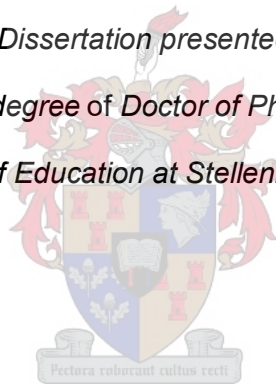


**Learning by design: enhancing the digital literacy of adult learners in a blended learning environment**

by

Zenobia Alethea Angelica Davidse

*Dissertation presented  
for the degree of Doctor of Philosophy  
in the Faculty of Education at Stellenbosch University*



Supervisor: Prof. Magda Fourie-Malherbe

Co-supervisor: Dr. Antoinette van der Merwe

December 2020

## **Declaration**

By submitting this dissertation electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the sole author thereof (save to the extent explicitly otherwise stated), that reproduction and publication thereof by Stellenbosch University will not infringe any third party rights and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

Z. Davidse

December 2020

Copyright © 2020 Stellenbosch University

All rights reserved

## Abstract

The higher education landscape is changing, influenced by phenomena like globalization, democratization, massification and emerging technologies. The reality higher education institutions (HEIs) are facing is an increase of access for a broader segment of the population from diverse socio-economic, cultural and educational backgrounds demanding flexible programme offerings to cater for their diverse needs. Among the larger student population, adult learners are becoming increasingly prominent.

Adult learners enter or re-enter HE for a variety of reasons: they must be upskilled in terms of qualifications required for the workplace, in terms of skills to actively contribute and participate in the knowledge economy, or in terms of personal development. The development and use of emerging technologies enable flexible delivery modes. Many universities are introducing hybrid learning strategies that combine the use of technology and face-to-face interaction. The readiness of adult learners to adapt to and flourish in a hybrid learning environment was the challenge investigated in this study to improve the digital literacy of adult learners with limited prior exposure to ICT.

In this study the collaborative nature of educational design research (EDR) assisted in developing deeper understanding, over a period of two years, of the challenges adult learners face with the use of technology in teaching and learning. EDR is conducted in the messiness of a real-world setting and involves several complex variables. In order to create a controlled setting for the study, a programme was purposively selected that had adopted a combination of block contact and online learning, and catered for a student population that consisted mostly of adult learners and was diversified in terms of their experience in the use of technology in learning and teaching. The nature of EDR situated this study within a pragmatic paradigm, using qualitative and quantitative methods for the data generation.

EDR was used as an approach to investigate, design, implement and integrate a technology-based intervention to improve the digital literacy of adult learners with the Integrative Learning Design Framework (ILDF) as the guiding framework. The integrative, systematic process of ILDF put emphasis on the context and activity of design. The significance of ILDF is the learning that occurs because of the data generated during each phase, as the context of the environment is better understood, applied and refined during these cycles.

The repetition of the cycles of operation in the various phases not only assists in the improvement of the design of the intervention, but also contributes to a deeper understanding of all the variables that influence the educational practices. ILDF draws from instructional design traditions, product design, usage-centered design and diffusion of innovation as an integrated systematic process. Instructional design and usage-centered design was of particular interest for the situated context of the study because of the emerging technology trends in HE and the needs of adult learners.

This study has demonstrated that challenges in technology-enhanced programme planning and teaching and learning can be viewed through different lenses. The lens of the programme coordinator drew attention to the shortcomings of adult learners with regard to the use of technology in a blended learning environment. However, from the perspective of the adult learners, it became clear that their expectations of expanded access to learning opportunities within HE were not accommodated in the mode of delivery, and technology in the learning environment did not provide for the needs of a diverse student population. This was addressed by the designed intervention.



## Opsomming

Die hoër onderwyslandskap verander voortdurend en word veral beïnvloed deur verskynsels soos globalisering, demokratisering, massifikasie en opkomende tegnologieë. Die realiteit waarmee hoër onderwysinstellings gekonfronteer word, is die verbreding van toegang vir 'n groter segment van die bevolking van diverse sosio-ekonomiese, kulturele en onderwysagtergronde, wat buigsame programaanbiedings om aan die verskeidenheid van behoeftes te voorsien, vereis. In terme van die breë studentepopulasie word volwasse leerders dus toenemend prominent.

Volwasse leerders betree of her-betree hoër onderwys vir 'n verskeidenheid van redes, hoofsaaklik om hulle vaardighede te verbeter ter wille van vereistes in die werkplek, om aktief deel te neem en 'n bydrae te lewer in die kennis-ekonomie, of ter wille van persoonlike ontwikkeling. Die ontwikkeling en gebruik van opkomende tegnologieë maak 'n buigsame gemengde-modus van aanbiedinge moontlik. Baie universiteite ontwikkel en implementeer hibriede leerstrategieë wat die gebruik van tegnologie en van aangesig-tot-aangesig interaksie kombineer. Die gereedheid van volwasse leerders om aan te pas by en te floreer in 'n hibriede leer-omgewing was die uitdaging wat in hierdie studie ondersoek is, met die doel om die digitale geletterdheid van volwasse leerders met 'n geskiedenis van beperkte blootstelling aan IKT (informasie-kommunikasie tegnologie) te verbeter.

