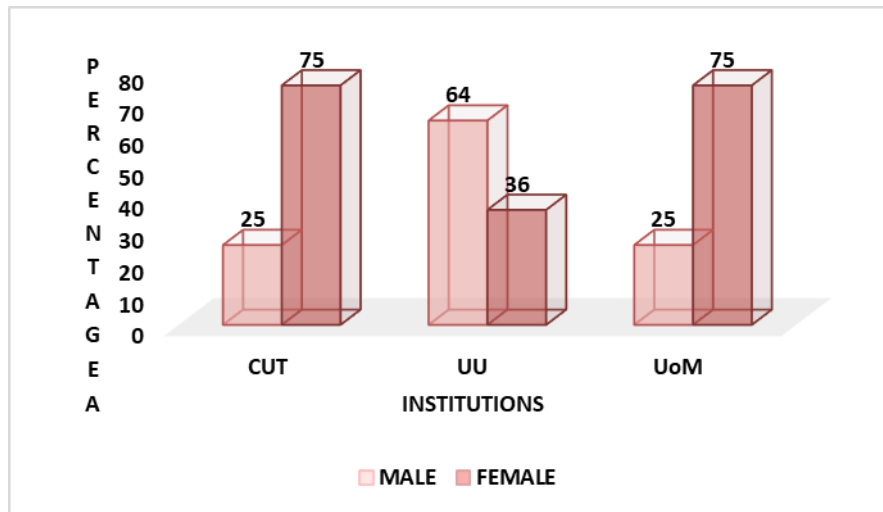


Figure 5.1.1: Graphical representation of the responses to question 1: gender

Question 2: *What is your highest qualification?* Figure 5.1.2)

It was found that academics at UU all had a PhD qualification, whereas at CUT and UoM two thirds of the respondents had a PhD qualification. The overall high level of qualifications of the UU staff may explain the focus and high expectations placed on these academics. As research is a notable driver at UU, it may also have influenced the overall achievement of such a large number of their academics having PhD qualifications.

Question 3: *What is the nature of the subject you teach?* (Figure 5.1.3)

As was expected, the responses related to the faculties that were represented by the respondents. This finding roughly cancels out the possibility of an extra variable pertaining to the findings that follow.

Question 4: *Select the approximate number of years of lecturing experience* (see Figure 5.1.4).

In terms of the years of experience, UoM respondents had both the lowest and highest number of years of experience. The experience between five and ten years

was roughly even for the three institutions, whereas CUT showed the lowest number of years of experience. This could once again be attributed to the fact that CUT is a much younger institution.

Q2

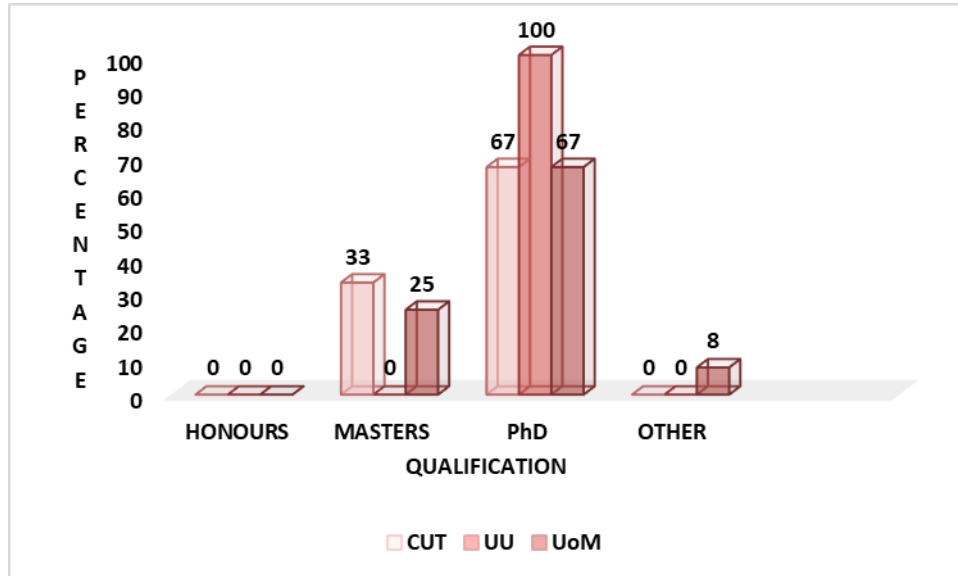


Figure 5.1.2: Graphical representation of the responses to question 2:

Q3

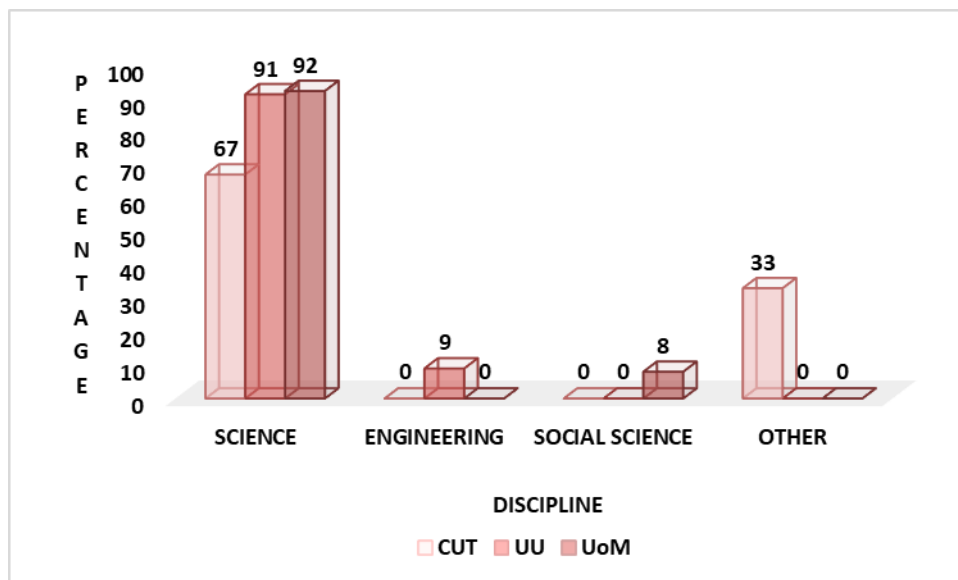


Figure 5.1.3: Graphical representation of the responses to question 3: subjects

Q4

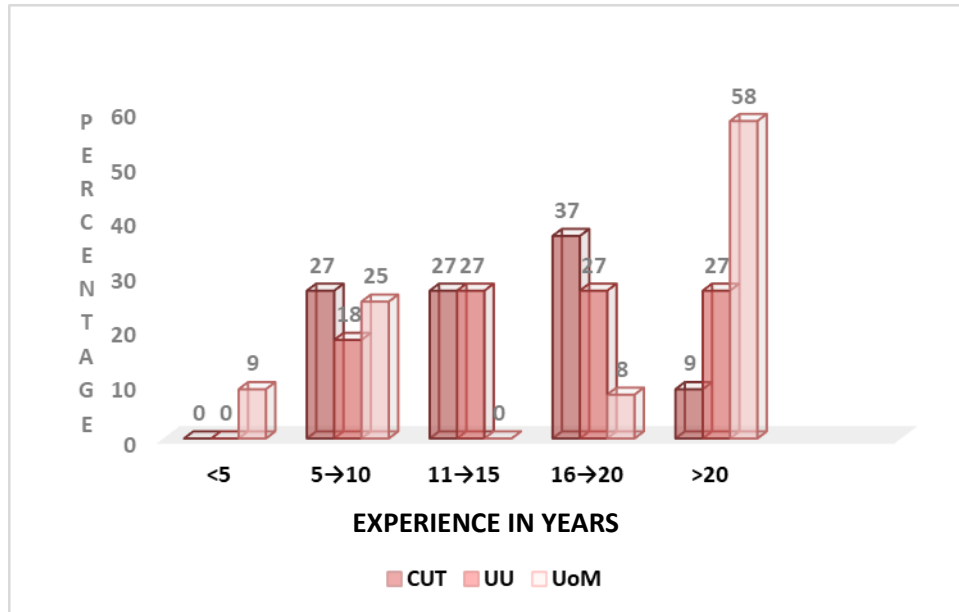


Figure 5.1.4: Graphical representation of the responses to question 4: years of lecturing experience

Question 5: *What is the average age of your students?*

The motivation for asking this question was to see if the age of students would show a relationship with any of the other findings, such as under-preparedness and the possible types of intervention required. The graph illustrates that there was no outstanding difference in age groups among the three institutions, and therefore this question and the findings had no bearing on the outcomes of any of the other questions.

Question 6: *Have the bulk of the students enrolled at the university directly from school?* (See Figure 5.1.6.)

It is often argued that students who do not enter a university directly from school may be influenced in terms of adaptation, attitude towards knowledge generation, and their overall success (Van Rooij, Jansen, and Van de Grift, 2017). This question was thus asked to explore the potential effect of the later arrival of students at the universities under study. It was argued that if there was a variation in other findings, it might be associated with this factor. However, as there was a split of roughly two thirds to one third at UU only, no obvious implications could be drawn. This split at

UU might have been due to students working before entering university, or because of the large number of foreign students from all over the European Union selecting UU for obtaining a university qualification.

Q5

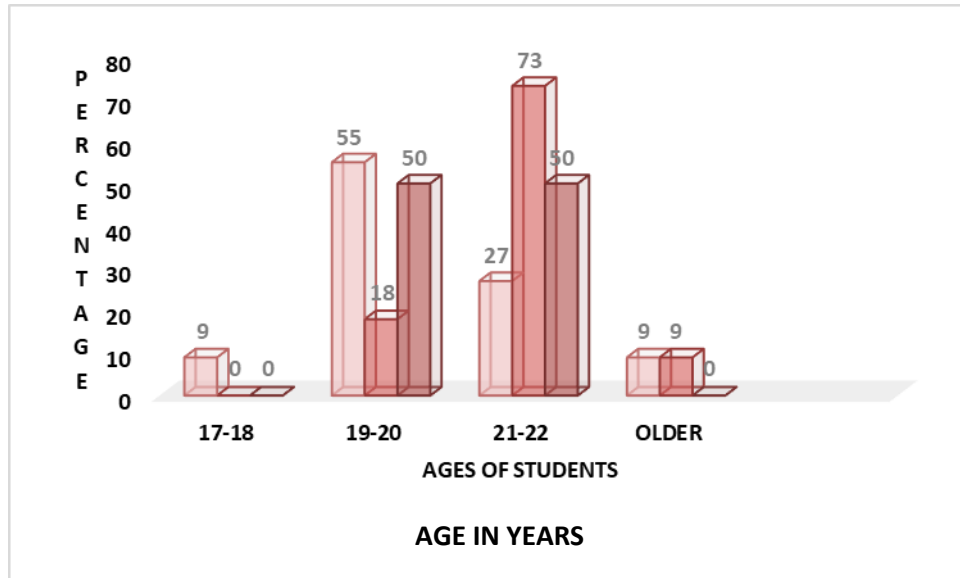


Figure 5.1.5: Graphical representation of the responses to question 5: age of students

Q6

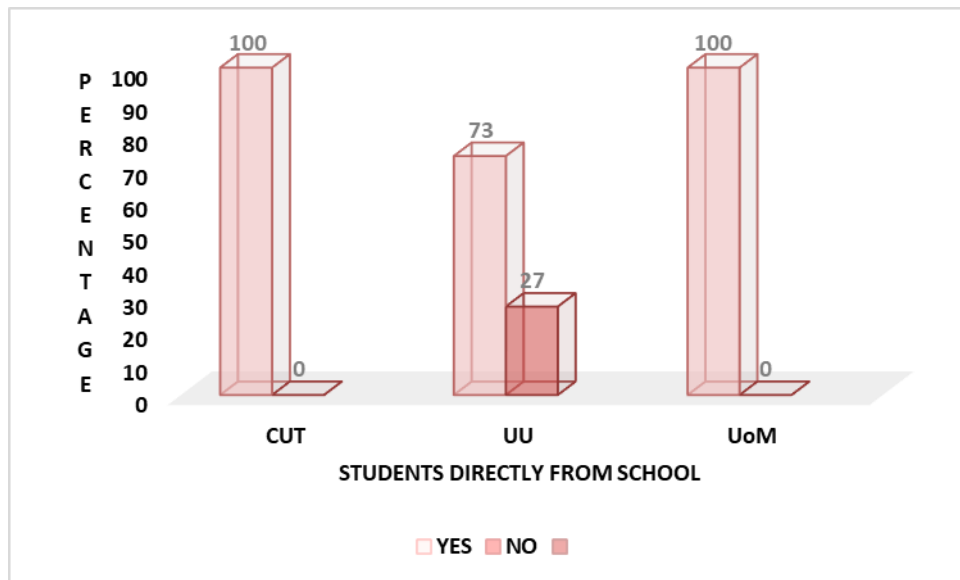


Figure 5.1.6: Graphical representation of the responses to question 6: students entering university directly from school

Question 7: *What is the medium of instruction at your institution?* (See Figure 5.1.7.)

It was found that the medium of instruction at all three the institutions was English. In Sweden, all students have an excellent command of the English language, and the same may be said about Mauritius. In South Africa, however, English is one of 11 official languages, and it is often the third or fourth language of students, although the medium of instruction in Grade 12, which is the entry year to university, is English (or Afrikaans, in a limited number of schools). The graph clearly indicates the South African predicament, and it will later be shown that there was a strong relationship between this finding and findings pertaining to other questions. The findings based on this question also underpinned some findings that emerged during the interviews regarding the challenges that contributed to the under-preparedness of students.

Q7



Figure 5.1.7: Graphical representation of the responses to question 7: language of instruction and learning

Question 8: *Is there a degree of under-preparedness for tertiary education among the students?* (See Figure 5.1.8.)

This question aimed to determine if academics believed that students are ready for tertiary education, or not. At CUT there was an almost 100% consensus that students are not ready. The UU staff had roughly a 50/50 response between students being prepared, and not being prepared, whilst the UoM academics leaned strongly towards students not being prepared. At UU and UoM, the results were slightly different from what was stated during the interviews. This may be due to the defined answers in the questionnaire compared to the interpretive, subjective responses allowed during the interviews.

Q8

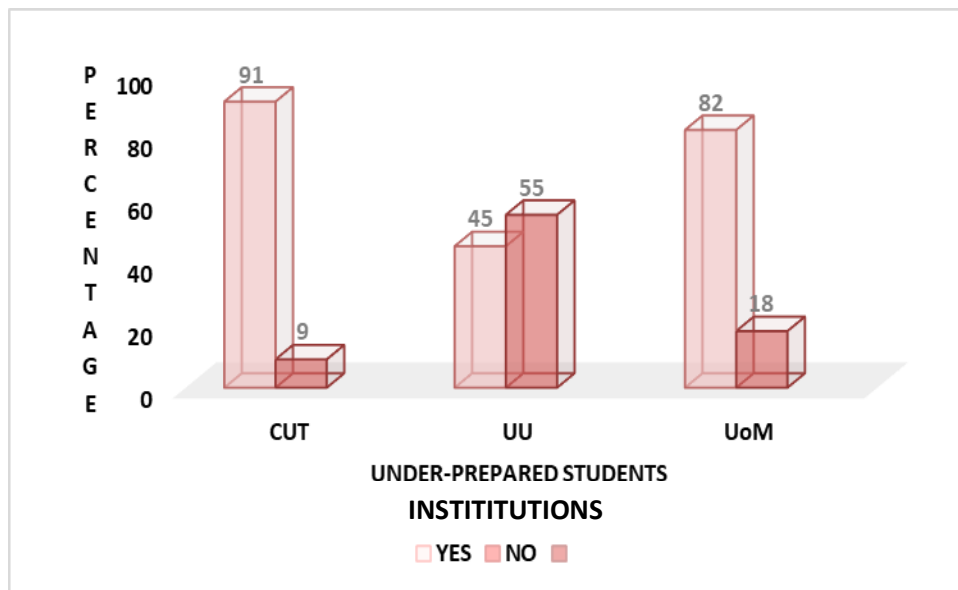


Figure 5.1.8: Graphical representation of the responses to question 8: under-preparedness of students

Question 9: *If your answer to the previous question was YES, to what extent?* (See Figure 5.1.9.)

The results presented in this graph, together with the result from question 8, show some anomalies and interesting discrepancies. Looking at CUT, the students were found to be mostly underprepared, and the same proportion was found to be slightly underprepared, significantly underprepared and not ready for tertiary education. This is a fair distribution based on the results pertaining to question 8, revealing an almost 100% under-preparedness. Secondly, at UU the response to question 8 showed that 45% of the respondents found the students to be underprepared. For question 9, however, the accumulative result is different. The sum of the slightly underprepared

and underprepared categories adds up to 50%. This indicates that 50% initially had answered 'No'. This represents a slight discrepancy and may once again be due to the narrowly defined options when answering the questions in the questionnaire. UoM academics had a result closely related to the finding for question 8, but somewhat different to the responses received during the interviews. A possible reason may be that when discussing the possibility of under-preparedness, the interpretation was different compared to when it needed to be categorised. Further research may be possible in this regard.

Q9

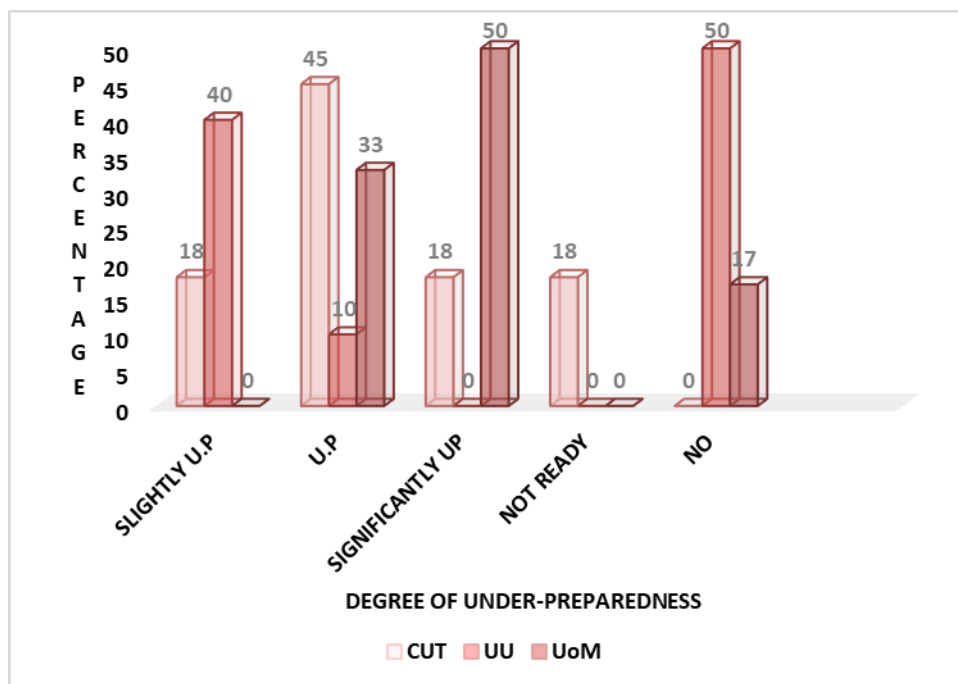


Figure 5.1.9: Graphical representation of the responses to question 9: degree of under-preparedness of students

Question 10: *If your answer was YES, WHAT is the nature of the under-preparedness of the students?* (See Figure 5.1.10.)

In view of any degree of under-preparedness, it is necessary to categorise the nature of the dilemma. CUT academics indicated that the bulk of underprepared students was unable to apply critical thinking. At UU the academics felt that the most notable problem was the inability to solve problems. What is interesting in this instance is

that there is an observable difference in the percentage lacking critical thinking ability, and the percentage lacking the ability to solve problems. Under most circumstances, during the teaching and learning process, these two skills go hand in hand. This finding may open an avenue for exploratory research regarding the aptitude of students at Uppsala University. At UoM the same discrepancy is noted, with a result of 58% lacking critical thinking skills, and only 8% having trouble with problem-solving. This notable difference also warrants further investigation.

Q10

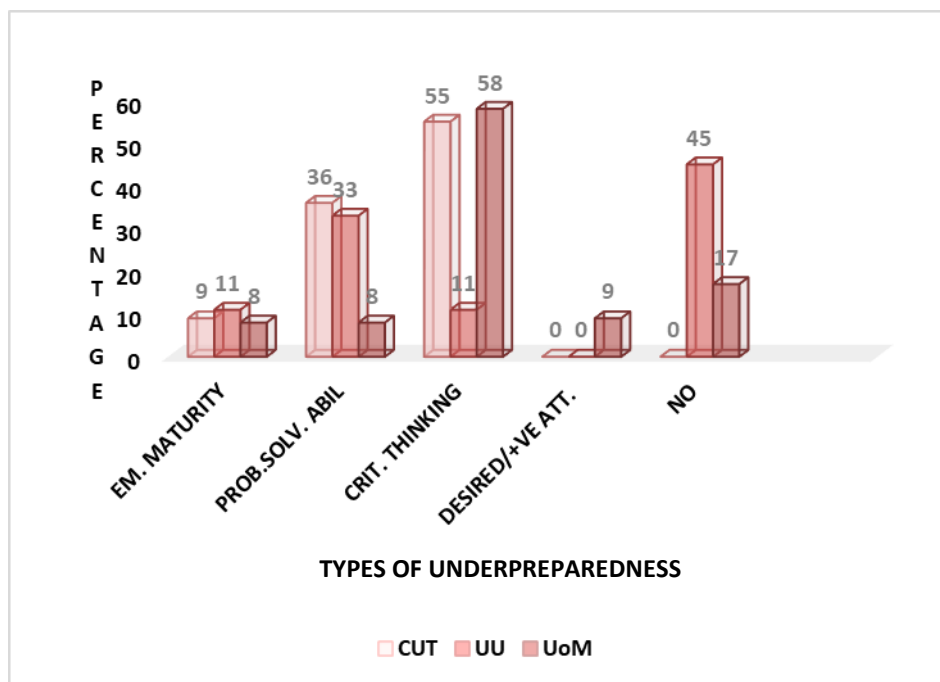


Figure 5.1.10: Graphical representation of the responses to question 10: nature of the under-preparedness of students

Question 11: *Is there a need for remedial intervention?* (Figure 5.1.11)

The purpose of this question was to ascertain whether the findings based on question 8 were of such concern that intervention strategies should be considered to prevent the problem from escalating. The results showed that there was a connection between the academics’ awareness of the under-preparedness of the students and their understanding of the need for interventions. The academics from CUT and UoM offered responses that linked question 8 and question 11, whereas the UU respondents were more inclined not to favour remedial intervention.

Q11

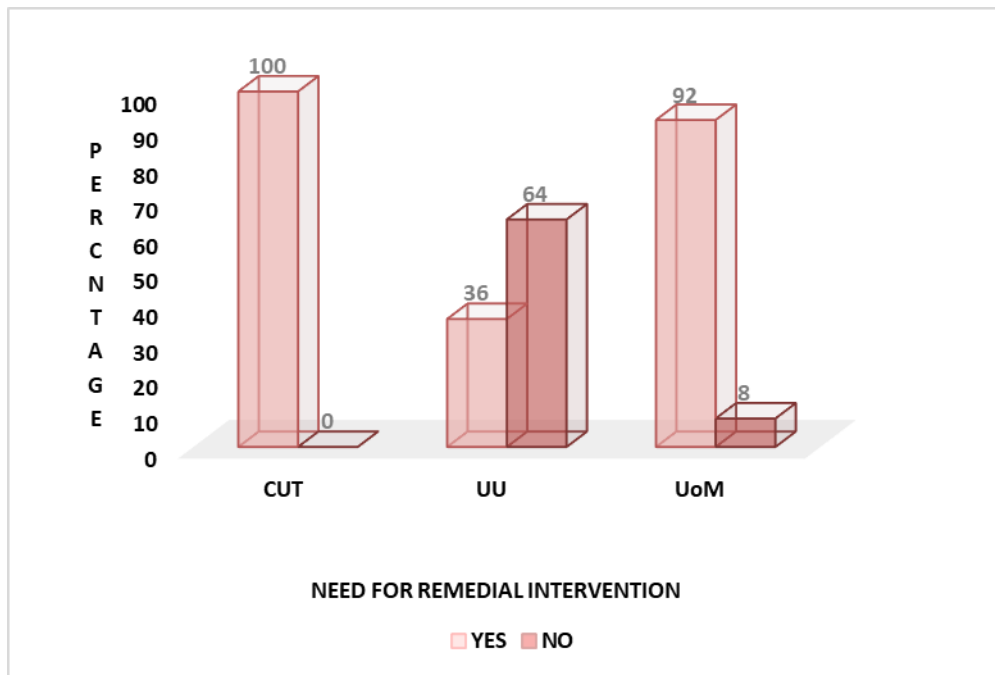


Figure 5.1.11: Graphical representation of the responses to question 11: the need for remedial intervention

Question 12: *If your answer to the previous question was YES: WHICH intervention strategies should be initiated? (See Figure 5.1.12.)*

The responses to this question showed which intervention strategies the academics would consider. The CUT respondents were unanimous in their view that the students were underprepared, and also regarding the remedial strategies they would employ. They felt that many students were not ready for tertiary education and agreed on the institution introducing a compulsory bridging year. The UoM and UU academics believed the institution should play a bigger role in supporting underachieving students, but the nature of this support was not defined due to the limitation in the questionnaire that did not allow space for this type of comment. As to what form this support would or should take may be explored and tested.

Q12

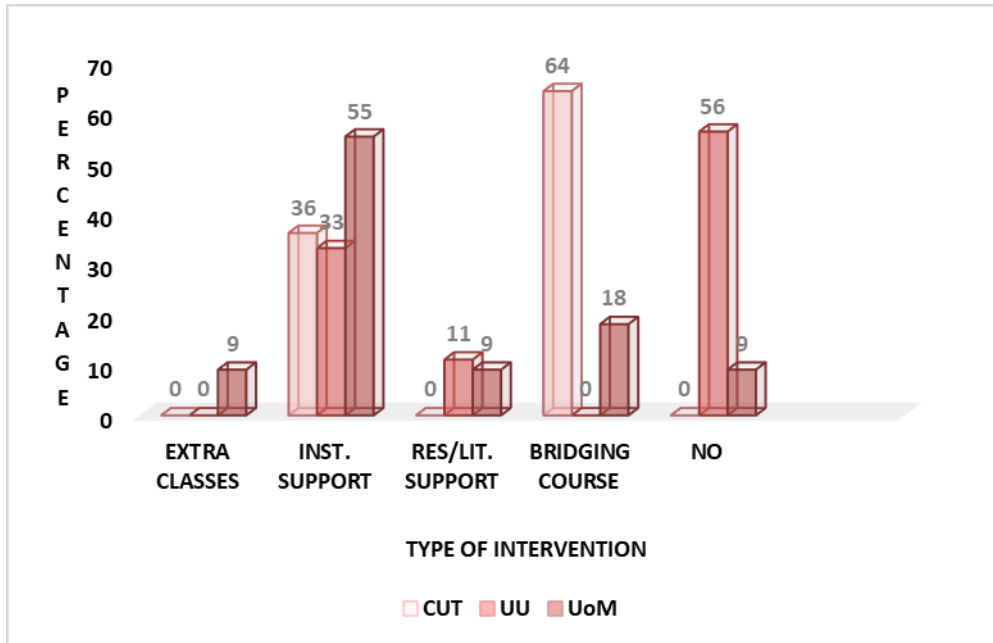


Figure 5.1.12: Graphical representation of the responses to question 12: recommended intervention strategies

Question 13: *Do you as an academic/lecturer have any influence in terms of what you teach?* (See Figure 5.1.13.)

This question overlapped with a question that was asked during the interviews (see Appendix 7), and the academics’ responses were similar. As was found with the interview responses, the UoM academics had the greatest degree of autonomy, followed by UU and then CUT. As was stated in the summary of the interview findings, CUT is largely dependent on government and professional bodies for curriculum structure and syllabi content. This opens an avenue for further research that may address the following question: “Does the fact that academics are subjected to restrictive curriculum structures have a negative effect on innovative teaching and the overall scholarship of teaching and learning?”

Q13

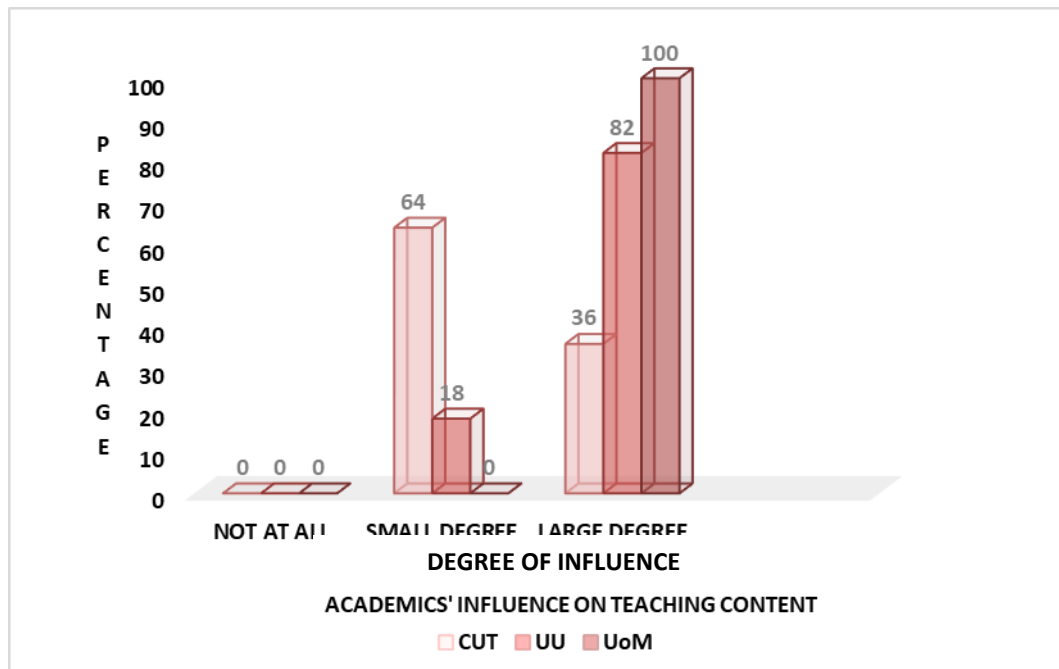


Figure 5.1.13: Graphical representation of the responses to question 13: academics’ influence on teaching content

The following two questions will be discussed simultaneously.

Question 14: *Is there a need/space/opportunity for entrepreneurial education in this module?* (See Figure 5.1.14.)

Question 15: *Is there a possibility for an entrepreneurship module in your course?* (See Figure 5.1.15.)

These questions were asked to address the second objective of the study (see Chapter 1) that attempted to gauge the need for, existence of and the possibility for introducing entrepreneurship. The CUT academics felt strongly that there was a need for entrepreneurship considering the unemployment figures in South Africa. However, they felt less enthusiastic regarding the possibility of introducing such a course as part of the subject content or curriculum. The UU academics were divided roughly along the middle regarding the need for entrepreneurship, and this percentage was inverted when the possibility of a module or part of the qualification was considered for entrepreneurship education. One of the reasons for this may be that the institution had already introduced entrepreneurship as an independent department, allowing students the opportunity to select this as a subject towards their qualification. The UoM academics’ responses were similar regarding the need

for entrepreneurship and the possibility of it being part of the curriculum. This was in line with existing curriculum structures at UoM, where entrepreneurship modules had already been introduced as part of most of the qualifications in the Faculty of Agriculture.

Q14

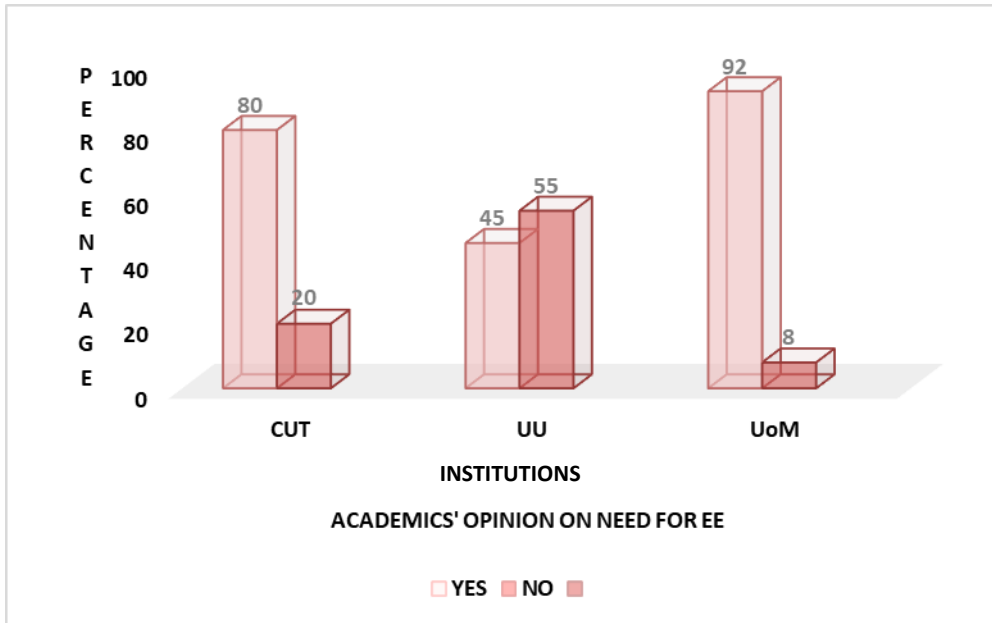


Figure 5.1.14: Graphical representation of the responses to question 14: the need for entrepreneurship education (EE)

Q15

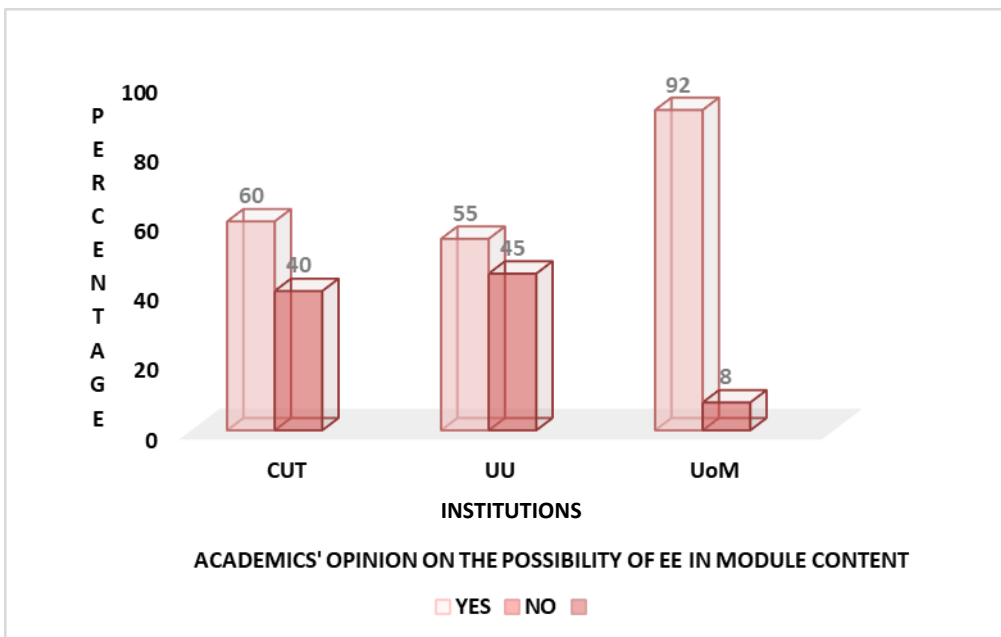


Figure 5.1.15: Graphical representation of the responses to question 15: Entrepreneurship education (EE) as part of the module being taught

The second and fourth objectives (see 5.2) speak to the role, interaction and need for any interaction.

Question 16: *Do you have any experience working in industry?* (See Figure 5.1.16.)

This question was asked to determine the academics' exposure to and collaboration with industry, as this would presuppose dialogue with and possibly the involvement of representatives of industry in the courses being offered. The CUT academics indicated the highest degree of exposure to industry, whilst UU academics indicated the lowest exposure to industry. The UoM academics were split roughly down the middle. Considering these findings, it could be deduced that dialogue with industry would follow the same percentage (see 5.5.1, Question 10). However, contradictory to this finding, during the interviews the CUT academics reported hardly any or only occasional dialogue with industry, while the UoM academics reported an on-going, healthy relationship with industry. This exchange extended to the UoM alumni, who formed an integral part of knowledge transfer, as they were utilised to inform students of market trends and the need for entrepreneurship.

Question 17: *Does industry in any way influence the content of the subject/module that you teach?* (See Figure 5.1.17.)

As several of the academics at CUT and UoM indicated that their students were prepared for industry, question 17 reflected the level of influence that industry had on what the students were taught. The highest level of influence occurred at CUT, whereas industry had limited influence on what was taught at UU. It was deduced that, at CUT and UoM, industry set certain trends and determined to some extent where higher education graduates would slot into the economy. At UU, 64% of the academics indicated no course involvement by industry, which might have been due to the strong research mandate that existed at the university, whereby industry would benefit from the knowledge generation of higher education. It is noteworthy that, in terms of the economy, UU functions within a developed economy, whereas the two SADC countries both function within developing economies.

Q16

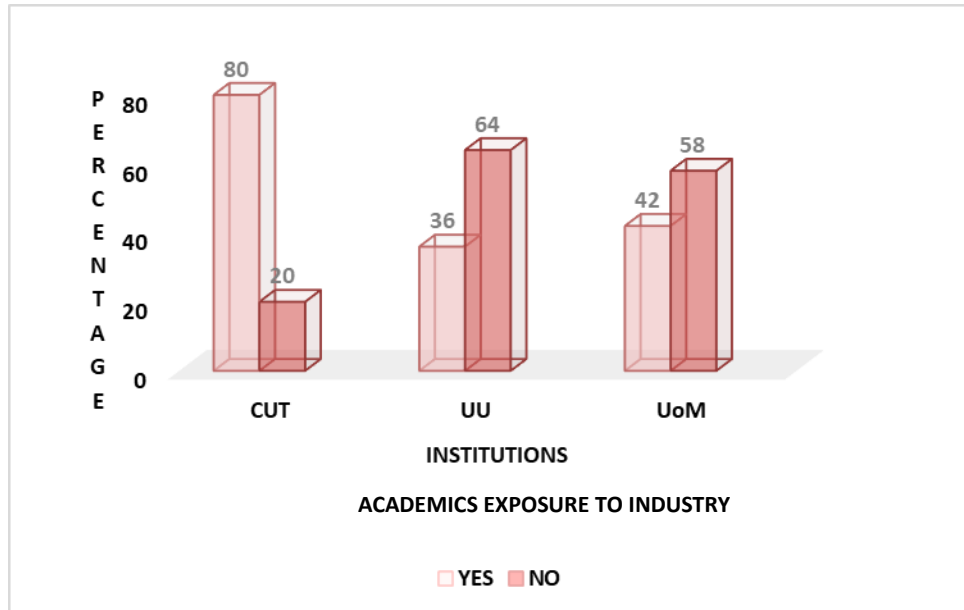


Figure 5.1.16: Graphical representation of the responses to question 16: academics' exposure to industry

Q17

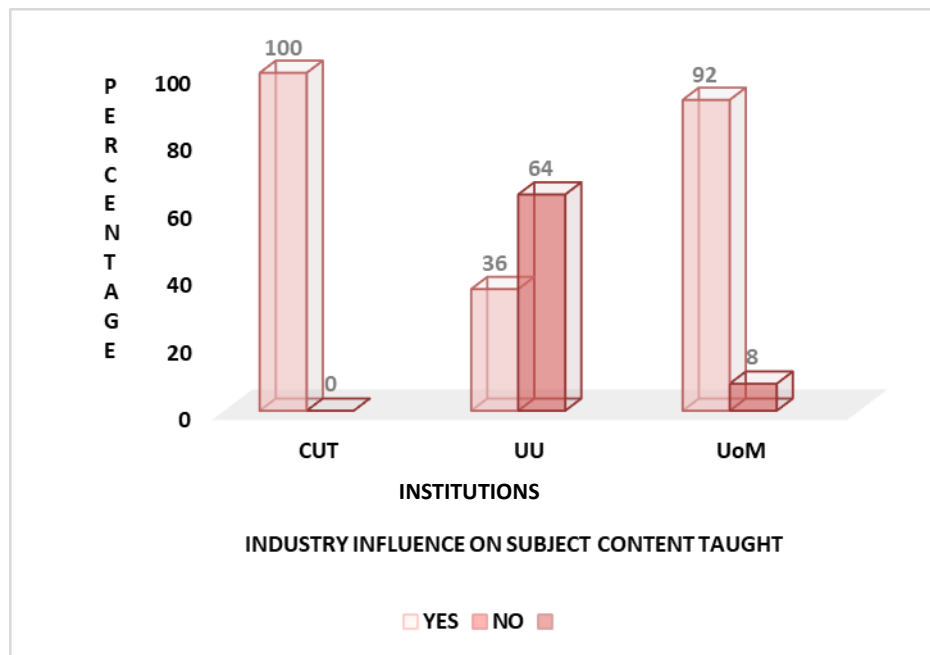


Figure 5.1.17: Graphical representation of the responses to question 17: the influence of industry on academic subject content

Question 18: *If your answer was YES, select in what manner industry influences course content (see Figure 5.1.18.)*

The types of influence exerted by industry were varied. The CUT academics reported that industry informed the skills required in the workplace to a large extent. As it had been established that the communication between industry and these academics was limited, this information was perhaps filtered through to them by professional bodies. The UoM academics indicated that industry played a pivotal role in the structure of what was taught (i.e. the contents of syllabi). At UU, more than 50% of the sample felt that industry had no influence in terms of what was taught.

Q18

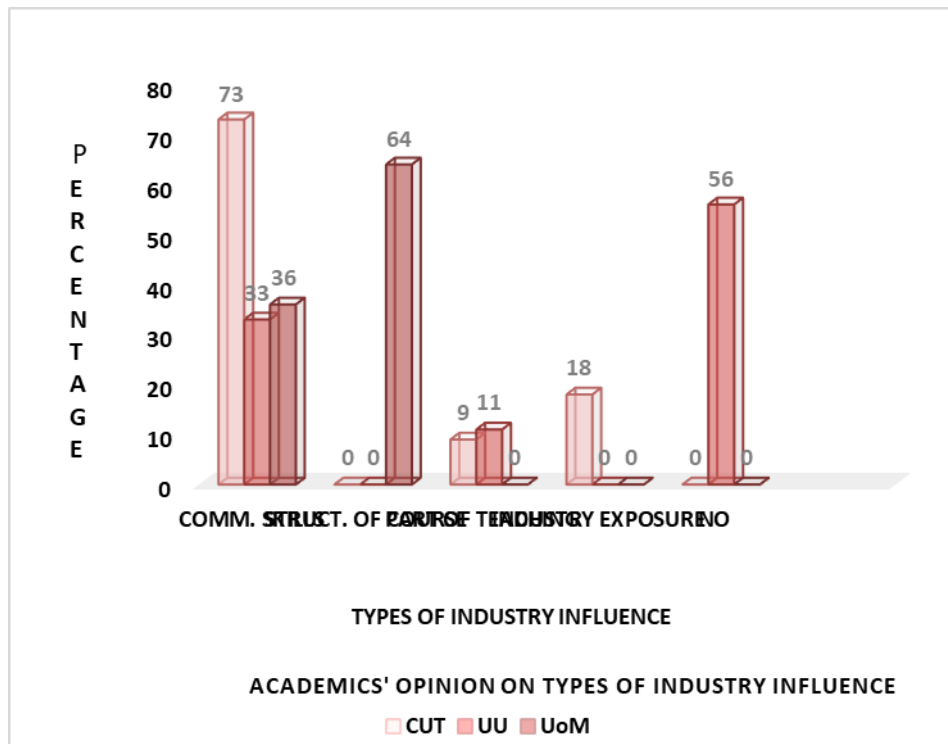


Figure 5.1.18: Graphical representation of the responses to question 18: manner in which industry influences course content

Question 19: *If you had a choice, which way would the focus of your job description lean? (Figure 5.1.19)*

As it is inevitable that academics transfer their passion (or lack of enthusiasm) to their students, it was necessary to establish where their passions lay, and how this

translated into the responses provided during the interviews. Collectively, the academics strongly leaned towards teaching and learning, which suggested that their attitude strengthened the overall scholarship of teaching and learning in the courses that they teach. The stronger leaning towards teaching and learning compared to research at UU indicated that even though most academics were involved in research at this institution, their focus was on teaching and learning. A significant finding was that at all academics did not favour any involvement in policy formation.

Q19

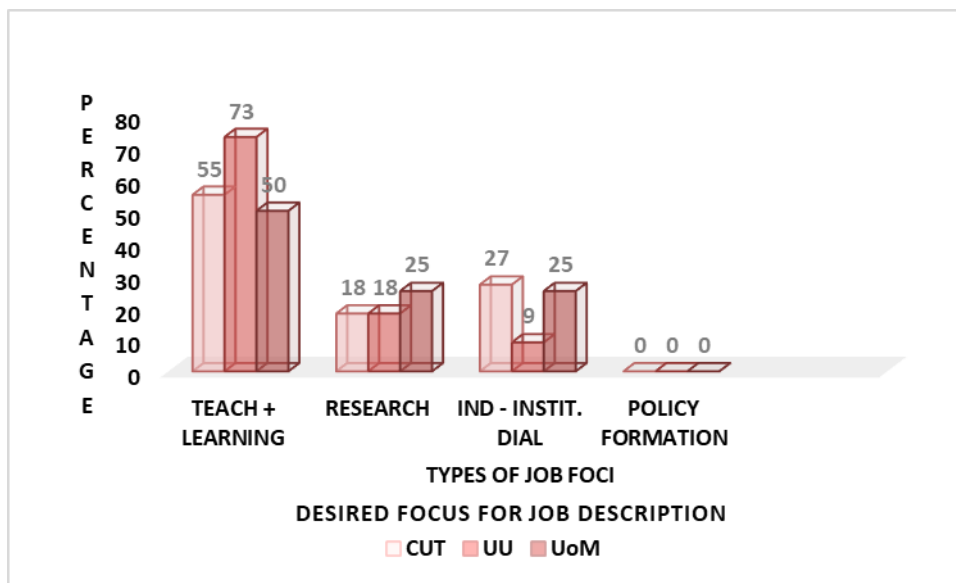


Figure 5.1.19: Graphical representation of the responses to question 19: desired focus of job description

Question 20: Was this your first career/employment choice? (See Figure 5.1.20.)

As is the case in any career, teaching is sometimes not the first career choice of academics. This might influence the focus of what is transferred to students in the classroom. When the responses to question 19 and question 20 were compared, the findings pertaining to the two questions were similar for CUT and UU, as both groups indicated that teaching, learning and lecturing were their first career choices. For the UoM group, however, a discrepancy existed between teaching and learning, and teaching/lecturing being their first career choice. This could mean that for them the choice of career as an academic went beyond teaching and learning. This strongly supports the scholarship of integration (Sol), see 5.6; Fig 5.2).