In hierdie studie het die samewerkende aard van opvoedkundige ontwerpnavorsing ('educational design research' of EDR) bygedra tot die ontwikkeling van 'n dieper begrip, oor 'n tydperk van twee jaar, van die uitdagings wat volwasse leerders in die gesig staar met die gebruik van tegnologie in onderrig en leer. Opvoedkundige ontwerpnavorsing word gedoen in die 'morsigheid' ('messiness') van die werklike lewe en behels verskeie komplekse veranderlikes. Om 'n beheerde omgewing vir die studie daar te stel, is 'n program wat 'n kombinasie van blok-kontak en aanlyn-leer toegepas het, doelbewus geselekteer. Die program het voorsiening gemaak vir 'n studentepopulasie van hoofsaaklik volwasse leerders wat divers is in terme van hulle ondervinding in die gebruik van tegnologie in onderrig en leer. Die aard van opvoedkundige ontwerpnavorsing het hierdie studie in 'n pragmatiese paradigma, wat gebruik maak van kwalitatiewe en kwantitatiewe metodes vir data-generering, geplaas. Opvoedkundige ontwerpnavorsing as navorsingsbenadering is gebruik om 'n tegnologie-gebaseerde intervensie te ondersoek, te ontwerp, te implementeer en te integreer om die digitale geletterdheid van volwasse leerders te verbeter, met die Integreerende Leer-Ontwerpraamwerk ('Integrative Learning Design Framework' of ILDF) as basiese raamwerk. Die integreerende, sistematiese prosesse van ILDF plaas die klem op die konteks en die aktiwiteit van die ontwerp. Die betekenis van ILDF is die leer wat plaasvind as gevolg van die data wat gedurende elke fase gegenereer word, aangesien die konteks van die omgewing beter begryp, toegepas en verfyn word gedurende elke siklus. Die herhaling van die operasionele siklusse in elke fase dra nie net by tot die verbetering van die ontwerp van die intervensie nie, maar ook tot 'n dieper begrip van

al die veranderlikes wat die onderrigpraktyke beïnvloed. ILDF steun op tradisies van opvoedkundige ontwerp, produkontwerp, gebruiksgesentreerde ontwerp en verspreiding van innovasie as 'n geïntegreerde sistematiese proses. Opvoedkundige ontwerp en gebruiksgesentreerde ontwerp was van besondere belang in die spesifieke konteks van die studie, veral in die lig van die opkomende tegnologiese tendense vir hoër onderwys en die behoeftes van volwasse leerders.

Hierdie studie het gedemonstreer dat uitdagings in tegnologie-versterkte programbeplanning en onderrig en leer deur verskillende lense beskou kan word. Die lens van die programkoördineerder het die aandag gevestig op die tekortkominge van volwasse leerders met betrekking tot die gebruik van tegnologie in 'n gemengde leeromgewing. Daarteenoor, vanuit die perspektief van die volwasse leerders, het dit duidelik geword dat hulle verwagtinge van uitgebreide toegang tot leergeleenthede in hoër onderwys nie aangespreek is in hierdie leeraanbieding nie, en dat die tegnologie in die leeromgewing nie in die behoeftes van 'n diverse studentepopulasie voorsien het nie. Dit is aangespreek deur die intervensie wat in die studie ontwerp is.

## Acknowledgements

To my husband Stuart and children, Aryana and Gian for your support, words of encouragement, your many sacrifices that gave me room to pursue my studies and gave me courage to endure.

Professor Magda Fourie-Malherbe, voicing my sincere gratitude does not begin to express how grateful I am that you firstly agreed to be my promoter and secondly for your guidance, patience and coaching during my PhD journey, it has been an incredible privilege to have been mentored by you.

I am also grateful to Dr Antoinette van der Merwe, my co-promoter, for your continued interest in the progress of the study, taking the time to be part of the journey, despite your busy schedule and for the constant invitations to open conversations.

To Magda Burger, language practitioner, thank you for the gentle manner in which you provided the feedback, extra effort to clear up uncertainties and helping me to finalize my dissertation.

To Adrian, Mandy, Chloe, and Bonnie, for your constant inspiration, support, and encouragement but more importantly for just believing in me.

To Bennie, Charlotte, Kyle, and Kieran, for your prayers, words of encouragement and reminding me to also rely on the strength of those who care.

To Courtney, it feels like you have walked by my side since the moment I registered, thank you so much for everything, the support and sacrifices.

To Eva, Milly, and Zachary, thank you very much for your creative interest in this study and for turning the students' whispering expectations into a magnificent, loud illustration.

Thank you to my colleagues, for being amazing not only with your kind words but everything you have done to show your support and offering your assistance.

To the lecturers and the students who made this study possible, I have learned a great deal from you, and I am so grateful to have had this experience with you and this study is dedicated to you.

Finally, to my Heavenly Father, thank you for being the source of my strength. "...My grace is sufficient for you, for My power is made perfect in weakness. Therefore, I will boast all the more gladly of my weaknesses, so that the power of Christ may rest upon me". (2 Corinthians 12 verse 9).

## Table of Contents

CHAPTER 1	ORIENTATION OF THE STUDY .....	1
1.1	INTRODUCTION .....	1
1.2	PROBLEM STATEMENT .....	3
1.3	RESEARCH QUESTIONS, AIM AND OBJECTIVES .....	5
1.4	THEORETICAL FRAMEWORK .....	6
1.5	RESEARCH APPROACH .....	7
1.6	RESEARCH METHODOLOGY .....	7
1.7	ETHICAL CONSIDERATIONS .....	9
1.8	STRUCTURE OF THE STUDY .....	9
CHAPTER 2	POSITIONING OF THE STUDY .....	12
2.1	INTRODUCTION .....	12
2.2	HIGHER EDUCATION TRENDS .....	13
2.2.1	Global trends impacting HE .....	13
2.2.2	Trends in South African higher education .....	19
2.3	TECHNOLOGY TRENDS IN HIGHER EDUCATION .....	25
2.3.1	Next Generation Digital Learning Environment .....	28
2.4	THE IMPLICATIONS OF THE FOURTH INDUSTRIAL REVOLUTION (4IR) FOR HIGHER EDUCATION .....	29
2.4.1	21 <sup>st</sup> Century Skills .....	30
2.5	DIGITAL LITERACY .....	32
2.5.1	Dimensions of digital literacies .....	33
2.5.2	Developing digital literacies .....	34
2.6	DESIGN PRINCIPLES .....	38
2.7	MULTIMEDIA LEARNING .....	40
2.7.1	Multimedia principles .....	43
2.8	CONCLUSION .....	46

CHAPTER 3	THEORETICAL FRAMEWORK.....	48
3.1	INTRODUCTION .....	48
3.2	ADULT LEARNING FOUNDATIONS .....	49
3.2.1	Behaviourism .....	49
3.2.2	Cognitivism .....	51
3.2.3	Humanism .....	53
3.2.4	Social learning theory .....	55
3.2.5	Constructivism .....	56
3.3	ADULT LEARNING THEORY OR ANDRAGOGY .....	59
3.4	THEORETICAL FRAMEWORK: JARVIS'S MODEL OF EXPERIENTIAL LEARNING ....	61
3.4.1	Non-learning paths .....	66
3.4.2	Non-reflective learning paths .....	66
3.4.3	Reflective learning paths.....	68
3.5	CONCLUSION.....	71
CHAPTER 4	RESEARCH PARADIGM, METHODOLOGY AND DESIGN.....	72
4.1	INTRODUCTION .....	72
4.2	RESEARCH PARADIGM: PRAGMATISM .....	73
4.3	RESEARCH METHODOLOGY: EDUCATIONAL DESIGN RESEARCH.....	75
4.4	RESEARCH DESIGN: INTEGRATIVE LEARNING DESIGN FRAMEWORK.....	78
4.5	RESEARCH POPULATION.....	79
4.6	DATA COLLECTION AND ANALYSIS.....	80
4.6.1	Phase 1: Informed Exploration.....	81
4.6.2	Phase 2: Enactment .....	85
4.6.3	Phase 3: Evaluation Local Impact.....	87
4.6.4	Phase 4: Evaluation Broader Impact.....	88
4.7	ETHICAL CONSIDERATIONS.....	89
4.8	CONCLUSION.....	89
CHAPTER 5	INFORMED EXPLORATION PHASE – DISCERN CONTEXT .....	91

5.1	INTRODUCTION .....	91
5.2	GLOBAL TRENDS IN HEALTH PROFESSIONS .....	92
5.3	NURSING EDUCATION IN SOUTH AFRICA.....	98
5.3.1	Continued Professional Development.....	102
5.4	STELLENBOSCH UNIVERSITY: DEPARTMENT OF NURSING AND MIDWIFERY ....	103
5.4.1	Programme content: PGDipNE Modules.....	106
5.4.2	Programme delivery mode.....	111
5.4.3	PGDipNE student demographics .....	113
5.4.4	PGDipNE practices.....	115
5.4.5	SUNLearn usage .....	116
5.5	CONCLUSION.....	121
CHAPTER 6	INFORMED EXPLORATION PHASE – NEEDS ANALYSIS.....	122
6.1	INTRODUCTION .....	122
6.2	SURVEY RESULTS.....	122
6.2.1	Computer Basics .....	123
6.2.2	Internet browsing .....	125
6.2.3	Software applications.....	128
6.2.4	Security and safety .....	135
6.2.5	Learning Management System – SUNLearn.....	138
6.3	FOCUS GROUP DISCUSSION RESULTS.....	139
6.3.1	Group discussion .....	140
6.3.2	Small group findings .....	142
6.4	IMPLICATIONS OF THE NEEDS ANALYSIS .....	154
6.5	CONCLUSION.....	155
CHAPTER 7	ENACTMENT PHASE: INTEGRATIVE DESIGN.....	157
7.1	INTRODUCTION .....	157
7.2	INTEGRATIVE LEARNING DESIGN FRAMEWORK – SYSTEMATIC PROCESS FOR DESIGN .....	158

7.2.1	Usage-centred design.....	159
7.2.2	Instructional design traditions.....	160
7.3	PGDIPNE ENHANCEMENTS FOR SUNLEARN .....	162
7.3.1	Procedural guide for PGDipNE course structure.....	163
7.3.2	PGDipNE template for course content .....	168
7.3.3	Didactics exemplar .....	171
7.3.4	DIGITAL LITERACY COURSE .....	176
7.4	CONCLUSION.....	183
CHAPTER 8	EVALUATION OF THE INTERVENTION .....	185
8.1	INTRODUCTION .....	185
8.2	FORMATIVE EVALUATION IN DESIGN RESEARCH.....	186
8.3	LOCAL IMPACT: FEEDBACK FROM THE COLLABORATORS.....	195
8.3.1	Student feedback: the adult learners as the users .....	195
8.3.2	Unplanned side effects: feedback from the lecturer perspective .....	199
8.4	CONCLUSION.....	201
CHAPTER 9	CONCLUSIONS AND RECOMMENDATIONS.....	203
9.1	INTRODUCTION AND OVERVIEW OF THE STUDY .....	203
9.2	LESSONS LEARNED IN CONTEXT OF OUTCOMES.....	205
9.3	RESEARCH OBJECTIVES, OUTCOMES AND DESIGN PRINCIPLES.....	207
9.4	CHALLENGES AND LIMITATIONS OF THE STUDY .....	212
9.5	CONTRIBUTIONS OF THE STUDY .....	213
9.6	FUTURE PROSPECTS .....	216
9.7	CONCLUSION.....	216
	LIST OF REFERENCES .....	218
	ADDENDUM A: Detailed integrative learning design framework (ILDF) .....	244
	ADDENDUM B: Humaniora Research and Ethics Committee of Stellenbosch University .....	245
	ADDENDUM C: Institutional permission.....	248
	ADDENDUM D: Electronic Consent.....	256