Q20

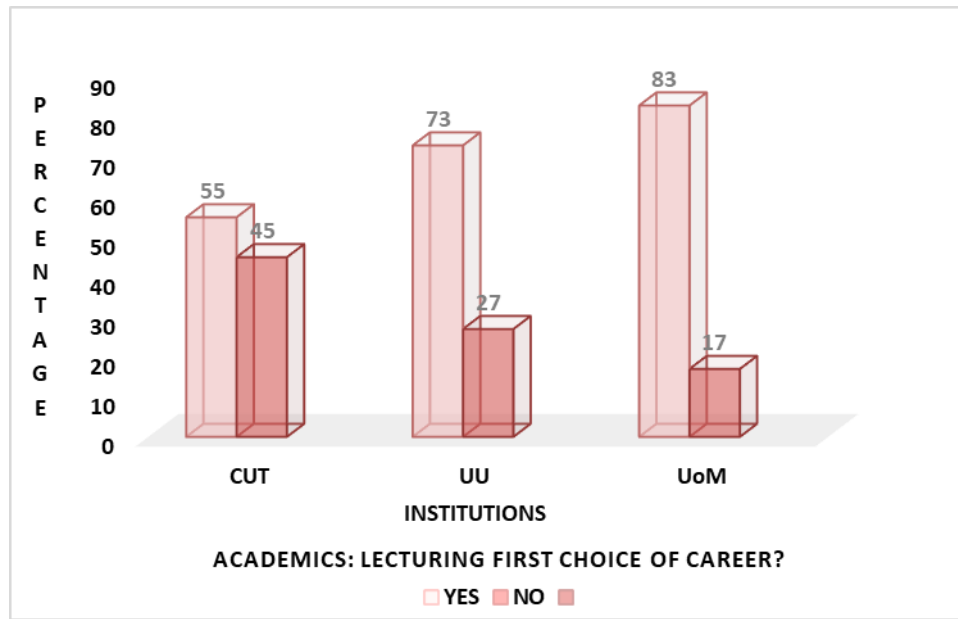


Figure 5.1.20: Graphical representation of the responses to question 20: lecturing as a first career choice

5.6 Conclusion

The study employed a mixed methods methodology, as the intention was to collect qualitative and quantitative data from the respondents. The respondents were found to be highly cooperative and willing to participate in order to address the aim of the study. Several findings detected similarities and notable differences in the responses of the participating academics from diverse contexts. These findings were systematically discussed and compared. The analyses of the interview data and the questionnaire data (that were presented graphically) were compared. As the aim and objectives of the study were clearly defined, various conclusions could be drawn.

The interviews elicited a vast body of invaluable information that stretched beyond the intended responses to the questions. Most of this information could be utilised in future research, as the data collected were broader than the scope of this study. In general, it was found that the academics at the three institutions were predominantly positive, committed and very partial to the task entrusted to them. Their approach towards the students and the institution where they lectured was guided by cultural influences and local societal dynamics. Their teaching methodologies were not too

dissimilar, although the academics at UoM were found to be more adventurous in the methodologies that they selected. The UU academics felt comfortable to maintain a system that worked for them, while the CUT academics were not keen to venture outside their comfort zone. An anticipated finding was that the participants believed almost without exception that higher education played a crucial role in the economy of their countries. However, the literature review revealed that the impact that higher education has on the economy is different for these countries (Sweden, Mauritius and South Africa). It was found that in Sweden the academics were not overly concerned about the degree of the economic impact, which may be attributed to the fact that the economy of this country is on a growth curve. However, they strongly supported entrepreneurship, but this discipline was already offered as a choice subject at their institution, and they thus did not regard it as a 'must do' in the courses they offered.

In Mauritius, the academics were found to be in touch with the mandate they received from the relevant ministry and the Tertiary Education Commission. This mandate was to join hands with industry, develop a capable workforce, and drive the concept of entrepreneurship to uplift the economy and thus create jobs. Conversely, South Africa has different challenges impacting on how academics function and fulfil their roles as educators. In this country the National Government, through its appointed structures, determines the guidelines, purpose and role to be fulfilled by higher education. Also, the political climate has a strong influence on the morale of academics. However, the literature states that the drive for entrepreneurship is on the increase, and the Minister of Higher Education and Training has made it a functional goal for this sphere in education.

Since the global economy is in transition towards a 'knowledge economy' as an extension of an information society, countries are focusing on linking knowledge production with the positive application thereof. Similarly, the international demand for new knowledge ensures the existence and growth of any institution of higher learning. However, the CUT academics did not reveal notable awareness of the necessity to generate any new knowledge. It may be argued that the mammoth task they have in dealing with an ever-growing gap between high school and university (which was clearly revealed by their comments) steers the inevitable direction of their

focus. Conversely, UU functions within the European Union, and here academics are drawn into forming part of a successful knowledge economy. Similarly, the academics at UoM were notably aware of the role they played in the country's knowledge economy, and their contributions to higher learning had an invaluable impact on their attitude and mission.

Interaction with and dialogue between institutions of higher learning and industry inevitably lead to a variety of desirable outcomes that are uplifting rather than deleterious. In this context, opportunities for producing new knowledge are enhanced and encouraged. In the current study, the triangular study research data elicited awareness that technological advancement and research outputs are crucial in ensuring the growth and sustainability of higher education institutions. It was against this backdrop that the participating academics, regardless of their academic status or their countries' economic background, were committed to academic excellence in the classroom and the holistic development of their students. These findings thus underscore the importance of a solid relationship between higher education, the local economy, and knowledge production. This solid relationship speaks to a striking approach to pedagogy that is known as the scholarship of integration (Sol). The components of the scholarship of integration approach that may be elicited from this study are presented in Figure 5.2 on the next page.

Ultimately, the current study aimed to propose several factors that, in the construct of the scholarship of integration, will inform the reflective approach of educators. These are:

- Governmental structures such as the Ministry and Department of Education as well as professional bodies: these structures are perceived as the entities that design and formulate policies. Alternatively, these are the entities that represent the employer. In South Africa, the higher education mandate, as well as instructional directions and monitoring strategies, are designed by and spiralled down by these bodies. In this context, a relevant question that may be posed is: "Should it be this way, or should it rather work both ways?" This suggests that the individuals who perform the task should be allowed to have valuable input.

- Curricula, syllabi and content: These inform Sol as to what needs to be included in the structured contents that are to be taught in a specific course. Questions that need to be asked may include: “Is what I teach relevant?”; “Is what I teach recent enough?”; “Is what I teach making a difference?”; and “Is what I teach contributing to a knowledge economy?”
- National finance, economic development and unemployment: In practice, most teaching and learning systems are hardly independent of a country’s national financial structure, its economic development and the level of unemployment. Sol is informed by the status and growth (or lack of growth) of these factors. Teaching and learning at higher education institutions, and mainly at universities of technology, do not take place separately or are divorced from the influences of these factors.
- Non-governmental organisations (NGOs) and innovation: As NGOs usually function autonomously, they create fertile ground and opportunity for innovation. If higher education remains abreast of the progress in this sector, the information that is generated will inform knowledge transfer and production.
- Innovation and entrepreneurship: In conjunction with innovation across the spectrum, entrepreneurship may be built, incorporated and infused into Sol to satisfy national needs and contribute to economic growth and social upliftment.
- Industry and the private sector: The mandate of universities of technology is closely linked to the needs and trends that are engendered by these sectors. As these needs and trends will inform Sol, it may be argued that higher education and industry should always function in a mutually inclusive manner.

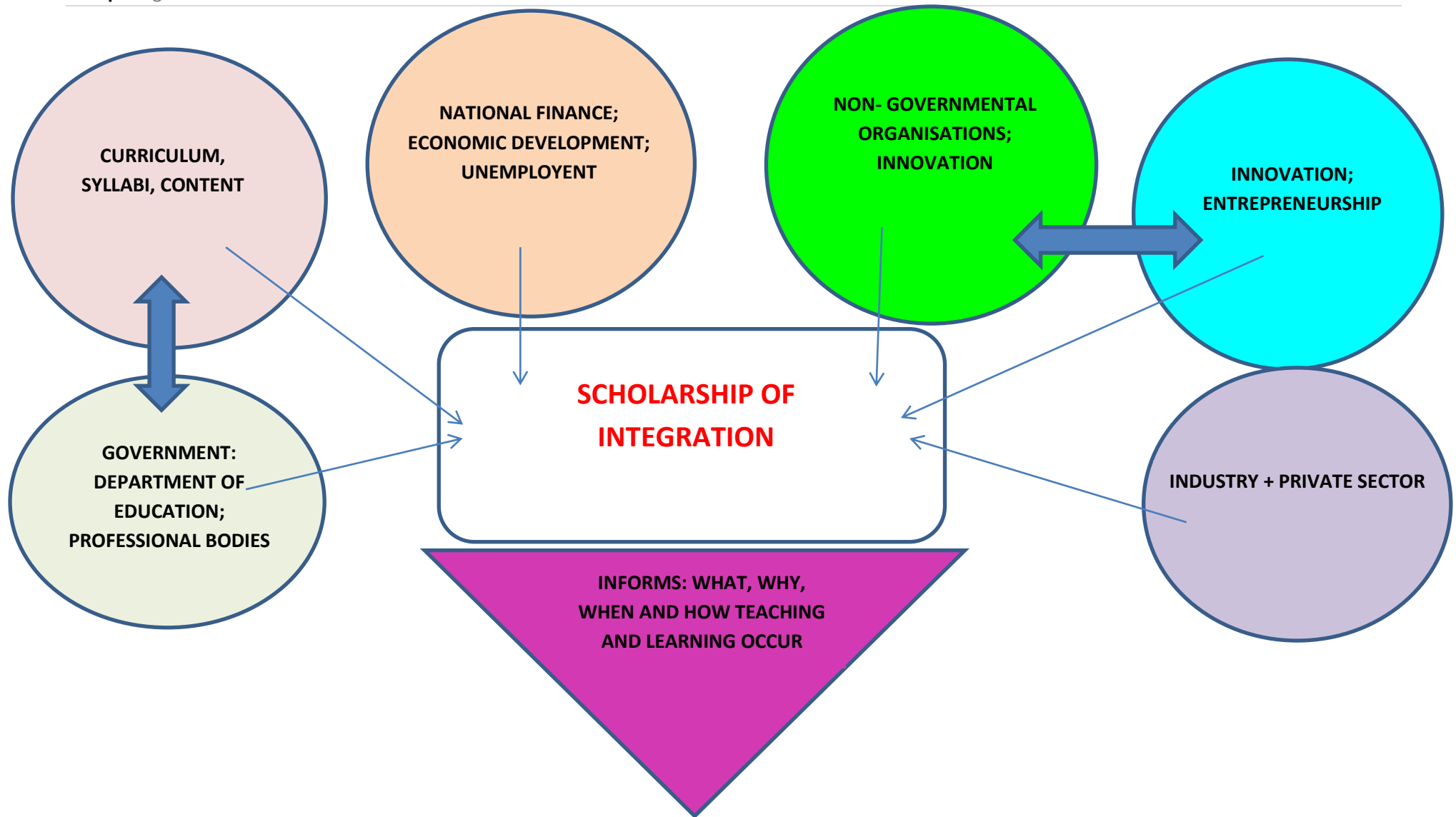


Figure 5.2: Diagrammatic representation of a construct for the scholarship of integration at universities of technology as formulated from the findings of the ‘triangular study’ data of the research

The scholarship of integration concept undoubtedly engenders a reflective teaching and learning approach for a developing economy such as South Africa's. Thus, an integrated approach to teaching and learning in the higher education context will engage all relevant stakeholders, and this will culminate in appropriately qualified and skilled graduates who enter the place of work. This will ensure that higher education institutions' 'products' will be relevant, up to date and needed, and this will contribute to addressing most of the pressing challenges that South Africa currently experiences.

In conclusion, the following findings are proposed to benefit universities of technology in particular:

- There is a pressing need to move away from traditional teaching methodologies, and to adopt a more student-centred, active teaching and learning methodology to educate the workforce of the future.
- Lecturers should embrace the value of being coordinators and designers of curricula and the courses that they teach.
- The importance of academic freedom that allows lecturers to function relatively autonomously by amending or adjusting course content as market needs fluctuate needs to be acknowledged and, if needs be, campaigned for.
- Utilising industry as a partner in teaching and learning processes will render subject content valid, reliable and up to date.

5.7 References

- Arnott, A.** (Ed.). 2010. *SADC regional capacity building strategy*.
<https://www.sadc.int/documents-publications/show/1919>
Accessed on 15 May 2019.
- Cohen, L., Manion, L. & Morrison, K.** 2000. Research methods in education. *British Journal of Educational Studies* 48(4):446-446.
- Cresswell, J.W.** 2003. *Research design: Qualitative, quantitative and mixed methods approaches*. Thousand Oaks: Sage.
- Creswell, J.W. & Plano-Clark, V.L.** 2011. *Designing and conducting mixed methods research Vol. 2*. Los Angeles: Sage.
- Currie, J.** 1998. Introduction. In: J. Currie, & J. Newson (Eds). *Universities and Globalization*, 1-13. Thousand Oaks: Sage.
- Currie, J. & Subotzky, G.** 2000. Alternative responses to globalization from European and South African universities. *Globalization and education: Integration and contestation across cultures*, pp.123-148.
- Dunning, J.H.** 2002. *Regions, globalization, and the knowledge-based economy*. Oxford: Oxford University Press.
- Elias, P. & Purcell, K.** 2004. "Is mass higher education working?" Evidence from the labour market experiences of recent graduates. *National Institute of Economic Review* 190:60-74.
- EC - European Commission**, 2018 a. *Higher education in Europe*.
(https://ec.europa.eu/education/study-in-europe/planning-studies/european-higher-education_en)
Accessed on 23 April 2019.
- EC - European Commission**. 2018 b. *Science, research and innovation performance of the EU (SRIP) report of 2018*.
(https://ec.europa.eu/info/research-and-innovation/strategy/support-policy-making/support-national-research-and-innovation-policy-making/srip-report_en)
Accessed on 23 April 2019.

- Gorad, G.** 2004. *Combining methods in educational and social research*. Berkshire: Open University Press.
- Harvey, L., Locke, W. & Morey, A.** 2002. *Enhancing employability, recognising diversity: Making links between higher education and the world of work*. London: Universities UK.
- Hofmeyer, A., Newton, M. & Scott, C.** 2007. Valuing the scholarship of integration and the scholarship of application in the academy for health sciences scholars: Recommended methods. *Health Research Policy and Systems* 5(5). (doi:10.1186/1478-4505-5-5)
Accessed on 14 May 2019.
- Jack, E.P. & Raturi, A.S.** 2006. Lessons learned from methodological triangulation in management research. *Management Research News* 29(6):345-357.
- Jackson, M.C.** 1991. *Systems methodology for management sciences*. New York: Plenum.
- Johnson, B.R. & Christensen, L.B.** 2017. *Educational research: Quantitative, qualitative, and mixed methods approaches, Vol. 6*. Los Angeles: Sage.
- Jowi, J.O.** 2012. African universities in the global knowledge economy: The good and ugly of internationalization. *Journal of Marketing for Higher Education* 22(1): 153-165.
- Kapetaniou, C. & Lee, S.H.** 2017. A framework for assessing the performance of universities: The case of Cyprus. *Technol. Forecast. Soc. Chang.* 123:169-180.
- Marks, E.S.** 2000. Defining scholarship at the uniformed services university of the health sciences school of medicine: A study in cultures. *Academic Medicine* 75:935-939.
- Mingers, J.C. & Gill, A.** 1996. Multimethodology: Towards a framework of mixing methodologies. *Omega* 25:448-509.
- Moloi, K., Mkwanzazi, T.S. & Bojabotseha, P.** 2014. Higher education in South Africa at the crossroads. *Mediterranean Journal of Social Sciences* 5:469-475.
- Nybom, T.** 2003. The Humboldt Legacy: Reflections on the past, present, and future of the European university. *Higher Education Policy* 16:141-159.

- Onwuegbuzie**, A.J. & Burke, J.R. 2006. The 'validity' issue in mixed methods research. *Research in Schools* 13:48-63.
- Ridder-Symoens**, H. 2003. *A history of the university in Europe Vol. 1*. New York: Cambridge University Press.
- Simpson**, D.E., Marcdante, K.W., Duthie, E.H., Sheehan, K.M., Holloway, R.L. & Towne, J.B. 2000. Valuing educational scholarship at the Medical College of Wisconsin. *Academic Medicine* 75:930-934.
- SADC - South African Development Community**. 2012. *Towards a common future*. (<https://www.sadc.int/about-sadc/>)
Accessed on 15 May 2019.
- Strauss**, A. & Corbin J. 1998. *Basics of qualitative research*. Thousand Oaks, CA: Sage.
- Teichler**, U. 2003. The future of higher education and the future of higher education research. *Tertiary Education and Management* 9(3):171-185.
- Teichler**, U. 2015. Higher education research in Europe. In: A. Curaj, L. Matei, R. Pricopie, J. Salmi, & P. Scott (Eds). *The European higher education area*. Springer: Cham.
- Thomas**, R.M. 2003. *Blending qualitative and quantitative research methods in theses and dissertations*. Thousand Oaks: Sage.
- Timol**, S.M., & Kinser, K. 2017. Higher education in Mauritius: Challenges and perspectives of internationalization. *International Higher Education* 91:9-11.
- UoM - University of Mauritius**. 2015. *Fact sheet 2015*.
(www.uom.ac.mu)
Accessed on 15 May 2019.
- Uppsala University**. N.d. *Uppsala University in international rankings*.
(<http://www.uu.se/en/about-uu/quality/rankings/>)
Accessed on 28 March 2019.
- Van Rooij**, E.C., Jansen, E.P. & Van de Griff, W.J. 2017. First-year university students' academic success: the importance of academic adjustment. *European Journal of Psychology of Education* 33(4):749-767.
- Zelesa**, P.T. 2002. African universities and globalisation. United States International University Digital Repository.

Zeleza, P.T. 2009. African studies and universities since independence. *Transition: An International Review* 101:110-135.

CHAPTER 6

DESIGNING AND TEACHING ENTREPRENEURSHIP THROUGH A NOVEL PEDAGOGIC INSTRUCTIONAL METHODOLOGY AT UNIVERSITIES OF TECHNOLOGY

A research article for submission partially or in full to: Journal of Innovation & Knowledge. www.elsevier.es/jik - ISSN: 2444-569X

6.1 Introduction

This chapter contains information that was collected from participants representing a traditional European research-oriented university, a partner university in the SADC region, and a selected university of technology (UoT) in South Africa. The focus of the chapter is to combine identified global approaches in entrepreneurship education and blending it with the subject content of an established module offered at universities of technology in South Africa. The process involved extrapolating data to design an alternative teaching methodology for the education of future entrepreneurs with knowledge of real-world challenges, so that they will be able to utilise acquired entrepreneurial skills and competencies to work towards societal, communal and economic solutions for various challenges experienced in South Africa. This proposed syllabus combines subject content, entrepreneurial content and outcomes, and utilises a novel challenge-oriented learning approach as a newly proposed pedagogical approach for entrepreneurial studies.

6.2 The nature of entrepreneurship education

During the last decade, entrepreneurship has become a sought-after commodity globally. More specifically, entrepreneurship education as a field of study has grown exponentially and is regarded as a recognised avenue of study at many institutions of learning (BMW, 2010; Paço & Raposo, 2016). The main driving force behind this development is challenged economies that are predominantly found in developing countries (Hanushek & Wößmann, 2010). The strong link with innovation has ideally positioned entrepreneurship as a mechanism to address socio-economic challenges. As South Africa is viewed as an emerging economy (Liou & Rao-Nicholson, 2017), the need for entrepreneurship education is increasingly promoted as a panacea that will support the country to become a player in the global economic arena. Moreover, it will provide solutions to the growing unemployment rate in the country (see Chapter 4).

Although the application of entrepreneurial concepts and principles is not new to South Africa, until recently there has been little noticeable dividends from these

efforts (Brand South Africa, 2017: Online). This predicament has contributed to debates as to whether entrepreneurship can be taught or not. The current study argues, however, that applied entrepreneurship represents a discipline that is strong enough to be taught in the academic sphere, and that debates should advance towards how, why and when this should be implemented, particularly in the context of institutions of higher learning.

In Chapter 4 of this thesis it was concluded that entrepreneurship is viewed on a global scale as a free-standing subject with its own pedagogic guidelines that encompass specific outcomes, methods of instruction and assessment criteria. European universities (see Chapter 5), certain universities in the SADC region, and universities of technology in South Africa acknowledge entrepreneurship in academic offerings that range from introductory short courses to credit-bearing modules and entrepreneurial studies as a fully-fledged subject. These offerings are predominantly free-standing and taught independently of specialist subject matter.

The nature of entrepreneurship education found its point of departure in business, business management and economic studies (Gibb, 2002). However, according to Turner and Gianiodis (2018), this approach has not had the desired impact. It was against this backdrop that the current study set out to demonstrate that, although current entrepreneurship learning is limited to business and the study of economics, it should, to be effective, not be packaged and limited to a certain pedagogic discipline. This principle implies that future entrepreneurs may be found within any discipline where a candidate or student is trained or coached in how to recognise a need, a shortcoming and/or societal or communal challenges. Hence, the rationale for offering entrepreneurship as an academic offering with a practical, market-based orientation should be kept in mind.

The purpose of introducing entrepreneurship education at institutions of learning and, more specifically, in higher education institutions, is well documented with worldwide consensus that this has become a necessity and not a dream (Johannisson, 1991; Doutriaux & Barker, 1996; Beranger, Chabbal. & Dabrine, 1998; Berlin Institute of Entrepreneurship, 1999; Menzies & Gasse, 1999; European Commission, 2000; US National Commission on Entrepreneurship, 2000;

Alasaarela, Fallemies, Halkosaari, Huhta, Jansson, Jylha, & Telkki, 2002; Kuratko, 2003; Higher Education in Europe, 2004; Schramm, 2013). Currently, challenges are experienced in terms of the way the subject should be offered and what the purpose of all pedagogic role-players should be. It has also been suggested that the training of future entrepreneurs should occur as a team or cross-disciplinary pedagogic offering (Nielsen-Pincus, Morse, Force, & Wulfhorst, 2007). However, it is undeniable that the crux of training future entrepreneurs is the methodology of instruction. This matter was discussed in some detail in Chapter 3, and it was alluded that an alternative teaching methodology that should replace outdated, traditional methods would be explored in this thesis.

Thus far, the most widely used teaching methodology for entrepreneurship education has been the lecturing method combined with a research component (see Chapter 5). However, based on the array of findings that was elicited by the current study, an alternative and novel methodology to teach, or to facilitate knowledge of and skills in entrepreneurship, will be presented in this chapter. This novel teaching methodology is intended specifically for studies in Environmental Health at universities of technology. It was originally designed as a pilot project, and the ultimate aim is to utilise the template to design modules for entrepreneurship education in other applied disciplines in South Africa.

As South Africa has a unique economic structure in terms of financial and labour challenges, it is suggested that the South African education sphere embark on a tailor-made entrepreneurship education model. A generic model that is purely inspired and influenced by global guidelines and specifically Western world economies might not be the sole solution to South Africa's socio-economic and financial challenges, particularly as this country is embedded in the African context. For this reason, an entrepreneurship education model that incorporates both Afrocentric and Eurocentric approaches is deemed most likely to precipitate the desired economic gains.

6.3 Drawing from established Entrepreneurship modules

When the practice of entrepreneurship education is observed within a variety of institutions internationally, an array of approaches, foci and methodologies emerges. The inspiration for these practices is often embedded in national economic policies, socio-economic challenges, and poverty and unemployment legacies (Welsh & Dragusin, 2011, 2013). It may be for this reason that entrepreneurship education is currently undergoing rapid transition (Welsh & Dragusin, 2016), also in South Africa where higher education is undergoing transformation (see Chapter 3). Moreover, technological changes and the advent of the so-called Fourth Industrial Revolution that heralded technological-pedagogical vehicles such as eLearning, mobile devices and online learning networks necessitate the application of a tailor-made entrepreneurship curriculum that keeps track of and sustains contemporary developments and technologies.

6.4 The model of design thinking

6.4.1 The choice and delineation of design thinking as developmental methodology

'Design thinking' is a novel problem-solving methodology that is well suited to the often-cited challenges of modern society, as it encourages innovation and growth (Liedtka, 2015). The increased interest of late in the concept as an approach to innovation has resulted in its adoption by non-design trained professionals. This development has imposed a need for a new method of teaching design thinking and the skills and processes related to it (Wrigley & Straker, 2017). This approach, like PBL, focuses on problem-solving and finding solutions for an ill-structured challenge, and to design a working plan. The five-stage model was originally proposed by Hasso-Plattner and the model is structured as follows (also see Figure 6.1):

- I Empathise: learn about the audience for whom you are designing; develop a deep understanding of the problem.

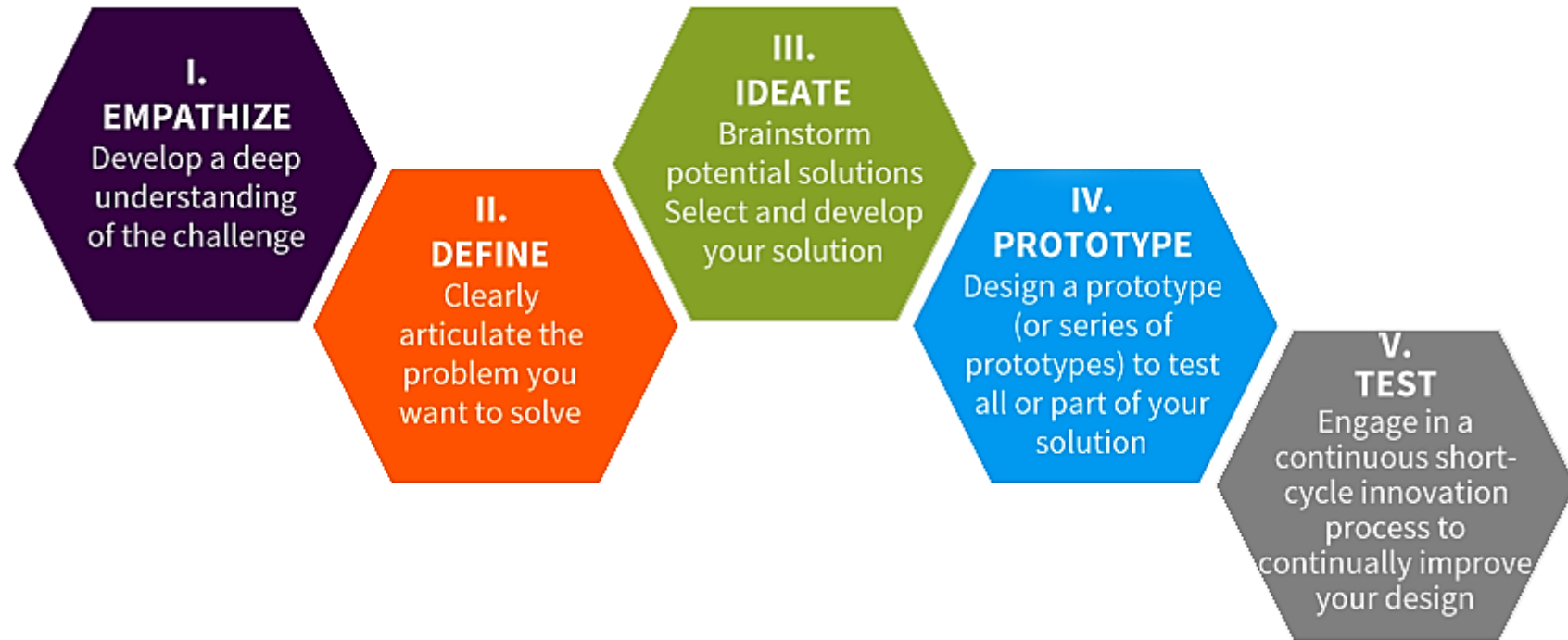


Figure 6.1: Diagrammatic presentation of the five stages of design thinking

Source: Adapted from Cleverby, 2018

- II Define: construct a point of view that is based on user needs and insights; clearly articulate the problem you want to solve.
- III Ideate: brainstorm and come up with creative solutions; brainstorm potential solutions; select and develop the solution.
- IV Prototype: build a representation of one or more of your ideas to show to others; design a prototype for testing a solution.
- V Implement and test: return to your original user group and test your ideas for feedback; test and short-cycle innovation to improve the design (Miller, 2017; Cleverby, 2018).

6.4.2 The application of design thinking for innovation

The discourse that follows will address the five stages of the model of design thinking:

- I Empathise: South Africa is presently experiencing challenges such as poor economic growth, a decline in socio-economic conditions, graduates perceived as lacking workplace skills, and rising unemployment. The target group is higher education and universities of technology.
- II Define: The study attempted to address the challenges experienced by South Africa, with the suggestion that entrepreneurship is a possible and viable solution. To date, entrepreneurship has been offered as a free-standing module in higher education, and only by universities engaged in science parks and incubation hubs and listing it as a graduate attribute with seemingly limited impact.
- III Ideate: The study explored a possible solution to the definition of the problem by investigating the possibility of offering entrepreneurship

education. Thus, an alternative teaching methodology was explored to find a solution for the disconnectedness of the outcomes of entrepreneurship education and those of a subject matter.

- IV Prototype: The study proposes a new syllabus for entrepreneurship education for universities of technology by drawing from international entrepreneurship offerings. Thereafter, a novel teaching methodology for teaching entrepreneurship education is presented. The prototype of the study is a blended syllabus that incorporates the subject content of an Environmental Health module with the outcomes of the new entrepreneurship education syllabus (an offering at universities of technology in South Africa), and structuring the blended syllabus on the novel teaching methodology referred to as challenge-oriented learning, or COL.
- V Test: The testing stage of the model fell outside the scope of the study and will be explored in future research.

6.4.3 Application of the model of design thinking for the study

The design thinking model informed the structure and development of the chapter:

- I The delineation of the problem (or challenge components) was dealt with in previous chapters.
- II The research challenge has been defined.
- III and IV These follow according to the structure of the model of design thinking.

The current entrepreneurship modules offered at Uppsala University, Sweden (see Appendix 9) and the University of Mauritius, Faculty of Agriculture (see Appendices

10 - 13) were utilised as the key drivers towards the design of a subject-linked entrepreneurship education model for universities of technology in South Africa. The motivation for selecting these institutions and faculties is outlined in Chapter 5. They were selected to compare best practices at a typical European, Southern African, and South African higher education institution. A comprehensive understanding of national enterprise practice was also utilised to help identify the resources and evidence unique to South Africa. The module drivers will be discussed below:

6.5 Ideate: a solution through entrepreneurship education

6.5.1 Objectives

Uppsala University: **Entrepreneurship 2019/2020** - 7.5 credits (Appendix 9) focuses on the preparation of students for a career as an entrepreneur, either as owners of start-ups (new businesses), or linking up with established enterprises. The course is structured to include opportunities for practical understandings of business aspects, especially during its inception. The course also aims to equip participants with keystone concepts to initiate entrepreneurial projects within existing companies. This module is offered mutually exclusive from any other module offered at the institution.

The University of Mauritius offers several modules or courses, and the objectives may be summarised as follows:

- manage agricultural enterprises and identify new ventures in the agricultural sector - **BSc (Hons) Agricultural Science and Technology – A312/15** (see Appendix 10);
- contribute to the development and growth of small and medium food enterprises and food industries - **BSc (Hons) Management (Minor: Entrepreneurship) – LM323** (see Appendix 11);
- developing the wider enterprising proficiency of students to understand the dynamics of the 'entrepreneurial process' - **BSc (Hons) Food Science and**

**Technology (Minor: Food Entrepreneurship) (with a 6-month internship)
– A307 (Appendix 12);**

- to keep pace with the global trend, the local food processing sector needs innovative and entrepreneurial professionals who would be the food entrepreneurs of tomorrow. To run a successful business in this competitive market, food entrepreneurs should have a good business plan and basic understanding about food processing, safety and hygiene, packaging, marketing, and regulatory requirements. This programme aims to produce graduates who will be innovative and have the entrepreneurial flair and abilities to contribute to a food system that can feed the country in a sustainable way;
- to enhance students' ability to harness design, innovation and problem-solving skills within the context of a business strategy and an organisational framework, and to prepare students to view entrepreneurship as a desirable and feasible career option - **BSc (Hons) Fashion Technology (minor: Entrepreneurship) (F/T) - E307** (see Appendix 13).

These objectives are addressed as modules that are incorporated into each qualification and dealt with as an independent module.

6.5.2 Requirements, credits and duration

- **Entrepreneurship 2019/2020** - (see Appendix 9) lasts approximately two months and carries 7.5 credits. This module may be incorporated into any qualification at the university as a credit-bearing module. This module is therefore not limited to a particular faculty or department but is offered by the Department of Business Studies.
- **BSc (Hons) Agricultural Science and Technology – A312/15** (see Appendix 10) runs for a minimum period of three to five years, and a maximum period of five-and-a-half years. It is offered by the Faculty of Agriculture. The requirements of the course are a Cambridge School

Certificate/'O' Level with a Credit in Mathematics and Chemistry, and at least two 'A'-level passes in related approved science subjects. The entrepreneurship component comprises 4 credits out of a total of 112.

- The module named **AGRI 3086Y (5) Entrepreneurship for Small and Medium Agribusiness** is offered in the third year of study.
- **BSc (Hons) Management (Minor: Entrepreneurship) – LM323** (see Appendix 11) is offered over a minimum of three years and a maximum of five years by the Department of Management. The requirements of the course are 'O' levels in five subjects, including Mathematics, together with two 'A'-level passes.
- The entrepreneurship modules are spread over three years as follows: First year - **LAW 1100Y (1); Business Law for Entrepreneurs, MGT 1102 (1) Fundamentals of Entrepreneurship**. Second year - **MGT 2059Y (3) Entrepreneurial Marketing, MGT 2251 (3) Introduction to Small and Medium Enterprise Management and MGT 2252 (3) Culture, Entrepreneurial skills**; Third year - **MGT 3089 (5) Entrepreneurial Leadership**, together with an elective named **MGT 3091Y (5) Technological Innovation and Entrepreneurship**. The entrepreneurship modules comprise a total of 30 credits out of a total of 105.
- **BSc (Hons) Food Science and Technology (Minor: Food Entrepreneurship) (with six-month internship) – A307** (see Appendix 12) is offered over a minimum of three-and-a-half years, and a maximum of five-and-a-half years by the Faculty of Agriculture. The minimum requirements for the course are a Senior Certificate credit in Mathematics and Chemistry/Biology, and two 'A'-level passes in related approved science subjects. The entrepreneurship modules are **AGRI 10109Y (1) Basics of Entrepreneurship for Food Businesses** during the first year, **AGRI 2113Y (3) Food Economics and Marketing** during the second year, and **AGRI 30106Y (5) Entrepreneurship and Innovation for Small and Medium**

Businesses during the third year of study. The entrepreneurship modules comprise 9 credits out of a total of 106.

- **Fashion Technology (minor: Entrepreneurship) (F/T) - E307** (Appendix 13) is offered over a minimum of 3 years and a maximum of 5 years by the Faculty of Engineering. The requirements for the course are 5 credits at Senior Certificate 'O' Level and any two 'A' Level passes. A foundation in Art, Design & Technology or in a design-related subject awarded by a recognised awarding body is also acceptable as NQF level 5. The entrepreneurship modules are **MGT 1102(1) Fundamentals of Entrepreneurship** during year 1, **DASE 2108 (3) Small and Medium Textile Enterprise Management** during year 2 and **DASE 3105 (3) Start up Business Plan** during the third year. There is also a yearly elective model namely **MGT 3087Y (5) Strategic Management & Entrepreneurial Strategies**. The entrepreneurship modules comprise a total of 15 credits out of a total of 100.

6.5.3 Specific outcomes

Salient elements from each of these outcomes were borrowed in the design of the entrepreneurship syllabus of the new blended or hybrid syllabus for the module for Environmental Health at universities of technology. The selection of the pertinent outcomes was directed and influenced by the current level of offerings of entrepreneurship at universities of technology, and of needs as dictated by the unique economy and environmental health status in South Africa.

The specific outcomes for each of the selected courses are summarised in Table 6.1. When comparing the specific outcomes of the selected courses, there is an assortment of unique, similar and overlapping elements in each of the modules. It should be highlighted that the nature of the specific outcomes, in conjunction with the specific modules, has been tailor-made for the specific qualification. The outcomes were chosen to emphasise what is needed in terms of entrepreneurship for that specific module. It is also useful to note that even though some modules are largely generic, there is a shaping of the module to satisfy the overall purpose of the qualification. An example of this is the specific outcomes exhibited by **AGRI 3086Y**

(5) Entrepreneurship for Small and Medium Agribusiness at the university of Mauritius. The outcomes in this instance are closely linked to the agricultural activities of Mauritius, and how this sector is linked with the country's economy. The intentions that are imparted to students are defined and are particularly aimed at overcoming the challenges specific to agricultural entrepreneurship in Mauritius. Another example is **AGRI 109Y (1) Basics of Entrepreneurship for Food Businesses** and **AGRI 2113Y (3) Food Economics and Marketing**. In these two modules the emphasis is clearly on the food industry. Even though the outcomes and intentions are founded in a generic entrepreneurship education approach, in this instance they are aimed at the food industry specifically. Some of these outcomes include drivers such as entrepreneurship for food businesses, business ideas and opportunities within the food sector, case studies of food businesses focusing on successes and failures, economic aspects of the food supply chain, and agricultural and food marketing following the product flow from commodity and marketing to value-addition. These selected modules, together with each module listed in Table 6.1, exhibit guidelines and a pathway for the hybrid/blended syllabus which is presented later in Table 6.4.

6.5.4 Assessment models

As with any curriculum design and syllabus structure, the assessment model and assessment criteria are dictated by the specific outcomes, methodology of instruction, and purpose of the module (Squires, 2009). When considering the assessment models from the selected courses, there was a variety of assessment techniques such as written, oral, and group assignments, as well as take-home examinations (Table 6.2). Pedagogically, the choice of assessment technique should be determined and influenced by the exit level outcomes, as well as by the design of the incorporated/blended syllabi.

6.6 Towards a framework for an Entrepreneurship Education module for an incorporated/blended syllabus

The summaries of the specific outcomes and assessment techniques for the selected models were utilised to formulate the specifics and unique features for

Table 6.1: Summary of specific outcomes for the five selected courses (Appendices 9 to 13)

UPPSALA UNIVERSITY	UNIVERSITY OF MAURITIUS			
Entrepreneurship 2019/2020 - (Appendix 9)	BSc (Hons) Agricultural Science and Technology – A312/15 (Appendix 10)	BSc (Hons) Management (Minor: Entrepreneurship) – LM323 (Appendix 11)	BSc (Hons) Food Science and Technology (Minor: Food Entrepreneurship) (with six-month internship) – A307, (Appendix 12)	Fashion Technology (minor: Entrepreneurship) (F/T) - E307 (Appendix 13)
	AGRI 3086Y (5) Entrepreneurship for Small and Medium Agribusiness	MGT 1102 (1) Fundamentals of Entrepreneurship	AGRI 109Y (1) Basics of Entrepreneurship for Food Businesses	MGT 1102(1) Fundamentals of Entrepreneurship
<ul style="list-style-type: none"> - Understand the fundamental pre-conditions for entrepreneurship. - Design a business plan and effectively communicate and 'sell' new business concepts to other people. - Distinguish between different sources of financing and assess which best fit the requirements of the new entrepreneurial venture. - Understand financial statements (balance sheet and income statement, and cash flow analysis). - Perform an environmental analysis and formulate a business strategy for the new venture that can be communicated to external 	<ul style="list-style-type: none"> - Risk and uncertainty in agribusiness. -Agribusiness finance. - Financial information. -The entrepreneurial attitude: generation of business ideas and innovation; opportunities for setting up an agribusiness. -Types of business organisations. -Business strategy in agribusiness firms. -Public and private sector support in Mauritius. -Setting up an agribusiness unit and development of a business plan. -Clustering & business incubators. -Case studies of 	<ul style="list-style-type: none"> -Concept of entrepreneurship. - Historical evolution of entrepreneurship. - Overview of organising, creating, developing and managing your own business. - The entrepreneurial process. - Definition of the entrepreneur. -Entrepreneurial traits. - Entrepreneurship and SME. - Entrepreneurship and large organisations. -Challenges of entrepreneurship. 	<ul style="list-style-type: none"> -Concept of entrepreneurship. -The entrepreneurial process. - Definition of the entrepreneur. -Entrepreneurial traits and skills. -Entrepreneurship and SME. - Entrepreneurship and organisations. - Challenges of entrepreneurship for food businesses. - Business ideas and opportunities. - Case studies of food businesses (successes and failures) at local, regional and international levels. 	<ul style="list-style-type: none"> -Concept of entrepreneurship. - Historical evolution of entrepreneurship. - Overview of organising, creating, developing and managing your own business. -The entrepreneurial process. - Definition of the entrepreneur. -Entrepreneurial traits. - Entrepreneurship and SME. - Entrepreneurships and large organisations. -Challenges of entrepreneurship.

stakeholders.
 - Plan for the internationalisation of the new venture through foreign market entry.
 - Plan for the launching and developing of new business ventures inside established corporations.

agribusinesses at national, regional and international levels.

MGT 2251(3) Introduction to Small and Medium Enterprise Management	AGRI 2113Y (3) Food Economics and Marketing	DASE 2108(3) Small and Medium Textile Enterprise Management
<ul style="list-style-type: none"> -Definition of a small business. - Small business and challenges. - The small business manager. - Multiple roles of the small business manager. - Starting a small business/enterprise. - Organising the small enterprise: marketing; financial, production and operations management, administrative and financial controls. -Financial planning, product strategies, market strategies, pricing, 	<ul style="list-style-type: none"> -Basic tools of economics. -Concepts of economics: Microeconomics: and Macroeconomics. - Demand and supply. -Principles of production economics. - Economic aspects of the food supply chain. - International economics: introduction to marketing. - Agricultural and food marketing: from commodity marketing to value-addition in agricultural products. -Marketing functions; marketing channels and costs. -Food policies. 	<ul style="list-style-type: none"> -Definition of a small business. - Small business challenges. -The small business manager; multiple roles of the small business manager. -Starting a small textile/enterprise. -Organising the textile enterprise: marketing and financial, production and operations management. -Administrative and financial controls. -Legal aspects connected to SMEs.

<p>credit policing, inventory control and capital budgeting as applied to small organisations.</p>		
<p>MGT 3089(5) Entrepreneurial Leadership*</p>	<p>AGRI 30106Y (5) Entrepreneurship and Innovation for Small and Medium Food Businesses</p>	<p>DASE 3105(3) Start-up Business Plan</p>
<ul style="list-style-type: none"> -Leaders and vision and mission. -Leading the entrepreneurial team. -Communication. - Setting policies and culture creation. -Spiritual leadership: physical, emotional, intellectual and spiritual values. -Signals of weak entrepreneurial leadership. -Leadership and innovation. -Case studies of successful ventures. - Business failures. 	<ul style="list-style-type: none"> -Risk and uncertainty in a food business. -Finance for a food business. - The entrepreneurial attitude: generation of creative business ideas and innovation. -Opportunities for setting up an agribusiness. -Types of business organisations. -Public and private sector support in Mauritius for food businesses. -Setting up a food business and development of a business plan. -Clustering. - Business incubators. -Case studies of food businesses at national, regional and international levels. 	<ul style="list-style-type: none"> -Students will be required to produce a business plan for a start-up business. -Preparation, development and presentation of a business portfolio.
<p>MGT 3091Y (5)</p>	<p>MGT 3087Y (5) Strategic</p>	

Technological Innovation and Entrepreneurship

The innovation process,
 -Technology appropriateness.
 -Intellectual property rights.
 -Patenting.
 -Intellectual property development.
 - Importance of technology transfer.
 - Technology transfer strategies.
 - Types of innovation; stakeholders in the Innovation process.

Management & Entrepreneurial Strategies

-The international environment: an SME perspective.
 - Driving forces for integration.
 -An assessment of the evolution of the Mauritian economy since 1968.
 -History of strategy since the 19th century.
 -Strategic management process.
 -Mission and vision for SMEs.
 -Resource-based theory and the entrepreneurial firm.
 -Value chain analysis.
 - Benchmarking.
 -SWOT analysis.
 - Environmental scanning.
 -Five-forces model.
 -Clusters and the new economics of competition.
 -Decision-making tools.
 -Competitive strategies.
 -Entrepreneurial strategy framework.
 -Growth and development strategies for SMEs.
 -Entry mode choice into corporate entrepreneurship.
 -International

entrepreneurship.
-Networks and alliances in
entrepreneurship.
-Strategic networking.
-Strategy implementation.
-Entrepreneurial strategic
leadership and growth.
-Innovation.
-Conflict management.
-Implementing change and
gaining commitment.
-Crisis management.
-Social responsibility and
ethics.
-Evaluation and control; case
study techniques.

Table 6.2: Summary of all the assessment models and criteria for entrepreneurship of the selected courses and modules

UPPSALA UNIVERSITY		UNIVERSITY OF MAURITIUS			
Entrepreneurship 2019/2020 (Appendix 9)	- BSc (Hons) Agricultural Science and Technology – A312/15 (Appendix 10)	BSc (Hons) Management (Minor: Entrepreneurship) – LM323 (Appendix 11)	BSc (Hons) Food Science and Technology (Minor: Food Entrepreneurship) (with six-month internship) – A307, (Appendix 12)	Fashion Technology (minor: Entrepreneurship) (F/T) - E307 (Appendix 13)	
-Take-home examination. -Oral and written assignments individually and in groups. -Grade based on an assessment of all parts of the examination.	AGRI 3086Y (5) Entrepreneurship for Small and Medium Agribusiness	EACH MODULE	EACH MODULE	EACH MODULE	
	-Written examination carrying a weighting of 70%. -Continuous assessment carrying a weighting of 30% of total marks.	-Written examination of two hours (for a semester module) or three hours (for a yearly module). -Continuous assessment carrying a range of 20% to 30% based on two assignments and should include at least one class test. -Research methodology.	-Written examination of two to three hours carrying a weighting of 70%. -Continuous assessment carrying a weighting of 30% of total marks. -Continuous assessment is based on laboratory/field work, and/or assignments, and should include at least one class test.	-Written examination of 2-3 hours. -Continuous assessment counts for 20-40% of the overall mark for the module(s). -Continuous assessment may be based on laboratory work, seminars and at least two assignments/tests per year per module. -A compulsory class test for all semester modules.	

educating future entrepreneurs in South Africa in terms of the content of an existing subject. The motivation for this innovative design was to expose students at subject level to the needs, skills and competencies of entrepreneurship. The intent was not to sway students towards an entrepreneurial career at the expense of targeted vocational or specialist fields, but rather to afford them the opportunity to use the subject content as a platform from which to apply acquired entrepreneurial skills and competencies to render the discipline of entrepreneurial education less abstract and more tangible and achievable. Also, such competencies should ideally provide students with alternative occupational opportunities in the event of limited employment opportunities in civil society, the public sector, or in commerce and industry. It is acknowledged that true entrepreneurial intent is determined by several factors (Jensen, 2014; Maresch, Harms, Kailer, & Wimmer-Wurm, 2016; Barba-Sánchez & Atienza-Sahuquillo, 2018), but an exploration of these factors was outside the scope of this study.






Another motivation for the proposed incorporated/blended syllabus was that the drivers of entrepreneurship should preferably have their origin within the background reality as well as the socio-economic reality of the student. To achieve this requirement, a relevant subject such as Food and Meat Safety was selected, as it responds directly to the socio-economic conditions in South Africa, as well as the true reality of most students in institutions of higher learning (see Chapter 1). Food and meat hygiene are also a growing national and international concern, with emerging pathogens causing severe food poisoning outbreaks and cross-border trade exacerbating the predicament. The proposed, newly designed syllabus for entrepreneurship education is presented in Table 6.3. The proposed syllabus addresses Food and Meat Hygiene and facilitates the blending of the two syllabi. The syllabus was also designed to conform to the criteria set by the Health Professions Council of South Africa (HPCSA) (the overarching professional body) under whose auspices Environmental Health Officers are registered. Therefore, although entrepreneurship education is entrenched in the proposed syllabus, the specific requirements of the HPCSA should be adhered to. This means that it was essential to adhere to specified outcomes and assessment criteria even in the novel, alternative methodology of instruction for entrepreneurship education, namely challenge-oriented learning. The term challenge instead of problem has a positive

Table 6.3: Proposed Entrepreneurship Education syllabus for a hybrid/blended syllabus for Food and Meat Hygiene 2 in Environmental Health at universities of technology, South Africa

ENTREPRENEURSHIP EDUCATION FOR FOOD HYGIENE AND FOOD SAFETY

Purpose of module:	<ul style="list-style-type: none">- Entrepreneurship education seeks to provide students with the knowledge, skills and motivation to encourage entrepreneurial intent in a variety of settings within the field of food and meat hygiene.- This component of entrepreneurship education will focus on the development of skills or attributes that equip Environmental Health students with the realisation of opportunity, knowledge of needs assessment, including starting up a new enterprise.-It will allow students the opportunity to learn to promote innovation and/or introduce new products and/or services, and to create organisations that will be self-supporting, together with a purpose for job creation.- Development of business acumen.- Economics, business design.
Entry requirements:	In line with Food and Meat Hygiene 2 at universities of technology in South Africa.
credits and NQF level:	In line with Food and Meat Hygiene 2 at universities of technology in South Africa.
Duration:	A one-year course running over two consecutive semesters.