ADDENDUM E: Written consent .....	257
ADDENDUM F: Self-assessment Questionnaire.....	259
ADDENDUM G: Focus group discussion .....	266
ADDENDUM H: Focus group discussion – small groups.....	267
ADDENDUM I: Didactics scaffolds.....	268
ADDENDUM J: digital literacy course: requirements and content .....	270
ADDENDUM K: Microsoft PowerPoint Digital literacy Course .....	271
ADDENDUM I: Questionnaire: Student Evaluation.....	285



## List of Figures

Figure 1.1 Integrative Learning Design Framework.....	8
Figure 1.2 Structure of the study .....	10
Figure 1.3 Structure of the study .....	10
Figure 2.1 Phase 1 - Informed Exploration (literature review).....	12
Figure 2.2 Ten trends changing global HE .....	14
Figure 2.3 Student priorities when choosing an institution for studying abroad.....	15
Figure 2.4 Education Dive - eight global trends impacting HE .....	15
Figure 2.5 Rise of the non-traditional student.....	16
Figure 2.6 State of digital integration across HEIs.....	19
Figure 2.7 Accumulative throughput rates: Diploma, 3–4-year Bachelors' degrees, 1st of enrolment 2012.....	20
Figure 2.8 Accumulative throughput rates: Postgraduate, 1st year of enrolment 2012 .....	21
Figure 2.9 South African higher education trends.....	23
Figure 2.10 EDUCAUSE Top IT issues 2021 .....	26
Figure 2.11 Higher Education drive and focus for 2020.....	27
Figure 2.12 Digital literacies practices.....	31
Figure 2.13 Multimedia principle .....	43
Figure 2.14 Modality principle .....	43
Figure 2.15 Contiguity principle.....	44
Figure 2.16 Redundancy principle.....	44
Figure 2.17 Coherence principle .....	44
Figure 2.18 Personalisation principle .....	45
Figure 2.19 Pretraining principle .....	45
Figure 2.20 Segmenting principle.....	46
Figure 2.21 Signaling principle .....	46
Figure 3.1 Maslow's hierarchy of needs .....	54

Figure 3.2 The internalisation and externalisation of culture.....	63
Figure 3.3 The transformation through sense experience .....	63
Figure 3.4 Transformation of a person through learning.....	65
Figure 3.5 Non-learning path.....	66
Figure 3.6 Non-reflective path (no practice) .....	66
Figure 3.7 Non-reflective path acquisition of skill.....	67
Figure 3.8 Non-reflective path (memorisation) .....	67
Figure 3.9 Reflective path (contemplation).....	68
Figure 3.10 Reflective path (reflective practice).....	68
Figure 3.11 Reflective path (pragmatic knowledge).....	69
Figure 3.12 Jarvis's learning model process.....	69
Figure 4.1 Nomenclature used by various authors for educational design research .....	76
Figure 4.2 Distinguishing characteristics of EDR.....	76
Figure 4.3 Integrative Learning Design Framework.....	79
Figure 4.4 Phase 1: Informed exploration – data collection methods.....	81
Figure 4.5 Phase 1: Discern context (guiding questions and data collection methods).....	82
Figure 4.6 Phase 2: Enactment - planning and design .....	85
Figure 4.7 Series of interventions to address the complexity of challenges in the setting .....	86
Figure 4.8 Phase 3 - Evaluation local impact .....	87
Figure 4.9 Phase 4 - Evaluation broader impact.....	88
Figure 5.1 Phase 1: Discerning the context within informed exploration.....	91
Figure 5.2 Three generations of curriculum transformation .....	93
Figure 5.3 Ratio of nursing staff per 10 000 of the population, 2018.....	94
Figure 5.4 Nursing Shortage .....	96
Figure 5.5 Nurse educator core competencies.....	98
Figure 5.6 Distribution of student population according to age group, 2018 .....	114
Figure 5.7 Nationality of students, 2018 .....	115
Figure 5.8 Workshop attendance and report submission, 2014 - 2017 .....	118

Figure 5.9 Utilization report of workshop resources, 2018.....	119
Figure 5.10 SUNLearn assignment submissions, 2018.....	120
Figure 5.11 Usage activity by resource, 2018 .....	120
Figure 6.1 Positioning of needs analysis as part of Phase 1: Informed Exploration .....	122
Figure 6.2 Skills level in using a computer .....	124
Figure 6.3 Understanding of computer basics .....	125
Figure 6.4 Understanding of Internet browsing basic functions .....	126
Figure 6.5 Verification of general knowledge of internet browsing.....	127
Figure 6.6 Understanding of basic email functions .....	129
Figure 6.7 Verification of understanding of basic email functions .....	129
Figure 6.8 Understanding of MS Word basic functions.....	130
Figure 6.9 Verification of understanding of MS Word basic functions.....	131
Figure 6.10 Understanding of MS Excel basic functions.....	132
Figure 6.11 Verification of understanding of basic MS Excel functions.....	133
Figure 6.12 Understanding of MS PowerPoint basic functions .....	134
Figure 6.13 Verification of understanding of basic MS PowerPoint functions .....	134
Figure 6.14 Identification of the attributes of a secure password .....	136
Figure 6.15 Are public networks safe to use?.....	136
Figure 6.16 Identification of malware.....	137
Figure 6.17 Identification of phishing.....	137
Figure 6.18 Understanding of SUNLearn basic functions .....	138
Figure 6.19 Role of technology in a social context .....	144
Figure 6.20 Role of technology in the academic programme.....	145
Figure 6.21 Role of technology for professional development .....	146
Figure 6.22 Group 1 - eLearning as an integral part of students' context .....	147
Figure 6.23 Group 2 - Social media and technology – lessons learned from a social context.....	148
Figure 6.24 Group 3 - eLearning improves the mobility of students.....	149
Figure 6.25 Group 4 - accessibility and staying connected.....	150