Syllabus: Teaching and Learning Guide

Unit:	Specific outcomes	Offering type and methodology of instruction	Action and activities	Assessment methods and criteria
		 <p>teaching from a Genghis Khan perspective.</p>		
<p>Unit 1: Introduction to Entrepreneurship and Enterprise in the Food Sector.</p>	<ul style="list-style-type: none"> -Understand the concept of enterprise and entrepreneurship. -Perform an environmental analysis and formulate a business strategy for the new venture. -Entrepreneurial traits. -Entrepreneurship and SMMEs in South Africa. -Acquire the ability to identify needs and challenges within the food sector in South Africa. -Generation of creative business ideas and innovation. 	<p>Introduction to the concept of the challenge-oriented learning approach.</p>	<ul style="list-style-type: none"> -Form groups of six. -Choose a specific food sector. -Identification and assessment of challenges: <ul style="list-style-type: none"> within food business; at business – public interface; business – government interface; business-to-business interface. 	<ul style="list-style-type: none"> -Group discussion. -Class critique. -Scaffolding by facilitator. -Group presentation about initial findings in line with subject content.
<p>Unit 2: Technological innovation towards a new enterprise</p>	<ul style="list-style-type: none"> -The innovation process. -Technology in the food industry. -Understanding intellectual property rights. -Importance of technology transfer. -Types of innovation. 		<ul style="list-style-type: none"> -Identify the need for intervention. -Outline the specific innovative approach to a solution – Unit 1. -Demonstrate the link between innovation and technological intervention. 	<ul style="list-style-type: none"> -Group presentation and class feedback. -Peer assessment: assessment by class groups. - Assess Unit 2 in line with a build up from Unit 1. - Group assessment.

		<ul style="list-style-type: none"> -Research: intellectual property rights; technology transfer within the food sector. -Facilitator scaffolding. 	<ul style="list-style-type: none"> - Self Assessment.
<p>Unit 3: Introduction to small and medium enterprise</p>	<ul style="list-style-type: none"> -The economy of South Africa. - Understanding small businesses – their role and niche in the economy. -Small businesses and challenges. -Government and SMMEs in South Africa. -Funding and SMMEs. 	<ul style="list-style-type: none"> -Case studies: learn from successes and failures and apply to selected start-up enterprise. -Research SMMEs in South Africa. -Role of government, legislation regarding SMMEs. -Apply and tailor group selected start-up enterprise. - Financial needs assessment: using government funding models. -Funding: technology innovation agencies, private sector. -Facilitator scaffolding. 	<ul style="list-style-type: none"> -Group feedback to class: tailored start up after actions. -Demonstrate the expansion of start-up combining Unit 1, 2 and 3. -Assessment by class groups, facilitator. -Group assessment. -Self assessment.
<p>Unit 4: The Bew Business</p>	<ul style="list-style-type: none"> -Starting a small business/enterprise. -Organising the small enterprise: marketing, financial, production and operations, financial planning. -Knowledge of product and strategies. -The role of marketing/market 	<p>Objective analysis of:</p> <ul style="list-style-type: none"> -operations within selected start-up enterprise. -Place of new product/technology within the food sector. -All possible opportunities locally, nationally and ultimately internationally. 	<p>Group feedback to class: ---</p> <ul style="list-style-type: none"> Tailored start-up after actions. -Demonstrate the expansion of start-up combining Units 1, 2, 3 and 4. -Peer assessment by class groups, also facilitator assessment. -Group assessment.

	<p>strategies.</p> <ul style="list-style-type: none"> -Opportunities for setting up a business within the food sector. -Public and private sector support in South Africa for food businesses. 	<ul style="list-style-type: none"> -Use financial needs assessment (Unit 3) to plan. -Private sector involvement (Unit 3). -Facilitator scaffolding. 	<ul style="list-style-type: none"> -Self assessment.
<p>Unit 5: New Business Management and Leadership</p>	<ul style="list-style-type: none"> -Management: administrative and financial controls. -Multiple roles of the small business manager. -Leadership: vision and mission. -Leading the entrepreneurial team. -Communication. - Establishing policies/guidelines. -Spiritual leadership: physical, emotional, intellectual and spiritual values. -Signals of weak entrepreneurial leadership. -Leadership and innovation. 	<ul style="list-style-type: none"> -Groups research and familiarise themselves with aspects and details of outcomes. -Incorporate essential findings where applicable. -Focus on desired and needed skills for new business manager. -Highlight applicable leadership aspects for selected start-up. -Show the link between the manager, his/her leadership and the innovative approach required. - Facilitator scaffolding. 	<p>Group feedback to class: Tailored start-up after actions.</p> <ul style="list-style-type: none"> -Demonstrate the expansion of start-up combining Units 1, 2, 3, 4 and 5. -Assessment by class groups, facilitator. -Group assessment. -Self assessment.
<p>Unit 6: The new start-up business</p>	<p>Students will be required to produce a business plan for a start-up business in the food and meat sector.</p> <ul style="list-style-type: none"> -Preparation, development and presentation of a business portfolio. 	<ul style="list-style-type: none"> -Use build-up from Unit 1 through to Unit 5, and design the specific business plan. -Compile a complete portfolio for submission. 	<ul style="list-style-type: none"> -Present detailed business plan to class – class group assessment and feedback. -Submission of completed portfolio for assessment.

connotation, and it opens several possibilities for finding informed solutions. Challenge-orientated learning is a nomenclature that was formulated for and is proposed by the current study. A definition for this term is proposed by the author as follows:

Challenge-oriented learning is an active student-centred pedagogy that allows students to build on previous knowledge, experience and understanding in order to learn about a subject through the process of solving open-ended, real-life challenges as triggers. COL is focused on students' reflection and reasoning to construct their own learning.

6.7 The design of a challenge-oriented teaching and learning methodology

6.7.1 Problem-based learning

PBL has been utilised for over 40 years in a variety of fields (Strobel & Van Barneveld, 2009). This methodology was based on the concept that a method of instruction should always aim to lead the student to discover what should be learned (Yew & Goh, 2016). However, merely conveying the facts and assessing what they have been communicated have been shown to bring about extrinsic motivation based on superficial learning. The merits of discovery during the learning process is two-fold: the student incorporates new knowledge into his/her knowledge bank, and in this manner creates a sense of confidence which is the proper award for good learning (Bruner, 1971; Husain, 2011). Problem-based learning (PBL) as a teaching methodology follows this practice.

According to PBL, the learning process may be described as active learning, which focuses on intricate real-world problems. Such problems represent a vehicle through which the student learns concepts and principles, and the method differs from the conventional lecturer-designed didactic delivery methodologies. The traditional lecturer/teacher curriculum is passive, memory-based and lends itself to an overindulgent one-sided activity (Kwan, 2002). PBL, on the other hand, rests on five

pillars that support learning: (1) using real-world problems initiates the learning process; (2) the formation of small groups encourage collaborative learning; (3) student-centred learning is facilitated; (4) the lecturer is only the guide/facilitator; and (5) sufficient time for self-study is allowed (Barrows, 1996; Schmidt, Molen, Winkel & Wijnen, 2009) (also refer to Figure 6.2 A).

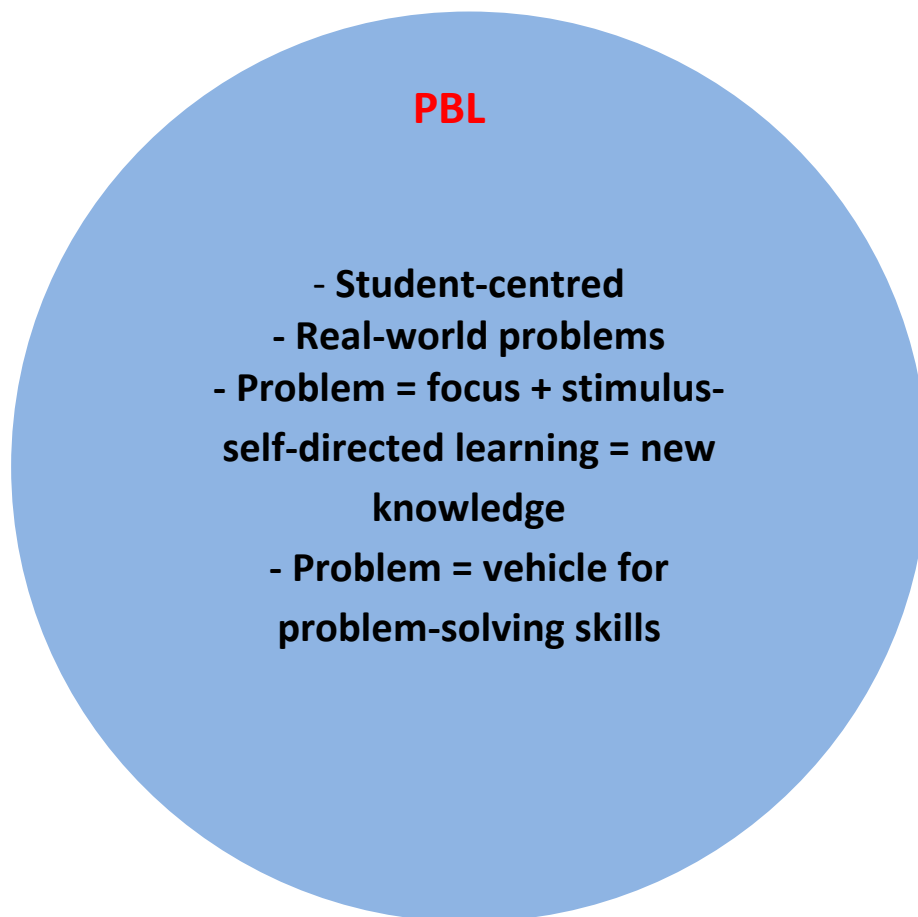


Figure 6.2 A: Schematic presentation of the five pillars of problem-based learning

The emphasis of this method of learning is active participation in the learning process, development of problem-solving abilities, and the acquisition of critical thinking skills (Smits, De Buissonje, Verbeek, Van Dijk, Metz, & Ten Cate, 2003). A more expansive overview was presented in Chapter 3 of this thesis. The aim of the current study was to design a teaching methodology that would reflect and include aspects of problem-based learning (PBL) as well as knowledge-based learning (KBL).

6.7.2 Knowledge-based learning as a teaching and learning methodology

KBL is centred around the knowledge that students already have and incorporates new knowledge and understanding that they acquire during the learning process. In this model, learning is therefore built on existing knowledge combined with new knowledge, and the learning process exhibits a close connection with real life (Dowd, Jones, Meier, & Barroso, 2019). A curriculum based on this learning and teaching methodology favours knowledge acquisition instead of skills acquisition only. To this effect, it is noteworthy that knowledge acquisition and skills acquisition are not necessarily mutually exclusive, and it has been shown that it is challenging to teach skills without knowledge of the context and content associated with the skill. A responsible way to transfer knowledge and skills is therefore to teach content in a manner that teaches skills, too (Dasgupta, 2016).

The transfer of knowledge in the KBL model is preceded using prior knowledge to comprehend and plan for the bases of acquisition of new knowledge. The transfer of knowledge does not happen after an educational intervention, but the process elicits existing knowledge (Lobato, 2003). To aid comprehension of this methodology, a synopsis is presented in Figure 6.2 B below.

The processes in this model may be summarised as follows:

- Establish the level of knowledge of the students through talks, discussions and written work around the subject or outcome.

- Allow the students to share and exchange knowledge and content without the aid of tests or quizzes – this facilitates and enhances group learning.
- The educational intervention process may now take place – this will be driven by the specific outcomes of the subject or unit.
- The facilitator performs regular checks or discussions to monitor individual and group progress by establishing what degree of knowledge has been added to pre-existing knowledge, in order to achieve the specific outcomes.



Figure 6.2 B: Schematic presentation of knowledge-based learning

- Evaluation and assessment follow: Similar to any pedagogic process, these are done to establish to what extent the learning process has been achieved.
- Assessments could take the form of presentations allowing for group assessment, peer assessment and facilitator assessment. Summative assessments may be used as part of the assessment score, but this is not the essential form of assessment (Dowd *et al.*, 2019).

The basic principles of KBL were merged with PBL in the design of the proposed teaching methodology labelled 'challenge-oriented learning', or COL.

6.7.3 Challenge-oriented learning as a novel teaching methodology

All the principles of each of the selected methodologies (PBL and KBL), as illustrated in Figures 6.2 A and B, form the foundation of the proposed novel teaching and learning methodology proposed in this thesis. For the purposes of entrepreneurship education, and particularly for this integrated/blended syllabus, it is proposed that the ideal teaching and learning vehicle is a combination of student-centred learning and knowledge-based learning (see Figure 6.2 C and Figure 6.3).

When drawing comparisons between traditional teaching methodologies and COL, the distinctive difference is passive versus active learning. It is in the former methodology that memorising, and the assessment of retention ability occur. In the COL model, the specific outcome of the pedagogic process leads the student from existing knowledge, through outcome requirement, to identifying new or inherent challenges, and finally to sourcing or researching how this challenge may be addressed or resolved. Concomitantly, knowledge deepens and widens as students build new experiences and information on existing knowledge and, by so doing, they familiarise themselves with the context and content of the challenge. The stimulus for learning or acquiring new knowledge is therefore driven by the challenge and initiated by existing knowledge. The pedagogic process is self-directed and embedded in a real-world challenge, as opposed to being directed or delivered by the lecturer (Husain, 2011). The way COL is managed (self-directed and group learning) lends itself to creativity, critical thinking, collaboration, and the acquisition of

much needed communication skills. The students' curiosity is triggered, and self-confidence and courage are developed. By means of scaffolding and 'side-line' facilitation, the challenge is unpacked, and thereby the development of problem-solving skills and critical thinking is nurtured (Smits *et al.*, 2003). These are the desired skills for graduates entering industry, and even more so for those having an entrepreneurial intent. This novel, newly designed methodology is incorporated into the blended syllabus for entrepreneurship.

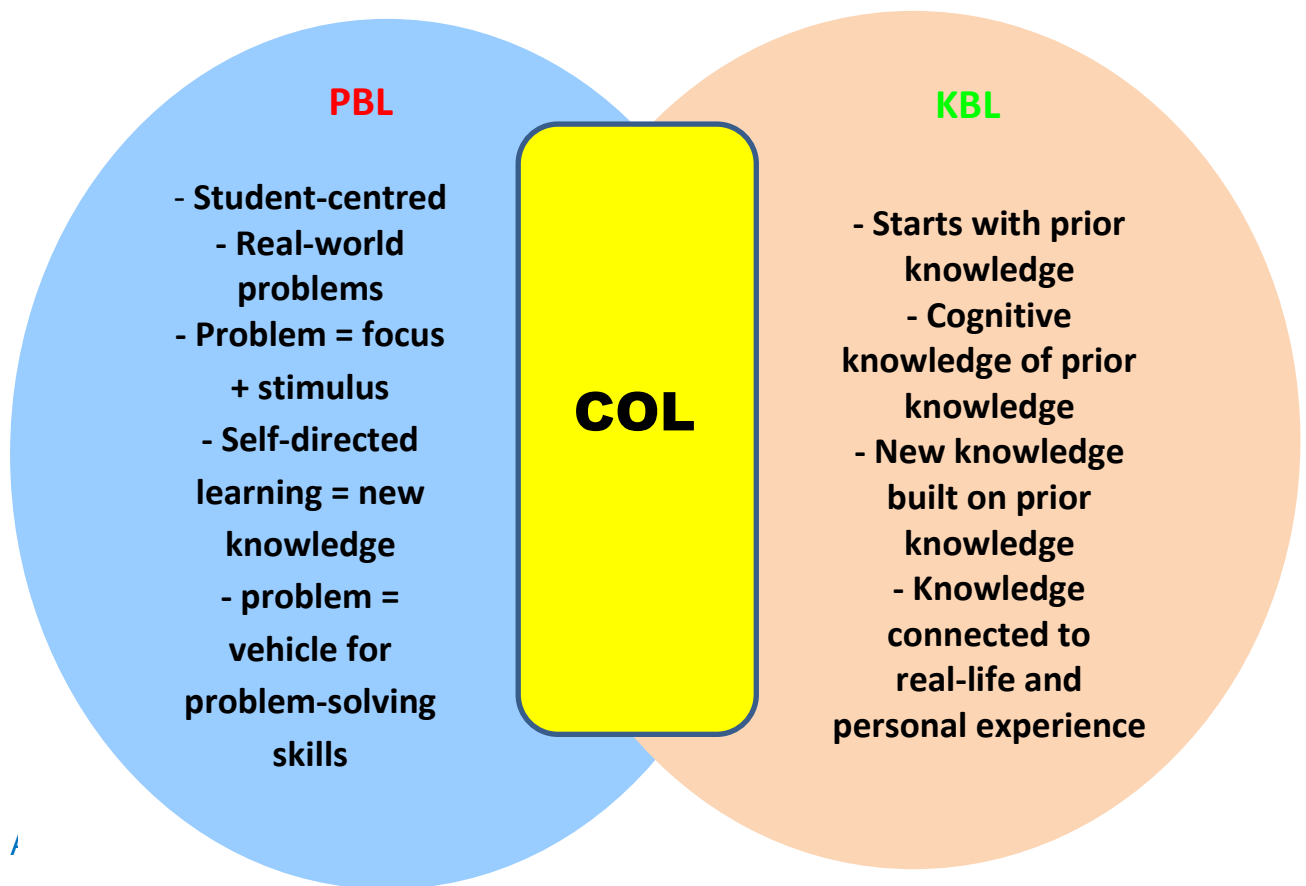


Figure 6.2 (C): A schematic representation of the combination of problem-based learning (PBL) and knowledge-based learning (KBL) to yield challenge-oriented learning (COL).



Figure 6.3: Diagrammatic representation of selected key principles of challenge-oriented learning (COL)

6.7.4 Proposed syllabus for Entrepreneurship Education in Food and Meat Safety utilising the COL model

The blended syllabus comprises of the new proposed syllabus for Entrepreneurship Education, as shown in Table 6.3, and a module selected from the Environmental Health qualification at universities of technology. The specifics of the course are as follows: Central University of Technology, Faculty of Health and Environmental Sciences, Department of Life Sciences. The details, which satisfy the SAQA and NQF requirements, are NQF level 6, with 30 credits representing 300 notional hours. The name of the umbrella qualification, as mentioned before, is B.Sc in Environmental Health, and the subject is Food and Meat Safety 2. The outline, details and all relevant information regarding this syllabus may be viewed in Appendix 14. The outcomes, teaching strategy, assessment criteria and methods of the syllabus are blended with the exact counterparts for Entrepreneurship Education, as represented in Table 6.3. Table 6.4 presents the new proposed syllabus for Entrepreneurship Education in Food and Meat Safety.








6.8 Discussion and conclusion

The task that the researcher had set out to do was to design an alternative teaching methodology for entrepreneurship education, and to design a blended syllabus that would combine subject content and entrepreneurship education. The final product was represented in a structured syllabus (see Table 6.4). This proposed syllabus displays units, topics, outcomes, teaching methodology, actions to be taken and assessment criteria and techniques. The chapter followed a step-by-step metamorphosis towards these outcomes. A design thinking model was applied to develop the process, which may be summarised as follows:

- A new/novel teaching methodology:

Salient needs for a holistic pedagogic approach were used as a guide for the design of the alternative teaching methodology. Various aspects of what will be required of the graduate were considered as the benchmarks for the methodology.

Table 6.4: Proposed syllabus for Entrepreneurship Education in Food and Meat Safety utilising the COL model

UNIT 1 					
TOPIC	OUTCOMES	TEACHING STRATEGY/METHODOLOGY OF INSTRUCTION	ACTION/ACTIVITY	ASSESSMENT CRITERIA	ASSESSMENT METHOD
					
Introduction to Food and Meat Hygiene	<ul style="list-style-type: none"> -Understand what 'Food and Meat Hygiene' entails. -Provide an overview of food legislation, standards and codes in South Africa. 	<p>Lecture controlled: Concepts regarding food and meat hygiene and food legislation are explained to assist students in familiarising themselves with the application of legislation and its relationship to food and meat hygiene and safety.</p> <p>Peer controlled: Group work evaluation in the form of a report on food premises compliance using legislation.</p> <p>Student controlled: -Students obtain legislation from the web-sites of the respective departments and organizations -Through self-study, students interpret and integrate the law in terms of various scenarios and case studies in the industry.</p>	Project Work	<ul style="list-style-type: none"> -The term 'food hygiene' is defined and the elements thereof are described. -Different pieces of legislation (Acts and by-laws) relevant to food production, preparation and processing are identified and discussed in terms of the responsible governmental department, purpose and the structure of control areas. -The different standards and codes relevant to food production, preparation and processing are identified and discussed in terms of the responsible authority, purpose and areas of control. -The powers and duties of inspectors/analysts in terms of legislation are interpreted and described. 	<p>Formative assessment:</p> <ul style="list-style-type: none"> - Group preparation and presentation of the respective legislation, standards and codes, followed by a class quiz in this regard. <p>Summative assessment:</p> <ul style="list-style-type: none"> -Theoretical test with a minimum pass rate of 50%. Final examination consisting of theoretical and practical evaluation on a 50:50 basis, which will include elements of design and layout of a premises.

<p>Introduction to entrepreneurship and enterprise in the food sector.</p>	<p>-Understand the concept of enterprise and entrepreneurship. -Perform an environmental analysis and formulate a business strategy for the new venture. - Entrepreneurial traits. - Entrepreneurship and SMMEs in South Africa. -Acquire the ability to identify needs and challenges within the food sector in South Africa. -Generation of creative business ideas and innovation.</p>	<p>Introduction to concept of the challenge-oriented project approach.</p>	<p>-Form groups of six. - Choose a specific food sector. -Identify and assess challenges within food businesses: business – public interface; business – government interface; business-to-business interface. -Establish, list and/or document existing knowledge and information.</p>	<p>-The use of alternative legislation, with reference to the Fines Act, is identified. -The purpose for and South Africa’s role in applying and or using international food safety organisations (e.g., FAO, FDA (USA) WHO, Codex, Alimentarius) are identified and explained.</p>	<p>-Group discussion. -Class critique. -Group assessment. -Peer assessment. -Self assessment. -Scaffolding by facilitator. -Group presentation of initial findings in line with subject content.</p>
--	---	--	---	---	--

UNIT 2



TOPIC	OUTCOMES	TEACHING STRATEGY/METHODOLOGY OF INSTRUCTION	ACTION/ACTIVITY	ASSESSMENT CRITERIA	ASSESSMENT METHOD
					
<p>Food premises design and layout</p>	<p>Assess food premises design (including equipment) in relation to national legislation and standards to ensure a safe food preparation/processing environment.</p>	<p>Lecturer controlled: -Lecture on new concepts as required by legislation and other relevant standards. -Placement of students at municipalities to gain exposure to food premises' design and layout. Peer controlled: -Evaluate each other's evaluation form against the requirements of legislation and other relevant standards. -Write a report in the prescribed format.</p> <p>Student controlled: -Find legislation on the websites of the relevant government departments. - Study theoretical content.</p>	<p>-Scaffolding by facilitator</p>	<p>-Typical layout and design requirements (inclusive of equipment and facilities) of different types of food premises are described in terms of relevant national legislation and standards. -Food premise compliance with national legislation and standards is evaluated and interpreted with consideration of the requirements of national legislation, standards, codes and appropriate rules of ethics and professionalism. -Health impacts related to formal and informal food premises design and layout are identified, evaluated, monitored and controlled. -Findings of evaluations, monitoring and interpretation are communicated to the industry in a reliable and coherent manner. - Alignment with specific</p>	<p>Formative assessment: -Class quiz and tests on the interpretation of the legal and standards requirements. -Group work on the design of an inspection form used to evaluate the design and layout of food premises. Feedback is provided to the class and discussed to make corrections and improvements to the form. -Case studies are used to determine level of compliance, e.g. use of photo slides. Class discussions.</p> <p>Summative assessment: Theoretical test with a minimum pass of 50% that counts as a mark for the predicate. Final examination consisting of theoretical and practical evaluation on a 50:50 basis, which will include elements of legislation.</p> <p>-Group discussion.</p>
<p>Technological Innovation</p>	<p>-The innovation</p>				








towards a new enterprise

- process.**
- Technology in the food industry.
 - Understanding of intellectual property rights.
 - Importance of technology transfer.
 - Types of Innovation.

- Establish, list and/or document existing knowledge and information: Technological information.
- Identify the need for intervention.
- Outline the specific innovative approach to a solution – Unit 1.
- Demonstrate the link between innovation and technological intervention.
- Research: intellectual property rights, technology transfer within the food sector.
- Facilitator scaffolding.
- Construct new knowledge based on existing knowledge.

- outcomes.
- Unit 1 outcomes as building blocks.
 - Use existing start-ups as templates – identify and highlight innovative ideas.
 - Design innovation based on Unit 1 findings.

- Class critique.
- Group assessment.
- Peer assessment.
- Self assessment.
- Scaffolding by facilitator.
- Group presentation of initial findings in line with subject content.

UNIT 3 					
TOPIC	OUTCOMES	TEACHING STRATEGY/METHODOLOGY OF INSTRUCTION	ACTION/ACTIVITY	ASSESSMENT CRITERIA	ASSESSMENT METHOD
		 <small>Teaching from a Google Khan presentation</small>			
Good hygiene and	Assess hygiene and manufacturing	Lecturer controlled: -Lecturing of new concepts as		-Good hygiene and manufacturing practices	Formative assessment: - Class quiz and tests on the







<p>manufacturing practices</p>	<p>practices (GHPs and GMPs), followed by food premises in relation to national legislation and standards to ensure safe food preparation and/or processing.</p>	<p>required by legislation and other relevant standards. -Placement of students at municipalities to gain exposure to hygiene and manufacturing practices. Peer controlled: -Evaluate each other's evaluation forms against the requirements of legislation and other relevant standards. -Write a report in the prescribed format. Student controlled: -Find legislation on the websites of the relevant government departments. -Study the theoretical content.</p>	<p>(GHPs and GMPs) required for safe food preparation and/or processing are described with the consideration of relevant national legislation and standards. -Good hygiene and manufacturing practices (GHPs and GMPs) followed by formal and informal food premises during preparation/ processing are evaluated and interpreted, with consideration of the requirements of national legislation, standards, codes and the appropriate rules of ethics and professionalism. -Health impacts related to formal and informal food premises; hygiene and manufacturing practices are identified, evaluated, monitored and controlled. -Findings of evaluations, monitoring and interpretation are communicated to the industry in a reliable and coherent manner.</p>	<p>interpretation of the legal and standards requirements. - Group work on the GHP and GMP form used to evaluate the hygiene and manufacturing practices followed by food premises. Feedback is provided to the class and discussed to make corrections/ improvements to the form. -Case studies are used to determine level of compliance; e.g. use of photo slides. Class discussions. Summative assessment: Theoretical test with a minimum pass of 50% that counts as a mark for the predicate. Final examination consisting of theoretical and practical evaluation on a 50:50 basis, which will include elements of design and layout of a premise.</p>	
<p>Introduction to small and medium enterprises</p>	<p>-Understand the concepts of an enterprise and entrepreneurship -Perform an environmental analysis and</p>	<p>Introduction to concept of the challenge-oriented project approach.</p>	<p>-Case studies: establish, list and/or document existing knowledge and information: successes and failures and apply to selected start up. -Scaffolding by facilitator. -Research SMMEs in South Africa.</p>	<p>-Unit 1 and Unit 2 used as building blocks.</p>	<p>-Group discussion. -Class critique. -Group assessment. -Peer assessment. -Self assessment. -Scaffolding by facilitator. -Group presentation on initial findings in line with subject content.</p>

formulate a business strategy for the new venture.
 -Entrepreneurial traits.
 -Entrepreneurship and SMMEs in South Africa.
 -Acquire the ability to identify needs and challenges within the food sector in South Africa.
 -Generate creative business ideas and innovation.

-Investigate role of government, legislation regarding SMMEs; apply and tailor group selected start-up.
 -Build new knowledge based on former knowledge.
 -Financial needs assessment using government funding models; technology innovation agency; private sector funding.
 -Facilitator scaffolding.

UNIT 4



TOPIC	OUTCOMES	TEACHING STRATEGY/METHODOLOGY OF INSTRUCTION	ACTION/ACTIVITY	ASSESSMENT CRITERIA	ASSESSMENT METHOD
 Abattoir design and animal slaughtering practices	 -Describe the slaughtering process for the different animals. -Describe the design and layout aspects	 Lecturer controlled: -Lecturing of theoretical and practical concepts, standards and codes and practical application of legislation.	 Project Work	 -In addition to the design and layout requirements in Unit 2, the design and layout requirements for different grades of abattoirs are	 Formative assessment: - Class quiz and tests on the interpretation of legal and standards requirements. -Group work on the GHP and GMP

specifically applicable to abattoirs.

-Placement of students at abattoirs to gain exposure to abattoir design, layout and animal slaughtering practices.

Peer controlled:

- Peer group discussions and presentations of interpretation and application of legislation (case studies).
- Evaluate each other's completed HAS evaluation forms against the requirements of legislation and other relevant standards.
- Write a report in the prescribed format.

Student controlled:

- Find legislation on the web-sites of relevant government departments.
- Self-exploratory literature review; study theoretical content and partake in practical sessions.

described.

- A process flow diagram for slaughtering (including emergency slaughtering) is constructed, and the activities relevant to each process are described step-by-step.
- Aspects relating to animal welfare and humane treatment of animals at abattoirs are identified.
- Abattoir design and layout as well as abattoir-specific hygiene and manufacturing practices are evaluated and interpreted, with consideration of the requirements of the Hygiene Assessment System (HAS) and the appropriate rules of ethics and professionalism.
- Health impacts related to abattoir hygiene and manufacturing practices are identified, evaluated, monitored and controlled.
- Findings of evaluations, monitoring and interpretation are communicated to the industry in a reliable and coherent manner.

form used to evaluate the hygiene and manufacturing practices followed by the different abattoir grades. Feedback is provided to the class and discussed to make corrections/improvements to the form.

-Case studies are used to determine level of compliance, e.g. use of photo slides. Class discussions.

Summative assessment:

Theoretical test with a minimum pass of 50% that counts as a mark for the predicate. Final examination consisting of theoretical and practical evaluation on a 50:50 basis, and which will include elements of the design and layout of abattoirs.

The new business

- Start a small business/enterprise.
- Organising the small enterprise: marketing and financial, production, operations planning.








- Establish, list and/or document existing knowledge and information pertaining to the new business.
- Objective analysis of operations within selected start-up business.

- Group discussion.
- Class critique.
- Group assessment.
- Peer assessment.
- Self assessment.
- Scaffolding by facilitator.
- Group presentation on initial

- Knowledge of product and marketing strategies.
- The role of marketing strategies.
- Opportunities for setting up a business within the food sector.
- Public and private sector support in South Africa for food businesses.

- Facilitator scaffolding.
- Place of new product/technology within food sector.
- Explore all possible opportunities locally, nationally and ultimately internationally.
- Use financial needs assessment (Unit 3) to plan.
- Private sector involvement (Unit 3).
- Facilitator scaffolding.

findings in line with subject content.







UNIT 5 					
TOPIC	OUTCOMES	TEACHING STRATEGY/METHODOLOGY OF INSTRUCTION	ACTION/ACTIVITY	ASSESSMENT CRITERIA	ASSESSMENT METHOD
		 <small>Teaching from a George Khan perspective.</small>			
Slaughtering practices: animal anatomy and physiology	-Identify the various parts of the carcass and the viscera, and discuss the anatomy and physiology thereof as they apply to meat inspection and the subsequent	Lecturer controlled: -Lecturing on theoretical and practical concepts of slaughter animal anatomy and physiology. -Demonstrations of the various anatomical parts of slaughter animals. - Placement of student at abattoirs to have exposure to slaughter		-The anatomy of the skeleton and the structure of the carcass are identified and described. -Using the knowledge gained in the Anatomy and Physiology module, the anatomy and physiology of the different body systems of	Formative assessment: -Class quiz on slaughter animal anatomy and physiology -Identification of slaughter animal parts and viscera presented to the student in the form of specimens and/or photo slides. Summative assessment:

	<p>approval/condemnation thereof.</p>	<p>animal anatomy and physiology.</p> <p>Peer controlled: Peer group discussions on anatomy and physiology of slaughter animal parts.</p> <p>Student controlled: - Find legislation on the websites of the relevant government departments - Self-exploratory by literature review; studying theoretical content and partaking in practical sessions.</p>		<p>slaughter animals as they apply to meat inspection are identified and described. -Knowledge of comparative anatomy of different slaughter animals is demonstrated (physiology is covered in Anatomy I). -The process of rigor mortis and its relation to muscle (meat) quality is described. -Evaluations are communicated to the industry in a reliable and coherent manner.</p>	<p>Theoretical test with a minimum pass of 50% that counts as a mark for the predicate. Final examination consisting of theoretical and practical evaluation on a 50:50 basis, which will include elements of slaughter animal anatomy and physiology. In the practical students will be expected to identify animal parts and viscera presented to them in the form of specimens and/or photo slides.</p>
<p>New business management and leadership</p>	<p>-Management and administrative and financial controls. -Multiple roles of the small business manager. -Leaders and their vision and mission. -Leading the entrepreneurial team. -Communication. -Establishing policies. -Spiritual leadership: physical, emotional, intellectual and spiritual values. -Signals of weak entrepreneurial leadership. -Leadership and</p>		<p>-Facilitator scaffolding. - Establish, list and/or document existing knowledge and information. -Groups research and familiarise themselves with aspects and details of outcomes. -Incorporate essential findings where applicable. -Focus on desired and needed skills required by new business manager. -Highlight applicable leadership aspects for selected start-up business. -Show the link between the manager, his/her leadership and the innovative approach required. -Facilitator scaffolding.</p>	<p>-Unit 1,2,3 and Unit 4 used as building blocks.</p>	

innovation.

UNIT 6



TOPIC	OUTCOMES	TEACHING STRATEGY/METHODOLOGY OF INSTRUCTION	ACTION/ACTIVITY	ASSESSMENT CRITERIA	ASSESSMENT METHOD
 Meat inspection	 -Identify and eliminate sick animals on arrival at the abattoir. -Understand disease and pathological and other physiological conditions at the primary meat inspection point in order to remove those animals whose meat will be unfit for human consumption.	 Lecturer controlled: -Lecturing of theoretical and practical concepts of slaughter animal anatomy and physiology. -Demonstrations of various anatomical parts of slaughter animals. -Placement of students at abattoirs to gain exposure to meat inspection practices. Peer controlled: -Evaluate each other's HAS evaluation forms regarding meat inspection against the requirements of legislation and other relevant standards. -Completion of abattoir slaughter and other records. Student controlled: - Self-exploratory by literature review; studying theoretical	 Project Work	 -Sick animals (including notifiable diseases) arriving at the abattoir and possibly unfit for human consumption are identified and prevented from being slaughtered. -Apply correct preventative and safety requirements for the slaughtering of sick animals (e.g. brucellosis and anthrax) as prescribed in the relevant regulations. -Identify injured animals that are fit for emergency slaughtering. -Meat inspection is performed on slaughtered animals as prescribed by legislation and in accordance with the rules of ethics and professionalism. - Ability to identify and judge disease, pathological and other physiological conditions	 Formative assessment: -Class quiz on slaughter animal meat inspection and the identification and judgement of disease and pathological and other physiological conditions. -Identification and judgement of disease, pathological and other physiological conditions presented to the student in the form of specimens and/or photo slides. Summative assessment: Theoretical test with a minimum pass of 50% that counts as a mark for the predicate. Final examination consisting of theoretical and practical evaluation on a 50:50 basis, which will include elements of the identification and judgement of disease, pathological and other physiological conditions. In the practical students will be expected to

			<p>(including possible secondary conditions) on whether suitable and safe for human consumption or not during meat inspection is demonstrated.</p> <p>- The appropriate disposal method of for the disposal of the condemned carcasses and parts are identified and monitored.</p>	<p>identify and judge disease, pathological and other physiological conditions presented to them in the form of specimens and/or photo slides.</p>
<p>The new start-up business</p>	<p>-Case studies of successful ventures. -Business failures. -Presentation of a business plan for a start-up business in the food and meat sector. -Preparation, development and presentation of a business portfolio. -Business within the food sector. -Public and private sector support in South Africa for food businesses.</p>	<p>-Use Unit 1 & Unit 5, and design a specific business plan. -Compile a complete portfolio to be submitted.</p>		<p>-Group discussion. -Class critique. -Group assessment. -Peer assessment. -Self assessment. -Scaffolding by facilitator. -Group presentation on initial findings in line with subject content.</p>

This new methodology is embedded in a student-centred and knowledge-based approach to teaching. The crucial parameters are: real-life challenges led by and precipitated by the subject content and outcomes; the learning process that is active and centred around the student; existing knowledge being recognised and used as an initial building block; allowing students to develop skills such as problem-solving, critical thinking, communication, collaboration and public speaking; assuring that formative and summative assessments are not the primary means of assessment or monitoring of progress; maintaining a flow-through of information and learning to ensure that units and outcomes are not dealt with mutually exclusively, and that they incorporate students' experiences. In this model, real-world challenges are incentives and the conduit for the learning process.

- A blended syllabus:

The chapter highlighted and demonstrated elements of the global view of entrepreneurship syllabi. It was shown that entrepreneurship modules are taught independently in some cases and based on the overarching subject in others. However, specific outcomes and goals have not been structured as part of a subject offering before. Based on these findings that were used as guidelines, a new syllabus for entrepreneurship education was constructed. This syllabus is specific to the South African context, and addresses employment creation that is a real need in South Africa. The new blended syllabus combines the outcomes of subject matter and entrepreneurship education and is a blended/hybrid approach to teaching entrepreneurship, as it utilises subject matter as the bedrock of the course. The student is thus able to learn and apply knowledge and skills outcomes directly to a real-world challenge, so that innovation and an entrepreneurial intent are encouraged. The selection of the specific subject was motivated, and the intended units, outcomes and purpose of the subject were demonstrated. Concerns regarding food safety were discussed, and it was shown that a gap exists in the market, which could be filled by new start-ups and original small businesses. The process in its entirety will address the first three goals of the United Nations Global Sustainable Development Goals, namely eradication of poverty, zero hunger, and good health and well-being for all (United Nations, 2015). The

subject was then blended with the new syllabus for entrepreneurship education to form a blended/hybrid Food and Meat Safety syllabus that also encourages and supports entrepreneurship education.

6.9 References

- Alaasarela, E., Fallemies, M., Halkosaari, T., Huhta, T., Jansson, L., Jylha, E., & Telkki, M.** 2002. Higher education as a pathway to entrepreneurship. Keski-Pohjanmann Ammatikorkeakoulu, Finland.
- Barba-Sánchez, V. & Atienza-Sahuquillo, C.** 2018. Entrepreneurial intention among engineering students: The role of entrepreneurship education. *European Research on Management and Business Economics* 24(1):53-61.
- Barrows, H.S.** 1996. Problem-based learning in medicine and beyond: A brief overview. *New Directions for Teaching and Learning* 68:3-12.
- Beranger, J., Chabbal, R. & Dabrine, F.** 1998. *Report concerning entrepreneurial training of engineers*. Paris, France: Ministry of Economy, Finance and Industry.
- Berlin Institute of Entrepreneurship.** 1999. The Berlin Proposition. Ten propositions to foster the culture of entrepreneurship in German Universities. Berlin, Germany.
- BMWi.** 2010. *Federal Ministry of Economics and Technology, Germany (BMWi), 2010.* (<https://www.bmwi.de/Navigation/EN/Home/home.html>) Accessed on 12 June 2019.
- Brand South Africa.** 2017. *State of entrepreneurship in South Africa.* (<https://www.brandsouthafrica.com/investments-immigration/state-of-entrepreneurship-in-south-africa>) Accessed on 23 August 2018.
- Bruner, J.S.** 1971. " The Process of Education" Revisited. *The Phi Delta Kappan* 53(1):18-21.
- Cleverby, V.** 2018. *Egos, empathy and iterative processes.* (<https://medium.com/thoughts-on-business-design/egos-empathy-and-iterative-processes-f3d46e9c2a0>) Accessed on 30 May 2018.
- CTG - Cognition and Technology Group at Vanderbilt.** 1990. Anchored instruction and its relation to situated cognition. *Educational Researcher* 20:2-10.

- Dasgupta, J.** 2016. *Knowledge-based learning versus skills-based learning.* (<https://www.linkedin.com/pulse/knowledge-based-learning-vs-skill-jayanti-dasgupta/>)
Accessed on 16 March 2019.
- Doutriaux, J. & Barker, M.** 1996. University and industry in Canada: A changing relationship. *Industry and Higher Education* 10(1):88-103.
- Dowd, M., Jones, J., Meier, K. & Barroso, K.** 2019. *Knowledge-based education: The Classroom.* Leaf Group Education.
(<https://www.theclassroom.com/knowledge-based-learning-5403738.html>)
Accessed on 15 March 2019.
- EC - European Commission.** 2000. *FIT project: The development and implementation of European entrepreneurship training curricula.* (<http://ietd.iipnetwork.org/content/european-commission-directorate-general-dg-enterprises-and-industry>)
Accessed on 17 February 2019.
- Gibb, 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.
- Hanushek, E.A. & Wößmann, L.** 2010. Education and economic growth. In: P. Peterson, E. Baker, & B. McGaw (Eds). *International Encyclopaedia of Education* 2:245-252. Oxford: Elsevier.
- Plattner, H., Meinel, C. and Leifer, L.** eds., 2010. *Design thinking: understand–improve–apply.* Springer Science & Business Media.
- Higher Education in Europe.** 2004. *Entrepreneurship in Europe Vol. XXIX no. 2.* Carfax Publishing.
- Husain, A.** 2011. Problem-based learning: A current model of education. *Oman Medical Journal* 26(4):295.
- Jensen, T.L.** 2014. A holistic person perspective in measuring entrepreneurship education impact: Social entrepreneurship education at the Humanities. *International Journal of Management Education* 12(3):349-364.
- Johannisson, B.** 1991. University training for entrepreneurs: Swedish approaches. *Entrepreneurship and Regional Development* 3:67-82.

- Kuratko**, D.F. 2003. Entrepreneurship education: Emerging trends and challenges for the 21st century. Coleman Foundation White Paper series for the US Association of Small Business and Entrepreneurship (USASBE).
- Kwan**, C.Y. 2002. Problem-based learning and teaching of medical pharmacology. *Naunyn-Schmiedeberg's Archives of Pharmacology* 366(1):10-17.
(<https://doi.org/10.1007/s00210-002-0561-y>)
Accessed on 17 February 2019.
- Liedtka**, J. 2015. Perspective: Linking design thinking with innovation outcomes through cognitive bias reduction. *Journal of Product Innovation Management* 32(6):925-938.
- Liou**, R. & Rao-Nicholson, R. 2017. Out of Africa: The role of institutional distance and host-home colonial ties in South African firms' post-acquisition performance in developed economies. *International Business Review* 26(6):1184-1195.
- Lobato**, J. 2003. How design experiments can inform a rethinking of transfer and vice versa. *Educational Researcher* 32:17-20.
- Maresch**, D., Harms, R., Kailer, N. & Wimmer-Wurm, B. 2016. The impact of entrepreneurship education on the entrepreneurial intention of students in science and engineering versus business studies university programs. *Technological Forecasting and Social Change* 104:172-179.
- Menzies**, T. & Gasse, Y. 1999. *Entrepreneurship and Canadian universities: Report of a national study of entrepreneurship education*. Canada: Brock University and Universite Laval.
- Miller**, B.H. 2017. *What is design thinking? And what are the five stages associated with it?*
(<https://medium.com/@bhmillier0712/what-is-design-thinking-and-what-are-the-5-stages-associated-with-it-d628152cf220>)
Accessed on 28 May 2019.
- Nielsen-Pincus**, M., Morse, W.C., Force, J.E. & Wulfhorst, J.D. 2007. Bridges and barriers to developing and conducting interdisciplinary graduate-student team research. *Ecology & Society* 12(2):8-22.
- Paço**, A. & Raposo, M. 2016. Development of entrepreneurship education programmes for HEI students: The lean start-up approach. *Journal of Entrepreneurship Education* 19(2):39-52.

- Schmidt, H.G., Molen, H.T.V.D., Winkel, W.W.R.T. & Wijnen, W.H.F.** 2009. Constructivist, problem-based learning does work: A meta-analysis of curricular comparisons involving a single medical school. *Educational Psychologist* 44(4): 227-249.
- Schramm, C.J.** 2013. *The entrepreneurial imperative: How America's economic miracle will reshape the world (and change your life)*. New York: Harper Collins.
- Smits, P.B., De Buissonje, C.D., Verbeek, J.H., Van Dijk, F.J., Metz, J.C. & Ten Cate, O.J.** 2003. Problem-based learning versus lecture-based learning in postgraduate medical education. *Scandinavian Journal of Work, Environment & Health* 29(4):280-287.
- Squires, D.A.** 2009. *Curriculum alignment: Research-based strategies for increasing student achievement*. Southern Connecticut State University, USA, ABC Education Consultants LLC, Branford, CT: Corwin Press.
- Strobel, J. & Van Barneveld, A.** 2009. When is PBL more effective? A meta-synthesis of meta-analyses comparing PBL to conventional classrooms. *Interdisciplinary Journal of Problem-Based Learning* 3(1):4.
- Turner, T. & Gianiodis, P.** 2018. Entrepreneurship unleashed: Understanding entrepreneurial education outside of the business school. *Journal of Small Business Management* 56(1):131-149.
- United Nations.** 2015. *Assembly, U.G. Transforming our world: the 2030 Agenda for Sustainable Development: Draft resolution referred to the United Nations summit for the adoption of the post-2015 development agenda by the General Assembly at its sixty-ninth session. A/70/L. 1, 18 September 2015.*
(<http://undocs.org/A/70/L.1>)
Accessed on 19 April 2019.
- US National Commission on Entrepreneurship.** 2000. *Harvard Business School, Business Research for Business Leaders.*
(<https://hbswk.hbs.edu/archive/national-commission-on-entrepreneurship>)
Accessed on 24 April 2019.
- Welsh, D.H.B. & Dragusin, M.** 2011. Entrepreneurship education in higher education institutions as a requirement in building excellence in business: The case of The University of North Carolina at Greensboro. *Forum Ware International Journal*, 1:1810-7028.
- Wrigley, C. & Straker, K.** 2017. Design thinking pedagogy: The educational design ladder. *Innovations in Education and Teaching International* 54(4):374-385.

CHAPTER 7

SUMMATIVE REMARKS, CONCLUSIONS AND RECOMMENDATIONS

7.1 Summative remarks

The study focused on the state of higher education in South Africa, with emphasis on universities of technology. Challenges such as poor economic growth, an increasing unemployment rate, and the articulation gap between high school and tertiary education were highlighted. Job creation was highlighted as a possible means of alleviating the effects of poverty and unemployment (Chapter 2). These foci were then channelled towards an investigation of the 'why' and 'how' of implementing entrepreneurship in a higher education curriculum. As part of this broad focus, special attention was given to the inception of universities of technology, teaching methodologies at tertiary level, comparison between a South African and international higher education institutions, and the viability of incorporating entrepreneurship education into an existing higher education curriculum (Chapter 3). In response to the objectives of the study, the following points are pertinent:

The South African education system has undergone numerous and arduous transformations since 1994. The transformation process was an attempt to eradicate and compensate for the effects of an undemocratic apartheid system. However, various researchers have shown that some of the decisions pertaining to education in South Africa have not had the anticipated outcomes due of an array of factors (Chapter 3). Some of these factors included decisions made by governmental structures in a non-consultative way, and the adoption of education routines based on first-world realities or westernised economies. These were implemented without considering the lack of the necessary infrastructure and specialised human capital in South Africa. Furthermore, the political influence and impact of trade unions often caused unsteadiness and disruption in all spheres of education. As a result, the fragile state of the standard of education in South Africa, especially of basic education, has created a snowball effect that has placed a burden on higher education and consequently on the job market. The compromised education system that produced questionable graduate ability has had a direct and indirect impact on the role of higher education and its contribution to the country's economic growth and positive social development. Having said this, it appears that higher education has failed in its mandate to address the needs of the market and industry.

Industry requires graduates who have problem-solving abilities, critical thinking ability, and communication and people skills. Since technological advancement is a powerful driver of economic and human resources development, and vice versa, advancement in technology is necessary to fuel economic growth. It is therefore essential that industry attracts a workforce with the necessary technical skills and individuals who are employable. In direct response to this requirement, the higher education platform in South Africa was redesigned, and universities of technology were formed (Chapter 3). The primary mandate of these institutions is to produce graduates who have the technical and other soft skills that will drive the economy. Given that curricula at universities of technology are application driven, the expectation has been that they would provide 'feedstock' for technological advancement. At their inception, the thinking was that universities of technology would have a unique character, and that they should not overlap with or duplicate the focus of traditional and comprehensive universities. Universities of technology should therefore have the ability to connect directly with the real world and tap into national and global needs in order to plan for success and produce employable graduates. To achieve sustainable planning and to produce graduates with these desirable attributes, their standard of teaching and learning should be on a par with the outcomes of the pedagogic process (Chapter 3).

Considering the constant change in the political climate in South Africa, teaching and learning processes have also not remained stagnant. As teaching and learning form the cornerstone of knowledge transfer, this study took a closer look at teaching methodologies. It was found that lecturing in combination with WIL and occasional case studies and class discussions were still favoured at Universities of technology. For universities of technology to succeed in their mandate, a blend of academic and other modalities needs to be adopted. Lecturing, which was found to be the primary methodology of instruction, has limited effectiveness in student-centred learning, which develops critical thinking, problem-solving, and the development of new knowledge (Chapter 3). The current research thus demonstrated that a need for an alternative methodology exists. A new teaching and learning methodology which combines problem-based learning (PBL) and knowledge-based learning (KBL) was put forward by the study. In addition to the fact that these approaches (PBL and KBL) have their origin in the constructivist approach, they are student-centred, in

touch with real-world problems, encourage critical thinking, and engender the production of new knowledge. Moreover, active learning and the acquisition of self-teaching skills encourage lifelong learning. Since universities of technology are expected to represent the breeding ground for innovation and technological advancement, the constructivist epistemology provides a firm foundation on which to develop graduates who are equipped for the Fourth Industrial Revolution.

KBL complements PBL in that it considers the knowledge and world views students already possess. The teaching and learning process resembles a building, as it adds building blocks of knowledge to existing knowledge and, as the process unfolds, all the new knowledge expands the knowledge bank of the student. It may thus be argued that academics have a mandate to develop the scholarship of teaching and learning for a continuously evolving teaching and learning process. It was against this background that the study involved the fusing of two student-centred methodologies for purposes of designing a new teaching methodology that is referred to as challenge-oriented learning (COL). COL aims to find solutions to problems within real-world contexts by combining the principles of PBL and the theories of KBL. The teaching and learning journey is therefore characterised by incorporating prior knowledge and observing a real-world problem as a challenge, and the process of finding solutions develops critical reasoning, problem-solving ability, and independence in combination with teamwork. In a fusion of these processes and attributes, the acquisition of a set of skills and innovative thinking are encouraged, while students' learning is embedded in the awareness of communal and societal challenges.

The challenges the country is experiencing and the proposed pathway to alleviating the negatives of poor economic growth and unemployment have encouraged a move towards entrepreneurship (Chapter 4). It is in response to this call for entrepreneurship education that this study explored its nature and possibilities. Since the study addressed the need for graduates with desirable workplace skills in conjunction with finding a solution for escalating unemployment rates, entrepreneurship education is championed as the most appropriate discipline to augment all the curricula of universities of technology in various ways. As entrepreneurship goes hand-in-hand with innovation, it allows for new concepts to be

turned into products and/or services, and this process is the driving force for the initiation of new enterprises and businesses. These, in turn, will contribute to economic growth and social upliftment. The vast array of literature that was consulted suggests that successful entrepreneurs benefit from a certain level of education, as it develops workforce creativity and business 'knowhow' skills. Moreover, access to entrepreneurship education levels the playing field and ensures impartial competition (Chapter 4). The literature also proposes an entrepreneurship ecosystem whereby government becomes a role-player and not the key facilitator. A study entitled 'The real state of entrepreneurship in South Africa' that was conducted by Brand South Africa in 2017 revealed important findings about where the country finds itself in terms of entrepreneurship, as a whole. Amongst several findings in the study of entrepreneurship, the following may be highlighted:

- Entrepreneurship at universities of technology varies from institution to institution. Wherever entrepreneurship is an academic offering, it is offered as a free-standing module and is not integrated or fused with any subject content. However, the effectiveness of any of these programmes, curricula and initiatives was beyond the scope of this study, and it thus opens a valuable avenue for research.
- South Africa needs new technologies, markets, jobs, risk-takers, rule breakers and innovators. These should be supported by a strong drive towards converting ideas and innovations into economic opportunities.
- A need exists for education and training regarding the specifics of business, and for the training or education to be incorporated into basic and tertiary syllabi.
- The most urgent challenges experienced by new entrepreneurs are accessing markets and gaining access to funding. Other challenges include lack of guidance, individuals being expected to be experts in many disciplines, and sales being slow or lost. An overall reason for these challenges may be

attributed to ignorance about where or how to source funding and obtain the necessary information.

- Existing entrepreneurs are from information technology, business services, advertising and marketing. These sectors are not strongly aligned with South African priority sectors such as manufacturing, construction, service provision and telecommunication. The obvious response to this would be much needed entrepreneurial development in these priority sectors.
- There has been a noticeable drop in entrepreneurs among the youth, and 87 per cent of these entrepreneurs' function on a basic survival basis. Statistics show that most of these businesses are Black owned and run by women. This situation creates questionable sustainability, although it creates exciting opportunities for the development of women entrepreneurs through various training courses.
- According to The World Bank (2018), small and medium enterprises in South Africa contribute an estimated 45% to national employment figures. This is low in comparison with other sub-Saharan countries, where the overall entrepreneurial activity is roughly four times higher. This low figure for South Africa may be attributed to poor infrastructure, poor access to a banking system, inadequate education levels, questionable government organisations, high crime levels, and stringent labour laws.
- Ultimately, it is suggested that South Africa needs a shift in economic development. To do this, policies need to be addressed to ensure that the nation is educated for an entrepreneurial revolution. Also, the back-and-forth reform of curricula since 1994 has placed a burden on educators, and this has caused resistance to any innovation or change. Stability in the education system is thus paramount.

Entrepreneurship education as a discipline has evolved from its historical roots to the point where it is now accepted as a recognised field of research and study. Scholars

of entrepreneurship education argue that entrepreneurial characteristics, skills and competencies may be taught and moulded by education and teaching. In general, a university education inspires bigger investment in a new business, and such businesses usually fare better than non-academic start-ups. Furthermore, there is a fundamental difference between business education and entrepreneurship education. Business education deals with how to manage a business, while entrepreneurship education is about the training of individuals for entry into new businesses. Also, the discipline of entrepreneurship education is a collection of different skills including education, management, study of technology, and economics.

Research findings to date are not in agreement about how to implement entrepreneurship education in practice. In addition, there is no real toolkit available to educate students in entrepreneurship. Since entrepreneurship education both challenges and questions established and traditional teaching methodologies, there has been a plea for new and innovative teaching techniques to match the outcomes towards achieving entrepreneurial intentions. The current study thus suggests that active learning is an important way to teach entrepreneurship, as it creates a platform for problem-solving. It also creates opportunities whereby the individual may engage in developing self-sufficiency and personal reflection. If an entrepreneurship education or training programme is aligned with the needs of the country, it may be instrumental in sustainable economic and social development. The appropriateness of what is taught, relevancy of the subject content, clear articulation from start to finish, social effectiveness, and efficiency of the practices are strong pillars on which to build this training programme.

Based on the results of the triangular study that was conducted to compare opinions and views of academics from the Central University of Technology, Free State with those of academics from Uppsala University and the University of Mauritius, the following findings may be extracted: (Chapter 5)

The research utilised a mixed methods paradigm by conducting interviews and administering electronic questionnaires as data collection tools. The data were thus analysed and interpreted quantitatively and qualitatively. The sample comprised of

12 academics from each institution. The academics at the three institutions were found to be committed and dedicated to the task of teaching and learning. All the participants agreed on the pivotal role that universities play in the economic and social development of their respective countries. There was consensus throughout that the drivers of economic growth are unique to each country. The approach to the execution of their tasks was found to be influenced by the culture, community, economy and society in which the institutions were located (Chapter 5).

The academics acknowledged that they engaged predominantly in lecturing as a teaching methodology. In some cases, this was complemented by class discussions, case studies and problem-solving exercises. Some of the academics at UoM were willing to attempt new methodologies. The academics at UU were comfortable with their way of teaching, and trusted the methodology applied to yield the desired results. At CUT, the academics were found to be somewhat conservative in their teaching approach, and lecturing was reported as the methodology of choice. This preference could be influenced by large classes, the need for continuous remedial intervention, diversity in socio-economic backgrounds, and the language barrier. The challenges experienced at UoM and UU were of a different nature and presented fewer hurdles to effective teaching and learning than were experienced at CUT (Chapter 5).

The contribution by government and professional bodies to the curriculum structure and subject content was markedly different for CUT compared to UU and UoM. A significant degree of autonomy and freedom to design and amend syllabi and subject content existed at UoM and UU, while at CUT academics had to follow a structured syllabus designed and approved by professional bodies such as HPCSA and DHET. Added to this, the academic freedom academics enjoyed at UoM offered them the opportunity to amend subject content as market needs fluctuate. This degree of flexibility allowed for better collaboration with industry.

One important lesson that was learnt from the study is that academic freedom facilitates innovative changes to methodologies and subject content. Moreover, collaboration with external stakeholders such as industry provides valuable input about market needs and enlightens academics about the preferred skill set of the

workforce, so that amendments and adaptations can address these needs timeously. This is a particularly important lesson considering the advent of the Fourth Industrial Revolution that requires creative adaptations on a regular basis if students are to be adequately equipped for the challenges of the near future and beyond.

As the study progressed, the importance and the applicability of the design thinking model emerged stronger (Chapter 6). This model was thus employed in the approach to curriculum design, and guided the utilisation of established entrepreneurship modules for purposes of designing an entrepreneurship syllabus for universities of technology, and a novel teaching and learning methodology referred to as COL. A blended syllabus that incorporates entrepreneurship education outcomes into an established subject was consequently designed, in combination with the subject outcomes of Food and Meat Hygiene 2. This subject is unique to universities of technology and is a second-year offering. The blended syllabus was informed by the newly devised COL teaching methodology.

7.2 Conclusions, recommendations and future research

The study proposes several interventions and models to equip graduates with the desired attributes for an efficient workforce in future South Africa. The interventions and models were structured to address a poorly growing economy and the escalating unemployment rate. These interventions and models will contribute to the existing body of knowledge, as depicted in Figure 7.1. The study's contributions may be summarised as follows:

1. A construct for the scholarship of integration is offered. This pedagogic approach will enhance and support the original mandate of universities of technology, as it brings together all role-players to uplift and give clear

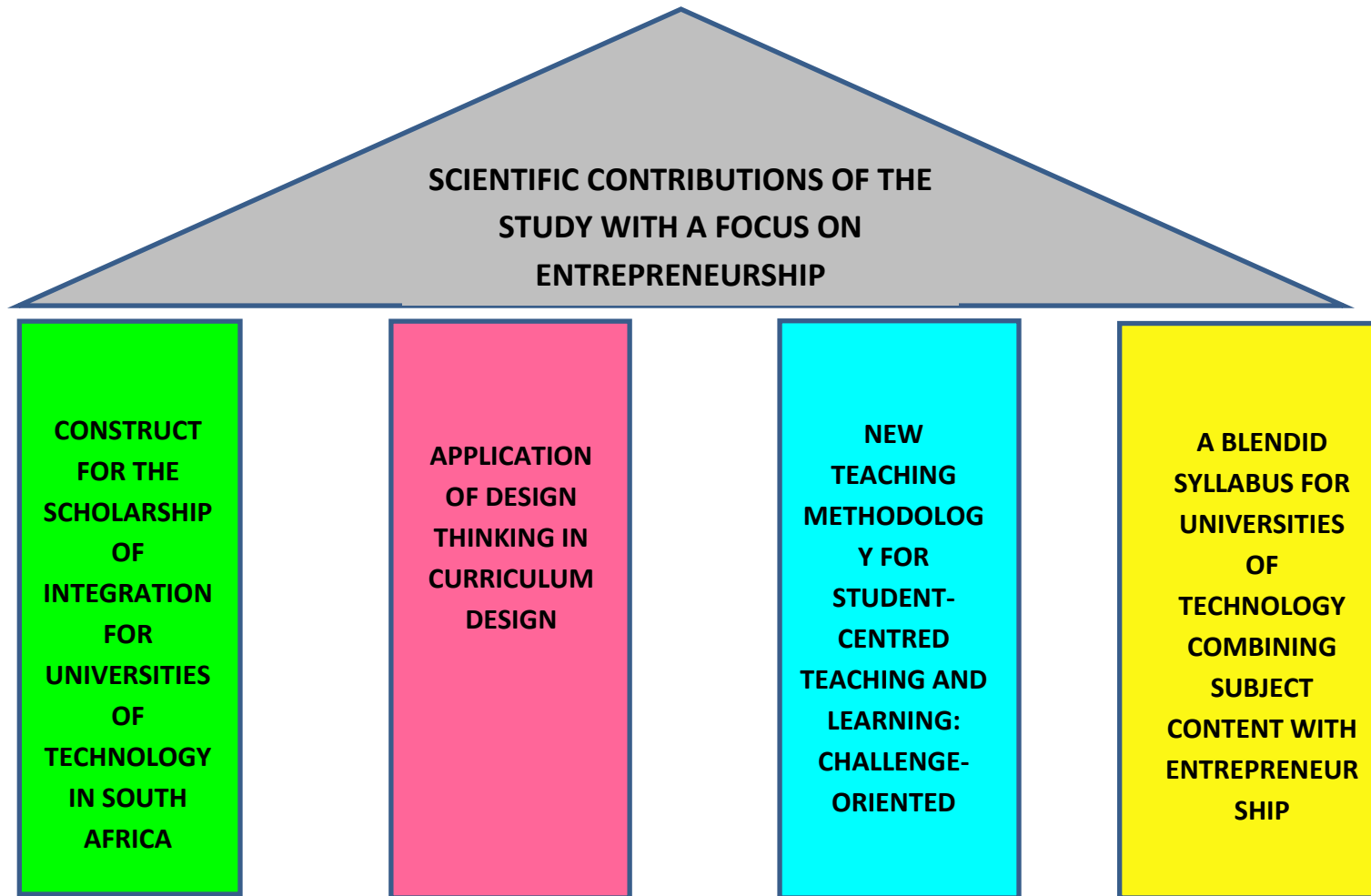


Figure 7.1: Diagrammatic presentation of the four major scientific contributions of the study

direction to the role these institutions should play in equipping students for the current and future workforce.

- 2 A design thinking methodology was employed in the approach to curriculum design and a new syllabus structure. South African higher education institutions, particularly universities of technology, and the failing economy may benefit from this design thinking model, as its application is effective in solving complex problems and addressing problematic and challenging scenarios on many levels.
- 3 A new teaching methodology was designed by blending problem-based learning (PBL) and knowledge-based learning (KBL) into a novel methodology referred to as challenge-oriented learning (COL). This model is proposed as an alternative teaching methodology that will be especially applicable in entrepreneurship education.
- 4 An example of a new and blended syllabus that is applicable for universities of technology was designed. This is a fusion of Environmental Health, Food and Meat Safety and Entrepreneurship Education offered at Universities of Technology. The blended syllabus is unique in content, teaching methodology and the approach to create entrepreneurial intent.

Based on the findings of the current study, recommendations for future research are the following:

- Research should be conducted to determine the effectiveness of existing entrepreneurship programmes, and to identify positive and negative factors in entrepreneurial skills development initiatives.
- Conducting investigations to determine the effectiveness of a blended syllabus such as the one that was designed for purposes of this study is recommended.

- Exploration of the final steps in design thinking as applied to curriculum and syllabi design is advised.
- An investigation into the implementation and the resulting impact of entrepreneurship education at universities of technology is proposed.
- The extent of academic/mission drift occurring at universities of technology, and the possible negative effects of this drift on the role of universities of technology in the higher education landscape in South Africa should be investigated.
- Research into ways to train academics in effective student-centred methodologies, entrepreneurship education and the management of entrepreneurship education is necessary.
- The design of a mobile model/application as part of entrepreneurship training of university students in South Africa is necessary, as students need to be equipped with hands-on information regarding government policies, legal matters, sourcing funding, and entrepreneurship opportunities in various communities. Also, the digital age necessitates the use of smart devices as learning and working tools.

7.4 Conclusion: a thought for the future

It is undeniable that universities of technology in South Africa do not only have the mandate, but also the capacity to educate and equip their students for appropriate employment and economic upliftment. Ultimately, these students should be prepared to function effectively and confidently in a world that is defined by the Fourth Industrial Revolution. This could be achieved if these institutions consider the following evolutionary changes (Table 7.1):

Table 7.1: Comparison between the characteristics of a traditional university and the characteristics of an ideal University of Technology

TRADITIONAL UNIVERSITY		IDEAL UNIVERSITY OF TECHNOLOGY
BASIC	→	APPLIED
SPECIALISATION	→	MULTI-DISCIPLINARY
THEME-BASED	→	SOLUTION-BASED
ISOLATED	→	INTEGRATED
EXCLUSIVE	→	INCLUSIVE
REGIONALLY IGNORANT	→	REGIONALLY REponsive
IVORY TOWER	→	PERMEABLE BORDERS



APPENDICES

APPENDIX 1



Jonas Almqvist
Professor
Department of Education
Box 2138
SE-750 02 Uppsala
Sweden
von Kraemers allé 1
Phone: 018-471 24 05
www.edu.uu.se
jonas.almqvist@edu.uu.se

Permission and ethical clearance for survey at Uppsala University 2017

On the behalf of Uppsala University, I hereby give Ms Elvina Smith permission and ethical clearance to do a survey amongst willing lecturers/academics at Uppsala University, preferably Health Sciences, in an attempt to gather information to make a positive contribution towards her PhD study. The comparative survey will be used towards highlighting areas of need, lacking depth and possible implementation strategies at CUT, Free State.

The title of her project is Developing entrepreneurial skills through problem-orientated learning in a second-year Environmental Health module at the Central University of Technology (CUT), Free State.

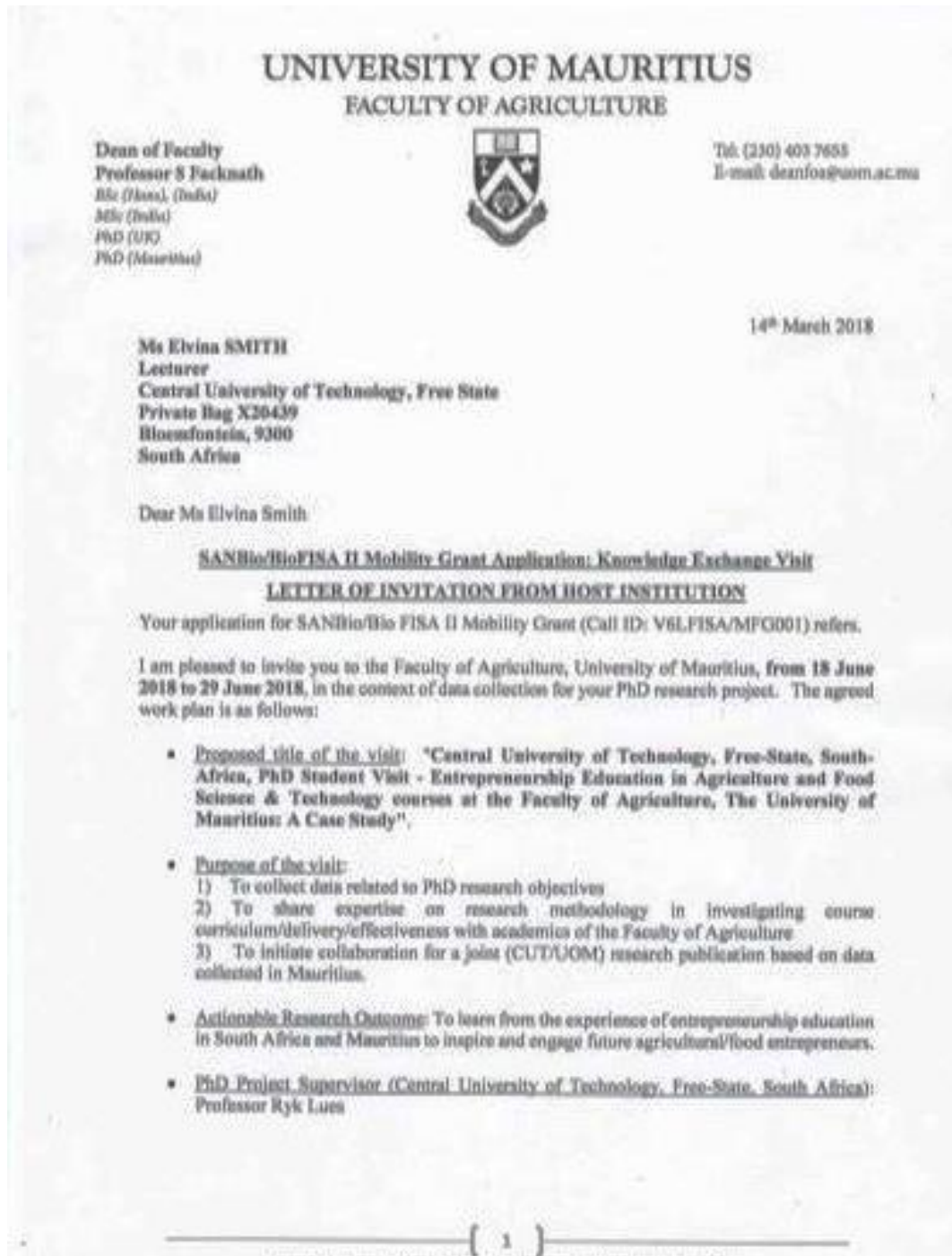
Ms Elvina Smith is a doctoral student who spends the fall semester 2017 as guest at Department of Education. Her visit at Uppsala University is funded by ERASMUS MUNDUS. Under my supervision, Ms Smith will interview a selection of teachers at my university and also make a survey amongst them. We will follow all the legal and ethical guidelines that are necessary, especially the ethical guidelines for research decided by the Swedish Research Council.

Sincerely,



Jonas Almqvist

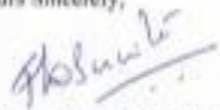
APPENDIX 2



- Role players at the Faculty of Agriculture, University of Mauritius:
 - ❖ Dean of Faculty: Professor Sunita Fackath
 - ❖ Heads of Department: Dr Deena Ramful-Baboolall (Agricultural & Food Science); Associate Professor Francoise Driver (Agricultural Production & Systems)
 - ❖ Host Organisation Facilitator: Mrs B Aumjaad
 - ❖ Academic Supervisors: Mrs B Aumjaad (Food Safety); Dr B Ramasawmy (Entrepreneurship)
- Facilities/Information to be provided by the Faculty of Agriculture: Office, internet access, meeting room with flip chart board/paper, RGB projector for presentations, non-confidential documentation on relevant University/Faculty courses/staff/students/alumni, access to the University of Mauritius library.
- Potential Participants in the Case Study: Academics concerned from the Faculty of Agriculture and the Faculty of Law & Management; University Students/Alumni; Agricultural/Food Entrepreneurs; Key informants from relevant National Bodies.
- Number of working days at the Faculty of Agriculture: 6
- Number of working days for on-site visits/interviews: 4

I wish you success in your grant application and look forward to mutually-beneficial collaborations between Central University of Technology, Free-State, South Africa, and the University of Mauritius.

Yours Sincerely,



Professor Sunita FACKNATH
Dean of Faculty



APPENDIX 3



TEACHING AND LEARNING PLAN 2014 – 2020

CENTRAL UNIVERSITY OF TECHNOLOGY, FREE STATE

COMPILED BY:
CENTRE FOR INNOVATION IN LEARNING AND TEACHING (CILT)

20 Pres. Brand Street, Bloemfontein, South Africa, 0301 • www.cut.ac.za • Private Bag X320510, Bloemfontein, South Africa, 0300

1. INTRODUCTION

The role of this teaching and learning plan is to affirm CUT's devotion to teaching and learning as one of the core functions of a university. It highlights what the university intends to do from 2014 to 2020 with regard to teaching and learning. It builds on the achievements, values and principles of the previous teaching and learning plan (2004 – 2010), and further focuses on new teaching and learning priorities, as required by higher education legislation; the CUT Strategic Plan 2010 – 2015 and 2016 – 2020; the Academic Plan 2014 – 2020; CUT's Vision 2020; and other significant institutional guiding documents and policies.

The Central University of Technology has adopted a new vision, Vision 2020, which positions the university to be an 'engaged university that focuses on producing quality social and technological innovations in socio-economic developments, primarily in the Central region of South Africa'. In order to advance this vision, the university set strategic sets/thrusts/developmental areas along which it will account for to reach the aspired destiny in 2020. The first strategic set focuses on building the foundations to make CUT fit for the purpose. The second set involves innovating on the academic project, especially Science, Engineering and Technology (SET), which is also acknowledged nationally as a critical skill. The third set involves building strategic partnerships in order to realise internal, regional, national and international goals, especially addressing socio-economic development through regional innovation.

Some of the defining characteristics of Vision 2020 that relate specifically to teaching and learning are:

- Development of a new ethos, attitudes, behaviours and relations among and between staff and students. New organisational design, function and structure aligned with Vision 2020.
- Development of state-of-the art facilities.
- Development of high-level skills and competencies amongst academics, especially younger members and designated groups.

- Pre-university programmes for students in SET.
- Student-centred methodologies and facilities.
- Emancipating, empowering and supportive engagements and transactions between students and staff.
- Focusing on innovation for industrial and socio-economic development.
- Development of strong links with business and industry through public and private partnerships (PPP) and other mechanisms.
- Development of new curricula that is responsive to the needs of students, employers and society.

This Teaching and Learning Plan coincides with the adoption of Vision 2020 and the Strategic Transformation of Educational Programmes and Structures (STEPS) – a process that was undertaken in 2010/2011 to ‘clarify and tackle the implications of Vision 2020 for CUT in the core domains of educational excellence and associated structural changes’. It supports the university’s unwavering commitment to provide teaching and learning that is underpinned in the new vision, and ensures that the entire academic division advances the vision through all teaching and learning activities and programmes. This Teaching and Learning Plan is also informed by CUT’s current priorities and objectives, as outlined in the Strategic Plan 2010 – 2015 and 2016 – 2020, as well as the Institutional Operational Plan.

This plan focuses on the following broad areas that are deemed critical for supporting teaching and learning at CUT:

- Development of a supportive teaching and learning environment and CUT teaching and learning philosophy and ensuring a student-centred approach to teaching and learning.
- Provision of enhanced access and participation as well as student retention.
- Enhancement of teaching and learning, assessment and moderation practices.
- Ensuring the distinctiveness of a CUT graduate through a set of graduate attributes.
- Provision of staff development and the enhancement of the scholarship of teaching and learning.
- Implementation of the Higher Education Qualifications Sub-Framework (HEQSF) and curriculum renewal.
- Creation of a technology-rich teaching and learning environment.

- Improving employability of CUT students through work-integrated learning (WIL) and career development.
- Promotion of community engagement through service learning, by making it an integral part of the curriculum in the mainstream academic programmes.

2. CUT TEACHING AND LEARNING PHILOSOPHY – A STUDENT-CENTRED APPROACH

In recognition of teaching and learning as one of the core functions of the university, and in committing its support and promotion of teaching and learning as an institutional and a national priority, CUT adopted a student-centred approach as a philosophy that should underpin all teaching and learning, as well as practices aimed at guiding a CUT graduate. In order to achieve this, the university continuously nurtures an environment that places the student at the centre of learning. **It promotes teaching and learning that places emphasis on the following student-centred practices and principles:**

- **Active versus passive learning:** In active learning, students are involved, active participants versus passive, non-participants in their own learning (Lea, Stephenson and Troy 2003); they learn by doing. This form of learning entails: solving problems, question-and-answer sessions, discussions, explaining issues, debating, and brainstorming. It entails a systems-based approach, resources-based learning, an experiential/personal relevance approach, and reflexive learning (Taylor 2000), to mention only a few activities.
- **Deep learning for understanding versus surface learning.**
- **Responsibility and accountability by students versus responsibility and accountability on lecturers.**
- **Autonomous, independent students versus dependent students.**
- **Students as active participants and lecturers as facilitators and guides versus lecturers as the only holders of knowledge and the sole communicators and transmitters of knowledge.**
- **Students as decision-makers in learning versus passive recipients of knowledge (Gibbs 1995).**
- **Emphasis is on what students do and achieve (activity and engagement) versus what lecturers do (Harden and Crosby 2000).**

- Improving employability of CUT students through work-integrated learning (WIL) and career development.
- Promotion of community engagement through service learning, by making it an integral part of the curriculum in the mainstream academic programmes.

2. CUT TEACHING AND LEARNING PHILOSOPHY – A STUDENT-CENTRED APPROACH

In recognition of teaching and learning as one of the core functions of the university, and in committing its support and promotion of teaching and learning as an institutional and a national priority, CUT adopted a student-centred approach as a philosophy that should underpin all teaching and learning, as well as practices aimed at guiding a CUT graduate. In order to achieve this, the university continuously nurtures an environment that places the student at the centre of learning. **It promotes teaching and learning that places emphasis on the following student-centred practices and principles:**

- **Active versus passive learning.** In active learning, students are involved, active participants versus passive, non-participants in their own learning (Lea, Stephenson and Troy 2003); they learn by doing. This form of learning entails: solving problems, question-and-answer sessions, discussions, explaining issues, debating, and brainstorming. It entails a systems-based approach, resources-based learning, an experiential/personal relevance approach, and reflexive learning (Taylor 2000), to mention only a few activities.
- **Deep learning for understanding versus surface learning.**
- **Responsibility and accountability by students versus responsibility and accountability on lecturers.**
- **Autonomous, independent students versus dependent students.**
- **Students as active participants and lecturers as facilitators and guides versus lecturers as the only holders of knowledge and the sole communicators and transmitters of knowledge.**
- **Students as decision-makers in learning versus passive recipients of knowledge** (Gibbs 1995).
- **Emphasis is on what students do and achieve (activity and engagement) versus what lecturers do** (Harden and Crosby 2000).

4

- **Inductive learning is used by presenting students with challenging scenarios.** It is inquiry-based, case-based, problem-based, and project-based in nature. It involves discovery and just-in-time teaching.
- **Cooperative learning is emphasised.** Involving students in collaborative or team projects in solving problems.

A student-centred approach ensures that students are active participants in the construction of their learning. This approach is underpinned by constructivist theories, which place **importance on activity, discovery and independent learning**. It has a resemblance to Roger's theory (1983) on students' freedom to learn, and Froebel's argument that teachers should not interfere in the process of students' maturatio, but should act as guides. Brown, Rust and Gibbs (1994) add that **students should be involved** not only in their learning, **but also in the development of course material, setting learning tasks, discussion of criteria for assessment, and feedback.**

Among other things, CUT declared work-integrated learning (WIL) and the use of blended learning and educational technologies as distinctive institutional features of its core mission and curriculum components of all CUT programmes. It is hoped that these would entrench a student-centred approach in teaching and learning within the institution. WIL is to become a component of all programmes at diploma level, while it is expected that all lecturers use blended learning and technology to enhance teaching and learning. These two approaches to learning follow the principles of active and cooperative/collaborative learning, and prepare CUT graduates for the world of work.

Through WIL (learning by doing), students are placed at credible workplaces and are involved in simulated work environments that enable them to apply theory learned in a practical workplace environment. This provides them with an opportunity to learn new work-related skills, and to sharpen and hone existing skills and knowledge by doing/application. On the other hand, enhanced access is achieved through the use of technology and by creating a blended learning environment. This is delivered mainly through an online platform called e-Tools (Blackboard), and the on-going exploration; procurement and integration of the latest educational technologies in teaching and learning.

Our CUT Vision asserts that teaching and learning and curriculum at CUT should transfer the basic knowledge entrenched in the content of the various disciplinary courses, while we strive to promote and **cultivate a student that is an innovative critical thinker who can apply**

5

theory and use technological innovations to solve socio-economic problems relating to their respective disciplines. The institution regards technological innovation as a stronghold for pursuit and stimulation of socio-economic development and entrepreneurship. This noble priority requires excellence and relevance in teaching. It requires co-responsibility and co-construction of knowledge between students and staff.

By means of a student-centred approach to teaching, CUT strives to facilitate the process through which our students are transformed to become knowledgeable and competent. An outcomes-based approach to teaching and learning steers our teaching, learning and assessment practices; aligning these and graduate attributes with programme and module outcomes. Furthermore, by constructively aligning teaching, learning and assessment, effective learning becomes a reality.

In order to ensure that the student is at the centre of learning and derives maximum benefit from learning, a repertoire of strategies are employed to support students with their studies and to assess conceptualisation of course content and its application among diverse groups, but most importantly among students with various levels of preparedness. One such strategy is the core curriculum, which hopes to nurture all CUT students, but particularly the underprepared, in digital literacy, numeracy, academic language and communication skills, as well as skills for success in studies and work.

CUT's teaching philosophy forms the foundation of all teaching and learning practices, and grounds the institution's conviction that every student can become a graduate and every lecturer an agent of change. Carrying through the CUT values of integrity and innovation, while appreciating our diversity, we strive to deliver customer service through excellent teaching. **By nurturing an engaged student; a scholarly academic and a rich learning environment, we believe we will progressively increase the throughput rates** and, more importantly, graduate a well-rounded individual. Improvement of lecturers' qualifications and a supportive environment are critical to supporting this teaching and learning philosophy.

The purpose of implementing a student-centred approach to teaching is broadly summarised by the National Department of Higher Education and Training as follows: "Curriculum development, especially the development of learning programmes and materials, should put students first, recognising and building on their knowledge and experience, and responding to their needs".

Curriculum development processes and the delivery of learning content (knowledge, skills, attitudes and values) should take into account the general characteristics, developmental and otherwise, of different groups of students.

Different learning styles should be acknowledged and accommodated, both in the learning situation and in the attainment of qualifications. The lecturer as facilitator and the student as recipient of knowledge/skills are both responsible parties in determining success in the teaching and learning process at CUT.

3. THE CHANGING TEACHING AND LEARNING ENVIRONMENT

The environment surrounding higher education teaching and learning in South Africa has changed dramatically since the political transformation almost two decades ago. This is evident from a myriad of external regulatory policies that shape and impact teaching and learning. Where universities could once operate within a relatively stable environment, the external world has now become unpredictable, and new emergent demands compel universities to transform. Institutions are not only challenged to enhance the quality of their teaching and learning practices, but are bound by legislation to transform and improve by complying with policy guidelines and frameworks, as well as to set quality and performance indicators that are often linked to funding and grants. Among the most critical policy imperatives, two that have a profound effect on the "what" (goals) and "how" (plan) of teaching and learning are the *White Paper 3: A Framework for the Transformation of Higher Education (1997)* and the *National Plan for Higher Education (2001)*.

In order to achieve all these and to remain responsive, institutions should change the manner in which they teach, and the manner in which they facilitate students' learning. Hence it is imperative to develop a strategy for teaching and learning at institutional level, and to have faculty teaching and learning plans.

4. STRATEGIES FOR THE ENHANCEMENT OF TEACHING AND LEARNING

4.1 Enhance and improve of the quality of teaching and learning at CUT

CUT recognises teaching and learning as an important function of the university, and attributes value to it in the same manner as it does to research. In recognition of this status, important Senate standing committees were reinstated, and their roles and responsibilities were revised to improve their impact on teaching and learning. In particular, the University Teaching and Learning Committee (UTLC) and the University Academic Planning and Quality Committee are now fully functional. The UTLC has the following working groups: curriculum; access with success; work-integrated; library and information services; and access and admissions. These working groups complement the University Teaching and Learning Committee, and thus the academic project, by ensuring that stakeholders engage adequately with all strategic matters relating to teaching and learning and channel them to the UTLC and Senate.

CUT has a quality enhancement project that takes place annually and undertakes a survey on the quality of teaching and learning at first-year level, as part of improving the first-year experience. Improvement plans are developed and implemented by all the faculties and relevant support centers (Innovation in Learning and Teaching as well as the Institutional Planning and Quality Enhancement Unit) to mitigate problems identified by the survey. Through these strategies, CUT will achieve improved quality of teaching and learning, including support for students.

For the past five years, Academic Development and Support, now called Innovation in Learning and Teaching, has conducted paper-based student evaluations of teaching and subject content by students. This has since been improved to an online evaluation from 2011. Academics use generated feedback reports to improve their teaching and learning practices.

Peer evaluation and observation are also an essential part of enhancing the quality of teaching within the faculties. This also forms part of the Institutional Performance Management System (IPeMS) for academics that was implemented from 2013.

4.2 Ensure the use of appropriate assessment and moderation practices

The plan supports the university's commitment to the use of integrated assessment, which permits the student to demonstrate an applied competence and that uses a range of formative and summative assessment methods. This assessment requires that assessment strategies and activities are planned from the onset, when both the critical and specific outcomes of a programme are formulated. It avails an opportunity to assess various competencies (skills, knowledge and attitudes). CUT will ensure that graduate attributes and critical cross-field outcomes are embedded in all teaching and learning activities, and that learning materials are assessed appropriately to uphold not only the quality of teaching, but also the quality of assessment.

4.3 Enhance and promote the status of teaching and learning

CUT recognises teaching and learning as an important function of a university, and attributes as much value to teaching and learning as it does to research. Excellent academic work is recognised annually through Vice-Chancellor's awards for academics displaying the best practices in teaching and learning and curriculum development respectively. A system for awarding excellent learning also exists at CUT. High-performing students, referred to as A-students because of their extraordinary performance (achieving distinctions in all their courses) are recognised and awarded bursaries by the Vice-Chancellor annually. This strategy motivates other students to strive for excellence in their studies.

5. PROMOTE ACCESS AND IMPROVE RETENTION OF STUDENTS

5.1 Provide increased access and participation

It is the institution's responsibility to ensure that deserving students are afforded access to the institution. Our admission requirements are not only diversified, but are consistent with national policy and legislation. While the commonly known M-score is the main criteria that CUT uses, other criteria such as recognition of prior learning (RPL), the National Benchmarking Tests (NBT), etc. are used for the selection and placement of students in relevant mainstream or foundation programmes. CUT has recently developed and launched an Admissions Policy for NC (V) level 4 and traditional N4, N5 and N6 qualifications in order to facilitate access and articulation pathways for students from the further education and training (FET) sector who fulfill the admission criteria for career-focused university qualifications in the field of study for which they obtained an FET qualification, and especially in scarce skills areas such as Engineering, ICT, Business/Finance, and Education.

Annual open days are also organised and presented by the Marketing Department and the faculties as a recruitment strategy. These are presented at both campuses (Bloemfontein and Welkom).

5.2 Ensure increased access, participation/equity and retention of students in Science and Technology

CUT is currently developing a strategy for improving enrolments and success in Science, Engineering and Technology (SET) in particular. Despite its relative strengths in Science, Engineering and Technology in the region, CUT still faces competition from its sister university, the University of the Free State (UFS). Both universities are competing for the same cohort of students with a background in Mathematics and Physical Sciences. Over the years, CUT has been on the side-lines without a comprehensive SET recruitment strategy, leaving the UFS with a dominating role. This important activity of addressing the SET deficit we currently experience has always been conducted on an ad-hoc basis. A strategy that will (a) increase CUT student enrolment in SET and (b) provide educational opportunities to students; equip them with skills required in the country, especially scarce skills that are more responsive to social and economic needs, is being developed.

CUT, therefore, set itself the following strategies to improve SET enrolments:

- Expand SET programme offerings at the Welkom campus, despite the challenges.
- Investigate opportunities to offer teacher re-skilling programmes around SET.
- Intensify our campaign in the Northern Cape (NC). Identify retired teachers in the NC to employ as field-marketing agents on a commission basis to sign up students for CUT.
- Financial incentives in order to redress socio-economic backlogs.
- Upgrading and strengthening current relations with established feeder schools.
- Ensuring thorough and rigorous career guidance for the number of students in the FET school phase who opt to choose SET subjects.
- Annually invite top achievers and their parents/guardians to a prestigious event, hosted by the Vice-Chancellor and Principal.
- Provide incentives for top performers, e.g. guaranteed accommodation; bursaries; and/or a university starter pack comprising an iPad, book prize, mobile phone, calculator, memory stick, etc.
- Expand CUT Schools Advancement Academy (SAA) initiatives to FET colleges.
- Sponsor schools with computers, and share with them some of our innovations to assist in teaching and learning.
- Intensify our marketing campaign at schools to cover all the schools in our region, with specific focus on attracting SET students.

5.3 Ensure access with success through student support programmes

CUT has a major obligation to the Department of Higher Education and Training (DHET) to address the retention of students. Retention has many dimensions, but it can be summarised as the prevention of student attrition, especially the 25% of first-year students who do not return to their university studies after the first semester or year of study, as well as those who do, but who eventually do not graduate.

Students' poor performance at university is often linked to their under-preparedness for higher education studies. The most common, but highly debilitating aspect of such under-preparedness, is their academic literacy. In this context, academic literacy is seen as knowing how to

communicate and act within a particular discourse, and the reading and writing that occur within the discipline. These are tools through which to facilitate learning. While some students acquire academic literacy by virtue of their participation in the discourse of the relevant discipline, this is not always the case for students who are less prepared for higher education studies.

In light of this, CUT has implemented various access and academic support programmes to ensure access with success for its students, particularly those who enroll with varying levels of preparedness. At entry into the university, students are supported by an orientation programme that is presented by students' services in collaboration with the faculties. This programme, however, should be improved.

There are various other support interventions both at faculty level and coordinated and provided by Academic Development and Support. One intervention that is well-established is the Academic Language Proficiency (ALP) programme that assists students to, inter alia, enhance their reading and writing skills. This programme is compulsory for all first-year students, and will be a credit-bearing unit within the core curriculum. A new, but innovative, ALP that is now called Academic Literacy and Communication Studies will be implemented in 2014 as part of the core curriculum, which will also focus on developing four main CUT attributes in all first-year students. These attributes are innovation, entrepreneurship, community engagement and sustainable development.

Another strong support venture for our students is the offering of our foundation programmes as extended programmes. These are designed to meet the academic and educational needs of students who do not meet programme-specific admission requirements into mainstream academic programmes. Consistent with the institutional foci, the institution will continue to sustain its foundation provision through its eleven (11) extended curriculum programmes to cover the following niche programmes: Engineering; Health Sciences; Information Technology; and Art and Design. On the other hand, it will extend these offerings to all programmes in fields of study where retention problems are rife. Currently, new extended programmes are being designed in the Faculty of Management Sciences and in programmes where students' performance is low.

In 2011, a mentorship programme was developed and implemented for students who live in the residences. Exemplary (high-performing) senior students are used as mentors for other students, particularly for first-year students. However, commencing in 2013, a mentorship programme for all first-year students was launched and implemented in three faculties (Faculty of Health, Management Sciences and Engineering and Information Technology). This programme will be extended to the Faculty of Humanities in 2014. This mentorship programme, which is funded through the DHET teaching development grant, supplements many other strategies that are already in place for support at CUT.

Supplemental instruction; a disability unit for students with special needs; the reading laboratory; student counseling; tracking of at-risk students; career services; tutorials; and student-advicing in some faculties are also examples of support provided to CUT students. Amongst these, our Supplemental Instruction is also well-established. In 2012, the students' attendance record showed that this is a strategy that is preferred and acknowledged, in particular by first-year students (15 944 first-year students attended; 2 683 second-year students attended and 523 third-year attended; and a total of 19 150 students attended).

Also of note is the CUT core curriculum, which has been developed as a strategy that will address the basic needs of under-prepared students in computer, numeracy and success skills, whilst at the same time ensuring the development of a type of graduate that the institution aspires for – a creative, engaged and innovative graduate who can make a socio-economic contribution in their communities.

Key to this core curriculum is the module on Success Skills, which comprises a personal information management theme called PIM. This aspect of Success Skills is offered by the library, and equips students with information literacy. The rest of the Success Skills module is to be integrated in the mainstream programmes, and will equip students with, among others, skills in the following: understanding the higher education/university context; time management; diversity; discipline; academic success; motivation; being a Generation-Y student; emotional intelligence; research; leadership; identity; integrity; substance abuse; health issues; and sexuality.

The university has a large-class support initiative planned and implemented to improve student-lecturer engagement, and to give effect to its student-centred philosophy to teaching and learning. An electronic class attendance monitoring system was also piloted institutionally, but due to financial limitations it was implemented only in the Faculty of Engineering in 2013, whilst funding is sourced to roll it out to the other faculties.

5.4 Develop and promote graduate attributes through integration in mainstream academic programmes and extra-curricular activities

The need to develop CUT graduate attributes that will be integrated into the curriculum and/or be achieved through extra-curricular activities and the core curriculum is currently being met. A task team led by the Dean, Academic Development and Support has developed a discussion document for consideration by the University Teaching and Learning Committee and approval by Senate. In order to arrive at the recommended graduate attributes for CUT, reference was made to national policy frameworks such as the Education White Paper 3 (1997); the National Plan on Higher Education (2001); the diverse CUT institutional strategic documents, such as the Teaching and Learning Plan 2004 – 2010; Vision 2020 and STEPS documents; and also the Higher Education South Africa (HESA) document on higher education institutions' graduate attributes (2009). Literature reviews and benchmarking with local universities and international universities were undertaken.

It is expected that, in some cases, these attributes will be formally assessed as part of (a) teaching and learning in mainstream academic programmes, and in other cases students will (b) engage in activities that are not necessarily assessed formally, but will have to provide adequate evidence of learning and development of a particular attribute. Students will compile/develop electronic portfolios to provide evidence of participation in various activities and the acquisition of the various attributes from both formal and informal learning activities and programmes.

6. ENHANCE STAFF DEVELOPMENT AND PROMOTE THE SCHOLARSHIP OF TEACHING AND LEARNING

Educational literature in the last decade has built a convincing argument about the role of professional development in promoting the quality of teaching and increasing student achievement. Simply put: What lecturers know and do impacts on what their students know and do. Deeper content knowledge, more content-specific instructional strategies, and greater understanding about how students learn enable lecturers to meet group and individual student needs.

Staff development helps prepare academics for the complexities of equipping a new generation with the advanced skills and knowledge they will need for the unknown future. It helps academic staff enhance their knowledge of content so that they are better able to answer students' questions, enliven class presentations, and help students solve problems. It expands lecturers' repertoire of facilitation skills, in order to determine the best method to meet an individual student's specific learning needs. The most effective way, therefore, to improve the achievement of students, is to improve the quality of facilitation/teaching. Improving academic staff training and development dictates, among other things, professionalising teaching and learning; offering formal and informal courses and workshops; developing and promoting the scholarship of teaching and learning, to empower lecturers to continuously inform their own teaching by exploring and developing new models of teaching and learning.

6.1 Professionalise teaching through formal and informal studies for academics

First and foremost, CUT is embarking on the reorganisation of the academic staff component. As a former Technikon, CUT has a challenge to ensure that all its academics upgrade their qualifications in order to lecture in the HEQSF-approved programmes. All academics without master's and doctoral degrees in their fields of study have to enroll in relevant studies and ensure that they acquire these qualifications. A two-to-three-year time frame is provided after enrolment for academics to complete their studies.