Figure 6.26 Group 5 - From student - to graduate - to employability.....	150
Figure 6.27 Group 6 - as a spectator of my academic journey .....	151
Figure 6.28 Group 7 -Equity in education .....	152
Figure 6.29 Group 8 - Unlocking the potential of technology .....	152
Figure 6.30 Group 9 - SUNLearn is an island.....	153
Figure 6.31 Group 10 - technology integration must be seamless.....	153
Figure 7.1 Phase 2: Enactment of the ILDF .....	157
Figure 7.2 People Process Technology framework guiding the design.....	158
Figure 7.3 PGDipNE abstract model for SUNLearn.....	160
Figure 7.4 ILDF in comparison to instructional design traditions.....	161
Figure 7.5 Didactics exemplar.....	161
Figure 7.6 Digital literacy course (usage-centred design).....	162
Figure 7.7 PGDipNE personalised dashboard.....	163
Figure 7.8 PGDipNE course overview .....	164
Figure 7.9 PGDipNE Module statistics .....	165
Figure 7.10 PGDipNE activity reminder.....	165
Figure 7.11 PGDipNE toolbar.....	166
Figure 7.12 PGDipNE toolbar icons .....	166
Figure 7.13 SUNLearn Sidebar (PGDipNE) .....	167
Figure 7.14 PGDipNE Virtual tour .....	167
Figure 7.15 Purpose of each module (example).....	169
Figure 7.16 PGDipNE modules integrated (SUNLearn).....	170
Figure 7.17 Overview of study units (integrated) .....	170
Figure 7.18 Study unit integrated with introduction, resources & activities .....	171
Figure 7.19 Multimedia learning theory process.....	173
Figure 7.20 Introducing the Didactics scaffold series .....	174
Figure 7.21 Coherence principle applied.....	174
Figure 7.22 Modality principle applied .....	175

Figure 7.23 Segmenting principle applied .....	176
Figure 7.24 Design guidelines for digital literacy course.....	177
Figure 7.25 Responsive versus adaptive design .....	179
Figure 7.26 Introduction of the PPT course (pretraining principle applied).....	180
Figure 7.27 Pretraining topics .....	181
Figure 7.28 Signalling principle in the reflective path.....	181
Figure 7.29 Reflective path: feedback loop with triggers .....	182
Figure 7.30 Graphical user interface (reflective path).....	183
Figure 8.1 ILDF: Positioning of Phase 3.....	185
Figure 8.2 Various layers of formative evaluation.....	186
Figure 8.3 PPT Cycle 1 .....	191
Figure 8.4 PPT Cycle 2.....	191
Figure 8.5 Process flow of the content model and associated GUI (PPT – Design your slides)...	192
Figure 8.6 User acceptance test for PGDipNE theme .....	193
Figure 8.7 Results of student evaluation survey .....	196
Figure 8.8 Word cloud of the evaluation (students' feedback) .....	197
Figure 9.1 Learning by design: enhancing the digital literacy of adult learners in a blended learning environment.....	203
Figure 9.2 Overview of the study.....	215

## List of Tables

Table 1.1 Summary of the pragmatist research approach .....	7
Table 2.1 International trends in HE 2016 - 2017 .....	17
Table 2.2 Higher Education trends over a three-year period .....	18
Table 2.3 Significant challenges impeding technology adoption in HE .....	33
Table 2.4 Traditional literacy versus digital literacy .....	36
Table 2.5 Design principles in EDR (exemplars) .....	39
Table 2.6 Content type, associative visual with examples that support learning .....	42
Table 3.1 Summary of adult learning foundations .....	59
Table 4.1 Summary of social science research paradigms.....	74
Table 4.2 Differences between psychological experiments and EDR.....	77
Table 5.1 Health system improvements from an instructional and institutional perspective .....	92
Table 5.2 Ratio of nurses to population and to doctors in various countries .....	95
Table 5.3 Legacy nursing qualifications .....	101
Table 5.4 New nursing qualifications.....	102
Table 5.5 PGDipNE delivery mode, throughput rate and graduations, 2004-2018.....	105
Table 5.6 Educational Practice SWOT analysis .....	107
Table 5.7 Didactics SWOT analysis .....	108
Table 5.8 Curriculum Development SWOT analysis.....	109
Table 5.9 Educational Psychology SWOT analysis.....	110
Table 5.10 PGDipNE SUNLearn SWOT analysis.....	117
Table 6.1 Coding patterns.....	143
Table 8.1 Evaluation criteria related to ILDF phases .....	187
Table 8.2 Technical features addressed .....	187
Table 8.3 Technical evaluation feedback .....	189
Table 9.1 Research objectives, outcomes and design principles.....	207

## List of acronyms

AACN	American Association of Colleges of Nursing
ACT	American College Test
ADN	Associate Degree in Nursing
AI	Artificial Intelligence
AR	Augmented Reality
BSN	Bachelor of Science in Nursing
CHE	Council of Higher Education
CPD	Continued Professional Development
DBR	Design-based Research
DHET	Department of Higher Education and Training
DOI	Diffusion of Innovation Theory
EDR	Educational Design Research
FUNDISA	Forum for University Nursing Deans in South Africa
GUI	Graphical User Interface
HE	Higher Education
HEIs	Higher Education Institutions
HEQC	Higher Education Quality Committee
HEQSF	Higher Education Qualifications Sub-Framework
ICT	Information and Communication Technology
ILDF	Integrative Learning Design Framework
IoMT	Internet of Medical Things
IS	Information Systems
ITE	Interactive Telematic Education
LMS	Learning Management System
LPN	Licensed Practical Nurse