On the other hand, the institution's Academic Development and Support (ADS) Unit continues to support academics through courses and workshops relating to teaching and learning, to promote the scholarship of teaching and learning and to support those academics who are experts in their fields, but who do not necessarily have background in teaching. In his scholarship, Boyer (1990) argues that practitioners in higher education should adopt new ways of scholarship, which places them at the centre of their own development and growth as experts in their fields. In order to prepare academics for these emergent challenges and expectations, CUT offers a myriad of professional development and support opportunities for its academics, including:

- Two formal credit-bearing modules that are compulsory for all academics who are experts in their field, but who are not necessarily teachers by profession and thus should acquire pedagogic skills. The two modules focus on Learning Facilitation and Assessment in higher education and are offered in collaboration with the University of the Free State (UFS).
- A formal mentorship programme for all new academics, aimed at exposing them to higher education legislation; curriculum development and programme design; e-learning and the integration of educational technologies in teaching and learning; learning facilitation and assessment; and work-integrated learning (WIL).
- Industry exposure to academics who work with work-integrated learning.
- A programme for supporting talented, young staff with potential for higher education leadership. This programme, named the Higher Education Leadership and Skills Academy (HELSKA) offers a series of programmes aimed at developing a new generation of academics who can meet the administrative, leadership and human capital needs of higher education. HELSKA offers the following:
 - A programme for developing leadership in higher education, called Leaders in Education and Development (LEAD).
 - A programme for developing academic leaders in the fields of Science, Engineering and Technology (SET), called Stars of Academic and Research (SoAR).

6.2 Develop and promote the scholarship of teaching and learning

Common practice in higher education has seen the profession undertake research for various reasons, which have for long excluded research on teaching and learning to improve the practice. With the advent of Ernest Boyer and his famous model of scholarship (Scholarship revisited), the way teaching and learning is perceived had to change. This paradigm shift will, for example, require that we have a new type of academic leaders at every level of the institution. These leaders should be willing, as Boyer (1994:17-18) advises, to adopt new ways of scholarship; to step back from their known ways of doing things, particularly in teaching and research. They should be keen to always look for new connections (discover things); build bridges between theory and practice (integrate and apply knowledge and findings); and communicate their knowledge differently, but effectively, to their students (use innovative ways and trends in teaching). This, coupled with the transition of CUT from a *institution* to a university of technology (UoT), mandates that academic work be research-informed; that teaching and learning practices be research-oriented; and that curriculum is both research-based and research-led. The scholarship of teaching and learning at CUT is promoted through:

- Our annual Vice-Chancellor's Teaching Awards, which acknowledge and celebrate vibrant, innovative and reflective teaching, whilst instilling growth and excellence among academic staff. Academics develop teaching portfolios as evidence of attendance of professional courses aimed at improving teaching and learning. Teaching awards acknowledge excellence in teaching and curriculum and community engagement among novice, middle and advanced academics. The institutional policy for VC's Awards has recently been reviewed. Our academics are also encouraged to compete with their peers by participating in the National Teaching and Learning Awards.
- This year, a colloquium on sharing best practice in teaching and learning was held for the first time. This will be an annual event at which exceptional academics share their best practices in academic work with the rest of the university community.
- Academics are encouraged to attend and present scholarly papers based on their teaching practices at conferences that focus on and promote teaching and learning, such as the Higher Education Learning and Teaching South Africa (HELTASA) Conference.

- The teaching development grants of the Department of Higher Education and Training (DHET) support the development of academics in teaching and learning. Academics are afforded opportunities to obtain industry exposure.

7. IMPLEMENT THE HIGHER EDUCATION QUALIFICATION\$ SUB-FRAMEWORK (HEQSF), AND CURRICULUM DEVELOPMENT AND RENEVAL

Articulation of programmes in Higher Education (HE) and the mobility and transfer of students between programmes and institutions of higher learning were hindered by separate and parallel qualification structures for universities and universities of technology. A programme for the Transformation of Higher Education (Education White Paper 3:1997) acknowledged the need for a single qualification framework for all institutions of higher learning. The HEQF, as promulgated on the 5th of October 2007, and the HEQSF of March 2013 provide the basis for the integration of all higher education qualifications into the National Qualifications Framework (NQF). In turn, the NQF, as assented by the President in the NQF Act (Act No. 67 of 2008) and its structures, provides for standards generation and quality assurance.

Traditional "technikon" qualifications such as national higher certificates; national diplomas; baccalaureus technologiae; magister and doctoral technologiae degrees are not aligned with the HEQSF. These qualifications should be replaced by certificates, diplomas and degrees as indicated in the HEQSF. The new diploma is pegged at level 6 of the HEQSF, which means that even the national diploma should be redesigned to meet the requirements of the HEQSF.

The Central University of Technology, Free State (CUT) proposes to follow a holistic approach towards the renewal and alignment of its qualifications with the HEQSF. In 2010/11, it introduced the Strategic Transformation of Educational Programmes and Structures (STEPS) project to facilitate such an alignment process.

Currently, a curriculum renewal strategy has been developed to inform the implementation process of aligning the renewed curriculum with the plan. Such a strategy incorporates the conceptualisation and development of new programmes. In addition, the strategy elucidates on the re-curriculum process of all existing programmes, to ensure that they are also aligned with the HEQSF.

8. CREATEA TECHNOLOGY-RICH EDUCATION ENVIRONMENT

The Centre for e-Learning and Educational Technology (CeLET) promotes and supports the use of electronic and other educational technology in learning and teaching at CUT. One of the goals of CUT is to promote student access through all our activities, in particular by using information technology to enhance the student learning environment. CeLET therefore focuses on the empowerment of lecturers and students; the enhancement of learning content through educational technologies; and the creation of technology-rich classrooms to promote interactive learning environments.

The focus is on managing the learning process and delivering content by electronic means (blended-learning programme delivery). Lecturers are encouraged to use electronic delivery means in the mainstream curriculum, and to support this with e-learning. The contact time of face-to-face sessions can be reduced if some parts of the course are presented electronically. The aim is to establish an interactive learning environment where students can freely engage with each other, the learning material and their lecturers without the confinements of space and time, both on or off campus.

An ever-changing and developing technology world places high demands on a university of technology to stay at the forefront of using appropriate educational technologies effectively. The goal is therefore to have educational technologies in every classroom, and to develop access points on the campus where students and lecturers can benefit from the use of digital communication through the internet for the interactive collaboration between students amongst themselves and with their lecturers.

Other strategies aimed at creating a technology-rich teaching and learning environment include:

- Setting up Smart Classrooms/interactive classrooms for all four faculties and the Welkom campus. One such classroom has been launched for the Hotel School. The technology installed in this classroom allows interactive teaching and learning within the class and between the students in the classroom and the kitchen, which cannot accommodate large numbers of students.
- The university is also embarking on a wireless project to ensure that students can use any space on campus and in the residences as a learning space.

The new Academic Student Support Centre provides ample learning space, computers, a fully equipped reading laboratory and a unit for students with disabilities.

9. PROMOTE AND DEVELOP WORK-INTEGRATED LEARNING OPPORTUNITIES

Work-integrated Learning (WIL) is an educational approach to learning in the workplace that is industry-based and curriculum-driven. It provides for credit-bearing learning experiences that are negotiated and structured; planned, monitored and assessed at the correct NQF level to ensure integration with the curriculum outcomes of the entire qualification.

WIL can be described as a more powerful learning experience than classroom-based learning. It includes combinations of theoretical learning, problem-based learning, project-based learning and work-based learning. It is a distinguishing feature of education in a university of [technology](#) and offers a holistic approach to education by equipping students not only with the necessary theoretical background, but also with the opportunity to apply the theoretical concepts in practice, to enable them to develop the concomitant skills required for entry into the workforce upon graduation.

The future entails adherence to, among other imperatives, the skills development and national human resources needs; HEQSF, STEPS; and Vision 2020, which require that WIL be implemented in all instructional programmes at CUT at diploma level. Renewing our curricula and establishing appropriate structures, processes and a sufficient number of workplaces in this regard do create opportunities and challenges. The first research and benchmarking on resource implications for the inclusion of WIL were undertaken, and a workload model was subsequently developed to accurately determine the workload involved as well as the resources required for the effective implementation of comprehensive WIL in identified programmes. Currently, 35 programmes have completed workshops on the inclusion of WIL in the [curriculum](#), and have developed and submitted implementation plans. All this work forms the basis for development of new programmes and the [re-~~curriculum~~](#) of old ones.

An important role of the office of WIL and Skills Development is to ensure that students access work placements in order to gain work experience; complete their qualifications; and are employment. Every year, all students who should do WIL are placed, with the exception of one programme, Electrical Engineering: Heavy Current that experiences challenges.

10. ENHANCE AND PROVIDE CAREER DEVELOPMENT AND EMPLOYMENT OPPORTUNITIES FOR STUDENTS

Career development training focuses on providing labour-related information and job-hunting skills to all CUT students and graduates. Students are encouraged to commence with career development training as early as their first year. These training sessions are presented as part of formal class periods, during lunchtime presentations, and on a one-on-one basis on both campuses.

The career development training equips students and graduates with the necessary skills and competencies to successfully compete in the growing and highly competitive labour market. It also connects them with employers in the different sectors of the economy in a process to reduce the unemployment rate amongst CUT students. The graduate recruitment programme allows students to develop effective networks; enhance their professional and industry interaction; and broaden their vision and thoughts beyond the boundaries of a specific qualification.

Expansion of the services of the Careers Office includes:

- Career development training/job-hunting skills in all academic programmes as an essential part of work-integrated learning.
- A well-equipped careers library to assist students in their company research and preparation to enter the world of work.
- The use of Blackboard in career development training.
- An electronic CV and employer database.
- An online Career Portal on the CUT webpage.
- Using social network/a blog to communicate career information to students/graduates.

Each year, two successful Career Fairs are held, one at the Welkom campus and one at the Bloemfontein campus. This presents an opportunity for CUT students to explore and negotiate work placements, work-integrated learning and internships. In 2012, the Career Fair attracted 38 employers, and 2 488 students participated. This year, the number of interested employers increased.

11. DEVELOP AND PROMOTE COMMUNITY ENGAGEMENT THROUGH SERVICE LEARNING

Community engagement is commonly known as the active interaction between the university and its communities. The basis of this interaction is the university's knowledge, practice and innovation. This is a process of mutual sharing and learning for the university and its students (CE Brochure; CUT 2010). The community is seen as equal partners in this process, and is not assigned the status of beneficiaries.

The HEQC (2004:24) defines community engagements:

"...initiatives and processes through which the expertise of the higher education institution in the areas of teaching and research is applied to address issues relevant to its community". The HEQC (2004:27) furthermore indicates that community engagement can take many forms, ranging from informal and relatively unstructured activities to more formal and structured academic programmes (such as service learning) that focus on specific community needs.

Therefore, CUT engages with the community on the basis of this approach; teaching and learning philosophy and practice; research; and innovation and technology transfer programmes. It is for the benefit of the graduates produced for the workplace, society and the university. Knowledge is generated and learning is enhanced. Simultaneously, partnerships with business, industry and government are strengthened.

- Community engagement should be rolled-out via the curriculum at both undergraduate and postgraduate level.
- Service learning and WIL are powerful curriculum strategies to deliver on community engagement.
- Community engagement projects should be rolled-out via a triple-helix approach (university/business and industry together with the community (CE Brochure, 2010)).
- CE projects should encompass one of the following components of CE: Research, service learning, work-integrated learning; incubation; innovation and/or professional engagement.

In order to achieve the objectives as laid out in Vision 2020, the below-mentioned categories of community engagement are advocated at CUT:

- Community engagement (CE) and teaching and learning (TL) (curriculum-related engagement (service learning and WIL)
- Professional development
- CE and innovation
- CE, TL, research and innovation
- TL; research and CE

At CUT, community engagement is not be viewed as an "add-on", but rather as an activity that can be integrated into the curricula.

Service learning is conceptualised as a form of experiential education and as a collaborative teaching and learning strategy designed to promote students' academic enhancement, personal growth and social responsibility. CUT supports the philosophy of reciprocity in the social

and educational exchange between the student and the community, and therefore views Service Learning (SL) as pedagogy as fostering the deep learning of students, while rendering a service to the community.

The design of Community Service Learning (CLS) often poses challenges due to the complex nature of the planning, implementation, monitoring and evaluation thereof, and for that reason it is gradually growing at CUT. CSL is often viewed as a "bolt-on", "one-shot" module to satisfy the credit-bearing needs of the programme in which it is offered. Instead, CSL should be a continuous experience throughout the year, integrated and directly related to course content.

A CSL experience cannot have a blind origin, but asks for intense research to explore opportunities where reciprocal learning can take place – service contribution vs. meets curricular objectives. It is imperative that CSL is not designed in isolation, and that it includes collaboration among faculty, community partners, and students. A key focus area should be the orientation of lecturers involved to develop a positive mindset toward CSL implementation in curricula.

PART B: TEACHING AND LEARNING STRATEGIC PLAN

1. PROMOTING ACCESS AND RETENTION

1.1. The teaching and learning environment

Goal	Objective	Strategies/Activities	Performance Indicators	Responsibility	Performance Targets									
					2014	2015	2016	2017	2018	2019	2020			
Goal 1: Create an enabling environment that fosters and supports teaching and learning	Ensure that the Faculties have appropriate physical and technological infrastructure and systems that support teaching and learning	• Install wireless connection	Wireless connection operational	ConTech										
		• Evaluate the effectiveness of the wireless connection	Evaluation report	ConTech			1							
		• Develop various technologies for advancement of blended and online learning systems	e-learning technologies developed	Co-ET			20%	20%						
		• Equip all lecture rooms in Bloemfontein and Mankweng campuses with state-of-the-art technologies (Active Learning Centres/Smart classrooms) to enhance and support educational technology	Lecture rooms equipped with state-of-the-art technologies	Co-ET					10 classrooms - BPh					
		• Provide academic staff members with a computer/laptop	All academics provided with laptops/computers	ConTech					All lecturers					
		• Upgrade computers in the Bloemfontein and Mankweng Libraries	Number of computers upgraded	ConTech										

The teaching and learning environment

Goal	Objective	Strategies/Activities	Performance Indicators	Responsibility	Performance Targets									
					2014	2015	2016	2017	2018	2019	2020			
Goal 1: Create an enabling environment that fosters and supports teaching and learning	Create a culture that encourages academic and support staff as well as students to reach their full potential	Develop lecturer self-evaluation mechanisms	Self-evaluations included in teaching portfolio	Faculties	1	2	3							
			1 student feedback of lecturer per semester	*	1	2	3							
		Improve students' pass rate and graduation rate	Pass rate and graduation rate improved	Faculties/ACS	2020	2023	3442 graduation rate							
			*	74.94%	75.55%	76.05% pass rate								
		Conduct annual surveys on the quality of teaching and learning. Use client feedback to enhance quality	Number of surveys conducted	Academic Planning Unit			1							
	Create a culture conducive to academic collaboration and innovation	Organise and convene workshops, seminars and colloquia	Number of workshops, seminars and colloquia conducted	ACS/Faculties/HRD			5							
			Number of Lecturing staff trained on Blackboard (Moodle and perForm)	CG/UT										
	Provide access to quality information resources	Ensure that teaching and learning material including text books are upgraded continuously	Yearly CA of T + L material (allocations at programme planning)	US										
			Amount secured	US										
		Review the Personal Information Management Module (PIM) and ensure full participation by all first-year students	Number of first-year students participating	US										

1.2. Promote access and improve retention of students

Goal	Objective	Strategies/Activities	Performance Indicators	Responsibility	Performance Targets							
					2014	2015	2016	2017	2018	2019	2020	
Goal 1: Improve access and retention of students	Identify, evaluate and address impediments to access and retention of students	Identify and address barriers to student success through research		CU/Academic Planning/Faculties								
			Provide appropriate academic support to all students	Number of academic interventions provided	PIMP/ST/ILLNESS							
		Review and implement student compulsory class attendance policy	Evaluation report	Registrar								
		Establish a monitoring process within each Faculty and programme to identify 'at-risk' students	Normal list of all the students available after assessment	Faculties								
		Encourage and enhance participation in SI & Peer Mentoring Programme through early detection of 'at-risk' students in all faculties and programmes	SI & Peer Mentoring Programme in all the at risk modules available	Faculties								
			SI & Peer Mentoring Programme listed on the timetable	Faculties								
		Monitor 'at-risk' students attendance of SI & Peer Mentoring Programme classes	Attendance and evaluation reports									
		Review and improve orientation initiatives by student services and faculties	Evaluation report and number of initiatives employed	Registrar								
		Review and implement rigorous student recruitment strategies	Number of strategies implemented	Faculties/Marketing								
		Investigate and use national benchmark tests for placement of students into appropriate mainstream academic programmes. Diversified Curriculum Programmes and academic support programmes	Evaluation report and number of students appropriately placed	Registrar								
		Encourage academics to benchmark and share best practices among CUT academics and external experts in teaching and learning	Number of SoTL sessions planned	Faculties/CU								
		Improve first-year student experience through a student mentorship programme	Number of students participating in mentorship programme	Faculties								
Enhance support programmes for students with special needs	CU											
Reduce the students' dropout rate		Faculties										

1.2 Promote Access and improve Retention of students

Goal	Objective	Strategies/Activities	Performance Indicators	Responsibility	Performance Targets						
					2014	2015	2016	2017	2018	2019	
Goal 2: To develop and design a credit-bearing core curriculum with explicit emphasis on generic skills and graduate attributes	Expand and improve the academic writing programme enhance the numeracy competence levels of CUT students	Offer module in academic literacy and communication studies in all faculties	Number of students registered and trained on academic literacy and communication studies	Faculty of Humanities							
		Ensure that academic writing is credit-bearing and actively learning		CCD							
		Ensure that academic writing module addresses the ten CUT graduate attributes	Graduate attributes integrated in academic writing module	CTU/CCD							
		Develop and introduce a module in numeracy proficiency as part of the CUT Core Curriculum	Module on numeracy proficiency produced	CCD/Faculties							
Ensure that students have numeracy computer skills	Develop and introduce computer literacy course/module (Digital Literacy) as part of the CUT core curriculum	Develop and introduce computer literacy module developed	Computer literacy module developed	CCD/Faculties							
		Develop and introduce life skills module as part of a core curriculum	Life skills module developed and introduced	CCD							
Goal 3: To provide access to first year students who do not meet admission requirements into mainstream programmes	Support underprepared students through extended curriculum programmes (ECPs)	Place students in ECP based on HET scores	HET results used to place students	Registrar/Faculties							
		Develop and introduce bridging programmes/learner preparatory programmes in collaboration with other Higher Education Institutions (traditional universities, UoTs and FET Colleges)		CCD/Faculties							

1. Assessment and moderation practice

Goal	Objective	Strategies/Activities	Performance Indicators	Responsibility	Performance Targets			Detailed comments on achieved targets
					2014	2015	2016	
Goal 1: To enhance the quality and rigour of assessment and moderation practice	Maintain high academic standards sustained by quality teaching (academic assessment) and moderation practice	Review and ensure the correct implementation of the assessment and moderation practice	<ul style="list-style-type: none"> CC and moderation of assessments Use of LS19.2 with assessment 	Faculties/Academic Planning				
		Ensure the implementation of assessment and moderation processes that are reliable, appropriate, valid and practical	Ensure that assessment follows guides and enhance/reinforce learning and achievement of outcomes	Faculties/CCD				
		Develop and implement an assessment module that focuses on assessment of teaching and learning for academic staff in a University of Technology		CCD				
		Ensure that learning material reflects constructive alignment of learning outcomes, activities and assessment criteria	Cross programme audits in the Faculties (per year)	CCD/Faculties				
		Ensure that academic use integrated assessment methodologies	<ul style="list-style-type: none"> Teaching portfolios with supporting evidence OC of question papers (evidence on the papers) To focus group per year group 	CCD/Faculties				All lecturers
To recognise and support quality teaching	Ensure that all lecturing staff acquire teaching and learning assessment skills	Enrol all lecturing staff for modules in teaching and learning assessment skills (if available)	Number of lecturing staff completed modules in teaching and learning assessment skills	Faculties/CTL				

2. Ensure the distinctiveness of the CUT graduate

Goal	Objective	Strategies/Activities	Performance Indicators	Responsibility	Performance Targets			Detailed comments on achieved targets.
					2014	2015	2016	
Goal: To review, develop and integrate CUT graduate attributes for the world of work.	Ensure that graduate attributes and critical cross-field outcomes are embedded in all teaching and learning activities	Develop CUT graduate attributes in accordance with the new CUT vision, STPS, national policies and market needs.	10 Graduate attributes developed and approved by Senate.	CTL				
		Integrate graduate attributes in new and re- existing programmes		CCO / Faculties				
		Evaluate acquisition and achievement of graduate attributes.	Evaluation report.	CTL / Faculties	1			
		Ensure that course outcomes address work integrated learning (WIL).	Learning guide	CCO/WL/Faculties				
		Introduce a system for development of student e-portfolio on graduate attributes.	Number of e-portfolio created.	CCO/HR		85% by year 1	100% of markers	
		Include stakeholder input into re- existing development and design of new programmes.	Advisory committee meetings (4) minutes	Faculties through Advisory Committees.				
		Ensure that WIL is embedded in all teaching and learning programmes at the diploma level.	Learning guides + calendar indicating WIL credit	CCO/WL/Faculties				
		Ensure that WIL is credit-bearing		CCO/WL/Faculties				
		Negotiate WIL placements for students work experience.		WL / Faculties				
		Ensure that all students who need WIL are placed in appropriate workplaces and are monitored and assessed.	Number of students placed on WIL	WL / Faculties				
Ensure that the development of graduate attributes underpins the entire student experience.		Promote development and acquisition of graduate attributes through extra-curricular activities, sporting activities, projects, and a supportive institutional environment.	Service learning module reflection report	CTL/Student Services / Faculties		1		

2. PROMOTING A STUDENT-CENTRED APPROACH TO TEACHING AND LEARNING

Goal	Objective	Strategies/Activities	Performance Indicators	Responsibility	Performance Targets			Detailed comments on achieved targets.
					2014	2015	2016	
To implement a student-centred approach (SCA) to education	Create an environment supportive to teaching and learning.	Research/benchmark national/international trends on student-centredness	A number of best practices	Faculties/CTL				
		Implement large class support initiatives to improve student/lecturer engagement.	Number and nature of initiatives implemented.	Faculties			4	

3. ENHANCING STAFF DEVELOPMENT AND PROMOTING THE SCHOLARSHIP OF TEACHING AND LEARNING

Goal	Objective	Strategies/Activities	Performance Indicators	Responsibility	Performance Targets			Detailed comments on achieved targets.
					2014	2015	2016	
To enhance staff training and development	Provide professional training and development initiatives to full-time and part-time academic staff	Provide induction for all lecturing academic staff	Number of academic staff inducted.	CCO / HR				
		Ensure that academic staff have developmental plans.	Number of developmental plans	HR & HODs				
		Enrol all new academics (without teaching background) in credit-bearing teaching and learning modules.		HRD/Faculties				
		Increase the number of staff with master's and doctoral degrees in the field of their studies	Number of staff completed master's degrees Number of staff completed doctoral degrees	Faculties/RSI Faculties/RSI				
		Provide workshops, seminars and conference opportunities for all academic staff	Number of workshops/seminars conducted.	Faculties / RSU / ACS				
		Invite renowned guest lecturers and experts to share teaching and learning best practices to academic staff.	Number of best practices introduced.	ACS/Faculties				
		Implement a sound reward system to recognize high quality staff involved in the scholarship of teaching and learning.		CTL/Faculties				

Goal	Objective	Strategies/Activities	Performance Indicators	Responsibility	Performance Targets			Detailed comments on achieved targets.
					2014	2015	2016	
	Provide professional training and	Support staff to write teaching and learning related papers for conferences	Number of articles published.	ACSR/RSI/Faculties				

To enhance staff learning and development	development initiatives to full-time and part-time academic staff	and publication in order to increase research output							
		• Support all academic staff to collaborate with other staff for sharing of best practices		Faculties					
		• Provide a leadership programme for academic staff		CTL, HR/Faculties					
		• Implement a mentoring programme for novice, younger members and designated senior senior staff to enhance their teaching and learning practices	CCD- 10-Mentors need a budget	Faculties					
		• Conduct training and development for all academic staff	Number of academics trained	CTL/ACSHRD					
Promote the scholarship of teaching and learning	Provide opportunities for researching, our practice and sharing of best practices among CUT academics and with external experts	• Convene forums, seminars and annual colloquium on teaching and learning	Number of seminars and colloquium held	ACS					
		• Encourage collaboration with other units on teaching and learning issues and programmes		ACS/ Faculties					
		• Encourage faculty participation in the Southern Africa Technology Network (SATN) committees	Number of staff members participating in SATN programmes	ACS/ Faculties					
		• Encourage staff participation in international teaching and learning exchange programmes	Number of staff members participating in international exchange programmes	Faculties/International Office					
		• Encourage academic staff participation and presentation of scholarly papers at conferences focusing on teaching and learning, e.g. H<A&A, SATN and SACS, etc.	Number of academic staff presenting at conferences	Faculties/ACS					

4. IMPLEMENTATION OF THE HIGHER EDUCATION QUALIFICATIONS SUB-FRAMEWORK, CURRICULUM DEVELOPMENT AND RENEWAL

4.1 Roll-out of HECSF

Goal	Objective	Strategies/Activities	Performance Indicators	Responsibility	Performance Targets	Detailed comments on achieved targets
					2014 2015 2016	

Plan and oversee the alignment of all newly designed and developed learning programmes	Provide training and support in the alignment of all new teaching and learning materials	• Coordinate and implement development of academic and academic developers in accordance with the identified needs	Number of academic and academic developers registered for PGDMS	ACS (CCD) /HRD		4	7	
		• Monitor and evaluate the impact of HECSF and CHS processes in teaching and learning	Evaluation report	Academic planning unit				

4.2 ~~Resources~~ and alignment

Goal	Objective	Strategies/Activities	Performance Indicators	Responsibility	Performance Targets	Detailed comments on achieved targets
Plan and oversee the alignment of all newly designed and developed learning programmes	Provide training and support in the alignment of all new teaching and learning materials	• Develop a strategy for curriculum renewal (suppose and renewal)	Resources strategy developed	CCD	2014 2015 2016	
		• Conduct training for development of learning programme developers in accordance with identified needs	Number of staff trained on identified needs	CCD		
		• Review and align all UP's with HECSF/Valor 2021, CUT's strategic priorities and ALMCS outcomes	Evaluation reports	CCD		

4. Programme design and development

Goal	Objective	Strategies/Activities	Performance Indicators	Responsibility	Performance Targets			Detailed comments on achieved targets.
					2014	2015	2016	
Align all programme design activities with the requirements of CHET, CHS and SACA	Provide continuous leadership, guidance and support to ensure an even rollout of the alignment process	<ul style="list-style-type: none"> Ensure programme alignment with the requirements of CHET, CHS and SACA Facilitate alignment of all LPs with CUT's strategic profiles. 		<ul style="list-style-type: none"> CCD 				
		<ul style="list-style-type: none"> Oversee design, development and implementation of all LPs 		<ul style="list-style-type: none"> CCD 				

To implement new technologies	Ensure the usage of digital resources, recorders and other mobile technologies	<ul style="list-style-type: none"> Record lectures in class for students to access from all learning spaces, including homes, workplaces and libraries 		<ul style="list-style-type: none"> CCAT 				
		<ul style="list-style-type: none"> Encourage the use of online (interactive mobile learning) to promote technology integration and assessment in large classes. 		<ul style="list-style-type: none"> CCAT/Faculties 				
		<ul style="list-style-type: none"> Introduce e-portfolios to support the graduate attributes project. 		<ul style="list-style-type: none"> ACS/CCAT 				
		<ul style="list-style-type: none"> Create a technology rich active learning class environment. 		<ul style="list-style-type: none"> CTU/CCAT 				
		<ul style="list-style-type: none"> Establish active learning demonstration classrooms for each Faculty and for the Willem Campus. 		<ul style="list-style-type: none"> CCAT 				
To do research into new educational technologies		<ul style="list-style-type: none"> Implement mobile learning, PC Tablets (I-Pads, etc.) and other new technologies 		<ul style="list-style-type: none"> CCAT 				

5. CREATING A TECHNOLOGY RICH EDUCATIONAL ENVIRONMENT

Goal	Objective	Strategies/Activities	Performance Indicators	Responsibility	Performance Targets			Detailed comments on achieved targets.
					2014	2015	2016	
To implement e-learning by using Blackboard	<ul style="list-style-type: none"> Ensure sufficient server hardware Ensure effective server maintenance and administration 	<ul style="list-style-type: none"> Install and maintain appropriate hardware Use maintenance contract to provide maintenance 		<ul style="list-style-type: none"> ConTech 				
	Implement and review impact of Blackboard on teaching and learning	<ul style="list-style-type: none"> Blackboard Community System implemented in all programmes 	Number conducted	<ul style="list-style-type: none"> evaluations 	<ul style="list-style-type: none"> CCAT 			
	Train and capacitate academic staff	<ul style="list-style-type: none"> Conduct training workshops for lecturers technology 			<ul style="list-style-type: none"> ACS/CCAT 			
		<ul style="list-style-type: none"> Ensure individual supportive training for lecturers 			<ul style="list-style-type: none"> CCAT 			
To upgrade educational technology in classrooms	Develop a technology rich classroom environment	<ul style="list-style-type: none"> Install basic technologies (data projectors and IP Lincos etc) in all classrooms 			<ul style="list-style-type: none"> ConTech 			
		<ul style="list-style-type: none"> Install network ports in all classrooms 			<ul style="list-style-type: none"> ConTech 			
		<ul style="list-style-type: none"> Ensure campus wide wireless access 			<ul style="list-style-type: none"> ConTech 			
		<ul style="list-style-type: none"> Provide video and audio recording equipment for recording of learning materials 			<ul style="list-style-type: none"> ConTech 			

6. PROMOTE AND ENHANCE WORK-INTEGRATED LEARNING OPPORTUNITIES

Goal	Objective	Strategies/Activities	Performance Indicators	Responsibility	Performance Targets			Detailed comments on achieved targets.
					2014	2015	2016	
To facilitate a student-centred approach to education	Implement comprehensive and quality WIL at CUT	<ul style="list-style-type: none"> Integrate WIL into academic programmes at the diploma level as part of <u>recalculation process</u>. 		WL / COO / Faculties				
		<ul style="list-style-type: none"> Align the WIL component of each learning programme according to HQSOP criteria. 	WIL and learning guides	ACS (WIL / COO) / Faculties				
		<ul style="list-style-type: none"> Promote other forms of WIL, e.g. simulation and project-based learning. 	WIL and learning guides	WIL / Faculties				
		<ul style="list-style-type: none"> Ensure that all students meeting work experience to complete their qualifications get work placement. 	Number of students with work placements.	WIL / Faculties				
Establish and maintain relationships with SGTAs and employers for student financial support and WIL placements		<ul style="list-style-type: none"> Source funding from SGTAs for students internships and WIL. 		WIL / Faculties				
		<ul style="list-style-type: none"> Provide training to staff in accordance with WIL needs. 		ACS (WIL)				
		<ul style="list-style-type: none"> Provide academics with industry exposure through staff placements. 	Number of staff exposed to industry.	Faculties			22	

36

7. ENHANCE AND PROVIDE CAREER DEVELOPMENT AND EMPLOYMENT OPPORTUNITIES

Goal	Objective	Strategies/Activities	Performance Indicators	Responsibility	Performance Targets			Detailed comments on achieved targets.
					2014	2015	2016	
To facilitate a student-centred approach to education	Provide professional career development training to students	<ul style="list-style-type: none"> Facilitate and present training sessions in job hunting skills to all students 		WL				
		<ul style="list-style-type: none"> Provide career development training/job hunting skills in all programmes as an essential part of Work Integrated Learning 		WL				
		<ul style="list-style-type: none"> Use a social networking to communicate career information to students/graduates 		WL				
		<ul style="list-style-type: none"> Use and link students/graduates with industry. 		WIL / Faculties				
		<ul style="list-style-type: none"> Establish a well-equipped careers library to assist students in their company research and preparation to enter the world of work. 		LIS				
		<ul style="list-style-type: none"> Develop and monitor the use of a career portal on CUT website 		WL				

37

1. DEVELOP AND PROMOTE COMMUNITY ENGAGEMENT THROUGH SERVICE/LEARNING

Goal	Objective	Strategies/Activities	Performance Indicators	Responsibility	Performance Targets			Detailed comments on achieved targets.
					2014	2015	2016	
To implement effective and efficient CS, outreach & LP design strategies	Provide orientation on Community Service Learning practices	<ul style="list-style-type: none"> Advocate compulsory implementation of CS in all LPs Conduct needs analysis in communities 	<ul style="list-style-type: none"> Service learning in different programmes 	CCO / Faculties / RM				
	Identification of community needs	<ul style="list-style-type: none"> Establish and maintain relationships with communities for possible collaboration 		Faculties / RM				
	Facilitate academic staff learning in the design of CS components	<ul style="list-style-type: none"> Align CSL component of each programme with requirements and standards set by HECDEP and CUT Align the community's needs with curricular content 	<ul style="list-style-type: none"> SL module in learning guide Learning guides and reports of meeting with service provider 	CCO / Faculties				
		<ul style="list-style-type: none"> Drawn inclusion in the curriculum of community projects aimed at sustainable development 	<ul style="list-style-type: none"> SL module in learning guide 	CCO / Faculties				
		<ul style="list-style-type: none"> Implement and monitor learning and learning material inclusive of and for promotion of sustainable development. 		Faculties / RM / CCO				
	Regularly implement and monitor CSL for sustainable development							

2. CONCLUDING REMARKS

The implementation of the Teaching and Learning Strategy/Plan is the responsibility of the entire CUT community, and the faculties will be expected to develop faculty plans in line with this institutional Teaching and Learning Strategy/Plan. The deans will ensure that the plan is consulted with, and implemented by, all the relevant stakeholders in their respective faculties. All the managers responsible for the implementation of this plan are expected to conduct meetings for purposes of discussing progress with implementation and subsequently provide quarterly.

APPENDIX 4



Vision 2020 and Beyond

What has been achieved in previous years

- From 2012 – 2015, we have focused on the Academic Project, in order to improve the relevance and impact and enhance the quality of our learning, teaching, research and innovation practices.
- We have embraced the 2016 theme of “The Year of Innovation and Entrepreneurship” (PDF) with many accolades and achievements – to such an extent that the Department of Higher Education and Training (DHET) recently indicated that the Central University of Technology, Free State (CUT) is
- The theme for 2017 was “The Year of the Human Project” (PDF), focusing on staff, students and other stakeholders, and enhancing the human reconciliation drive. A number of outcomes were achieved in 2017
- The theme for 2018 was "Reimagining CUT: Embracing Servant Leadership" (PDF). Servant leadership is a philosophy and set of practices that enrich the lives of individuals, build better organisations, and ultimately create a more just and caring world. It is a blend and balance between leader and servant. You do not lose leadership qualities when you become a servant leader; instead, you are leading with others in mind.

What to expect going forward

The following special project for the **next five years** was approved in September 2017: **“Reimagining CUT as a transformative University and ‘model’ UoT in Africa, impacting on the socio-economic development of the Central region of South Africa and beyond”**.

This project, founded on our transformation drive and new institutionalism (change), consists of the following **ten focus areas**:

1. Reimagining CUT as a transformative University.
2. Academic excellence promoting entrepreneurial education.

3. Pockets of world-class research programmes.
4. “Model”, vibrant innovation ecosystem in Africa.
5. Engagement and partnerships nationally and internationally (incl. alumni).
6. A sustainable and well-equipped University (smart green campuses and digital transformation).
7. Institutional culture of caring and safety towards holistic development (Human Project Stage 2).
8. Effective and efficient administration and governance.
9. Financial sustainability (running the University as a business).
10. Image of CUT as a University: branding, marketing and communication.

2019: Reimagining CUT: Living our values

Core organisational values are a set of beliefs that specify universal expectations and preferred modes of behaviour in an institution. They point the way to purposeful action and approved behaviour (Kane, 2002:1). Malphurs (2002) defines core values as simply “why we do what we do”. Values are there to be lived! The CUT values:

Integrity

As a campus community, we expect all conduct to be rooted in integrity, mutual respect and civility. We value ethical behaviour in scholarly and other endeavours. Integrity in our context will include the creation of a diverse, collegial scholarly community in which individuals are valued and respected, academic freedom is exercised with intellectual rigour, and high ethical standards and an environment where critical inquiry is encouraged are upheld. As our conduct should be rooted in integrity, mutual respect and civility, one can argue that trust and stewardship are integrated in this value. At the same time, accreditation processes that establish integrity as central to educational and institutional quality will be embraced within the CUT. These will be benchmarked against trends in Higher Education in South Africa and Africa, as well as international. Therefore, we behave in an ethical and professional manner; we conduct our activities in an accountable and transparent manner; and we ensure the integrity of our information, systems and processes.

Important questions to be asked: *Do I practice what I preach? Am I ethical and professional? Do I always uphold conduct that is informed by respect, honesty and dignity?*

Diversity

Diversity has several dimensions and these dimensions fall into two primary categories: Social diversity and intellectual diversity. Social diversity means that the composition of our students, as well as our staff, must reflect broad societal characteristics that encompass race, class, multilingualism, ethnicity, national origin, religion, freedom of conscience, gender, sexual orientation, age and ability. Included in this perspective is the fact that the CUT must have no discriminatory practices that will prevent it from bringing together, into

one CUT, all the mentioned varieties and differences of society. If the CUT thus coexists as a microcosm of the larger society in which we live, we will be able to classify ourselves as a diverse institution. Intellectual diversity refers to the broad range of academic programmes, the variety of delivery modes we utilise, a diversity of theoretical approaches, and a broad definition of community service. Central to this value is openness and the continuance of the technology-driven tradition of the CUT. Furthermore, fairness, honesty and objectivity will prevail as the CUT assesses its own policies, practices and behaviours to ensure that it makes credible the actions taken to enhance quality improvement in higher education.

Therefore, we reflect and serve diverse regional, national and global communities; we promote an open society where critical scholarship and the expression of a multiplicity of opinions and experiences are actively encouraged; we foster an environment in which diversity is appreciated, respected and celebrated; and we are committed to accessibility, inclusivity and social justice. Embracing diversity in all its forms and complexity, appreciating the richness and dynamism it brings to the academic project and the broader university life. We should ensure that the institutional culture is welcoming, supportive and inclusive, not alienating. Finally, we need to be conscious of the social injustices and unfairness of the past, as we commit to restore the dignity of every human being at CUT and beyond.

Important questions to be asked: *Do I have an understanding regarding the definition of diversity in my context? Have I created an environment to support diversity?*

Customer service

Key aspects related to customer service are selflessness, responsiveness and accountability. A work ethic that empowers colleagues to be professional in all dealings; to treat people with respect, to have a sense of urgency and agency, and to value their work and expertise required. Therefore, ready to learn new and innovate ways to improve the quality of work and building a culture of following through and remaining accountable to self and others. The CUT will nourish the commitment to provide excellent service by maintaining strong, supportive relationships that are flexible and responsive to the institutional and student needs and to the interests of the broader public/society at large. We will deliver what the customer needs in terms of value, quality and satisfaction. It further means we should deliver the best quality programmes and support to our students and colleagues in an endearing and an empowering manner. It also means we must help one another to grow intellectually and otherwise.

Important questions to be asked: *Would I have been satisfied with the service I have rendered? Do I always place the people I serve first?*

Innovation

We are committed to innovative approaches for achieving our vision and will create a campus environment that encourages and rewards creativity and innovation. The aim is to empower students and staff to trust their creativity and skills to change the world; to motivate them to build the courage and excitement to stretch beyond their limits in technology, finding new ways of practice and design, thereby contributing to social and technological innovation; and to approach each day with a mindset ready to achieve greater heights, change and improve, and contribute to advancements in technology and life.

Important questions to be asked: *Is this the best way/method/process/product? Have I thought about doing it differently? How creative am I? Do I always think of new ideas and approaches to doing things? Have I challenged the status quo?*

Excellence

The CUT aspires to an excellence that is approached through diligent effort, both individual and collective. Pursuing excellence means being satisfied with no less than the highest goals it is possible to envision. We value excellence and innovation inside the classroom and out. Thus, we strive to offer outstanding academic programmes; to foster intellectual inquiry, exploration, and discovery; to transcend traditional boundaries; to apply and perfect knowledge; to encourage creativity; to provide effective tools, technologies and facilities for learning; and to excel in research and scholarly activity, including the “scholarship of teaching and learning” – an area of research that explores how individuals teach and learn.

We recognise and accept the sacrifices, risks and responsibilities involved in pursuing excellence, and so we celebrate one another’s successes. We commit ourselves to this process in an ethical and moral manner. Therefore, we promote, recognise and reward excellence in our teaching, learning, research, engagement and support services; we promote, recognise and reward excellent service delivery to all our stakeholders; we provide a supportive and affirming environment that enables students and staff to reach their full potential; and we adopt innovative approaches to promote excellence in our institutional policies, structures, processes and systems.

Important questions to be asked: *Do I continuously strive to improve on previous efforts? Was this my best effort? Do I strive for excellence at all times and in all that I do?*

The aim is to be true to the CUT brand by living the values we stand for – “walking the talk” honestly and consistently, putting objectivity at the heart of operations, and functioning at all times guided by the highest ethical standards engrained in the culture of the university.



Let us, as the CUT family, embrace this theme in 2019 and live our values!

APPENDIX 5

§ 18.3.14 B

INSTITUTIONAL REGULATORY CODE

Policy Framework	Regulations/rules	
Policy	x Constitution	
Procedure (Manual)	Local document	
Guidelines	Other (name)	

Title: Work Integrated Learning Category: Academic

Approval Authority: Senate

Responsible Officer: Deputy Vice-Chancellor: Teaching and Learning

Designated Officers:
Deputy Director: Work Integrated Learning and Skills Development
Faculty Deans

First approved: 25/08/2014 Last amended: 2014
Effective implementation date: Review date:

Reference number: O.3
Replaced number: E/9.1 Cooperative Education policy: 803.4 Manual for Work-Integrated Learning, 505.33 Accreditation of employers offering Work-Integrated Learning opportunities for CUT students, 503.3 Campus Work by students.

Section reference (please indicate below):

Teaching & Learning	x	Registrar	
Research, Innovation & Engagement		Vice-Chancellor's Office	
Resources and Operations			

Approved by:

Management Committee (Mancom) Resolution: _____	Council	
Approval date: _____	Resolution: _____	
Signature of approval: _____	Approval date: _____	
Senate	Signature of approval: _____	
Resolution: _____	Executive in charge	
Approval date: _____	Approval date: _____	

Page 1 of 5

Signature of approval:		Signature of approval:	
------------------------	--	------------------------	--

INSTITUTIONAL POLICY TEMPLATE

1. POLICY STATEMENT (REASON, NATURE AND OBJECTIVES)

To describe the scope of work for the implementation, functioning and maintenance of Work-Integrated Learning ("WIL").

2. DEFINITIONS & ABBREVIATIONS

2.1 **Co-operative Education** is a philosophy of learning that promotes the concept of enhanced learning based on the co-operation between education institutions, industry, commerce and the public sector (HEQC 2004).

2.2 **Work-Integrated Learning** is a term used to describe a range of approaches, strategies and methods used to meaningfully integrate theory with practices of the workplace within a purposefully designed curriculum. It makes provision for four curricular modalities, namely workplace or work-based learning in the workplace, work-directed theoretical learning (for example Mathematics for mechanical engineering instead of generic mathematics), problem-based learning, project-based learning as well as simulations.

2.3 **Placement Position** is a workstation or temporary position at a company or institution, where students are placed for periods of WIL.

2.4 **Problem-based learning (PBL)** is used for a range of pedagogic approaches that encourage students to learn through the structured exploration of a research or practice-based problem. In PBL, students work in small self-directed groups to define, carry out and reflect upon a task, which is usually related to, or based on, a 'real-life' problem (CHE 2011:74).

2.5 **Project-based learning (PJBL)** combines PBL and workplace learning in that it brings together intellectual inquiry, real-world problems, and student engagement in relevant and meaningful work. Project work is generally understood to facilitate students' understanding of essential concepts and practical skills (CHE 2011:75).

Page 2 of 5

2.6 **Simulated learning** occurs when learning is stimulated through an activity that involves the imitation of the real world in the academy. The act of simulating something entails representing certain key characteristics of the selected workplace and includes such things as laboratories, patient models, mock meetings, flight simulations etc. (CHE 2011:76).

3. PURPOSE OF THE POLICY

To provide a framework for WIL at the Central University of Technology, Free State ("CUT") for the enhancement of producing quality social and technological innovations in socio-economic developments, primarily in the central region of South Africa.

4. SCOPE AND APPLICATION

4.1 The implementation of comprehensive WIL is required, without exception, at a suitable juncture in every qualification in every Faculty (Directions document Version 4 – Next steps in the STEPS process). A minimum of 30 (thirty) credits must be allocated for WIL (for qualifications which are 3 (three) years in duration or longer) and must consist of an approved placement in a workplace environment (Workplace-based learning) of at least 3 (three) months or problem-based learning and/or project-based learning and/or simulations as well as a WIL preparation module with generic and specific workplace skills. Every qualification must include a code of conduct that students must adhere to during WIL. Refer to the WIL Procedure for a generic code of conduct that contains compulsory information that must be included in every programme's own code of conduct.

4.2 Although the emphasis is on workplace-based learning a WIL module may include the other modalities of WIL, such as problem-based learning, project-based learning as well as simulations, as electives within the WIL module.

5. THE APPROACH AND PHILOSOPHY/ PRINCIPLES

5.1 The Higher Education Qualifications Sub-Framework (HEQSF 2013: 11) states that: "WIL may take various forms including simulated learning, work-directed theoretical learning, problem-based learning, project-based learning and workplace-based learning". "Where the entire WIL component or any part of it takes the form of workplace-based learning, it is the responsibility of institutions that offer ~~programmes~~ requiring credits for such learning to place

students into appropriate workplaces. Such workplace-based learning must be appropriately structured, properly supervised and assessed".

5.2 The CHE 2004 provides criteria for programme accreditation in terms of WIL under criterion 15 and the HEQC 2004 indicates the relevant audit criteria for WIL under criterion 7 (iii) and criterion 11 (iv).

5.3 WIL is the distinguishing feature of Universities of Technology and has been practised by the CUT since its inception.

5.4 WIL provides a close link to the vision, mission and strategic operational statements of the CUT to equip students with the necessary knowledge, skills and hands-on experience to prepare employed graduates and entrepreneurs that make an impact on socio-economic development primarily in the central region of South Africa.

5.5 WIL provides a mechanism to approach and forge strategic partnerships with commerce, industry and the public sector to further enhance the relevance of qualifications as well as the employability of students.

6. ROLES AND RESPONSIBILITIES

Refer to the WIL Procedures for a delineation of roles and responsibilities.

7. DELEGATION OF AUTHORITY

The delegations of authority set out in the CUT Delegations Register will apply to this policy.

8. REVIEW OF THE POLICY

Scheduled for 2022 or earlier if changes in circumstances require an earlier review.

9. RELATED DOCUMENTS

The Higher Education Qualifications Sub-Framework (HEQSF)
Council on Higher Education: Work Integrated Learning Good Practice Guide
Higher Education Quality Committee (HEQC): Criteria for Programme Accreditation
HEQC Audits Manual

10. **RESPONSIBLE OFFICER(S)** (Title of applicable senior officer accountable for the implementation of and compliance with the policy)

Deputy Vice-Chancellor: Teaching and Learning

11. **DESIGNATED OFFICER(S)** (Titles of persons responsible for operationalizing the policy)

11.1 Deputy Director: Work Integrated Learning and Skills Development

11.2 Work Integrated Learning Coordinators

11.3 Heads of Departments in faculties

11.4 Lecturers (involved with WIL in faculties)

11.5 Deputy Registrar: Academic Administration

11.6 Deputy Director: Curriculum and Academic Staff Development

APPENDIX 6

§ 18.3.14 C

INSTITUTIONAL REGULATORY CODE

Policy Framework		Regulations/rules	
Policy		Constitution	
Procedure (Manual)	x	Local document	
Guidelines		Other (name)	

Title: Work Integrated Learning Category: Academic

Approval Authority: Senate

Responsible Officer: Deputy Vice-Chancellor: Teaching and Learning

Designated Officers:

Deputy Director: Work Integrated Learning and Skills Development
Faculty Deans

First approved: 25/08/2014

Last amended: 2014

Effective implementation date:

Review date:

Reference number: Q.3

Replaced number: E/9.1 Cooperative Education [policy: 803.4](#) Manual for Work-Integrated Learning, 505.33 Accreditation of employers offering Work-Integrated Learning opportunities for CUT students, 503.3 Campus Work by students.

Section reference (please indicate below):

Teaching & Learning	x	Registrar	
Research, Innovation & Engagement		Vice-Chancellor's Office	
Resources and Operations			

Approved by:

Management Committee (Mancom) <u>Resolution</u> :	Council
Approval date: _____	Resolution: _____
Signature of approval:	Approval date: _____
	Signature of approval: _____

Senate	Executive in charge
Resolution: _____	Approval date: _____
Approval date: _____	Signature of approval: _____
Signature of approval: _____	

INSTITUTIONAL PROCEDURE TEMPLATE

1. STATEMENT (REASON, NATURE AND OBJECTIVES)

To describe the procedures for the implementation, functioning and maintenance of Work-Integrated Learning ("WIL").

2. DEFINITIONS & ABBREVIATIONS

2.1 **Work-Integrated Learning** is a term used to describe a range of approaches, strategies and methods used to meaningfully integrate theory with practices of the workplace within a purposefully designed curriculum. It makes provision for four curricular modalities, namely workplace or work-based learning in the workplace, work-directed theoretical learning (for example Mathematics for mechanical engineering instead of generic mathematics), problem-based learning, project-based learning as well as simulations.

2.2 **Placement Position** is a workstation or temporary position at a company or institution, where students are placed for periods of WIL.

2.3 **Problem-based learning (PBL)** is used for a range of pedagogic approaches that encourage students to learn through the structured exploration of a research or practice-based problem. In PBL, students work in small self-directed groups to define, carry out and reflect upon a task, which is usually related to, or based on, a 'real-life' problem (CHE 2011:74).

2.4 **Project-based learning (PJBL)** combines PBL and workplace learning in that it brings together intellectual inquiry, real-world problems, and student engagement in relevant and meaningful work. Project work is generally understood to facilitate students' understanding of essential concepts and practical skills (CHE 2011:75).

2.5 **Simulated learning** occurs when learning is stimulated through an activity that involves the imitation of the real world in the academy. The act of simulating something entails representing certain key characteristics of the selected workplace and includes such things as laboratories, patient models, mock meetings, flight simulations etc. (CHE 2011:78).

3. PROCEDURES FOR WIL (WITH AN EMPHASIS ON WORKPLACE-BASED LEARNING)

3.1 The Unit for Work-Integrated Learning & Skills Development is primarily responsible for:

- 3.1.1 Promoting WIL by negotiating suitable Placement Positions for students with companies and institutions in collaboration with faculties.
- 3.1.2 Institutional oversight and the drafting and maintenance of policy and procedures regarding WIL at the CUT.
- 3.1.3 Assistance with the development of methods for and the process of monitoring and assessing student progress (visits to students whilst visiting companies to negotiate opportunities for WIL during WIL).
- 3.1.4 The administration of WIL by setting up and maintaining databases of potential Placement Positions and students in such Placement Positions.
- 3.1.5 Assistance provided to academic departments with the drafting of a WIL curriculum as well as guidelines and programmes (logbooks and study guides).
- 3.1.6 Liaising with the various faculties and departments on an on-going basis in order to develop and maintain effective systems of WIL.
- 3.1.7 Assistance to academic departments with the preparation of students for their WIL experience.
- 3.1.8 Approval of employers for WIL in collaboration with academic departments.
- 3.1.9 Meeting with relevant academic staff in academic departments to ensure cohesion and proper coordination of student placements and contact with employers.
- 3.1.10 Maintaining records of visits to employers and students for WIL purposes.

3.1.11 Liaising with national and international organisations such as the Southern African Society for Cooperative Education and the World Association for Cooperative Education.

3.2 Academic departments are primarily responsible for:

- 3.2.1 Drafting of a suitable a WIL curriculum as well as guidelines and programmes (logbooks and study guides) as well as a code of conduct for students who do WIL. Refer to 3.4.9 for a generic code of conduct that contains compulsory information that must be included in every programme's own code of conduct.
- 3.2.2 The registration and identification of students who are to be placed for WIL.
- 3.2.3 Approval of employers for WIL in collaboration with the Unit for WIL & Skills Development.
- 3.2.4 The preparation and regular monitoring of students placed for or engaged in WIL.
- 3.2.5 The assessment of WIL done by students.
- 3.2.6 Keeping record of reports and assessments.
- 3.2.7 Arranging briefing and debriefing sessions with students in collaboration with the Unit for WIL and Skills Development.
- 3.2.8 Meeting with relevant WIL coordinators to ensure cohesion and proper coordination of student placements and contact with employers.
- 3.2.9 Maintaining records of visits to employers and students for WIL purposes

3.3 Students:

- 3.3.1 Must ensure that they receive the prescribed WIL as required by their WIL programmes (logbook or study guide) in consultation with their relevant academic department. Problems experienced must be reported to the relevant head of department and/or WIL coordinator.
- 3.3.2 Must submit reports to their employers and the CUT as part of their assessment.
- 3.3.3 May approach companies to negotiate opportunities for WIL after consultations with the relevant WIL coordinator, but these opportunities are

subject to the approval of the relevant academic department and/or WIL coordinator.

- 3.3.4 In cases where students have been placed for WIL with employers by the Unit for WIL and Skills Development or an academic department and is dismissed by the employer due to misconduct, attitude problems or unsatisfactory work performance, it is incumbent on the student to find further opportunities for WIL where he/she can complete the required WIL. Students' continuation with WIL is then based on approval of the head of academic department. Each case will be dealt with on merit by the head of the academic department in collaboration with the Unit for WIL and Skills Development. Such opportunities will be subject to approval by the relevant head of department in collaboration with the unit for WIL & Skills Development.
- 3.3.5 Must also register for WIL like any other subject. Failure to register will result in the student not receiving credit for the WIL completed.
- 3.3.6 Must register for WIL within 2-4 (two to four) weeks (before or after) commencement of WIL with an employer and provide details such as name of employer, contact person, address, and telephone and fax number to the relevant academic department.
- 3.3.7 May be required to undertake their WIL at a company/organisation outside Mangaung and Matieland, as it is not always possible to accommodate all WIL students within the immediate vicinity of both Bloemfontein and Welkom campuses.
- 3.3.8 Cannot reasonably expect to receive remuneration during this phase of their training, since WIL is a pre-qualification requirement. However, some companies/organisations do offer some form of allowance or wages.
- 3.3.9 Are subject to the rules and regulations of the relevant company/organisation where they do their WIL and must abide by it. Students must also display a positive attitude at all times. Any perceived injustices must be reported to the relevant head of department.
- 3.3.10 Pregnancy may result, where relevant, in the cancellation and/or postponement of a student's WIL placement due to safety and/or operational requirements subject to relevant labour and other applicable legislation.

3.4 General:

- 3.4.1 The insurance portfolio of the CUT makes provision for personal accident cover for all students placed for WIL as well as cover for exposure to the HIV virus resulting from needle prick or bodily fluids in specified programmes of the Faculty of Health and Environmental Sciences.
- 3.4.2 Opportunities for WIL may be advertised on notice boards, by means of electronic and social media, during information sessions to students, announcements in classes or by means dictated by employers.
- 3.4.3 Students apply for positions on the prescribed application forms of employers or by means of a full curriculum vitae as requested by an employer for WIL. Students submit their applications to the Unit for WIL and Skills Development, the relevant academic department or directly to the relevant employer, depending on the requirements of the employer.
- 3.4.4 After the closing date for applications, applications are forwarded to the relevant employers for their consideration. The final decision lies with employers as to which students they are willing to accommodate, if any.
- 3.4.5 Where employers request interviews, interviews are arranged by the Unit for WIL and Skills Development in collaboration with the relevant academic department and staff.
- 3.4.6 In some instructional programmes, academic staff is responsible for the placement of students for WIL due to logistical reasons and/or requirements by the relevant employers and industry. The same process, as outlined above, is followed for the placement of such students. The number of students to be placed and progress made must be reported to the Unit for WIL and Skills Development to enable the Unit for WIL and Skills Development to assist in finding suitable opportunities for WIL, as well as the monitoring of students placed.
- 3.4.7 In cases where academic departments have placed students for WIL, complete information on the placement must be submitted to the Unit for WIL and Skills Development for data and administrative purposes.
- 3.4.8 The closing dates for the submission of WIL marks to the Assessment and Graduation Office are within the first two weeks of August for the Spring (September) graduation ceremony and within the first two weeks of February for the Autumn (March) graduation ceremony.
- 3.4.9 Generic code of conduct

STUDENTS MUST:

- Display a positive attitude at all times:
- show an eagerness to learn as opposed to an attitude of knowing it all;
- execute tasks in an energetic and enthusiastic way – thus be willing to walk the extra mile for the employer – also after hours;
- avoid using telephones, internet, email, etc. for personal purposes without the employer's necessary approval in writing;
- avoid any criticism of the employer as well as gossip, especially with other employees;
- dress properly and appropriately for each day, abiding by the dress code of the employer;
- treat staff of the employer and visitors to the employer with the necessary respect;
- abide the working hours as well as rules and regulations of the employer;
- commit themselves for the full period of WIL at an employer where they have started with WIL. Students are not allowed to move between employers without written approval from the relevant head of department and the employer. This will only be granted if irregularities occurred on the side of the employer.

IT MUST BE NOTED THAT:

- Students' work-integrated learning with the specific employer will be ended in the event of attitude and disciplinary problems, unsatisfactory work performance and any conduct of a student that could cause potential harm to the reputation and image of the employer and CUT as well as failure to comply with any aspect of the code of conduct. Each case will be dealt with on merit by the relevant head of academic department in collaboration with the unit for WIL & Skills Development.
- In such cases, students could fail and have to repeat the WIL instructional offering. It is then incumbent on the student to find further opportunities for WIL where he/she can complete the required WIL. Such opportunities will be subject to approval by the relevant head of department in collaboration with the unit for WIL & Skills Development.

3.5 Approval of employers:

- 3.5.1 Students must complete the WIL component of their programmes at an approved employer, which implies that the employer has been approved by either the Unit for WIL & Skills Development and/or the relevant academic department at the CUT. Complete information regarding approved employers must be made available to the Unit for WIL & Skills Development by the relevant staff at CUT who had done the approval(s).

3.6 Campus work by students:

- 3.6.1 When another education institution approaches the CUT to make its facilities available to students of that institution for purposes of obligatory WIL, the relevant head of the academic department, in collaboration with the Deputy Director: WIL & Skills Development can approve the number of students to be placed for WIL at CUT.
- 3.6.2 All appointments of students as student-assistants, lab-assistants, lecturer-assistants, internships, etc. must be reported to the Careers Office of the Unit for WIL & Skills Development by the relevant staff at CUT who had made the appointments.

3.7 PROCEDURES FOR WIL (WITH AN EMPHASIS ON PROBLEM-BASED LEARNING, PROJECT-BASED LEARNING AS WELL AS SIMULATIONS)

- 3.7.1 The selection of the relevant modality of WIL (PBL, PJBL, Workplace-based Learning or simulations) within a WIL module is subject to the following:
- 3.7.1.1 The modality of WIL selected might be subject to approval by a programme's relevant professional board. Each programme must determine whether this will be acceptable for its relevant professional board.
- 3.7.1.2 A motivation must be provided and approved by senate as part of the approval process of the programme.
- 3.7.1.3 The relevant department must provide a motivation to Senate and include reasons why the specific modality of WIL is proposed.

4. **RESPONSIBLE OFFICER(S)** (Title of applicable senior officer accountable for the implementation of and compliance with the procedure)

Deputy Vice-Chancellor: Teaching and Learning

5. DESIGNATED OFFICER(S) (Titles of persons responsible for operationalizing the procedure)

5.1 Deputy Director: Work Integrated Learning and Skills Development

5.2 Work Integrated Learning Coordinators

5.3 Heads of Departments in faculties

5.4 Lecturers (involved with WIL in faculties)

5.5 Deputy Registrar: Academic Administration

5.6 Deputy Director: Curriculum and Academic Staff Development

6. SIGNATURE(S) OF APPROVAL

(Append signatures of approval on cover page of the procedure.
Initial all pages)

APPENDIX 7:



**Central University of
Technology, Free State**



**UPPSALA
UNIVERSITET**



University of Mauritius

AN INITIATIVE TO DO A COMPARISON BETWEEN CENTRAL UNIVERSITY OF TECHNOLOGY, FREE STATE, RSA. AND UPPSALA UNIVERSITY AND UNIVERSITY OF MAURITIUS LECTURERS: TO BE USED TOWARDS THE FOLLOWING RESEARCH FOCUS:

Developing entrepreneurial skills in Environmental Health at the Central University of Technology, Free State through a novel Challenge-oriented pedagogic approach.

I hereby request permission/ethical clearance to do a survey amongst willing lecturers/academics at Uppsala University, preferably Health Sciences, in an attempt to gather information to make a positive contribution towards the PhD study listed above. The comparative survey will be used towards highlighting areas of need, lacking depth and possible implementation strategies at CUT, Free State.

As South Africa is experiencing an education dilemma, together with severe deterioration in the economy I have opted to attempt an intervention at tertiary education level to try and initiate a remedy for this escalating problem. The chasm between secondary (High School) education and tertiary education has been intensifying in the under preparedness of new University students. This problem creates a snowball effect throughout the qualification time period and is subsequently carried over to industry and the growing un-employability of graduates. Coupled with this dilemma, job creation has suffered tremendously in RSA and Entrepreneurship has been seen as a possible answer to this. The overall question of the research is of course: Will an intervention to the curriculum and methodology of instruction bring about a significant change to this situation, especially in the Health Sciences.

My request for permission would include interviews with the willing participants and the completion of an on-line questionnaire.

I am attaching the following:

An overview of the possible questions to be asked during the interviews

INTERVIEWS – Lecturers/Academics

The essence of the interviews will be centred on the following aspects:

1. The lecturers' level of experience
2. The teaching methodologies used: WHY? WHEN? And FOR WHAT?
3. Opinion of the level of preparedness of new students.
4. Opinion on socio-economic and cultural differentiation and the influence on academic success.
5. In view of question 4, To what extent is the teaching approach inclusive
6. What is the overall degree of success in terms of pass or fail?
7. What are the graduates prepared for: e.g. further study, research or industry etc.?
8. When you teach what do you have in mind: Future research, future academics or for industry/workplace?
9. What is the nature of the dialogue between the department of education and the institution, and who is responsible for the curriculum content?
10. What is the nature of the dialogue between the institution/your department and industry?
11. Would the individual like to bring about changes to the content, if possible?
12. Is there a need for entrepreneurship education or not? Is entrepreneurship in any way incorporated into the subject contents or applications?

APPENDIX 8

Developing entrepreneurial skills through challenge-orientated learning in a second-year Environmental Health module at the Central University of Technology (CUT), Free State



Good day Colleagues You are invited to participate in my survey: An initiative to do a comparison between Central University of Technology, Free State, RSA, University of Mauritius, Mauritius and Uppsala University, Sweden - to be used towards the research focus titled above. In this survey, approximately 12 academics from each institution will be asked to complete a survey that asks questions about the teaching and learning experience, the standard of the students and the presence/absence of entrepreneurship education. It will take approximately 15 minutes to complete the questionnaire. Your participation in this study is completely voluntary. There are no foreseeable risks associated with this project. However, if you feel uncomfortable answering any questions, you can withdraw from the survey at any point. It is very important for me to learn your opinions. Your survey responses will be strictly confidential and data from this research will be reported only in the aggregate. Your information will be coded and will remain confidential. If you have questions at any time about the survey or the procedures, you may contact me at esmith@cut.ac.za or elvina123434@gmail.com Thank you very much for your time and support. Please start with the survey now by clicking on the Continue button below.

1. Please select your gender:
 - A Male
 - B Female

2. What is your highest qualification?
 - A Bachelor's degree + honours
 - B Master's degree
 - C PhD
 - D Other _____

3. What is the nature of the subject you teach?
 - A Science
 - B Engineering
 - C Social Science
 - D Other _____

4. Please choose your approximate number of years of lecturing experience:
 - A less than 5
 - B between 5 and 10 years
 - C between 10 and 15 years
 - D between 15 and 20 years
 - E More than 20 years

Developing entrepreneurial skills through challenge-orientated learning in a second-year Environmental Health module at the Central University of Technology (CUT), Free State

5. What is the average age of your students?
 - A 17 -18
 - B 19-20
 - C 21-22
 - D older

6. Have the bulk of the students enrolled at the University directly from school?
 - A Yes
 - B No

7. Are the students predominantly English first language speakers?
 - A Yes
 - B No

8. Is there a degree of under-preparedness for tertiary education among the students?
 - A Yes
 - B No

9. If your answer to the previous question was YES, to what extent?
 - A Slightly under-prepared
 - B Under-prepared
 - C Significantly under-prepared
 - D Not ready for tertiary education
 - E ANSWER WAS NO

10. If your answer was YES: Is the under-preparedness of anature?
 - A Emotional/Maturity
 - B Problem solving ability
 - C Critical thinking ability
 - D Desired/positive attitude towards workplace readiness
 - E ANSWER WAS NO

11. Is there a need for remedial intervention?
 - A Yes
 - B No

12. If your answer to the previous question was YES: How?
 - A Extra- contact sessions
 - B Institutional academic support
 - C Resource/Literary support
 - D Advised to consider bridging course
 - E ANSWER WAS NO

13. Do you as an academic/lecturer have any influence in what you teach?
 - A Not at all
 - B To a small degree
 - C To a large degree

Developing entrepreneurial skills through challenge-orientated learning in a second-year Environmental Health module at the Central University of Technology (CUT), Free State

14. Is there a need/space/opportunity for entrepreneurial education in this module?
 - A Yes
 - B No

15. Is there a possibility of a entrepreneurship module in your course?
 - A Yes
 - B No

16. Do you have any experience working in industry?
 - A Yes
 - B No

17. Does industry in any way influence the content of the subject/module content?
 - A Yes
 - B No

18. If your answer was YES: Select how?
 - A By communicating the skills needed in the workplace
 - B By having input in the structuring of the course
 - C By forming part of the teaching/training
 - D By allowing academics to gain industry experience
 - E ANSWER WAS NO

19. If you had a choice, which way would the focus of your job description lean?
 - A Teaching and learning
 - B Research
 - C Industry -institutional dialogue
 - D Policy formation within the Ministry of education

20. Was this your first choice of a career or employment?
 - A Yes
 - B No

APPENDIX 9



UPPSALA
UNIVERSITET

Entrepreneurship 2019/2020 (7.5 credits)

Autumn 19/20, Afternoon, 50 %, Campus

Start date: 2 September 2019

End date: 5 November 2019

Application Deadline: 15 April 2019

Enrolment Code: UU-21020

Language of Instruction: English

Location: Uppsala

Selection: Final school grades (40 %) - Swedish Scholastic Aptitude Test (10 %) - Higher education credits, maximum 165 credits (50 %)

Spring 2019, Afternoon, 50 %, Campus

Start date: 20 January 2020

End date: 25 March 2020

Application Deadline: 15 October 2019

Enrolment Code: UU-71020

Language of Instruction: English

Location: Uppsala

Selection: Final school grades (40 %) - Swedish Scholastic Aptitude Test (10 %) - Higher education credits, maximum 165 credits (50 %)

Entry Requirements: 60 credits

If you are not a citizen of a European Union (EU) or European Economic Area (EEA) country, or Switzerland, you are required to pay application or tuition fees. Formal exchange students will be exempted from tuition fees, as well as the application fee.

Application Fee: SEK 900

Tuition fee, first semester: SEK 11250

Tuition fee, total: SEK 11250

About the course:

This course prepares participants for a future career as entrepreneurs, either as founders of new businesses or within already established companies. It is designed to give participants practical insights into those business aspects that are particularly important during a firm's early development phases, and to make them more effective in managing and growing the start-up firm. It also provides the cornerstones for successfully launching and implementing entrepreneurial projects within already established organisations.

Syllabus for Entrepreneurship

Entrepreneurship

- **7.5 credits**
- **Course code:** 2FE105
- **Education cycle:** First cycle
- **Main field(s) of study and in-depth level:** Business Studies G1N
- **Grading system:** Fail (U), Pass (G), Pass with distinction (VG)
- **Established:** 2011-02-16
- **Established by:**
- **Revised:** 2019-01-30
- **Revised by:** The Department Board
- **Applies from:** week 36, 2019
- **Entry requirements:** 60 credits
- **Responsible department:** Department of Business Studies

Decisions and guidelines

The course is offered as a single subject course and can be included in an education programme at Uppsala University according to the degree system. The course syllabus was approved by the board of the Department of Business Studies on delegation from the Faculty of Social Sciences.

Learning outcomes

This course prepares participants for a future career as entrepreneurs and founders of new companies. They gain practical insights into those aspects of running a business that are particularly salient during the early development of a new company.

By the end of the course, participants will know how to identify and account for some of the most common challenges involved in starting a company or launching a new business venture within an established organisation. Specifically, they will be able to:

- Understand the fundamental pre-conditions for entrepreneurship.
- Design a business plan and effectively communicate and "sell" new business concepts to other people.
- Distinguish between different sources of financing and assess which best fit the requirements of the new entrepreneurial venture.
- Understand financial statements (balance sheet and income statement, and cash flow analysis).
- Perform an environmental analysis and formulate a business strategy for the new venture that can be communicated to external stakeholders.
- Plan for the internationalisation of the new venture through foreign market entry.
- Plan for the launching and developing new business ventures inside established corporations.

Content

The Entrepreneurship course has a distinctly practical orientation. Discussions are carried out about real-life cases to identify and deal with common problems and challenges during the early start-up phase of a company. Analytical models and tools are applied to issues such as selling and marketing new products and services, understanding financial statements, financing the growing firm, competitive strategy, entry into foreign markets, and entrepreneurship inside the established corporation.

Instruction

The course is taught in English. Teaching involves a mix of: (a) lectures that introduce organising frameworks and analytical tools, (b) guest lectures where active entrepreneurs and prominent practitioners share their business experiences and insights with the course participants and (c) real-life case discussions. In the case discussions, course participants are exposed to a range of business problems and asked to decide about real-life problems in companies or projects in the start-up phase.

Assessment

The student will get one single grade, equivalent to 7.5 credits.

The examination consists of a take-home exam and oral and written assignments, carried out both individually and in groups. The grade for the entire course is based on an assessment of all parts of the examination.

Grading criteria are presented in the study guide that applies to the course section. The following grades will be used, pass with distinction (VG), pass (G) and fail (U). Examinations handed in late will not be assessed except under special circumstances. Any

remaining supplemental work must be handed in by the deadline specified in the study guide.

For students who have not received a passing grade for the course, the entire course (including all examinations) will have to be redone during subsequent course sections, pending availability on the course.

If there are special reasons for doing so, an examiner may make an exception from the method of assessment indicated and allow a student to be assessed by another method. An example of special reasons might be a certificate regarding special pedagogical support from the University's disability coordinator.

Uppsala University does not accept cheating or plagiarism. Suspected incidents of cheating or plagiarism are reported to the Vice-Chancellor, which may issue a formal warning to the student or suspend the student from studies for a certain period.

NOTE: Only completed courses can count toward a degree.

Other directives

The course overlaps/substitutes among others the following courses: Entrepreneurship A 2FE031, Entrepreneurship 2FE033, Entrepreneurship 2FE026, Entrepreneurship, Basic Course A 2FE012, Entrepreneurship, avancerad kurs D 2FE623, Entrepreneurship 8FE623.

Reading list

Kurskompendium: metod, grundkurs B 1, sociologi. [2]

by Kempe, Per

Kurskompendium: metod, grundkurs B 1, sociologi. [1]

by Kempe, Per

Kurskompendium i nationalekonomi

by Umeå universitet. Avdelningen för nationalekonomi

Kurskompendium i nationalekonomi, 1974

Kurskompendium till kurs i offentlig upphandling: en grundläggande kurs i förenklad upphandling med...

by Axberg, Madeleine, 1940; Petersson, Leif

Kurskompendium i bokformat

by Aksnes, Håvard

Tidsskrift for Den norske legeförening, 2009, Volume 129, Issue 9

BSc (Hons) Agricultural Science and Technology – A312/15

1. Objectives

The changing socio-economic pattern of Mauritius has led to an increasing demand for agricultural produce of good quality. Agricultural production is now increasingly being characterised by the use of modern technology. It is the Government policy and vision for the future to adopt a technology-based approach to render the local agricultural sector more productive, service-oriented, sustainable and competitive whilst responding to the environmental and ethical standards demanded by society.

The further development of agriculture and its related industries is challenging and requires appropriate knowledge, skills and technology concepts to keep pace with the latest technological developments in that sector. This has led to the need for well-trained agricultural scientists who have the technical and practical skills in addition to in-depth knowledge of the science to meet these new challenges facing the Mauritian agriculture.

The growth linkages in agriculture (upstream to suppliers of inputs, equipment and services, and downstream in processing, marketing and consumption) are greater than in other sectors. This programme aims at connecting science with needs and opportunities in agriculture to equip students with a broad spectrum of scientific, technical and managerial skills needed to contribute to the future success of agriculture in Mauritius and elsewhere. The programme aims at training the students in securing long-term food security to reduce imports and sustain the transformation of agricultural production systems.

The programme offers the opportunity of a 6-month work placement with the objective of preparing graduating students with the knowledge, skills and abilities, inter alia, to interact with producers in the agricultural and food sector, to become entrepreneurs, to develop and manage agribusiness, to work as research scientists. The placement aims at equipping the graduating student with the ability to

- (i) develop from dependence to independence in learning
- (ii) think creatively
- (iii) develop an analytical approach to problem-solving
- (iv) promote interpersonal skills (teamwork and communication).

By the end of this programme, graduates will have developed knowledge, abilities and skills to:

- Explain the scientific, economic, environmental and business principles underpinning agricultural productivity and production;
- Identify and evaluate appropriate agricultural techniques in the crop and animal sectors to enhance efficiency of production and secure long-term food security;
- Identify and solve technological problems encountered in current crop and livestock production systems;
- Evaluate the wider consequences of agricultural activities and promote sustainable agricultural practices;
- Transfer relevant knowledge, skills and technology concepts to the producers and to support innovation;
- Design, plan and carry out research in the various fields of agriculture;
- Manage agricultural enterprises and identify new ventures in the agricultural sector;
- Use appropriate scientific and statistical methods and evaluations for decision making in various sectors of agriculture;
- Demonstrate use of written and oral communication skills;
- Embark on training programme at postgraduate level.

2. General Entry Requirements

In accordance with General Entry Requirements for Admission to the University for Undergraduate Degrees.

3. Programme Requirements

Cambridge School Certificate/ 'O' Level: Credit in Mathematics and Chemistry and at least 2 GCE 'A' Level passes in related approved Science subjects (Mathematics, Chemistry, Physics, Biology, Food Studies, Botany, Zoology, Computer Science, Computing, Agriculture or any other related field).

4. Programme Duration

	Normal (Years)	Maximum (Years)
Degree:	3½	5½

5. Credits per Year: Minimum 18 credits, Maximum 48 credits subject to Regulation 4.

6. Minimum Credits Required for Award of the Degree: 112

The breakdown is as follows:

	Credit from		
	Taught Core Modules	Project	Work Placement
Degree	97	9	6

Students may exit with a,

- Certificate after having earned 30 credits in core modules.
- Diploma after having earned 60 credits in core modules.

7. Assessment

Each module will be assessed over 100 marks (i.e. expressed as %) with details as follows (unless otherwise specified).

Assessment will be based on a Written Examination of 2-3 hour duration, carrying a weighting of 70%, and Continuous Assessment carrying 30% of total marks for AGRI modules. Modules from other Faculties/Departments/Centres will carry weighting in the Written Examination and the Continuous Assessment as specified by the concerned Faculties/Departments/Centres. Continuous Assessment will be based on laboratory/field reports, and/or oral and written presentations, and should include at least 1 class test. Written examinations for all AGRI modules will normally be carried out at the end of the academic year.

An overall total of 40% for combined Continuous Assessment and Written Examination would be required to pass a module, without minimum thresholds within the individual Continuous Assessment and Written Examination.

Modules will carry the weightings of 1, 3 or 5 depending on their status (Introductory, Intermediate or Advanced). Weighting for a particular module is indicated within parentheses in the module code. Each module will carry credits in the range of 3 to 6. Project will carry 9 credits.

Assessment of the "Scientific Communication Skills and Methods" and "Occupational Safety and Health" modules will be based on continuous assessment of students throughout the module and/or submission of a portfolio and a minimum of 40% should be attained.

Assessment of the "Emerging Issues in Agricultural Production" module will be based on continuous assessment of students (e.g. group presentation on case-studies) and written examination each carrying a weighting of 50%.

8. List of Modules

CORE MODULES

Code	Module Name	Hr / Yr	Credits
		L+P	
AGRI 1018Y(1)	Agricultural Chemistry and Soil Science	45+60	5
AGRI 1034Y(1)	Animal Production: Principles and Techniques	30+30	3
AGRI 1035Y(1)	Agromony and Horticultural Crop Production I	45+60	5
AGRI 1047Y(1)	Microbiology and Genetics	60+60	6
AGRI 1064Y(1)	Agrometeorology and Climate Change	45+0	3
AGRI 1071Y(1)	Data Handling and Research Methodology	30+30	3
AGRI 1078Y(1)	Economics for Agricultural Managers	45+0	3
COMS 1010(1)	Communication Skills	DE	3
AGRI 1100 (1)	Occupational Safety and Health	15+0	1
AGRI 2156Y(3)	Agricultural Engineering Principles	60+45	5
AGRI 2088Y(3)	Biochemistry and Biotechnology	60+60	6
AGRI 2089Y(3)	Pests, Diseases and Weeds Control	45+60	5
AGRI 2092Y(3)	Animal Production and Science I	60+60	6
AGRI 2093Y(3)	Botany and Crop Physiology	60+45	5
AGRI 2112Y(3)	Experimental Designs and Sampling Techniques	30+30	3
AGRI 2118Y(3)	Science and Technology of Foods	45+30	4
AGRI 2130 (1)	Scientific Communication Skills and Methods	15+0	1
AGRI 2257Y(3)	Agricultural Management, Marketing and Extension	45+0	3
AGRI 3000Y(5)	Project	-	9
AGRI 3003Y(5)	Animal Science and Production II	60+60	6
AGRI 3026Y(5)	Crop Production Technologies	60+45	5
AGRI 3051Y(5)	Postharvest Management and Agricultural Produce Processing	60+30	5
AGRI 3086Y(5)	Entrepreneurship for Small and Medium Agribusiness	45+30	4
AGRI 3132Y(5)	Agri-food Value Chain Analysis	60+0	4
AGRI 3114Y (5)	Emerging Issues in Agricultural Production	45+0	3
WORK PLACEMENT			
Code	Module Name	Wk/Yr	Credits
AGRI 2103(5)	Work Placement	24	6
Total Number of Credits = 112			

10. Programme Plan – BSc (Hons) Agricultural Science and Technology

YEAR 1

CORE MODULES

Code	Module Name	Hr / Yr	Credits
		L+P	
AGRI 1018Y(1)	Agricultural Chemistry and Soil Science	45+60	5
AGRI 1034Y(1)	Animal Production: Principles and Techniques	30+30	3
AGRI 1035Y(1)	Agromony and Horticultural Crop Production I	45+60	5
AGRI 1047Y(1)	Microbiology and Genetics	60+60	6
AGRI 1064Y(1)	Agrometeorology and Climate Change	45+0	3
AGRI 1071Y(1)	Data Handling and Research Methodology	30+30	3
AGRI 1078Y(1)	Economics for Agricultural Managers	45+0	3
COMS 1010(3)*	Communication Skills	DE	3
AGRI 1100 (1)	Occupational Safety and Health	15+0	1

* To be taken in Semester 2

YEAR 2

CORE MODULES

Code	Module Name	Hr / Yr	Credits
		L+P	
AGRI 2156Y(3)	Agricultural Engineering Principles	60+45	5
AGRI 2083Y(3)	Biochemistry and Biotechnology	60+60	6
AGRI 2089Y(3)	Pests, Diseases and Weeds Control	45+60	5
AGRI 2092Y(3)	Animal Production and Science I	60+60	6
AGRI 2093Y(3)	Bomny and Crop Physiology	60+45	5
AGRI 2112Y(3)	Experimental Designs and Sampling Techniques	30+30	3
AGRI 2118Y(3)	Science and Technology of Foods	45+30	4
AGRI 2257Y(3)	Agricultural Management, Marketing and Extension	45+0	3
AGRI 2130 (1)	Scientific Communication Skills and Methods	15+0	1
Code	Module Name	Wk/Yr	Credits
AGRI 2103(5)	Work Placement	24	6

YEAR 3

Code	Module Name	Hr / Yr	Credits
		L+P	
AGRI 3000Y(5)	Project	-	9
AGRI 3003Y(5)	Animal Science and Production II	60+60	6
AGRI 3026Y(5)	Crop Production Technologies	60+45	5
AGRI 3051Y(5)	Postharvest Management and Agricultural Produce Processing	60+30	5
AGRI 3086Y(5)	Entrepreneurship for Small and Medium Agribusiness	45+30	4
AGRI 3132Y(5)	Agrifood Value Chain Analysis	60+0	4
AGRI 3114Y(5)	Emerging Issues in Agricultural Production	45+0	3

Total number of credits = 112

11. Outline Syllabus

AGRI1018Y(1) - AGRICULTURAL CHEMISTRY AND SOIL SCIENCE

Agrochemicals, their properties, metabolism, and mode of action. Chemistry of fertilisers: straight, complex, compound mixed, blended fertilisers. Fertiliser solutions. Foliar fertilisers. Manures, municipal sewage, compost, biofertilisers.

Chemistry of pesticides: organochlorines, organophosphates, carbamates, pyrethroids, dinitrophenols, phthalimides, substituted ureas, triazines, inorganics, botanical pesticides, bio-pesticides. Analysis of pesticides and fertilisers.

Soil as a natural body. Weathering. Factors and processes in soil formation. Physical, physio-chemical, biological and mineralogical properties of soil. Soil profile. Soil air. Water, temperature, soil organic matter and soil organisms. Concepts of soil fertility and land suitability. Soil taxonomy. Soil biology. Soil amendments. Soil pollution. Heavy metals. Polyaromatic hydrocarbons (PAH), persistent organic pollutants (POP) in soils. Soil bioremediation.

AGRI1034Y(1) - ANIMAL PRODUCTION: PRINCIPLES AND TECHNIQUES

Fundamentals of animal management and production: nutrition; feeds and feeding; reproduction and breeding; animal welfare and health; housing and equipment; animal-environment interactions.

Introduction to farm animal industries, breeds of animal, their products and by-products; matching production of quality and safe food with protection and care of the environment.

Fundamental skills of animal husbandry: rationing; weighing and tagging; usage of preventive and diagnostic equipment; evaluation of body condition score; use and development of performance records. Evaluation of Animal behaviour. Animal housing evaluation.

AGRI1035Y(1) - AGRONOMY AND HORTICULTURAL CROP PRODUCTION I

Principles of field crop agronomy. Crop-environment interactions. Cropping systems. Crop propagation. Plant Nutrition. Nutrient deficiency symptoms and their corrections. Nutrient requirements and fertiliser recommendations for specific crops / cropping systems.

Applied crop physiology. Husbandry and production of economically important horticultural crops. Field operations and techniques in crop production.

AGRI1047Y(1) - MICROBIOLOGY AND GENETICS

Microbiology diversity, structure, functions and economic significance. Microbial physiology. Growth and Survival. Control of microorganisms. Basic procedures and techniques in microbiological analysis.

Mendelian Inheritance. Linkage and chromosome mapping. Sex linked and extra-nuclear inheritance. Quantitative and population genetics. Objectives of plant breeding. Selection techniques. Breeding of selected crops. Legislative framework. Methods of crop improvement. Genetic variation and manipulation of variability.

AGRI1064Y (1) - AGROMETEOROLOGY AND CLIMATE CHANGE

Economic significance and importance of weather. Radiation and surface energy balance: earth's atmosphere; atmospheric energy; atmospheric moisture and precipitation; atmospheric motion. Soil and its heat balance. Topoclimate and mesoclimate, representative observation, and their dependence on topography. Agrometeorology management at microscale and topocscale.

Global climatic change and variability and its effect on agriculture: weather hazards affecting agricultural output. Weather patterns over Mauritius. Use of weather data in agriculture. Basic instrumentation in agro-meteorology. Seminar-based learning. Problem-solving and case studies on climate change mitigation and adaptation.

AGRI 1071Y (1) – DATA HANDLING AND RESEARCH METHODOLOGY

Introductory statistics. Levels of measurements. Collection, organisation and presentation of numerical data. Averages and measures of variation and skewness. Probability distributions. Point and interval estimation. Hypothesis testing. Analysis of categorical data. Correlation and Regression Analysis. Introduction to research methodology. Elements of scientific and technical writing. Data entry and analysis using EXCEL and MINITAB.

AGRI 1078Y(1) – ECONOMICS FOR AGRICULTURAL MANAGERS

Agricultural economics: demand functions; supply functions; elasticity; price determination. Neoclassical theory of farm production; principles of production economics; costs: definitions; cost-minimizing input choices; short-run, long-run distinction. Profit maximization and supply.

COMS 1010(1) – COMMUNICATION SKILLS

Writing skills, non-verbal communication, modes of speech delivery and presentation aids, speeches, perception and listening skills, business and technical writing.

AGRI 1100(1) - OCCUPATIONAL SAFETY & HEALTH

General Introduction to Safety & Health History & Evolution of Safety & Health in Mauritius. Accident rate in workplaces. General Safety & Health at the University of Mauritius. Occupational Safety & Health Act 2005 and related regulations and Food Act 1998. Risk Assessment (Definition of Hazard, Types of hazards, Five steps of Risk Assessment). General Laboratory Safety (Housekeeping, Machinery safety, Good Practices in Laboratory, Personal Protective Equipment). Chemical and Waste Management. Fire Safety. Ergonomics. First Aid.

AGRI 2156Y(3) - AGRICULTURAL ENGINEERING PRINCIPLES

Basic engineering science relevant to agriculture, soil systems and water.

Soil tillage. Agricultural machinery: tractors, rototators, mechanical planters and harvesters, and fertigrators. Tractor Technology. Field mechanisation. Pesticide sprayers and fertiliser applicators. Water logging and drainage. Introductory remote sensing, and GIS.

Irrigation systems: Equipment and operation. Soil moisture and soil moisture characteristic curves. Evapotranspiration and net water requirements. Soil water movement. Infiltration rate. Hydraulic conductivity of soil. Nuclear methods of soil moisture determination. Irrigation systems: surface, overhead irrigation and drip irrigation. Planning and design of various irrigation systems based on soil-water plant climate relationships. Use and maintenance of irrigation systems.

Farm structures and farm buildings. Farm roads. Waste management technology. Introduction to controlled environment technology: control of temperatures, humidity, light and other variables in agricultural, including livestock buildings and horticultural building and the instrumentation connected therewith.

AGRI 2088Y(3) - BIOCHEMISTRY AND BIOTECHNOLOGY

Structure and functions of cells and organelles; Biomolecules: Polysaccharides biological membranes; Proteins, amino acids, ; Enzymes, mechanism of actions and kinetics; Nucleic acids and protein synthesis. Thermodynamics, Energy metabolism: Respiration and ATP synthesis. Photosynthesis. Application of biotechnology. Cell and tissue culture. Genetic improvement of crops. Managing plant and animal diseases. Molecular methods of pathogen diagnosis, characterization and monitoring. Transgenic animals. Animal embryo transfer and associated techniques. Cloning. Vaccine development. Legislative framework.

AGRI 2089Y(3) - PESTS, DISEASES AND WEEDS CONTROL

Taxonomy, systematic, biology, ecology and economic importance of pests, plant pathogens and weeds affecting crops. Management of pests, diseases and weeds of crop plants. Concept and principles of IPM. Biological, physical, chemical, cultural, biology-based, genetic, biotechnological and legal methods of pest control. Botanical pesticides and biopesticides. Pest-resistant transgenic crops (GMOs). Economics of crop protection.

Quarantine for plant health and biological control agents; pest-free areas; Sanitary and phytosanitary issues; the SPS Agreement of the WTO; Pest risk assessment, surveillance and mitigation; Phytosanitary inspection, quarantine treatments and disposal of plants/produce; Standards, certification and legislation. Climate change and crop protection. GIS and Remote Sensing for crop protection.

AGRI 2092Y(3) - ANIMAL PRODUCTION AND SCIENCE 1

Aspects of physiological processes in growth and development, digestion, reproduction, lactation, egg laying. Meat science: carcass composition and quality, pre and post mortem muscle metabolism. Key concepts in thermal balances in farm animals. Livestock and climate change: impacts on grasslands, biodiversity, and health.

Digestive physiology and metabolism of end products of digestion. Factors regulating feed intake. Feed evaluation. Feeding standards and their applications. Feed formulation: manual and computerised procedures. Legislative framework for feed manufacture.

Basic principles of qualitative and quantitative genetics. Main selection methods and genetic responses. Concepts of correlated selection response, heterosis and crossbreeding system.

Natural and acquired immunity. Disease causing agents. Major pests and diseases of farm animals and their control. Veterinary Public health and food borne and zoonotic diseases. Disease surveillance and Animal health schemes.

AGRI 2093Y(3) - BOTANY AND CROP PHYSIOLOGY

Classification, identification, morphology, ecology and uses of economically important crops. Plant breeding. Environmental influences on crop growth and development. Vegetative and reproductive plant physiology. Plant water relationships. Plant growth substances. Plant growth analysis. Yield determination and crop productivity.

Seed physiology. Growth kinetics and Introductory Crop Modelling. Light and plant development: photomorphogenesis and photoperiodism. Source-sink relationship. Photosynthate partitioning in relation to yield. Modification of yield potential by chemical and cultural means. Senescence. Stress physiology. Essential plant nutrients: forms, functions, deficiency symptoms, and corrections. Water and plant mineral uptake. Assimilation of inorganic nutrients. Plant tissue analysis. Problem-solving and case-studies on plant mineral deficiencies/ toxicities and plant stress management.

AGRI 2112Y(3) – EXPERIMENTAL DESIGNS AND SAMPLING TECHNIQUES

Design and analysis of experiments. Analysis of variance. Completely randomized design. Randomized block design. Latin square design. Factorial treatment structure. Non-parametric methods. Data entry, analysis and interpretation using EXCEL and MINITAB. Qualitative and quantitative research. Sampling methods. Questionnaire development, design and administration. Data coding and processing using SPSS.

AGRI 2118Y(3) – SCIENCE AND TECHNOLOGY OF FOODS

Classification, chemical structure and properties and nutritional value of food commodities. Primary sensory attributes of foods and perception of food quality. Methods for Proximate analysis of foods.

Microbial food spoilage. Useful micro-organisms. Incidence and causes of major food borne microbial diseases. Types of nutrients and their role in the human body. Healthy eating guidelines: sustainable diet. Food safety concept from farm to table. Post harvest losses. Postharvest loss reduction technologies. Processing of foods of plant and animal origin.

AGRI 2130(1) - SCIENTIFIC COMMUNICATION SKILLS AND METHODS

Avenues of communication in science. Scientific and technical writing. Oral and poster presentations. Ethics of scientific publishing. The dissertation guidelines. Planning and managing the dissertation writing up process – effective literature search and review, introduction, methodology, results, discussion, conclusions, referencing rules and plagiarism. Concepts of Web 2.0 tools. Uses of Web 2.0 tools: Targeted web searches; use of social media tools (eg. blogs, wikis) for scientific communication; Sharing and collaborative tools (eg social bookmarking) in scientific publications.

AGRI 2257Y(3) – AGRICULTURAL MANAGEMENT, MARKETING AND EXTENSION

Business principles applied to a farm enterprise/agroindustry. Agricultural management: framework of farm management. Farm Planning Techniques: Budgeting and Linear programming. Strategic decision-making in agribusiness. Managing human resources. Business control. Analysis of farming results. Project planning and investment decisions.

Agricultural marketing: marketing functions; marketing channels and costs. Advanced agricultural and food marketing. International agricultural trade Emerging issues and challenges. Agricultural and food policies. Structure and organisation of local agricultural institutions.

Introduction to agricultural extension. Agricultural extension: principles, programmes and management; Participatory Research Approach. Systems analysis and modelling; farming systems research.

AGRI 3000Y(5) – PROJECT

Every student will be allocated a research topic related to the programme. The research work will be carried out under academic supervision. Students should demonstrate good practice in using skills and knowledge acquired during the programme and follow dissertation guidelines as laid down by the Faculty of Agriculture. The number of words in the final year project/dissertation shall be between 8,000-12,000.

AGRI 3003Y(5) - ANIMAL SCIENCE AND PRODUCTION II

Principles of managing animals in typical production systems for biological, economic sustainability and securing food security: poultry (meat, eggs, other avian species); pigs; rabbits; deer; goats and sheep; beef and dairy cows. Meeting the challenge of climate change: adaptation and mitigation livestock strategies.

Food chain management from primary production to consumer use. Management of disease risks. Trends and current issues related to production and consumption of animal products: meeting the needs of a global market and public concerns.

Principles and their applications in the efficient and profitable production of poultry meat and eggs, and pig meat. Nutrition, housing and equipment, prevention and control of diseases, environment care and waste management.

Predlaughter and postlaughter effects on meat quality and composition and hygienic practices to ensure quality and safety of carcass. Welfare considerations in farm animal production setting.

AGRI 3026Y(5) - CROP PRODUCTION TECHNOLOGIES

Mechanised vegetable crop production. Plant characteristics for mechanised crop production. Soil conditioning for vegetable production. Seed priming and enhancement. Fluid drilling. Direct sowing for crop establishment. Plug production. Mechanical transplanting. Plastic mulching in horticulture. New trends in vegetable crop production. Good agricultural practices in crop production. Tissue Culture technologies for crop improvement.

Cropping and production of high value horticultural crops in plastic tunnels, shade houses and greenhouses. Types of structures for protected cultivation and their characteristics. Greenhouse design and site considerations. Greenhouses and their operation.

Plant culture in hydroponics. Plant nutrition in Soilless Culture. Hydroponics media. Hydroponics systems. Cropping and production of selected vegetables, fruits and ornamentals in soilless culture systems: water culture systems and substrate culture systems. Aeroponics.

AGRI 3051Y(5) - POSTHARVEST MANAGEMENT AND AGRICULTURAL PRODUCE PROCESSING

Climacteric and non-climacteric produce. Post-harvest physiology. Post-harvest crop losses and their reduction. Packaging. Quality and safety of fresh horticultural products. Minimal processing of horticultural products. Processing of fruits, vegetables, milk, egg, meat, poultry and seafood products.

AGRI 3086Y(5) - ENTREPRENEURSHIP FOR SMALL AND MEDIUM AGRIBUSINESS

Risk and Uncertainty in agribusiness. Agribusiness finance. Financial information. The entrepreneurial attitude: generation of business ideas and innovation; opportunities for setting up an agribusiness. Types of business organisations. Business strategy in agribusiness firms. Public and private sector support in Mauritius. Setting up an agribusiness unit and development of a business plan. Clustering. Business Incubators. Case studies of agribusinesses at national, regional and international levels.

AGRI 3132Y(5) – AGRIFOOD VALUE CHAIN ANALYSIS

Value chain analysis in the agrifood sector; value chain coordination; value chain performance; methodologies for agrifood chain analysis; global value chains in the agrifood sector. Case studies of agrifood value chains.

AGRI 3114Y(5) – EMERGING ISSUES IN AGRICULTURAL PRODUCTION

Review of important current developments in the field of agricultural production. Threats and opportunities to the agricultural sector. Rapid advances in agricultural production technologies. Innovative practices in crop and animal production. Organic farming. Biomass Production. Recycling and management of agricultural wastes. Foreign investment in high value-added activities (certified seed production, semen production etc). National, regional and global issues faced by the local agricultural sector.