LVN	Licensed Vocational Nurse
MOOC	Massive Open Online Course
MPCU	Model of PC Utilization
MR	Mixed Reality
NCLEX-RN	National Council Licensure Examination
NDP	National Development Plan 2030
NEIs	Nursing Education Institutions
NGDLE	Next Generation Digital Learning Environment
NLN	National League of Nursing
NMC	New Media Consortium
OECD	Organisation for Economic Cooperation and Development
PC	Personal Computer
PGDipNE	Postgraduate Diploma in Nursing Education
SANC	South African Nursing Council
SAQA	South African Qualifications Authority
SAT	Scholastic Aptitude Test
SCORM	Shareable Content Object Reference Model
SCT	Social Cognitive Theory
SDGs	Sustainable Development Goals
STEM	Science, Technology, Engineering and Mathematics
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TAM	Technology Adoption Model
TAM2	Extended Technology Adoption Model
TOEFL	Teaching of English as a Foreign Language
TPB	Theory of Planned Behaviour
TRA	Theory of reasoned action
UX	User Experience



VR	Virtual Reality
WHO	World Health Organization
XR	Extended Reality

# CHAPTER 1

## ORIENTATION OF THE STUDY

### 1.1 INTRODUCTION

Education is the foundation upon which democracy, cultural heritage, the economy and the future rest (Kramer, 2014). This foundation is currently being shaken by phenomena like globalisation, democratization and massification of higher education (HE) and emerging technologies. In addition, the COVID-19 pandemic has had sudden and far-reaching effects on educational institutions. Higher education institutions (HEIs) across the world found themselves almost overnight having to move to online learning and to adopt more flexible methods of designing and delivering content (Martin & Furiv, 2020). The pandemic has also highlighted the importance of investment in inclusive and equitable lifelong learning opportunities, and of reinforcing global cooperation in education (Newman, Kalbous & Van't Land, 2020).

As more and more countries are requiring an educated and skilled workforce in today's knowledge economy (OECD, 2012), questions about the structure of HEIs, diversity of programme offerings and flexibility to widen access to HE have arisen. Some authors argue that the role of students is changing to that of consumers buying a product that best suits their preferences and career opportunities, packaged as an academic offering (Barber, Donnelly & Rizvi, 2013). The interplay of national context, external factors, institutional characteristics and individual student preference has shaped the patterns of global talent mobility and HEIs are cautioned to monitor and track the shifting landscape to attract and retain global talent (Choudaha, 2021). The attraction and retention of global talent has increased access to an ever-larger segment of the population, while the growth in the numbers of non-traditional students is directly related to the democratization and massification of HE. Access to HE is no longer viewed as the privilege of 'traditional' students between the ages of 18 to 24 years. The reality facing HEIs includes larger numbers of 'non-traditional' students, i.e., older students, students from diverse socio-economic circumstances and cultural and educational backgrounds, as well as working adults.

More prominently, is the question of how HEIs are able to adapt when a pandemic like COVID-19 disrupts teaching and learning on such a global level. According to Martin and Furiv (2020), HEIs must be more innovative, flexible and collaborative to advance HE post the pandemic. To find new ways of leading HE, innovation is required (Martin & Furiv, 2020). To find new approaches for teaching and learning as well as creating pathways for students to pursue learning, flexibility is required (Martin & Furiv, 2020). For more resilient HE systems, HEIs must build trust and collaborate with one another (Marin & Furiv, 2020). Students who now enrol differ in terms of academic readiness

and literacy skills because of disparities in education systems. As the focus shifts to the essential importance of human and intellectual capital and skills required by the knowledge economy (CFI, 2020), there is an increasing demand for lifelong learning opportunities, particularly for adult learners (DHET, 2013).

Adult learners enter or re-enter HE for a variety of reasons: they must be upskilled in terms of qualifications required for the workplace, or in terms of skills to actively contribute and participate in the knowledge economy, or in terms of personal development. This has led to HEIs identifying adult learners as one of their 'new knowledge markets'. However, adult learners differ from the 'traditional' student population, i.e., undergraduate school-leavers, in significant ways. Adult learners are older students who return to HE for personal or professional reasons (Schreyer Institute of Teaching Excellence, 2007). Adult learners require a different mode of delivery from full-time contact teaching and learning, due to factors like their inability to study full-time because of work and family commitments (Schreyer Institute of Teaching Excellence, 2007). This is where the use of digital technologies, enabling flexible delivery of teaching and learning, can address adult learners' unique needs. Technology thus affords innovative and creative ways of designing and delivering course content that can cater for diverse groups of students. Among others, these include students in the health professions.

The Lancet report (Frenk, Chen, Bhutta, et al., 2010) criticizes the lack of transformation in health professional education since 1910, proposing that curricula need to be designed to train students to address the needs of society, and highlighting the drivers for change as testing economic times, the quest for quality teaching and higher research outputs, and socio-political imperatives. More importantly, the report brings to our attention the challenges that health professional education is facing, the connections between education and health systems and the ill-equipped graduates in the profession. From a health professional education point of view, a big concern worldwide is the number of undergraduate nursing students who fail to complete their studies successfully (Beauvais, Stewart, De Nisco, et al., 2014:1; Masango, 2014: 721). South Africa faces similar challenges. There is a great need for qualified nurse educators in South Africa to enhance the quality of the development of student nurses, and by doing so, enhancing the quality of nursing care (Meyer & Van Niekerk, 2008:8). Nurse educators' level of competency, attitude and approach will either promote or discourage learning; hence, directly impacting the personal, professional, and academic development of a nursing student (Bruce, Klopper & Mellish, 2011:107).