AGRI 2103(5) – WORK PLACEMENT

Students will be placed in agro-industry, agribusiness (small and medium) or other relevant work environment for 6 months after the second year. They will be expected to make a significant contribution to a relevant project under the supervision of a workplace and an academic mentor. Students will be expected to actively participate in the Work Placement Programme and to attend scheduled interviews. Students are required to prepare a final report on their placement, and make a presentation on their work. Students will be expected to adhere to the learning contract stipulated under this module.

BSc (Hons) Management (Minor: Entrepreneurship) – LM323
1. Objectives

The aim of the programme is to offer comprehensive knowledge and skills in Management Theory and Practice in addition to expertise in the area of 'entrepreneurship'. Students will be equipped to take on management roles in a range of organisations. The course also aims at developing the wider enterprising proficiency of learners and they will understand the dynamics of the 'entrepreneurial process'. They will gain competency to assess appropriately the risk inherent in new ventures (start up, family businesses) and gain pre start-up knowledge of the small and micro business environments.

2. General Entry Requirements

In accordance with General Entry Requirements for admission to the University for Undergraduate Degrees

3. Programme Requirement

Credit in five (5) subjects at 'O' Level including Mathematics.
2 GCE 'A' Level passes.

4. Programme Duration

Degree:	Normal (Years)	Maximum (Years)
	3	5

5. Credits per Year

Minimum 18 Credits, Maximum 48 Credits subject to Regulation 4

6. Minimum Credits Required for Award of Degree: 105 credits.

Breakdown as follows:

Degree	Core taught modules	Business Plan	Elective modules	General Education Module	Practicum	Total
Credits	90	6	6	3	n/a	105

Core and Elective Structure	Credits
Management	45
Entrepreneurship	30
Finance and Accounting	12
Computer Science and Engineering	3
Law	6
GEM	3
Electives	6
Total	105

7. Assessment

Each module will carry 100 marks and will be assessed as follows:

Assessment will be based on a written examination of 2-hour (for a semester module) or 3-hour (for a yearly module) duration as specified and continuous assessment carrying a range of 20% to 30% of total marks except for Module Research Methodology in Management. Continuous assessment will be based on two (2) assignments and should include at least one class test per module per year.

For a student to pass a module, an overall total of 40% for combined continuous assessment and written examination components would be required without minimum thresholds within the individual continuous assessment and written examination.

Most modules in the structure are yearly modules which are taught over a period of two semesters and examined at the end of the second semester only. There are continuous assessments over the period of two semesters and the written examination will be of a duration of 3 hours for a yearly module of 6 credits.

Some modules in the structure are run over 15 weeks and carry 3 credits. The assessment of such modules will consist of continuous assessment and an examination of a duration of 2 hrs at the end of the semester in which the module is run.

Written Examinations and Continuous Assessment would each carry a weighting of 50% each for the Module Research Methodology in Management (MGT 2117).

Students of the BSc (Hons) Management (minor Entrepreneurship) are not allowed to choose GEM Entrepreneurship/Innovation/Leadership MGT 2251Y as elective.

Submission Deadline Business Plan:

Final copy: End March in the final year of the programme.

Assessment: The word limit for the Business Plan is 12 000 words.

The University reserves the right not to offer a given elective module if the critical number of students is not attained and/or for reasons of resource constraints.

8. Termination of Registration

If the CPA of a student is < 40 for an academic year, s/he will have to repeat the entire academic year, and retake modules as and when offered. However, s/he will not be required, if s/he wishes, to retake module(s) for which Grade C or above has been obtained.

Students will be allowed to repeat only once over the entire duration of the Programme of Studies.

Registration of a student will be terminated if

- the CPA is < 40 at the end of an academic year and the student has already repeated one year of study; or
- the maximum duration allowed for completion of the Programme of Studies has been exceeded.

8. List of Modules

CORE MODULES

Code	Module Name	Hrs/Wk L+P	Credits
DFA 1020Y(1)	Accounting and Financial Analysis	3+0	6
MGT 1067Y(1)	Principles and Practice of Management	3+0	6
MGT 1226(1)	Economics for Managers	3+0	3
MGT 2086(3)	Marketing in Practice	3+0	3
CSE 1010e(1)	Introduction to Information Technology	O.E.	3
STAT 1223(1)	Statistics I for Entrepreneurs	3+0	3
MGT 1235 (1)	Managing People in Organisations	3+0	3
MGT 3111(3)	Operations Management	3+0	3
MGT 2123(3)	Health, Safety and Welfare Management	3+0	3
MGT 2117(3)	Research Methodology in Management	3+0	3
MGT 3087Y(5)	Strategic Management and Entrepreneurial Strategies	3+0	6
LAWS 1100Y(1)	Business Law for Entrepreneurs	3+0	6
MGT 2059Y(3)	Entrepreneurial Marketing	3+0	6
MGT 3059Y(5)	International Business Management	3+0	6
MGT 1102(1)	Fundamentals of Entrepreneurship	3+0	3
MGT 2088(3)	Business Planning and Development	3+0	3
DFA 2135 (3)	Business Finance	3+0	3
DFA 3105(5)	Performance Measurement and Control	3+0	3
MGT 3089(5)	Entrepreneurial Leadership	3+0	3
MGT 2251(3)	Introduction to Small and Medium Enterprise Management	3+0	3
MGT 2254(3)	Creativity and Innovation in Business	2+1	3
MGT 2253(3)	Business Communication and Effective Negotiation	3+0	3
MGT 2087(3)	Corporate Ethics and Good Governance	3+0	3
MGT 2252(3)	Culture Entrepreneuriale	3+0	3
MGT 3300Y(5)	Business Plan	-	6
ELECTIVE MODULES			
MGT 3061Y(5)	Managing Quality	3+0	6
MGT 3129Y(5)	Corporate Social Responsibility	3+0	6
MGT 3091Y(5)	Technological Innovation and Entrepreneurship	3+0	6
MGT 3090Y(5)	Family Business Management	3+0	6
MGT 3092Y(5)	Corporate Entrepreneurship	3+0	6

3

9. Programme Plan – BSc (Hons) Management (Minor: Entrepreneurship)

Modules with * will be run in Semester 1 and with ** will be run in Semester 2.

YEAR 1			
Code	Module Name	Hrs/Wk L+P	Credits
CORE			
DFA 1020Y(1)	Accounting and Financial Analysis	3+0	6
LAWS 1100Y(1)	Business Law for Entrepreneurs	3+0	6
MGT 1067Y(1)	Principles and Practice of Management	3+0	6
MGT 1226(1)	Economics for Managers**	3+0	3
MGT 2086 (3)	Marketing in Practice*	3+0	3
CSE 1010e(1)	Introduction to Information Technology*	O.E.	3
MGT 1102 (1)	Fundamentals of Entrepreneurship*	3+0	3
STAT 1223(1)	Statistics for Entrepreneurs**	3+0	3
YEAR 2			
Code	Module Name	Hrs/Wk L+P	Credits
CORE			
MGT 2088(3)	Business Planning and Development**	3+0	3
MGT 2059Y(3)	Entrepreneurial Marketing	3+0	6
MGT 1235 (1)	Managing People in Organisations *	3+0	3
MGT 3111(3)	Operations Management *	3+0	3
MGT 2123(3)	Health, Safety and Welfare Management*	3+0	3
MGT 2117(3)	Research Methodology in Management**	3+0	3
DFA 2135 (3)	Business Finance **	3+0	3
MGT 2251(3)	Introduction to Small and Medium Enterprise Management*	3+0	3
MGT 2253(3)	Business Communication and Effective Negotiation*	3+0	3
MGT 2252(3)	Culture Entrepreneuriale**	3+0	3
MGT 2254(3)	Creativity and Innovation in Business**	2+1	3
YEAR 3			
Code	Module Name	Hrs/Wk L+P	Credits
CORE			
MGT 3059Y(5)	International Business and Management	3+0	6
DFA 3105(5)	Performance Measurement and Control*	3+0	3
MGT 3089(5)	Entrepreneurial Leadership*	3+0	3
MGT 3087Y(5)	Strategic Management and Entrepreneurial Strategies	3+0	6
MGT 2087(3)	Corporate Ethics and Good Governance**	3+0	3
MGT 3300Y(5)	Business Plan	-	6
ELECTIVES			
CHOOSE ONE FROM			
MGT 3129Y(5)	Corporate Social Responsibility	3+0	6
MGT 3061Y(5)	Managing Quality	3+0	6
MGT 3090Y(5)	Family Business Management	3+0	6
MGT 3091Y(5)	Technological Innovation and Entrepreneurship	3+0	6
MGT 3092Y(5)	Corporate Entrepreneurship	3+0	6

4

10. Outline Syllabus

CORE MODULES:

CSE 1010E(1) - INTRODUCTION TO INFORMATION TECHNOLOGY

IT and Computers; Stepping in the Computer; Input and Output Devices; Secondary Storage; Programming; Systems Software; Applications Software; Systems Development; Computer Networks; The Internet; Computer Security; Software Utilities; Issues and Trends in IT.

DFA 1020V(1) - ACCOUNTING AND FINANCIAL ANALYSIS

The Role of Accounting Information; Recording and Summarising Transactions; Accounting Concepts & Preparing Final Accounts; Adjustments to Final Accounts; Capital w/s Revenue Expenditure; Bank Reconciliation Statements; Accounting Ratios & Interpretation Techniques; Introduction to Group Accounting & related issues; Accounting for Internal Decision Making Techniques; Elements of Cost; Costing Methods & Techniques; Decision Making Techniques; Accounting for Manufacturers; Budgets; Regulatory Framework for Company financial Reporting; Understanding Published Annual Reports; Corporate Failures Prediction; Forecasting & Valuing Businesses; Earnings Management.

DFA 2135 (3) - BUSINESS FINANCE

Financial Management Objectives; Time Value of Money Mathematics; Nature, Purpose and Scope of Financial Management in profit making organisations; Financial Management Environment; Sources of finance (equity, debt, near-debt and financing of SMEs) and relative costs; introduction to risk management; Capital Structure Planning and Policy including application of Modigliani and Miller propositions; Analysis of Capital Budgeting Decisions - Identifying Free Cash Flows and Appraisal of capital investment opportunities (DCF and Non-DCF Techniques) inclusive of effects of taxation, inflation, risk and uncertainty; leasing w/s buying with borrowed funds decision; Credit analysis and management; working capital management (stocks, debtors, cash); drivers of business and shareholder value.

DFA 3105(5) - PERFORMANCE MEASUREMENT AND CONTROL

Performance Measurement Models - Financial w/s Non Financial performance indicators, conventional profit related measures of performance w/s value based measures; multi-dimensional performance measurement: Balanced Scorecard; Benchmarking; Non Profit Organisations; Planning & Control - Strategic Management Accounting: goals, appraising the environment, position appraisal, strategy evaluation; Short run Decision-making techniques; traditional costing w/s activity based costing; divisional performance; contemporary issues in measuring performance; Pricing Policies; Relevant Costs; Budgeting & Budgetary Control; Evaluation of Fixed/Flexible, Zero Based, Incremental, Periodic, Continuous and Activity Based budgetary systems; Budget Review; Costing Techniques; Absorption, Marginal and Opportunity Cost Approaches for Specific Orders/Operations; Life Cycle Costing; Target Costing

LAW 1100Y (1) - BUSINESS LAW FOR ENTREPRENEURS

Study business law, particularly as it pertains to new businesses, relationships between employees and employers, ways to make sure your business is above-board and possible legal ramifications of misguided business ventures.

MGT 2253(3) - BUSINESS COMMUNICATION AND NEGOTIATION SKILLS

Overview of Communication in business communication and organizational business effectiveness; Formal and informal communication systems, intercultural communications, Profiles of diverse cultures, effective of business writing, Employment-Process Communication - Cover letter, resumé, follow-up, interviewing and listening skills; Art of negotiating. Preparing for a negotiation. Managing conflicts. Telephoning and Secretarial barrier. Presentation techniques, culture and negotiating skills. Using visual aids. Cross-Cultural understanding, culture and negotiation. Making meetings effective

MGT 1067V(1) - PRINCIPLES AND PRACTICE OF MANAGEMENT

Part 1: The study of organisations; The Environment of Organisations; Evolution of Management theory; Management concepts; The Managerial functions of Planning, Leading, Organising, Controlling; Managerial Skills.

Part 2: Managing Individuals in organisations; Managing differences; Motivation.

Part 3: Managing Groups and Teams; Group behaviour; Conflict and co-operation; Power and Politics; Leadership; Ethics and Social Responsibility.

Part 4: Managing Structure and processes: Organisational structure; Job Design; Restructuring, reengineering, downsizing; new structural forms of Communications, Careers, Change; Diversity; Knowledge Management.

MGT 1102 (1) - FUNDAMENTALS OF ENTREPRENEURSHIP

Concept of Entrepreneurship, Historical Evolution of Entrepreneurship, Overview of organizing, creating, developing and managing your own business, The Entrepreneurial Process, Definition of the Entrepreneur, Entrepreneurial traits, Entrepreneurship and SME, Entrepreneurships and large organizations, Challenges of Entrepreneurship

MGT 1235(1) - MANAGING PEOPLE IN ORGANISATIONS

Introduction to People Management, Historical Background and Evolution of People Management, Personnel Management w/s Human Resource Management, Motivation, Leadership Styles and Traits, Commitment of Employees, Human Resource Planning, Recruitment and Selection, Training and Development, Performance Management, Employee Relations, Teamwork and Empowerment.

MGT 2123(3) - HEALTH, SAFETY AND WELFARE MANAGEMENT

Basic Principles and Accident Prevention. Safety Management. Medical and Health Surveillance Systems. Psychological Aspects of Safety Performance. Industrial Hygiene. Health and Safety Legislations. Waste Management.

MGT 3111(5) - OPERATIONS MANAGEMENT

Introduction to Operations Management. Types and characteristics of manufacturing and service systems. Production planning and control - Forecasting, Capacity planning and operations scheduling, Inventory Management, MRP I and MRP II. Project scheduling - Network Analysis. Quality Control. Layout designs. Location selection. Work study. Just-In-Time. Supply-Chain Management. People and work systems. Types of Maintenance.

MGT2251(3) - INTRODUCTION TO SME MANAGEMENT

Definition of Small Business; Small Business and Challenges; the Small Business manager; multiple roles of the Small Business Manager; Starting a small business/enterprise. Organising the small enterprise; marketing, financial, production and operations management, administrative and financial controls. Financial planning, product strategies, market strategies, pricing, credit policing, inventory control and capital budgeting as applied to small organisations.

MGT 2254(3) - CREATIVITY AND INNOVATION IN BUSINESS

Factors which drive behaviour in organizations; critical thinking skills and strategies; role of teams in idea generation and creation; decision making environment and strategies; creative thinking in business; observation and analysis; awareness of one's own learning process; business environment and learning; Innovation; link among creativity, innovation and entrepreneurship. 30 Hours traditional face to face and 15 hours 'creativity' workshop.

STAT 1223(1) - STATISTICS FOR ENTREPRENEURS

Introduction to problems involved in the handling of data; Collection of data including Sample Design; Organisation and Presentation of Data; Measures of Central Tendency; Measures of Dispersion; Measures of Skewness; Introduction to Probability Theory.

MGT 1226(1) - ECONOMICS FOR MANAGERS

Basic tools of Economics; Microeconomics: Scarcity and Allocation, Demand and Supply, Elasticity, Long and short run costs, Labour & Factor Markets, Market Mechanisms, Economic Systems; Macroeconomics: Introduction and Measurement of National Income, Long run macro, short run macro, Money and Monetary Policy, Fiscal policy. International Economics; Microeconomics of Trade, Macroeconomics of Trade.

MGT 2252 (3) - CULTURE ENTREPRENEURIALE

La culture D'entreprise-définitions et dimensions, Entrepreneuriat et Culture, L'Education et la culture entrepreneuriale, Aspects culturels du business familial, L'Entrepreneuriat féminin-caractéristiques culturelles, La culture d'intrapreneuriat au sein de L'entreprise, L'Entrepreneuriat social, Culture entrepreneuriale et pauvreté La société entrepreneuriale-la culture entrepreneuriale au niveau national, Comparaisons internationales.

MGT 2086 (3) - MARKETING IN PRACTICE

Marketing concepts and practices; Introduction to the 7Ps of Marketing; Changing marketing environment; Marketing research methods; importance and relevance of STP; product and the PLC; Consumerism and Customer Relationship Marketing; Social Responsibility and Green Marketing; Issues related to Global Marketing Management; Emergence of Internet Marketing; Lectures will be supplemented with mini case studies, seminar related to the business sector.

MGT 2117(3) - RESEARCH METHODOLOGY IN MANAGEMENT

The Research Process – The need for information – Problem definition – Establishing research objectives – Research design – Causal Research – Experimental design – Information types and sources – Data collection methods – Data collection forms – Measurement and scaling – Sampling – Data coding – Editing and analysis – Hands-on with SPSS –Writing of report

MGT 3087Y(5) - STRATEGIC MANAGEMENT AND ENTREPRENEURIAL STRATEGIES

The international environment: An SME perspective, Driving forces for integration; An assessment of the evolution of the Mauritian economy since 1968; History of strategy since the 19th century; Strategic Management Process; Mission and Vision for SMEs; Resource based theory and the entrepreneurial firm, Value chain analysis, Benchmarking; SWOT, Environmental scanning, 5 Forces Model; Clusters and the new economics of competition; Decision tools; Competitive strategies; Entrepreneurial strategy framework, Growth and development strategies for SMEs, Entry mode choice into corporate entrepreneurship, International entrepreneurship; Networks and Alliances and Entrepreneurship, Strategic networking; Strategy implementation, Entrepreneurial strategic leadership and Growth; Innovation; Conflict management, Implementing change and gaining commitment, Crisis management, Social responsibility & Ethics; Evaluation & control, Case study techniques.

MGT 3089(5) - ENTREPRENEURIAL LEADERSHIP

Leaders and vision and mission; Leading the Entrepreneurial Team; Communication; setting policies and Culture Creation; Spiritual Leadership; physical, emotional, intellectual and spiritual values; Signals of weak entrepreneurial leadership; Leadership and Innovation; case studies of successful ventures and business failures.

MGT 3059Y(5) - INTERNATIONAL BUSINESS AND MANAGEMENT

The International Business Environment - Introduction to International Business, The Emerging Global Economy, The Role of Technological Forces in the Globalisation Process, Differences in Political Economies The Concept of National Competitiveness, Emerging Markets in the Global Economy. Cross-Border Management - The International Marketing environment as influenced by Political, Legal and Cultural dimensions. Foreign Market Analysis, Selecting and Managing Entry Modes to Foreign Markets, Assessing the Impact of Exporting, Importing and Counter-Trade, International Market Research and Multinational Marketing Information Systems, International Marketing Mix decisions Managing Diversity and Cross Cultural Differences. Current Issues in International Business and Management.

MGT 2088(3) –BUSINESS PLANNING AND DEVELOPMENT

Based on fundamentals of entrepreneurship and other management skills acquired in year 1, students will be expected to design and develop a business plan; Business Planning Process; Elements and Design of a Business Plan; Synthesis of functions of the business (marketing, finance, accounting, legal etc) in a coherent format; Reflect on and apply the entrepreneurial process; team and networking strategies; personal development and self-directed learning; primary and secondary research; communication skills. The plan drawn can be for start up ventures or new projects launch within an existing business. This module will include 35 hours traditional face to face lecture and 10 hours practitioners' workshop.

MGT 2059Y(3)- ENTREPRENEURIAL MARKETING

The nature of entrepreneurial marketing, The Marketing and Entrepreneurship Interface; Identifying market opportunities; Positioning, targeting and segmentation for entrepreneurs; Selecting, developing and evaluating new products and services; Entrepreneurial pricing decisions; Entrepreneurial distribution strategy; Entrepreneurial promotion strategy and viral marketing; Marketing in the Context of SMEs; The Entrepreneurial Marketing Plan.

MGT 2087 (3)- CORPORATE ETHICS AND GOOD GOVERNANCE

Brief overview of ethics philosophies (teleology, deontology, justice theories, ethical relativism – what constitutes good governance in the corporate world – stakeholder and stockholder theory – the social duty versus the economic duty of business – implications of Friedman's theory – individual ethics versus corporate ethics – difference between codes of ethics and the legislation – how to distinguish between right and wrong behaviour – why moral questions arise in the business corporation – bribery in the context of business – gifts versus bribes – implications of gifts in the corporate world – why there is an ongoing debate on whether ethics can or should be taught - profit maximisation v/s other corporate objectives - personal v/s corporate ethics – whistle blowing – impact of poor governance on business.

MGT 3500Y(5)- BUSINESS PLAN

Students will be expected to build up a real business concept and develop a business plan. The Plan will incorporate: the IP position, a marketing analysis, producing a business strategy and a financial analysis. Business Plan template will be provided in the module 'Business Planning and Development', though students are expected to be innovative.

ELECTIVES**MGT 3061Y(5) - MANAGING QUALITY**

Introduction to Quality, Total Quality Management concept and philosophies, Kaizen, Total Quality Culture, Leadership for Quality, Planning for Quality, Organising for Quality, Business Excellence Model – MBNQA, EFQM, Deming Prize, Quality Management Systems: ISO 9000, Quality System Audit, Quality tools and techniques for process improvement, Quality of Services, Teamwork for Quality, Communications and training for Quality, Benchmarking, Cost of Quality, Statistical Process Control, Implementing TQM.

MGT 3091Y(5) -TECHNOLOGICAL INNOVATION AND ENTREPRENEURSHIP

The Innovation process, technology appropriateness, Intellectual property rights, Patenting, Intellectual property development, Importance of technology transfer, Technology Transfer strategies, Types of Innovation, Stakeholders in the Innovation process.

MGT 3129Y(5) - CORPORATE SOCIAL RESPONSIBILITY

Perspectives of Corporate Social Responsibility (CSR); individual vs organisational ethical/social responsibilities; Factors which contribute to good CSR practices nationally and internationally; CSR and ethical/societal agendas; CSR strategies; Managing CSR within various settings (private sector, public sector, NGOs); Corporate Social Reporting; CSR and Governance; Concept of social entrepreneurship; Social entrepreneurship and economic development; Case Studies in Social Entrepreneurship.

MGT 3090Y(5) - FAMILY BUSINESS MANAGEMENT

Definition and types of family organisations; Role of family businesses in the Mauritan Economy and globally; Family firms and Entrepreneurship skills and talent; sustainability of family businesses across generations; management succession issues; Agency Theory, RBV of the family firm; economic vs non-economic goals of owners; ownership/governance structures of family firms.

MGT 3092Y(5) - CORPORATE ENTREPRENEURSHIP

Concept of corporate entrepreneurship; entrepreneurship and corporate success; strategic positioning and management; internal corporate venturing; corporate entrepreneurship and organisation types; innovation of products, services and processes and the formation of new ventures within existing companies; case studies in corporate entrepreneurship.

APPENDIX 12

BSc (Hons) Food Science and Technology (Minor: Food Entrepreneurship) (with 6-month internship) – A307

1. Objectives

The increasing growth in the global food industry can be linked to favourable economic & cultural transformation, change in lifestyles and needs of consumers, who are more willing to experiment with different cuisines, tastes and new brands. Moreover, today, there is an increase in awareness and concern for wellness and health, providing opportunities for development of new functional foods such as high protein, high antioxidant, low fat, wholegrain and organic food. To keep pace with the global trend, the local food processing sector needs innovative and entrepreneurial professionals who would be the food entrepreneurs of tomorrow. To run a successful business in this competitive food market, food entrepreneurs should have a good business plan and basic understanding about food processing, safety and hygiene, packaging, marketing, and regulatory requirements. This programme aims to produce graduates who will be innovative and have the entrepreneurial flair and abilities to contribute to a food system that can feed the world in a sustainable way. Graduates will also be qualified to work in food processing industries in production and managerial capacities, to teach and carry research and extension in governmental and non governmental institutions and to pursue further education and research in food related disciplines.

The programme offers students the opportunity to undertake a 6-month internship at the end of the third year, in organisations relevant to the field of study. The internship aims at (1) developing technical and practical skills of students in the area of food science and technology and entrepreneurship and (2) familiarizing students with skills that will enable them to contribute to the professionalization of the food sector in Mauritius.

By the end of this programme, graduates will have developed knowledge, abilities and skills to:

- apply scientific principles to control the chemical, physical, microbiological, nutritional and sensory properties of food during manufacture and storage;
- apply methods of preservation and processing to control deterioration and spoilage mechanisms in foods and to produce safe foods;
- apply methods of food analysis to assess quality, nutritive value, safety and compliance with standards;
- participate in the development, implementation and maintenance of comprehensive food safety management systems to protect consumer health;
- demonstrate the ability to manage food businesses and develop strategies in making a food business an economically viable and profitable enterprise;
- contribute to the development and growth of small and medium food enterprises, and food industries;
- recommend measures to prevent and reduce food loss and waste;
- identify, relate and apply the content of academic courses to specific work practices and make a worthwhile contribution in the workplace;
- demonstrate people related skills - communications, interpersonal, and team working;
- demonstrate conceptual skills - researching, collecting and organising information, problem solving, planning and organising, innovation and creativity, systems thinking and self-reliance;
- apply the steps involved in a research process;
- embark on training programmes at postgraduate level.

2. General Entry Requirements

In accordance with General Entry Requirements for Admission to the University for Undergraduate Degrees.

3. Programme Requirements

SC - Credit in Mathematics and Chemistry/Biology

2 GCE 'A' Level passes in related approved Science subjects (Mathematics, Chemistry, Physics, Biology, Food Studies, Botany, Zoology, Computer Science or Computing).

Preference will be given to candidates also holding an 'A' Level in either Food Studies or Biology.

4. Programme Duration

	Normal (Years)	Maximum (Years)
Degree:	3 ½	5 ½

5. Credits per Year: Minimum 18 credits, Maximum 48 credits subject to Regulation 6.

6. Minimum Credits Required for Award of Undergraduate Degree: 106 credits

Breakdown as follows:

Degree	Credits from		
	Taught Modules	Project	Internship
	Core		
	91	9	6

Students may exit with:

- Certificate after having earned 30 credits in core modules.
- Diploma after having earned 60 credits in core modules.

7. Assessment

Each module will be assessed over 100 marks (i.e. expressed as %) with details as follows (unless otherwise specified).

Assessment will be based on a Written Examination of 2-3 hour duration, carrying a weighting of 70%, and Continuous Assessment carrying 30% of total marks for AGRI modules. Continuous Assessment will be based on laboratory/field works, and/or assignments, and should include at least 1 class test. Written Examinations for all AGRI modules will normally be carried out at the end of the academic year. Semester Examinations will be carried out for modules indicated in the programme structure.

An overall total of 40% for combined Continuous Assessment and Written Examination would be required to pass a module, without minimum thresholds within the individual Continuous Assessment and Written Examination.

All students should keep a portfolio of all coursework for their respective Programme of studies and same should be made available upon request, to the Faculty/Centre Examination Office. In case students fail to submit the Portfolio to the External Examiners through the Faculty/Centre Examination Office, a penalty of 10% on all Continuous Assessment marks obtained shall apply.

Modules will carry the weightings of 1, 3 or 5 depending on their status (Introductory, Intermediate or Advanced). Weighting for a particular module is indicated within parentheses in the module code. Each module will carry credits in the range of 1 to 6. Project – AGRI 3000Y(5) will carry 9 credits.

Assessment of the module WCS 2200(3) – Writing Case Studies, will be based on the write up and submission of a Case Study. Assessment of the Internship – AGRI 4100(1) will be based on the Evaluation of the Industrial/Enterprise Mentor and the Student's Portfolio, and module will carry 6 credits.

Assessment of the module Professional Development AGRI 4101(1) will be based on continuous assessment of students throughout the module and/or submission of a portfolio and for satisfactory completion of the module, a minimum of 40% should be achieved.

Assessment of the module AGRI 1153(1) - Effective Scientific Communication: Principles and Practice I will be based on the submission of a portfolio. For the part on WEB 2.0 tools, participation in all discussion forum on the MOODLE platform and demonstration of the use of the tools (e.g. creation of a blog) should be shown. Assessment of the module AGRI 2279(1) - Scientific Communication: Principles and Practice II, will be based on the submission of a Portfolio.

The modules: AGRI 1153(1) - Effective Scientific Communication: Principles and Practice I and AGRI 2279(1) - Scientific Communication: Principles and Practice II, will carry 2 credits and 1 credit, respectively.

Submission Deadlines for Dissertation

- First Draft: by last week day of February of the Academic Year.
- Final Copy – not later than the last week day of March of the Academic Year.
- Three copies of the dissertation (two spiral-bound copies, printed on both sides in black and white and one soft copy in a single PDF text file on electronic storage media) should be submitted to the Faculty/Centre Registry.
- In addition a soft copy of the dissertation (main body i.e. Introduction up to the last Chapter) should be uploaded on the Turnitin Platform, as a single PDF file in the appropriate class/assignment provided by the Project Supervisor by 3.00 p.m. In case a student is allocated a Part-Time Supervisor, the class is to be created by the Programme/Project Coordinator.
- All of the above should be submitted not later than the working day (i.e. excluding Saturdays, Sundays and Public Holidays) of March of the academic year by 4.00 pm at latest unless specified otherwise in the Programme of studies.
- Failure to submit the Project/Dissertation through the Turnitin Platform will result in the dissertation of the student, whether the bound copy or the soft copy, being unreceivable.

8. List of Modules

CORE MODULES

Module code	Module Name	Hrs/Yr L+P	No. of credits
AGRI 10107Y(1)	Basic Food Microbiology	45+45	4
AGRI 10108Y(1)	Chemistry and Analysis of Foods I	60+60	6
AGRI 1065Y(1)	Introduction to Food Engineering	45+45	4
AGRI 1012Y(1)	Biochemistry and Nutrition	75+30	6
AGRI 1052Y(1)	Chemistry Fundamentals and Laboratory Techniques	30+60	4
AGRI 1056Y(1)	Introductory Statistics	30+30	3
AGRI 1041Y(1)	Introduction to Agricultural Production	45+0	3
AGRI 1072Y(1)	Introduction to Management in Food Industries	30+30	3
AGRI 10109Y(1)	Basics of Entrepreneurship for Food Businesses	45+0	3
AGRI 1153(1)	Effective Scientific Communication: Principles and Practice I	30+0	2
AGRI 20107Y(3)	Chemistry and Analysis of Foods II	60+30	5
AGRI 2018Y(3)	Unit Operations in Food Processing	30+30	3
AGRI 20106Y(3)	Food Safety and Quality Management	45+45	4
AGRI 20109Y(3)	Food Processing and Packaging Technology	60+30	5
AGRI 20110Y(3)	Molecular Biology and Biotechnology	30+45	3
AGRI 20111Y(3)	Statistical Methods for Food Scientists	30+30	3
AGRI 20112Y(3)	Food Hygiene	45+0	3
AGRI 2279(1)	Effective Scientific Communication: Principles and Practice II	15+0	1
AGRI 2113Y(3)	Food Economics and Marketing	30+30	3
AGRI 3014Y(5)	Food Legislation	45+0	3
AGRI 3017Y(5)	Developments in Food Science and Technology	45+0	3
AGRI 30104Y(5)	Innovative Approaches to Food Loss and Waste Reduction	45+30	4
AGRI 30105Y(5)	New Food Product Design, Development and Testing	45+30	4
AGRI 30106Y(5)	Entrepreneurship and Innovation for Small and Medium Food businesses	45+0	3
AGRI 30107Y(5)	Strategic Management for Food Businesses	45+0	3
AGRI 3000Y(5)	Project	-	9
WCS 2200(3)	Writing Case Studies	9+36	3
AGRI 4101(1)*	Professional Development	15+0	0
AGRI 4100(1)	Internship	6 months	6

*AGRI 4101(1) - Professional Development will be delivered before the students embark on the 6-month internship

Total Number of Credits = 106

9. Programme Plan: BSc (Hons) Food Science and Technology (Minor: Food Entrepreneurship) (with 6-month internship)

Module code	Module Name	Hrs/Yr L+P	No. of credits
Year 1			
AGRI 10107Y(1)	Basic Food Microbiology	45+45	4
AGRI 10108Y(1)	Chemistry and Analysis of Foods I	60+60	6
AGRI 1065Y(1)	Introduction to Food Engineering	45+45	4
AGRI 1012Y(1)	Biochemistry and Nutrition	75+30	6
AGRI 1052Y(1)	Chemistry Fundamentals and Laboratory Techniques	30+60	4
AGRI 1056Y(1)	Introductory Statistics	30+30	3
AGRI 1041Y(1)	Introduction to Agricultural Production	45+0	3
AGRI 1072Y(1)	Introduction to Management in Food Industries	30+30	3
AGRI 10109Y(1)	Basics of Entrepreneurship for Food Businesses	45+0	3
AGRI 1153(1)	Effective Scientific Communication: Principles and Practice I	30+0	2
TOTAL		435+300	38

Module code	Module Name	Hrs/Yr L+P	No. of credits
Year 2			
AGRI 20107Y(3)	Chemistry and Analysis of Foods II	60+30	5
AGRI 2018Y(3)	Unit Operations in Food Processing	30+30	3
AGRI 20108Y(3)	Food Safety and Quality Management	45+45	4
AGRI 20109Y(3)	Food Processing and Packaging Technology	60+30	5
AGRI 20110Y(3)	Molecular Biology and Biotechnology	30+45	3
AGRI 20111Y(3)	Statistical Methods for Food Scientists	30+30	3
AGRI 20112Y(3)	Food Hygiene	45+0	3
AGRI 2279(1)	Effective Scientific Communication: Principles and Practice II	15+0	1
AGRI 2113Y(3)	Food Economics and Marketing	30+30	3
WCS 2200(3)	Writing Case Studies	9+36	3
TOTAL		435+245	33

Module code	Module Name	Hrs/Yr L+P	No. of credits
Year 3			
AGRI 3014Y(5)	Food Legislation	45+0	3
AGRI 30104Y(3)	Innovative Approaches to Food Loss and Waste Reduction	45+30	4
AGRI 3017Y(5)	Developments in Food Science and Technology	45+0	3
AGRI 30105Y(3)	New Food Product Design, Development and Testing	45+30	4
AGRI 30106Y(3)	Entrepreneurship and Innovation for Small and Medium Food Businesses	45+0	3
AGRI 30107Y(3)	Strategic Management for Food Businesses	45+0	3
AGRI 3000Y(5)	Project	-	9
TOTAL		270+60	29

Year 4			
AGRI 4101(1)	Professional Development	15+0	0
AGRI 4100(1)	Internship	6 months	6

Total Number of Credits = 106

10. Outline Syllabus

AGRI 10107(1) – BASIC FOOD MICROBIOLOGY

Microbial diversity, structures and functions. Microbial physiology. Growth and survival. Characteristics of predominant microorganisms in food. Intrinsic and extrinsic factors that influence microbial growth. Natural reservoirs and sources of microorganisms. Pathogenic and spoilage microorganisms. Control of microorganisms. Beneficial micro-organisms. Fermented dairy and non-dairy foods. Microbiological examination of foods.

AGRI 10108Y(1) – CHEMISTRY AND ANALYSIS OF FOODS I

Chemistry of food constituents: water, carbohydrates, lipids, proteins and vitamins. Browning reactions in foods. Colloid chemistry of food systems.

Quantitative and qualitative analytical methods for foods. Factors affecting reliability of analyses. Good Laboratory Practices. Sampling plans and methods. Sample preparation. Validated and standard methods of food analysis. Instrumental methods of food analysis.

AGRI 1065Y(1) – INTRODUCTION TO FOOD ENGINEERING

Basic engineering principles of food processing operations: units, dimensions and system conversions. Material and energy balance. Thermodynamics. Heat and mass transfer. Heat exchangers. Solid and fluid rheology. Fluid flow. Pumps.

AGRI 1012Y(1) – BIOCHEMISTRY AND NUTRITION

Basic concepts of biochemistry and cell biology. Structure and function of biological molecules. Enzymes and reaction kinetics. Metabolic pathways. Essential principles and processes of cell and molecular biology.

Sources and functions of nutrients. Major Diet-related diseases. Nutritional requirements. Concept of Healthy eating. Energy balance and weight control. Digestion and absorption of food. The effect of processing on nutrients.

AGRI 1052Y(1) – CHEMISTRY FUNDAMENTALS AND LABORATORY TECHNIQUES

Basics of organic, inorganic and physical chemistry. Structures of atoms, molecules, bonding, orbitals. Reactions and stoichiometry. Reaction rates and equilibrium. Acid/base redox reactions. Isomerism. Stereochemistry. Free radicals. Electrophilic, nucleophilic reactions. Spectroscopic techniques.

pH and acid-base equilibria. Buffers: functions and uses. Acid-base titrations, indicators and titration curves. Potentiometric titration. Chemical kinetics. Partition coefficients. Physical and chemical methods of analysis. Preparation of standard solutions. Standardisation of reagents. Volumetric methods (acid-base titrations; redox titrations). Spectrophotometric methods.

AGRI 1056Y(1) – INTRODUCTORY STATISTICS

Importance of statistics. Descriptive statistics – displaying and summarising data. Probability distributions. Point and interval estimation. Hypothesis testing. Analysis of categorical data. Correlation and regression analysis. Data entry and analysis using EXCEL and MINITAB. Elements of research methodology.

AGRI 1041Y(1) – INTRODUCTION TO AGRICULTURAL PRODUCTION

Fundamentals of animal management and production: nutrition; feeds and feeding; reproduction and breeding; animal welfare and health; housing and equipment; Introduction to farm animal industries, their products and by-products; matching production of quality and safe food with protection and care of the environment. Sustainable food production. Food security concepts.

Climatic requirements; planting. Classification of food crops and their economic importance. Fundamentals of food crop production: agro-materials; crop establishment; plant nutrition; irrigation; crop protection; harvesting and postharvest practices. Good Agricultural Practices and sustainable crop production. Introduction to food crop production enterprises. Processed products from commercial food crops

AGRI 1072Y(1) – INTRODUCTION TO MANAGEMENT IN FOOD INDUSTRIES

Management Concepts and Functions. Development of Management Theories. The Internal and External Environments of the Organisation. Social Responsibility and Ethics in Management. Managerial Decision Making. The planning process. The nature of Organisation Structure. Organisational Control. Human Resource Management. Category Management.

AGRI 10109Y(1) - BASICS OF ENTREPRENEURSHIP FOR FOOD BUSINESSES

Concept of Entrepreneurship, The Entrepreneurial Process, Definition of the Entrepreneur, Entrepreneurial traits and skills, Entrepreneurship and SME, Entrepreneurship and organizations, Challenges of Entrepreneurship for food businesses, Business ideas and opportunities. Case studies of food businesses (successes and failures) at the local, regional and international levels.

AGRI 1153(1) – EFFECTIVE SCIENTIFIC COMMUNICATION: PRINCIPLES AND PRACTICE I

Objective of scientific communication. The scientific method. Common modes of scientific communication, and skills required: elements, structure and style of scientific papers; technical reports; research synopsis and proposals. Making effective scientific and technical oral presentations and posters. Falsification and fabrication of results. Ethics of scientific publishing. Concept of WEB 2.0 tools. Targeting web resources and searches. Fine tuning web searches. Use of social media tools for scientific communication and updates. Sharing and collaborative tools (e.g. alerts, RSS feeds). Uses of blogs, Facebook, WhatsApp for dissemination of information. Use of Google maps. Web based Referencing tools (e.g. Zotero).

AGRI 10107Y(3) – CHEMISTRY AND ANALYSIS OF FOODS II

The chemistry of natural pigments, flavours and major food products including dairy products, seafood products, fat products, meat, egg, cereals, fruits and vegetables. Chemistry and applications of food additives: sugar replacers; antimicrobial agents; antioxidants; colouring agents. Chemistry and mechanisms of fat modification processes to control formation of trans fatty acids.

Application of physical, chemical, instrumental and sensory methods to determine nutritive value, quality, safety and compliance with food standards. Analysis of selected food products. Structure and content of scientific reports.

AGRI 1018Y(3) – UNIT OPERATIONS IN FOOD PROCESSING

Applications of engineering principles in selected unit operations used in food processing including, refrigeration, freezing, heat exchangers, evaporation and dehydration. Operation of equipment. Problem solving.

AGRI 20108Y (3) – FOOD SAFETY AND QUALITY MANAGEMENT

Food safety definitions and concepts. Definitions and relationships between quality and quality management concepts. Relationship between food safety and quality. Food safety, food security and sustainability. Factors which affect food safety and quality. Importance of food safety and quality management throughout the food chain. Evolution of quality management approaches. Quality management principles. Quality management system standards (ISO 9001). Quality management system documentation and auditing. Inherent and assignable causes of process variation. Development and application of variable and attribute Shewart Control Charts in food industries. Operation of Codex sampling plans. Codes of practice and quality standards for food laboratories. Certification and standardisation. Traceability.

Food safety hazards: primary sources, characteristics, adverse health effects, implicated foods and control measures. Comprehensive food safety management systems. Codex guidelines for the Hazard Analysis Critical Control Point (HACCP) system. Application of the seven HACCP principles to selected food processing operations. ISO 22000 food safety management system standard.

AGRI 20109Y(3) – FOOD PROCESSING AND PACKAGING TECHNOLOGY

Raw material selection and preparatory operations. Food preservation using low and high temperatures, reduced water activity, fermentation, chemicals, radiation, modified atmosphere. Alternatives to heat processing. Processing of selected food commodities from different food groups including dairy, seafood, meat, poultry, fruits and vegetables, cereals and vegetable oils. Chemical and physical properties of package materials. Interaction between package and food. Selection and evaluation of packaging materials. Package design. Printing. Computers in packaging.

AGRI 20110Y(3) – MOLECULAR BIOLOGY AND BIOTECHNOLOGY

Introduction to cell and genome structure. Cellular organizations. Gene structure and organisation. DNA replication, repair and recombination. Gene expression and modification processes. Modification of genetic content. Principles of gene cloning. Recombinant DNA technology and genetically modified organisms.

Basic concepts in Biotechnology. Scope and applications of biotechnology in health care, agriculture, environment. Cell & Tissue Culture. Food Biotechnology, Environmental, aquatic and Industrial Microbiology. Biotechnology in animal Production. Legislative framework.

AGRI 20111Y(3) - STATISTICAL METHODS FOR FOOD SCIENTISTS

Need for statistics in experimental planning and analysis in Food studies. Design and Analysis of Experiments. ANOVA. Analysis of data from sensory evaluations. Post-hoc comparisons of means. Data transformation. Non-parametric methods: Wilcoxon signed-rank test, Mann Whitney U test, Kruskal-Wallis and Friedman's test. Sampling design and techniques. Questionnaire design and development. Measures of reliability: Cronbach's alpha, Test-retest reliability using correlation and Cohen's kappa. Knowledge, Attitude and Practice (KAP) survey model. Consumer studies. Data processing using MINITAB and SPSS.

AGRI 20112Y(3) – FOOD HYGIENE

Benefits of food hygiene. Food contamination and its prevention. Prerequisite programmes. General principles of food hygiene from farm to fork(primary production; Establishment; Equipment; Control of operations; Pest control; Maintenance and Best practices in food Sanitation; Waste management; Personal hygiene, Storage and Transportation. Training in food hygiene of food handlers and consumers. Food hygiene rating . Assessment of food hygiene.

AGRI 2279(1) – EFFECTIVE SCIENTIFIC COMMUNICATION: PRINCIPLES AND PRACTICE II

The University of Mauritius regulations for final year projects/dissertations. The Faculty Dissertation Guidelines. Planning and executing the research work. Dissertation writing up process: abstract; introduction; literature review; methodology; results; discussion; conclusions (and recommendations); referencing rules; appendices. Recognising and avoiding different forms of plagiarism. Use of Turnitin software. Editorial rigour. Meeting deadlines: effective time management. Final year project/dissertation related deadlines and forms.

AGRI 2113Y(3) - FOOD ECONOMICS AND MARKETING

Basic tools of Economics; Concepts of Economics: Microeconomics and Macroeconomics; Demand and supply; principles of production economics. Economic aspects of the food supply chain. International economics. Introduction to marketing. Agricultural and Food Marketing: from commodity marketing to value-addition in agricultural products; marketing functions; marketing channels and costs. Food policies.

WCS 2200(3) – WRITING CASE STUDIES

This self-learning module (9 contact hours; 36 hours of self-directed learning) aims to equip students with a range of skills needed to be successful in the world of work: analytical skills, critical thinking, problem solving, decision making, writing and research skills, communication skills, independent learning. Every student is expected to identify a real-life, practical situation (the Case), where existing problem(s) need to be solved. Through the write-up of the Case Study (between 3000-4000 words), the student will be trained to analyse the case, propose solution(s), and recommend the implementation of the solution(s). The Case Study will enable students to contextualise and apply their theoretical knowledge to real-life situations. Furthermore, this module will acquaint students with the Turnitin software as a tool to detect plagiarism, building up references and adopting a proper referencing style.

Writing the Case Study: types of Case Studies; recognising the sections to be included; guidelines for writing a Case Study; examples of Case Studies.

AGRI 3014Y(5) – FOOD LEGISLATION

FAO guidelines for national food control systems. Mauritius food control system. British food control system. European food legislation. Codex Alimentarius Commission. World Trade Organisation. Elimination of tariff and technical barriers to food trade. Agreements on Sanitary and Phytosanitary measures (SPS) and Technical Barriers to Trade (TBT). Occupational health and safety laws. Regulations regarding GM and novel foods. MauriGAP/ GlobalGAP certification and standards, ECOCERT certification for organic produce. Local legislation on organic food production. Traceability.

AGRI 30104Y(5) – INNOVATIVE APPROACHES TO FOOD LOSS AND WASTE REDUCTION

Causes and sources of postharvest food losses along the food chain. Postharvest physiology. Postharvest handling systems. Postharvest treatments. Identification of causes of food waste. Innovative approaches, technologies, and policies for food loss and food waste prevention, reduction and management : environmental control, commodity treatments; packaging systems; Regulation of standard criteria's ; date marking; policies and measures for food and drink waste prevention and reduction and management. Outreach and education . Behavioural changes

AGRI 3017Y(5) – DEVELOPMENTS IN FOOD SCIENCE AND TECHNOLOGY

Reviews on current research and development in food science and technology. Student seminars on defined research topics in food science and technology.

AGRI 30105Y(5) - NEW FOOD PRODUCT DESIGN, DEVELOPMENT AND TESTING

The scientific and technological principles underpinning new product development (NPD). Stages of the NPD process and activities. NPD success factors. New product design. Food innovation case studies. Market-oriented NPD methodologies. Integration of market and sensory analysis. Marketing of novel foods. Food safety and shelf-life aspects of NPD.

Integration and application of acquired competencies through group learning activities to select and develop a food product based on a valid scientific, business, environmental and social rationale. Group learning activities for selected food product: relevant food standards; literature search and scientific thinking to propose a food product formulation and process; processing inputs and methods; pre-requisite programmes and HACCP plan; appropriate food packaging; food label; nutritional labelling and health claims; target markets and consumers.

AGRI 30106Y(5) – ENTREPRENEURSHIP AND INNOVATION FOR SMALL AND MEDIUM FOOD BUSINESSES

Risk and Uncertainty in a food business. Finance for a food business. The entrepreneurial attitude: generation of creative business ideas and innovation; opportunities for setting up an agribusiness. Types of business organisations. Public and private sector support in Mauritius for food businesses. Setting up a food business and development of a business plan. Clustering. Business Incubators. Case studies of food businesses at national, regional and international levels.

AGRI 30107Y(5) – STRATEGIC MANAGEMENT FOR FOOD BUSINESSES

Definition and process of strategic management, nature of strategic decisions for a food business; Strategy formulation; Developing mission and objective; Formulation of functional action plans; Analyzing organisation culture; Strategic control: The strategic control process. A Case Analysis Framework for a food business: Diagnosis and record of the current situation. Identification and record of strategic issues and key problems.1

AGRI 3000Y(5) – PROJECT

This is a very important component of the programme, allowing students to develop high level skills and cognitive abilities. Every student will be allocated a research topic. Students will be encouraged to undertake their project work in the minor option. The research work will be carried out under academic supervision. Students should demonstrate good practice in using skills and knowledge acquired during the programme and follow dissertation guidelines as laid down by the Faculty of Agriculture, and regulations of the University of Mauritius. The number of words in the final year project/dissertation shall be between 8,000 -12,000.

AGRI 4101(1) – PROFESSIONAL DEVELOPMENT

This module will be delivered before the students embark on the 6-month internship and will include the following topics:

Personality, Attitudes and Work Behaviour. Communication skills. Interpersonal and team-working skills. Work ethics, culture and values. Professional code of conduct. Confidentiality. Data protection laws. Labour laws. Intellectual Property Policy and Rights. Leadership and employee engagement. Customer focus. Time management. Performance appraisal and management. Promoting excellence.

AGRI 4100(1) – INTERNSHIP (6 MONTHS)

Personality, Attitudes and Work Behaviour. Communication skills. Interpersonal and team-working skills. Work ethics, culture and values. Professional code of conduct. Confidentiality. Data protection laws. Labour laws. Intellectual Property Policy and Rights. Leadership and employee engagement. Customer focus. Time management. Performance appraisal and management. Promoting excellence.

APPENDIX 13

BSc (Hons) Fashion Technology (minor: Entrepreneurship) (F/T) - E307

1. Introduction

The textile industry has historically been the cradle of major developments in technology, manufacturing methods, management principles and entrepreneurial strategies. Locally, the textile and apparel industry has, over several decades, been a great employer of graduates in numerous fields from technical to managerial and it still remains a significant provider of high technical skilled and managerial job for our youth at the supervisory and middle-management level. Besides, the revenue generated by the small, medium and large textile enterprises is considered to be an important contributor to the Mauritian economy. The Fashion Technology (minor: Entrepreneurship) degree program aims at fulfilling two current human resource needs of the country: (i) producing graduates with a sound and coherent understanding of the technological and managerial aspects of the various chains of the textile and apparel production (ii) producing young people with the potential of becoming job creators in the short to medium term in various textile and non-textile related areas. Graduates may either opt for a career in the textile and apparel industry or consider setting up micro-businesses, small enterprises and support services that supplement and sustain the textile and apparel industry. The provision of skilled workforce would allow the textile and fashion apparel industry to consolidate itself and flourish by maintaining high productivity and quality standards. The integration of latest technologies and techniques of manufacturing and the application of sophisticated logistics for the timely supply of products are critical for the industry to remain competitive in such a global marketplace. On the other hand, those who opt to become entrepreneur in the field of textile, fashion, and apparel would help to support the industry at large and generate further revenue for the economy.

2. Aim

The aim of this programme is to produce graduates with a broad-based knowledge of production technology of textiles and apparel along with the knowledge and skills necessary to launch enterprises that directly or indirectly support the textile, fashion, and apparel industry.

3. Objectives

- i. To provide students with a theoretical and practical understanding of fashion and design, textile production and technological processes, business enterprise and their interactions;
- ii. To develop students' skills, knowledge and understanding as applicable to work within the Mauritian textile and apparel industry;
- iii. To assist students in developing, managing ideas and associated technologies in textile and apparel design projects;
- iv. To enhance students' ability to harness design, innovation and problem solving skills within the context of a business strategy and an organisational framework;
- v. To prepare students to view entrepreneurship as a desirable and feasible career option;
- vi. To assist students in their ability to carry out research effectively by identifying, assimilating, interpreting and applying technical, market and business information through sound and innovative research methods.

4. Job Opportunities & Prospects

Graduates of Fashion Technology (minor: Entrepreneurship) degree program will be qualified for jobs in the textile and apparel industry, such as product developer, textile/apparel/fashion technologist,

textile/apparel/fashion merchandiser, textile and fashion co-coordinator or can be self-employed in the field of textile and apparel production.

5. General Entry Requirements

As per General Entry Requirements for admission to the University for Undergraduate Degrees.

6. Programme Requirements

Five credits at SC/ 'O' Level.

Any 2 GCE 'A' Level Passes. A Foundation in Art, Design & Technology or in a design-related subject awarded by a recognised awarding body is also acceptable as NQF level 5

OR alternative qualifications acceptable to the UoM.

7. (i) Minimum Requirements for Degree Award – 100 credits

(ii) Minimum Requirements for exit with a Diploma – 60 credits

A student may exit with a Diploma award provided s/he satisfies the following minimum requirements, as given hereunder. The request for exit at the Diploma level should be made in writing to the Dean of Faculty. A Diploma project is compulsory and would normally be of 12 weeks duration, commensurate with work input of at least 90 contact hours. Diploma Project carries 5 credits.

Minimum Credits Required for the Award

MODULES	Minimum Credits Required	
	Degree	Diploma
Management	6	6
Entrepreneurship	6	3
Technology & Engineering	12	6
Departmental	61	45 (including 5 credits for Diploma Project)
Management (Elective)	6	
Entrepreneurship (Elective)	6	
Departmental (Elective)	3	
TOTAL	100	60

8. Programme Duration : Full-Time

	Normal (Years)	Maximum (Years)
Degree:	3	5

9. Credits per Year

Minimum 6, Maximum 48, subject to Regulations 7 above.

10. Assessment

Examinable Modules

A given module can either be taught in semester 1 only or in semester 2 only or throughout the two semesters.

Assessment will be based on a written examination of 2 to 3-hour duration (normally a paper of 2-hour duration for modules carrying less or equal to 3.5 credits and a 3-hour paper for modules carrying five or more credits) and on continuous assessment carried out during the semester or year.

Written examinations for all yearly modules will be carried out at the end of the academic year. Written examinations for semester modules will be carried out at the end of each respective semester.

The continuous assessment will count for 20-40% of the overall percentage mark of the module(s), except for a Programme where the structure makes for other specific provision(s). Continuous assessment may be based on laboratory work, seminars and at least 2 assignments/tests per year per module.

There will be a compulsory class test for all semester modules, unless otherwise stated in the programme structure. An overall total of 40% for combined continuous assessment and written examination components would be required to pass the module, without any minimum thresholds within the individual continuous assessment and written examination. The same criterion will apply for modules being assessed jointly.

The following modules will be assessed as specified hereunder:

DASE 1107(1) Apparel Construction I; DASE 1204(3) Pattern Drafting System I; DASE 1001 Y(3) Fashion Design Principles; DASE 2109(3) Software Applications for Fashion Design; DASE 2208(3) Computer Aided Design for Apparel; DASE 3105(3) Start Up Business Plan.

There will be a minimum of 3 assignments and 1 mini-project per yearly module, and a minimum of 1 assignment and/or 1 mini-project per semester module, which will account for 60% of total marks. A final assessment based on 40% of total marks will be conducted at the end of the semester/ year by the resource person concerned under examination conditions.

Special examinations will be arranged at the end of semester 1 or semester 2 for exchange students who have registered for only one semester. In case of yearly modules, credits will be assigned on a pro-rata basis.

11. List of Modules – BSc (Hons) Fashion Technology (minor: Entrepreneurship)

CORE MODULES

Code	Module Name	Hrs/Wk L+P	Credits
Management			
MGT 1117(1)	Principles and Practice of Management	3+0	3
MGT 2253(3)	Business Communication and Effective Negotiation	3+0	3
Entrepreneurship			
MGT 1102(1)	Fundamentals of Entrepreneurship	3+0	3
DASE 2108(3)	Small and Medium Textile Enterprise Management	3+0	3
Technology & Engineering			
DASE 2109(3)	Software Applications for Fashion Design	1+4	3
DASE 2208(3)	Computer Aided Design for Apparel	2+2	3
DASE 2002Y(3)	Quality Concepts in Textile Industry	3+0	6
Department			
DASE 1105(1)	Textile Materials	3+0	3
DASE 1106(1)	Yarn Production	3+0	3
DASE 1107(1)	Apparel Construction I	0+4	2
DASE 1203(1)	Garment Technology	2+2	3
DASE 1204(3)	Pattern Drafting Systems I	1+4	3
DASE 1205(3)	Fabric Production	2+2	3
DASE 1206(3)	Textile Statistics	3+0	3
DASE 1001Y(3)	Fashion Design Principles	1+4	6
DASE 1200(1)	Industrial Placement I	-	0
DASE 2107(3)	Product Performance and Evaluation	2+2	3
DASE 2209(3)	Creativity and Innovation in Design	2+2	3
DASE 2003Y(5)	Textile Colouration and Finishing	2+2	6
WCS 2200(3)	Writing Case Studies	-	3
DASE 2200(3)	Industrial Placement II	-	0
DASE 3103(3)	Fashion Merchandising	3+0	3
DASE 3105(3)	Start Up Business Plan	0+6	3
DASE 3004Y(5)	Apparel Production Planning & Control	2+1	5
DASE 3006Y(5)	Dissertation	-	9
TOTAL DEPARTMENT			61
DASE 2002(3)	Diploma Project	12 weeks	5

ELECTIVES

Code	Module Name	Hrs/Wk L+P	Credits
Management			
ACF 1000(1)	Accounting for Financial Decision-Making	3+0	3
MGT 1226(1)	Economics for Managers	3+0	3
MGT 2086(3)	Marketing in Practice	3+0	3
Entrepreneurship			
DASE 2210(3)	Sustainable Practices for Textile Industry	3+0	3
MGT 2087(3)	Corporate Ethics and Good Governance	3+0	3
MGT 3087Y(3)	Strategic Management & Entrepreneurial Strategies	3+0	6
Department			
DASE 3102(3)	Technical Textiles	3+0	3
DASE 3202(3)	Ethics, Fair Trade & Sustainability in the Textile Supply Chain	3+0	3

12. Programme Structure

YEAR 1							
SEMESTER CORE MODULES							
Semester 1				Semester 2			
Code	Module Name	Hrs/Wk L+P	Credits	Code	Module Name	Hrs/Wk L+P	Credits
DASE 1105(1)	Textile Materials	3+0	3	DASE 1203(1)	Garment Technology	2+2	3
DASE 1106(1)	Yarn Production	3+0	3	DASE 1204(3)	Pattern Drafting Systems I	1+4	3
DASE 1107(1)	Apparel Construction I	0+4	2	DASE 1205(3)	Fabric Production	2+2	3
MGT 1102(1)	Fundamentals of Entrepreneurship	3+0	3	DASE 1206(3)	Textile Statistics	3+0	3
MGT 1117(1)	Principles and Practice of Management	3+0	3				
SEMESTER ELECTIVE MODULE							
				MGT1226(3)	Economics for Managers	3+0	3
YEARLY CORE MODULES							
Code	Module Name	Hrs/Wk L+P	Credits				
DASE 1001Y(3)	Fashion Design Principles	1+4	6				
DASE 1200(1)	Industrial Placement I	-	0				
Total Number of credits Yr 1 = 35							

YEAR 2							
SEMESTER CORE MODULES							
Semester 1				Semester 2			
Code	Module Name	Hrs/Wk L+P	Credits	Code	Module Name	Hrs/Wk L+P	Credits
DASE 2107(3)	Product Performance and Evaluation	2+2	3	DASE 2208(3)	Computer Aided Design for Apparel	2+2	3
DASE 2108(3)	Small and Medium Textile Enterprise Management	3+0	3	DASE 2209(3)	Creativity & Innovation in Design	2+2	3
DASE 2109(3)	Software Applications for Fashion Design	1+4	3	MGT 2253(3)	Business Communication and Effective Negotiation	3+0	3
				WCS 2200(3)	Writing Case Studies	-	3
YEARLY CORE MODULES							
Code	Module Name	Hrs/Wk L+P	Credits				
DASE 2002Y(3)	Quality Concepts in Textile Industry	3+0	6				
DASE 2003Y(3)	Textile Colouration & Finishing	2+2	6				
DASE 2200(3)	Industrial Placement II	-	0				
SEMESTER ELECTIVE MODULE							
Code	Module Name	Hrs/Wk L+P	Credits	Code	Module Name	Hrs/Wk L+P	Credits
ACF 1000(1)	Accounting for Financial Decision Making	3+0	3	DASE 2210(3)	Sustainable Practices for Textile Industry	3+0	3
MGT 2087(3)	Corporate Ethics and Good Governance	3+0	3	MGT 2086(3)	Marketing in Practice	3+0	3
Total Number of credits Yr 2 = 42							

YEAR 3							
SEMESTER CORE MODULES							
Code	Module Name	Hrs/Wk L+P	Credits	Code	Module Name	Hrs/Wk L+P	Credits
DASE 3103(3)	Fashion Merchandising	3+0	3				
DASE 3105(3)	Start Up Business Plan	0+6	3				
YEARLY CORE MODULE							
Code	Module Name					Hrs/Wk L+P	Credits
DASE 3004Y(5)	Apparel Production Planning & Control					2+1	5
DASE 3006Y(5)	Dissertation					-	9
SEMESTER ELECTIVE MODULES							
DASE 3102(3)	Technical Textiles	3+0	3	DASE 3202(3)	Ethics, Fair Trade & Sustainability in the Textile Supply Chain	3+0	3
YEARLY ELECTIVE MODULE							
MGT 3087Y(5)	Strategic Management & Entrepreneurial Strategies					3+0	6
Total Number of credits: Yr 3 = 23							

13. OUTLINE SYLLABUS

MGT 1117(1) - PRINCIPLES AND PRACTICE OF MANAGEMENT

Management Concepts and Functions. The internal and external environments of the organisation. Introduction to Organisational Behaviour. Foundations of Individual and Group Behaviour. Management Decision Making. Communication. Conflict Management. Organisational Culture. Organisational Change and Development. Social Responsibility and Ethics in Management.

MGT 2253(3) - BUSINESS COMMUNICATION AND EFFECTIVE NEGOTIATION

Overview of Communication in business communication and organizational business effectiveness; Formal and informal communication systems, intercultural communications, Profiles of diverse cultures, effective of business writing, Employment-Process Communication -Cover letter, résumé, follow-up, interviewing and listening skills; Art of negotiating, Preparing for a negotiation, Managing conflicts, Telephoning and Secretarial barrier. Presentation techniques, culture and negotiating skills. Using visual aids. Cross-Cultural understanding, culture and negotiation. Making meetings effective

ACF 1000(1) - ACCOUNTING FOR FINANCIAL DECISION MAKING

The Role of Accounting Information, Recording and Summarising Transactions, Accounting Concepts & Preparing Final Accounts, Adjustments to Final Accounts, Capital v/s Revenue Expenditure; Bank Reconciliation Statement, Accounting Ratios; Accounting for Internal Decision Making Techniques, Elements of Cost, Costing Methods and Techniques, Decision Making Techniques, Accounting for Manufacturers, Budgets.

MGT 1226(1) - ECONOMICS FOR MANAGERS

Basic tools of Economics; Microeconomics: Scarcity and Allocation, Demand and Supply, Elasticity, Long and short run costs, Labour & Factor Markets, Market Mechanisms, Economic Systems; Macroeconomics:

7

© University of Mauritius 2016, 2018

Introduction and Measurement of National Income, Long run macro, short run macro, Money and Monetary Policy, Fiscal policy, International Economics; Microeconomics of Trade, Macroeconomics of Trade.

MGT 2086(3) - MARKETING IN PRACTICE

Marketing concepts and practices; Introduction to the 7Ps of Marketing; Changing marketing environment; Marketing research methods; importance and relevance of STP; product and the PLC; Consumerism and Customer Relationship Marketing; Social Responsibility and Green Marketing; Issues related to Global Marketing Management; Emergence of Internet Marketing; Lectures will be supplemented with mini case studies, seminar related to the business sector.

MGT 1102(1) - FUNDAMENTALS OF ENTREPRENEURSHIP

Concept of Entrepreneurship, Historical Evolution of Entrepreneurship, Overview of organizing, creating, developing and managing your own business, The Entrepreneurial Process, Definition of the Entrepreneur, Entrepreneurial traits, Entrepreneurship and SME, Entrepreneurships and large organizations, Challenges of Entrepreneurship.

DASE 2108(3) - SMALL AND MEDIUM TEXTILE ENTERPRISE MANAGEMENT

Definition of Small Business; Small Business and Challenges; the Small Business manager; multiple roles of the Small Business Manager; Starting a small textile/enterprise. Organising the textile enterprise: marketing, financial, production and operations management, administrative and financial controls. Legal aspects connected to SMEs.

DASE 2210(3) - SUSTAINABLE PRACTICES FOR TEXTILE INDUSTRY

This module will be focus on the textile industry and will look at sustainable business practices of this key sector of the Mauritian economy, from manufacturing to retailing. The triple bottom line: economic, social and environmental activities and their interactions. Sustainable technologies, business practices and strategies; initiatives for carbon neutrality, and low carbon transport & logistics. Social responsibility of enterprises, employee education & empowerment. Re-use, reduce, recycling. Renewable energies. Low cost solar systems in textile industry.

MGT 2087(3) - CORPORATE ETHICS AND GOOD GOVERNANCE

Brief overview of ethics philosophies (teleology, deontology, justice theories, ethical relativism – what constitutes good governance in the corporate world – stakeholder and stockholder theory – the social duty versus the economic duty of business – implications of Friedman's theory – individual ethics versus corporate ethics – difference between codes of ethics and the legislation – how to distinguish between right and wrong behaviour – why moral questions arise in the business corporation – bribery in the context of business – gifts versus bribes – implications of gifts in the corporate world – why there is an ongoing debate on whether ethics can or should be taught - profit maximisation v/s other corporate objectives - personal v/s corporate ethics – whistle blowing – impact of poor governance on business.

MGT 3087Y(5) - STRATEGIC MANAGEMENT AND ENTREPRENEURIAL STRATEGIES

The international environment: An SME perspective, Driving forces for integration; An assessment of the evolution of the Mauritian economy since 1968; History of strategy since the 19th century; Strategic Management Process; Mission and Vision for SMEs; Resource based theory and the entrepreneurial firm, Value chain analysis, Benchmarking; SWOT, Environmental scanning, 5 Forces Model; Clusters and the new economics of competition; Decision tools; Competitive strategies; Entrepreneurial strategy framework, Growth and development strategies for SMEs, Entry mode choice into corporate entrepreneurship, International entrepreneurship; Networks and Alliances and Entrepreneurship, Strategic networking; Strategy implementation, Entrepreneurial strategic leadership and Growth; Innovation; Conflict management, Implementing change and gaining commitment, Crisis management, Social responsibility & Ethics; Evaluation & control, Case study techniques.

8

© University of Mauritius 2016, 2018

DASE 2109(3) - SOFTWARE APPLICATIONS FOR FASHION DESIGN

Introduction to CAD for drawing and creating illustrations and specifications pack for fashion collections. Specific technology for presentation purposes and software such as Adobe Illustrator and Photoshop for creating client visuals, communication and general marketing of design work including 3D and web design.

DASE 2208(3) - COMPUTER AIDED DESIGN FOR APPAREL

Introduction to the use of CAD software as applied to preproduction tasks in manufacturing of textile and apparel products. Introduction to the computer as a tool for apparel drawings Technical Sketching and fashion sketching and illustration. Application of apparel industry-specific software for flats, specs, fabrication and storyboards. Digital presentation for Apparel and textile design Apparel Manufacturing Software Systems, Fashion CAD (Computer Aided Design), Fashion Illustration and Draping (CAD), Computerized Flat Pattern and Grading, CAD Apparel/Textile Design for Industry, CAM: Designing Knit Apparel. Auto CAD.

DASE 2002Y(3) - QUALITY CONCEPTS IN TEXTILE INDUSTRY

Introduction to quality concepts and quality assurance. Quality systems and quality standards applicable to textile industry, ISO 9000. Total Quality Management in textiles. Quality Improvement tools and techniques. Statistical Quality Control. Quality Management in design and manufacturing processes. Quality costing.

DASE 1105(1) - TEXTILE MATERIALS

Fibres: Classification, production, structure and properties. Mapping properties of textiles with application. General properties of fibrous materials: density, packing, porosity, permeability etc. Production, application and structure-property relationships of selected natural and man-made fibres. Current trends and innovations in textile fibre production.

DASE 1106(1) - YARN PRODUCTION

Yarn characterization, yarn preparatory processes and spinning systems for ring-spun, rotor spun and friction spun yarns, production of man-made staple and filament yarns. Current trends and innovations in yarn manufacture.

DASE 1107(1) - APPAREL CONSTRUCTION 1

Introduction to sewing machines, basic stitching, seams, openings, pleats and darts in the construction of garments. Garment construction process, experimentation with fabric manipulation techniques and different sewing techniques. Introduction pattern making, body measurements and size charts; sewing with commercial patterns.

DASE 1203(1) - GARMENT TECHNOLOGY

Introduction to garment Industry; sampling, cutting, production and finishing; pre-production planning; cutting techniques; marker planning; fabric packages; sewing production – seam types, stitch types; machines used in sewing; kinematics and function of machines used for spreading, cutting, fusing and embroidery; construction techniques for apparel; sewing skills in construction of garments.

DASE 1204(3) - PATTERN DRAFTING SYSTEM I

Manual pattern making and grading; marker making for apparel production; basic pattern making. Study of drafting techniques employed in the flat pattern method for designing of apparel. Fitting bodice (darted and dart less blocks) and skirt block. Understanding of principles of dart manipulation, various style lines in garment features. Principles of contouring and its application to achieve a well fitted body garment, pattern making woven and knitted garments pattern.

DASE 1205(3) - FABRIC PRODUCTION

General characteristics, properties and applications of knitted and woven fabrics. Fabric geometry, structure-property relationships. Fundamentals of knitting and weaving technology. Woven fabric structure, quality and performance. Current trends and innovations in knitting and weaving.

DASE 1206(3) - TEXTILE STATISTICS

Introduction to problems involved in the handling of data; collection of data including sample design; organisation and presentation of data; measures of central tendency; measures of dispersion, correlation and linear regression.

DASE 1001Y(3) - FASHION DESIGN PRINCIPLES

Introduction to basic principles and elements of design and colour fundamentals, with application particularly in the fields of fashion and textiles. Creating inspiration, mood boards and garments design development. Definition and Explanation of regularly used terms viz. Style, design, classic, fad, high fashion garments, mass fashion, fashion trends etc.

DASE 1200(1) - INDUSTRIAL PLACEMENT I

Students undertake eight weeks industrial training for gaining a work-based experience in industry or conduct an industry-based project to integrate theoretical and practical aspects.

DASE 2107(3) - PRODUCT PERFORMANCE AND EVALUATION

An understanding of the rationale of testing textile materials. The physical properties of textile materials and their measurements. The assessment of the performance-related properties of textile materials such as degradation, durability, comfort and wear; a good working knowledge of a wide range of physical & chemical test methods.

DASE 2209(3) - CREATIVITY AND INNOVATION IN DESIGN

Processes of original and creative thinking in design; lateral thinking; generation of innovative ideas/concepts and their manifestation from thought into reality; use of experiential methods to demonstrate the process of creative thinking and generation of innovative ideas in design. New type of design such as sensory and inclusive design. The module focuses on stimulating creativity in individuals and helping students to identify factors that promote and inhibit creativity & innovation. Studio-based assignments.

DASE 2003Y(5) - TEXTILE COLOURATION AND FINISHING

Preparation of textile materials for colouration; classes of colourants, principle and theory of colouration of textile materials; colouration of different textile substrates using a range of suitable colorants; introduction to various printing techniques and styles; properties, production and application of print pastes onto different textile substrates; practical aspects of colour measurement and phenomena; an overview of basic textile chemical and mechanical finishes and their application to textile materials.

WCS 2200(3) – WRITING CASE STUDIES

Rationale of a case study – Objectives – Problem Identification – Contextualising the case – Constructing the case – Investigation and mobilisation of evidence, facts and figures – Structuring the case study – Drafting and scoping the study – Examples – Emphasis on style, jargon, writing and presentation skills – referencing style – Essence of Plagiarism.

This module will consist of 9 contact hours and 36 hours of self-study, carries 3 credits and shall be compulsory. A group of 2 students is expected to identify a case-study and must submit an Abstract of 200

words to the lecturer co-ordinating the module after the 3 weeks of lectures and submit the full case study at the end of the module for assessment”.

DASE 2200(3) - INDUSTRIAL PLACEMENT II

Students undertake eight weeks industrial training for gaining a work-based experience in industry.

DASE 3103(3) - FASHION MERCHANDISING

Fundamentals of the fashion industry; Pre-Production steps up to apparel production, the textile and apparel supply chain including accessories; the importance of communication. Responsibilities of merchandisers. The buying function. Retail Business fundamentals, visual merchandising, e-fashion; fashion promotion and buying process.

DASE 3004Y(5) - APPAREL PRODUCTION PLANNING & CONTROL

Basic types of apparel production process; Basic Production system - manual making through - progressive bundle system - section or process system – synchro system – unit production system – quick response sewing system – Principle of choosing a production system; Fabric & Garment Finishing. Fusing and pressing technology. Application of Production Planning & Control in Apparel Industry. Sewing planning and record keeping; Line Balancing, Skill Matrix chart, Overall efficiency, Capacity Planning. Aspects of industrial engineering: Work study, time study, and ergonomics for Apparel Manufacturing. Packaging and dispatching. Certifications.

DASE 3202(3) - ETHICS, FAIR TRADE & SUSTAINABILITY IN THE TEXTILE SUPPLY CHAIN

Overview of World Textile & Apparel Trade: The ATC Period; the Post Quota Era; Trends in the Post Quota Era; Vision for Future-Projections and Trends. Evaluation of issues considering economic, political, social, ethical and professional implications. Trade Fairs and Fashion Shows. General overview of the major countries exporting and importing textiles and apparel.

DASE 3102(3) - TECHNICAL TEXTILES

Technical textiles, technical fibres, role of yarn and fabric construction, composite material; Production and properties of geotextiles, filtration, automotive and medical textiles. Textiles for agriculture, protective clothing.

DASE 3105(3) – START UP BUSINESS PLAN

Students will be required to produce a business plan for a start-up. Preparation, development and presentation of a business portfolio.

DASE 3006Y(5) - DISSERTATION

Project related to apparel, design, entrepreneurship and related areas supported by a dissertation of about 10,000 to 12,000 words.

DASE 2002(3) - DIPLOMA PROJECT

Project related to fashion technology or entrepreneurship and related areas supported by a dissertation of 6,000 to 8000 words.

APPENDIX 14



Central University of
Technology, Free State

**FACULTY OF HEALTH AND ENVIRONMENTAL
SCIENCES**

DEPARTMENT OF LIFE SCIENCES

subject: code

NQF LEVEL 6
CREDITS: 30

BSc in Environmental Health

Food and meat safety

2. STUDY COMPONENT

2.1 Cross-Field outcomes for module

The seven critical cross-field outcomes which, according to SAQA, would best meet the needs of our country at this stage in time, and which should direct all teaching and learning in all levels of education and training and in all subjects and courses are:

For all learners to:

- 1 Identify and solve problems within the context of the work environment in which responses display those responsible decisions using critical and creative thinking as well as somatic and special senses. This outcome manifests in the identification, evaluation, control and recommendation of remedial and preventative measures.
- 2 Work effectively with others as a member of a multidisciplinary team, intersectoral group, organization and/ or community through management of Environmental Health matters in the multidisciplinary manner.
- 3 Organise, analyse and critically evaluate information within the context of Environmental Health by organising and managing oneself and one's activities responsibly and effectively.
- 4 Collect, analyse, organise and critically evaluate information in order to manage Environmental Health risks within natural, socio-economic, built and working environments.
- 5 Communicate effectively using visual, mathematical and/ or language skills in the modes of oral and written persuasion to colleagues, staff and clients in research, reports and health promotion.
- 6 Use science and technology effectively through the appropriate use of Environmental Health equipment responsibility toward the environment and health of others.
- 7 Demonstrate an understanding of the world as a set of related systems by recognizing that problem solving contexts do not exist in isolation, hence the focus on holistic environment.
- 8 Contribute to the full personal development of each learner and the social and economic development of the society at large, by making it the underlying intention of this program of learning to make the individual aware of the importance of:
 - 8.1 Reflecting on and exploring at variety of strategies to learn more effectively;
 - 8.2 Participating as responsible citizens in the life of local, national and global communities;
 - 8.3 Being culturally and aesthetically sensitive across a range of social contexts;
 - 8.4 Exploring education and career opportunities;
 - 8.5 Developing entrepreneurial opportunities
- 9 Apply a professional code of ethics and demonstrate professionalism in all endeavours

BSc IN ENVIRONMENTAL HEALTH

ASSOCIATED ASSESSMENT CRITERIA

Assessment criteria for Exit Level Outcome 1:

- 1.1 Ethical and legal responsibilities pertaining to the Profession are applied during all interactions with clients, colleagues and/or the community.
- 1.2 All activities are performed in terms of ethical rules of the HPCSA, the Scope of the profession, the Environmental Health package of services and the Batho Pele principles.
- 1.3 Professional and personal growth is achieved through the assumption of various roles within the Environmental Health milieu or community setting and is evidenced during interactions between practitioners and communities/clients and/or practitioner and colleagues.
[Range of roles includes but are not limited to: educator, facilitator, administrator, project manager, law enforcement officer, community developer and researcher]
- 1.4 Interactions with community groups, Non-Governmental Organisations, clients and media are handled using tactful, objective, non-confrontational, culturally acceptable and language sensitive communication skills.
- 1.6 The requirements for registrations with the HPCSA and professional bodies are fulfilled.

Assessment criteria for Exit Level Outcome 2:

- 2.1 Physical, chemical, biochemical and biological principles are integrated and applied in the identifying, assessing managing and controlling of Environmental Health risks and services.
- 2.2 Anatomical, Physiological, Pathophysiological and Mathematical principles and knowledge are integrated and applied in the identifying, assessing managing and controlling of Environmental Health risks and services.
- 2.3 Social and behavioural principles and knowledge are integrated and applied by means of community outreach, project facilitation and related Environmental Health services.

Assessment criteria for Exit Level Outcome 3:

- 3.1 Expected outcomes are demonstrated according to the level of competence of the learner in collaboration with the relevant workplace mentors and supervisors.
- 3.2 Portfolios are completed in accordance with expected outcomes, required learning experience and in agreement with workplace mentors and supervisors.
- 3.3 The ability to initiate, plan, manage and monitor and evaluate community projects in accordance with the relevant policies and regulations of HE institutions are demonstrated.

Assessment criteria for Exit Level Outcome 4:

- 4.1 Current and potential health risks are identified and their impacts are assessed within the Environmental Health field, using applicable strategies.
- 4.2 Health risks are recognised in accordance with relevant legislation and best practice. [Range: Legislation includes, but are not limited to all health and environmental-related acts and regulation, codes of practice, norms and standards and work procedures]
- 4.3 A comprehensive risk management plan is compiled in accordance with relevant legislation and best practice.
- 4.4 All intervention measures for the identified Environmental Health risk are evaluated to determine corrective actions.
- 4.5 The effectiveness of the comprehensive risk management plan is monitored and reviewed.
- 4.6 Current and potential risks are addressed by applying various strategies. [Range: various strategies include: Environmental Impact Assessment, Social Impact Assessment, Strategic Environmental Assessment, and Health Impact Assessment]
- 4.7 The effectiveness of the comprehensive risk management plan is monitored and reviewed.
- 4.8 Findings, recommendations and requirements are reported in an acceptable format.
- 4.9 Verification tools are developed to measure and evaluate all elements of the Environmental Health risk management. [Range: 'Tools' could include surveys, questionnaires, statistical packages and reports]
- 4.10 Public participation is conducted at all stages of the development and implementation of the risk management plan.
- 4.11 A report is presented in an acceptable report format and outcomes communicated to the relevant stakeholders.

Assessment criteria for Exit Level Outcome 5:

- 5.1 A situational analysis is performed in the community by collecting information, conducting meetings and interviews and by complying with acceptable protocols. [Range: Community refers to but are not limited to the community leaders, Non-Governmental Organisation demographic make up of communities, available resources and current health promotion projects].
- 5.2 Sustainable health promotion programmes are designed, implemented, monitored and evaluated in compliance with accepted National policies and guidelines of health promotion.
- 5.3 Multi-disciplinary promotion programmes are participated in.
- 5.4 Participatory methodologies are used to promote Environmental Health amongst communities in the working, living and recreational environment.

Assessment criteria for Exit Level Outcome 6:

- 6.1 Administrative skills are applied in context by applying the relevant management norms and standards.
- 6.2 A skills development plan is drawn up.
- 6.3 Policies, legislation and guidelines are critically reviewed and developed.
- 6.4 Policies, legislation and guideline gaps are identified and analysed and recommendations are developed and applied.
- 6.5 Human resources are managed within an Environmental Health context.
- 6.6 Labour relations policies and legislation are reviewed and applied in context. [Range: labour relations, basic conditions of employment, Employment equity, Prevention of Discrimination Act, HIV and AIDS (AMS 16000), CPD]
- 6.7 The relationship between health, environment and sustainable development is applied in the context of Environmental Health service delivery.
- 6.8 Financial matters and physical resources of an Environmental Health service are managed adhering to relevant legislative requirements.
- 6.9 Accounts, budgets and financial procedures are controlled in accordance with applicable legislation.
- 6.10 Environmental Health information system is managed. [Range: manage include collection, collation, interpretation, analysing, application and recording]
- 6.11 Relevant electronic/software programmes for Environmental Health information system management are applied.

Assessment criteria for Exit Level Outcome 7:

- 7.1 The project is planned, fully implemented, managed and assessed adhering to project management principles.
- 7.2 Time-management and financial management principles are applied within a project.
- 7.3 The project is monitored and evaluated adhering to project management principles.
- 7.4 Results are communicated (verbally & in writing) in an acceptable format to the relevant stakeholders.

Assessment criteria for Exit Level Outcome 8:

- 8.1 A research need/ theme/ problem is identified.
- 8.2 The research proposal reflects national and international accepted guidelines and ethical norms.
- 8.3 Research principles are applied in design and conduct of investigation.
- 8.4 Research data is managed in line with prescribed guidelines.

BSc in Environmental Health

- 8.5 Intervention measures are developed to confirm research objectives.
- 8.6 Intervention measures are implemented and evaluated.
- 8.7 Results are communicated in appropriate format (verbal and in writing).
- 8.8 The report reflects interpretation, prioritization and applicability of data completely and accurately.
- 8.9 The research report addresses the identified problem as stated in the proposal.
- 8.10 The report reflects intervention measures according to the findings of the research.
- 8.11 Feedback of research results and recommendations is given to all role players.
- 8.12 The presentation demonstrates the research capability according to institutional guidelines.

Assessment criteria for Exit Level Outcome 9:

- 9.1 Communication strategies are developed and managed to improve Environmental Health services.
- 9.2 All forms of communication are handled promptly, politely, and professionally.
[Range: All forms of communication include, but are not limited to letter and e-mail correspondence, telephone calls, site visits, group discussions, meetings, and presentations].
- 9.3 Protocols for communicating Environmental Health issues to community members are developed.
- 9.4 Participatory sessions are planned.
- 9.5 Systems for the communication of strategies for the delivery of Environmental Health services are developed and reviewed.
- 9.6 Resolution of conflicts is facilitated within the work environment.
- 9.7 Conflict resolution skills are demonstrated.
[Range: Skills include, but are not limited to, listening skills, respect for diversity, understanding the history and context of the conflict, identifying the nucleus of the problem separate from the symptoms, finding common ground and areas of agreement, as well as identifying negotiable and non-negotiable areas].
- 9.8 Communication and marketing strategies that are related to Environmental Health are managed.
- 9.9 Complicated issues and procedures are explained to the level of the target audience.
- 9.10 Opportunities for public speaking are sought to broaden the audience on Environmental Health issues.

BSc in Environmental Health

- 9.11 Various public speaking skills are demonstrated by applying a variety of resources and methods.
[Range: Resources include, but are not limited to, electronic software, slides, posters, flip-charts, pamphlets, exhibitions, role-play, mentoring and debate].
- 9.12 Marketing strategies that are tactful, objective, non-confrontational, culturally and linguistically sensitive are demonstrated to articulate the goals, purposes, problems, and needs of Environmental Health.
- 9.13 Marketing strategies are evaluated and appropriate remedial actions are taken.

UNIT 1 – Introduction to food and meat hygiene		
Outcomes:		
<ul style="list-style-type: none"> Express and understanding of what "Food and Meat Hygiene" entails Provide an overview of the food legislation, standard and codes in South Africa 		
Assessment Criteria	Teaching Strategy	Assessment method
<ul style="list-style-type: none"> The term "food Hygiene" is defined and the elements thereof are described The different pieces of legislation (Acts and by-laws) relevant to food production, preparation and processing are identified and discussed in terms of the responsible governmental department, purpose and the structure of control areas. The different standards and codes relevant to food production, preparation and processing are identified and discussed in terms of the responsible authority, purpose and areas of control. The Powers & Duties of Inspectors / Analysts in terms of the legislation are interpreted and described. The use of alternative legislation, with reference to the Fines Act, is identified. The purpose behind the need for and South Africa's role in applying and or using international food safety organizations (e.g. FAO, FDA (USA) WHO, Codex Alimentarius) is identified and explained. 	<p>Lecture controlled: Concepts regarding food and meat hygiene and food legislation are explained to assist students in familiarizing the application of legislation and its relationship to food and meat hygiene and safety.</p> <p>Peer controlled: Group work evaluation in the form of a report on food premises compliance using legislation.</p> <p>Student Controlled:</p> <ul style="list-style-type: none"> Students obtain legislation from the web-sites of the respective departments and organizations Through <u>self study</u> students interpret and integrate the law in terms of various scenarios and case studies 	<p>Formative assessment: Group preparation and presentation of the respective legislation, standards and codes. Followed by a class quiz in this regard.</p> <p>Summative assessment: Theoretical test with a minimum pass of 50%. Final examination consisting of theoretical and practical evaluation on a 50:50 basis which will include elements of design and layout of a premises</p>

UNIT 2 - Food premises design and layout		
Outcomes: Assess food premises design (including equipment) in relation to national legislation and standards in order to ensure a safe food preparation / processing environment.		
Assessment Criteria	Teaching Strategy	Assessment method
<ul style="list-style-type: none"> Typical layout and design requirements (inclusive of equipment and facilities) of different types of food premises are described in terms of the relevant national legislation and standards. Food premises compliance to national legislation and standards are evaluated and interpreted with consideration of the requirements of national legislation, standards, codes and the appropriate rules of ethics and professionalism. Health impacts related to formal and informal food premises design and layout are identified, evaluated, monitored and controlled. Findings of evaluations, monitoring and interpretation are communicated to the industry in a reliable and coherent manner. 	<p>Lecturer controlled:</p> <ul style="list-style-type: none"> Lecturing of new concepts as required by the legislation and other relevant standards Placement of student at municipalities to have exposure to food premises design and layout. <p>Peer controlled:</p> <ul style="list-style-type: none"> Evaluate each other's evaluation form against the requirements of legislation and other relevant standards Writing of a report in a prescribed format <p>Student controlled:</p> <ul style="list-style-type: none"> Find legislation on the web-sites of the relevant government departments Studying of the theoretical content 	<p>Formative assessment:</p> <ul style="list-style-type: none"> Class quiz and tests on the interpretation of the legal and standards requirements Group work on the design of an inspection form used to evaluate the design and layout of food premises. Feedback is provided to the class and discussed to make corrections / improvements to the form. Case studies are used to determine level of compliance e.g. use of photo slides. Class discussions <p>Summative assessment: Theoretical test with a minimum pass of 50% that counts as a mark for the predicate. Final examination consisting of theoretical and practical evaluation on a 50:50 basis and which will include elements of the legislation.</p>

UNIT 3 – Good Hygiene and Manufacturing Practices		
Outcomes: Assess hygiene and manufacturing practices (GHPs and GMPs) followed by food premises in relation to national legislation and standards in order to ensure safe food preparation / processing.		
Assessment Criteria	Teaching Strategy	Assessment method
<ul style="list-style-type: none"> Good Hygiene and Manufacturing practices (GHPs and GMPs) required for safe food preparation / processing are described with the consideration of relevant national legislation and standards. Good Hygiene and Manufacturing practices (GHPs and GMPs) followed by formal and informal food premises during preparation / processing are evaluated and interpreted with consideration of the requirements of national legislation, standards, codes and the appropriate rules of ethics and professionalism. Health impacts related to formal and informal food premises hygiene and manufacturing practices are identified, evaluated, monitored and controlled. Findings of evaluations, monitoring and interpretation are communicated to the industry in a reliable and coherent manner. 	<p>Lecturer controlled:</p> <ul style="list-style-type: none"> Lecturing of new concepts as required by the legislation and other relevant standards Placement of student at municipalities to have exposure to hygiene and manufacturing practices. <p>Peer controlled:</p> <ul style="list-style-type: none"> Evaluate each other's evaluation form against the requirements of legislation and other relevant standards Writing of a report in a prescribed format <p>Student controlled:</p> <ul style="list-style-type: none"> Find legislation on the web-sites of the relevant government departments Studying of the theoretical content 	<p>Formative assessment:</p> <ul style="list-style-type: none"> Class quiz and tests on the interpretation of the legal and standards requirements Group work on the GHP and GMP form used to evaluate the hygiene and manufacturing practices followed by food premises. Feedback is provided to the class and discussed to make corrections / improvements to the form. Case studies are used to determine level of compliance e.g. use of photo slides. Class discussions <p>Summative assessment: Theoretical test with a minimum pass of 50% that counts as a mark for the predicate. Final examination consisting of theoretical and practical evaluation on a 50:50 basis which will include elements of design and layout of a premises</p>

UNIT 4 – Abattoir design and slaughter of animals		
Outcomes:		
<ul style="list-style-type: none"> Describe the slaughter process for the different slaughter animals Meat Describe the design and layout aspects specifically applicable to abattoirs 		
Assessment Criteria	Teaching Strategy	Assessment method
<ul style="list-style-type: none"> In addition to the design and layout requirements in Unit 2, the design and layout requirements different grades of abattoirs are described. A process flow diagram for slaughter (including emergency slaughter) of the different slaughter is constructed and the activities relevant to each process step are described. Aspects relating to animal welfare and humane treatment of animals at abattoirs are identified. Abattoir design and layout as well as abattoir specific hygiene and manufacturing practices is evaluated and interpreted with consideration of the requirements of the Hygiene Assessment System (HAS) and the appropriate rules of ethics and professionalism. Health impacts related to abattoir hygiene and manufacturing practices are identified, evaluated, monitored and controlled. Findings of evaluations, monitoring and interpretation are communicated to the 	<p>Lecturer controlled:</p> <ul style="list-style-type: none"> Lecturing of theoretical and practical concepts, standards and codes and practical application of legislation. Placement of student at abattoirs to have exposure to abattoir design and layout and animal slaughter. <p>Peer controlled:</p> <ul style="list-style-type: none"> Peer group discussions and presentations of interpretation and application of legislation (case studies). Evaluate each other's completed HAS evaluation form against the requirements of legislation and other relevant standards Writing of a report in a prescribed format <p>Student controlled:</p> <ul style="list-style-type: none"> Find legislation on the web-sites of the relevant government departments Self-exploratory by literature review; studying theoretical content and partaking in practical sessions. 	<p>Formative assessment:</p> <ul style="list-style-type: none"> Class quiz and tests on the interpretation of the legal and standards requirements Group work on the GHP and GMP form used to evaluate the hygiene and manufacturing practices followed by the different abattoir grades. Feedback is provided to the class and discussed to make corrections / improvements to the form. Case studies are used to determine level of compliance e.g. use of photo slides. Class discussions <p>Summative assessment: Theoretical test with a minimum pass of 50% that counts as a mark for the predicate. Final examination consisting of theoretical and practical evaluation on a 50:50 basis and which will include elements of design and layout of abattoirs.</p>

industry in a reliable and coherent manner.		
---	--	--

UNIT 5 – Slaughter animal anatomy and physiology Outcomes: <ul style="list-style-type: none"> Identify the various parts of the carcass and the viscera and discuss the anatomy and physiology thereof as it applies to meat inspection and the subsequent approval/condemnation thereof 		
Assessment Criteria	Teaching Strategy	Assessment method
<ul style="list-style-type: none"> The anatomy of the skeleton, the structure of the carcass are identified and described With consideration of the knowledge gained in "Anatomy and Physiology" module, the anatomy and physiology of the different body systems of slaughter animals as it applies to meat inspection are identified and described Knowledge on comparative anatomy of different slaughter animals is demonstrated (physiology is covered in Anatomy I). The process of rigor mortis and its relation to muscle (meat) quality is described. 	Lecturer controlled: <ul style="list-style-type: none"> Lecturing of theoretical and practical concepts of slaughter animal anatomy and physiology. Demonstrations of the various anatomical parts of slaughter animals. Placement of student at abattoirs to have exposure to slaughter animal anatomy and physiology. Peer controlled: Peer group discussions on anatomy and physiology of slaughter animal parts. Student controlled: <ul style="list-style-type: none"> Find legislation on the web-sites of the relevant government departments Self-exploratory by literature review; studying theoretical content and partaking in practical sessions. 	Formative assessment: <ul style="list-style-type: none"> Class quiz on slaughter animal anatomy and physiology Identification of slaughter animal parts and viscera presented to the student in the form of specimens and / or photo slides Summative assessment: Theoretical test with a minimum pass of 50% that counts as a mark for the predicate. Final examination consisting of theoretical and practical evaluation on a 50:50 basis and which will include elements of slaughter animal anatomy and physiology. In the practical students will be expected to identify <u>animals</u> parts and viscera presented to them in the form of specimens and / or photo slides

UNIT 6 – Meat inspection Outcomes: <ul style="list-style-type: none"> Identify and eliminate sick animals on arrival at the abattoir from slaughter as well as disease, pathological and other physiological conditions at Primary Meat Inspection point in order to remove those that makes the meat unfit for human consumption 		
Assessment Criteria	Teaching Strategy	Assessment method
<ul style="list-style-type: none"> Sick animals (including notifiable diseases) arriving at the abattoir and possibly unfit for human consumption are identified and prevented from slaughter. The correct preventative safety requirements with the slaughter of sick animals (e.g. brucellosis and anthrax) are applied as prescribed in the relevant regulations. Injured animals upon and fit for emergency slaughter is identified. Meat Inspection on slaughter animals is performed as prescribed by legislation and in accordance with the rules of ethics and professionalism Ability to identify and judge disease, pathological and other physiological conditions (including possible secondary conditions) on whether suitable and safe for human consumption or not during meat inspection is demonstrated. The appropriate disposal method of for the condemned carcasses and parts are 	Lecturer controlled: <ul style="list-style-type: none"> Lecturing of theoretical and practical concepts of slaughter animal anatomy and physiology. Demonstrations of the various anatomical parts of slaughter animals. Placement of student at abattoirs to have exposure to meat inspection. Peer controlled: <ul style="list-style-type: none"> Evaluate each other's HAS evaluation form regarding meat inspection against the requirements of legislation and other relevant standards Completion of abattoir slaughter and other records Student controlled: <ul style="list-style-type: none"> Self-exploratory by literature review; studying theoretical content and partaking in practical sessions. Conduct primary meat inspections under supervision of a registered meat inspector according to the prescriptions of the legislation. 	Formative assessment: <ul style="list-style-type: none"> Class quiz on slaughter animal meat inspection and the identification and judgement of disease, pathological and other physiological conditions Identification and judgement of disease, pathological and other physiological conditions presented to the student in the form of specimens and / or photo slides Summative assessment: Theoretical test with a minimum pass of 50% that counts as a mark for the predicate. Final examination consisting of theoretical and practical evaluation on a 50:50 basis and which will include elements of the identification and judgement of disease, pathological and other physiological conditions. In the practical students will be expected to identify and judge disease, pathological and other physiological conditions presented to them in the form of specimens and / or photo slides

identified and monitored.			Saved to this PC
---------------------------	--	--	------------------

Learner Number:	<input type="text"/>
Surname & Initials:	<input type="text"/>
Program:	BSc: Environmental Health
Module Name:	Food and meat safety
Subject Code:	<input type="text"/>
Assignment Number:	<input type="text"/>
Due date:	<input type="text"/> <input type="text"/> <input type="text"/> M M D D
Lecturer:	<input type="text"/>

Declaration of own work

I hereby declare that this assignment is my own work and that it has
Not been copied from any other person or document.

Signature

Date