The nursing profession is facing an array of challenges, including an increasing deficit of nurses and an aging nursing labour force (Fawaz, Hamdan-Mansour & Tassi, 2018). According to the World Health Organization (WHO) there is a global shortage of nurses and midwives, with less than three nursing and midwifery personnel per 1000 of the population globally (WHO, 2019). Another

challenge contributing to the nursing shortage is the limited capacity of nursing schools. According to the American Association of Colleges of Nursing (AACN), nursing schools had to turn away 75 029 applicants who qualified for admission in 2018 (AACN, 2019).

In the context of this study, various challenges were also identified in the Postgraduate Diploma for Nursing Education (PGDipNE) at Stellenbosch University. The change in delivery mode from on-campus to off-campus and the adoption of a blended learning approach contributed to an increase in the student intake, but did not necessarily address underlying issues related to student success or low completion rates. The students in this programme are generally older adult learners coming from a variety of socio-economic backgrounds.

In addition, some of these students transfer from a clinical to a non-clinical programme and are novices in education and training. Although computer literacy is a prerequisite for admission to the programme, there was no mechanism in place to test the students' literacy or prior exposure to technology. They have limited contact sessions and the expectation of the Nursing Department is that the students would be able to use the web-based learning management system of the University to download their learning resources, complete their online quizzes and upload their assignments.

The practices in the PGDipNE are consistent with the widespread adoption of emerging technologies for teaching and learning purposes in higher education worldwide. Many universities are introducing blended learning that combines the use of technology and face-to-face interaction. The readiness of adult learners to adapt to and flourish in such a blended learning environment, and the effective use of information and communication technology (ICT) in teaching and learning for adult learners, are the challenges that this study wished to investigate.

## **1.2 PROBLEM STATEMENT**

The importance of digital proficiency for learning, teaching and development within the knowledge economy cannot be over-emphasised. According to the New Media Consortium (NMC) reports (Johnson, Adams Becker, Estrada, et al., 2015; Johnson, Adams Becker, Estrada, et al., 2016; Adams Becker, Cummins, Davis, et al., 2017; Adams Becker, Brown, Dahlstrom, et al., 2018; Alexander, Ashford-Rowe, Barajas-Murphy, et al., 2019) digital literacy has been identified as a significant challenge impeding technology adoption in HE for five consecutive years. Numerous studies over the past 15 years indicate that while the use of technology in the classroom has increased as it is offered as a solution to educational problems, the effective utilisation of educational technologies in the classroom has much room for improvement (Prinsloo & Sasman, 2015; Hughes & Robertson, 2013; Burnett, 2011; Keating, Gardiner & Rudd, 2009; Lim & Khine, 2006).

The rapid advancements in technology do not automatically infer effective adoption, as was experienced with regard to the PGDipNE when a blended learning model was adopted in the Nursing

and Midwifery Department at the Faculty of Medical and Health Sciences of Stellenbosch University. This non-clinical postgraduate programme is delivered with a combination of block contact and online delivery. The initial rationale for the change in the delivery mode of the programme was to increase enrolment in the programme. However, the increase in the student numbers and change in the delivery mode did not address the low completion rate. The quality of the learning experience and student engagement was contributing to poor student performance (Fürst, 2017). The change in the delivery mode was not accompanied by changes to the existing practices or learning resources, but had an impact on the type of student who applied. The applicants are mostly adult learners who have been out of formal learning for a few years. These adult learners embark on a new journey of discovery as novices to the nursing education field to develop their careers, leverage lifelong learning opportunities and enhance their skills. These goals are consonant with those of the White Paper for post-school education and training (DHET, 2013: 4): "...responsive to the needs of individual citizens and of employers in both public and private sectors, as well as broader societal and development objectives" and "increased diversity of provision". Despite these lofty ideals, the adult learners face a number of challenges.

These students, shifting from a clinical programme to a non-clinical programme, are novices in the field of education and not familiar with educational paradigms. For example, theories in the field of Didactics are new concepts for them. The Didactics module plays a dual role for nurse educators. On the one hand the students learn about the theory of didactics, and on the other hand they should get sufficient opportunity for practical work to develop their expertise (Hugo, 2019). This makes an important contribution to the competences developed by the nurse educators. They enrol from all over Africa and are taught in English, which is not necessarily their first language. In addition, these students enter a technology-rich environment with a web-based learning management system (LMS), with little to no prior experience or knowledge of an LMS.

Within this context, this study addressed the need to explore the challenges that returning adult learners, with limited prior exposure to ICT, experience in a blended learning environment. Computer literacy is a prerequisite for admission to the programme. Computer literacy is defined as the basic "knowledge and ability to use computers, related technologies with varying skill level" (Computer literacy, 2020, n.p.). However, the Department of Nursing was not able to assess the skill level of the applicants. According to the lecturers, these students struggle with the use of a computer, but are required to use the LMS (in the institutional context called SUNLearn) to access their learning resources or to download content, to complete online quizzes and to upload their completed assignments. No literacy training or orientation programme in the use of SUNLearn was offered and for these students the use of technology did not lead to effective learning.

### 1.3 RESEARCH QUESTIONS, AIM AND OBJECTIVES

It became clear that in the light of the transformation of the health profession and the competencies nurse educators require, the digital literacy skills of these adult learners needed to be addressed. Digital literacy is defined as “the ability to use information and communication technologies to find, understand, evaluate, create and communicate digital information, an ability that requires both cognitive and technical skills” (American Library Association, 2011, n.p). This study investigated the problem of enhancing the digital literacy of adult learners in a nursing education programme through educational design research (EDR), also known as design-based research (DBR). One of the distinguishing attributes of EDR is the ability to bring together theoretical contributions and the practicality of interventions in a learning environment (Anderson & Shattuck, 2012:16). Furthermore, “being situated in a real education context” (Anderson & Shattuck, 2012:16), EDR could potentially lead to interventions that would accelerate the adoption of technologies to improve the learning experience of the adult learners.

The aim of the study was to identify the challenges adult learners experience with the use of technology in a blended learning environment and investigate ways in which technology could be used to enhance the digital literacy of adult learners for effective learning to occur.

The primary research question which I as the researcher attempted to answer through this study was: *How can technology be utilised to enhance the digital literacy of adult learners in a blended learning environment in order that effective learning can take place?*

To successfully answer the primary research question, the social context and factors contributing to the adult learners re-entering HE had to be understood. Therefore, the following sub-questions were formulated: *Which factors influence the digital literacy of the adult learners? Which dimensions of digital literacy are required in the targeted learning environment? How can the utilization of technologies in the targeted programme be enhanced? How does the effective utilization of educational technologies enhance the learning experience of the adult learners?*

The objectives of the study were the following:

- To determine the nature/dimensions and level of digital literacy competencies required in the blended learning environment of the specific programme.
- To investigate how the gaps in the different digital literacy dimensions could be addressed to enhance the digital literacy of adult learners in a blended learning environment.
- To improve the effectiveness of the utilization of educational technologies in the specific academic programme.

- To evaluate if the acquisition of digital literacies, as part of the academic programme in a blended learning environment, changed the learning experience for adult learners.

The gap in the body of knowledge I wished to address, was to discover how digital technologies could be applied and incorporated in teaching and learning processes to add value for adult learners within the context of section 1.2. This gap is highlighted by Laurillard (2012:2) who believes that “technology has much to offer, but it is up to the academic teaching community to define and defend the role technology should play.” She argues that educationists must lead technology development by using their knowledge of what technology can offer, and so gain confidence in the use of technology to go beyond mere awareness to full exploitation (Laurillard, 2012:2). The collaborative nature of EDR tries to “progressively and dynamically generate, improve and learn about a particular phenomenon from interconnected research and design cycles” (Bannan, 2010:56). In the learning process of EDR, I wanted to understand how technology should be adopted and integrated to add value to adult learners.

## **1.4 THEORETICAL FRAMEWORK**

Laurillard (2012: 2) argues that: “Teaching is about moving minds”. This is as true for adult learners as for children and younger students. Adult learners have a need to understand why they are learning new knowledge (McGrath, 2009), hence learning content needs to be presented in relation to real life situations (McGrath, 2009), i.e. experiential learning needs to take place. Therefore, Jarvis’s model of experiential learning theory was used as a lens to analyse the challenges adult learners, pursuing professional development opportunities, experience in a blended learning environment, and as a point of departure for the design of effective teaching and learning opportunities for these learners.

Jarvis (2012:10) argues that learning is a complex process that “stem(s) from social experience”. He further argues that different learning experiences occur because of how the collaboration among learners is constructed. Therefore, EDR was deemed an appropriate research methodology and was used to design a technology-based digital literacy course. The structure of the design had to include learning paths that mimic a reflective learning path, as explained in Jarvis’s model of experiential learning. The model makes provision for different learning paths such as non-learning, non-reflective learning and reflective learning (Dyke, 2017). As a methodology EDR makes provision for taking into account the challenges adult learners are faced with, using technology to design interventions to enhance their digital literacy skills and employing iterative cycles to inform the design with the feedback received from the learners (Bannan, 2010). The full theoretical framework is unpacked in Chapter 3.

## 1.5 RESEARCH APPROACH

EDR or DBR, according to Barab and Squire (2004:2), is defined as “a series of approaches, with the intent of producing new theories, artefacts, and practices that account for and potentially impact learning and teaching in naturalistic settings.” The nature of EDR situated the study within a pragmatic paradigm to best answer the research questions, using both qualitative and quantitative methods to generate data. A pragmatic paradigm allows the researcher to use multiple methods of data collection and analysis and adopt different world views and assumptions in answering the research questions and not committing to one particular philosophy and reality (Creswell, 2009; Mertens, 2010). From a pragmatist position, the most important determinant of the research philosophy is the research question (Saunders, Lewis, & Thornhill, 2009: 598). The details of the research paradigm, methodology and design are discussed in Chapter 4. Table 1.1 summarises the epistemology, ontology, axiology and data collection techniques of the research approach.

**Table 1.1 Summary of the pragmatist research approach**

Epistemology: view regarding what constitutes acceptable knowledge	Either or both observable phenomena and subjective meanings can provide acceptable knowledge dependent upon the research question. Focus on practical applied research, integrating different perspectives to help interpret data.
Ontology: view of the nature of reality or being	External, multiple views chosen to best enable answering the research questions.
Axiology: view of the role of values in research	Values play a large role in interpreting results; the researcher adopted both the objective and subjective point of view.
Data collection techniques	Mixed method design (quantitative and qualitative data collected).

**Source: Saunders, Lewis & Thornhill, 2009: 119**

This paradigm allows for the integration of different perspectives to assist with the collection and interpretation of the data. According to Tashakkori and Teddlie (1998: 30) the pragmatist researcher should “study what interests you and is of value to you, study in the different ways in which you deem appropriate and use the results in ways that can bring about positive consequences within your value system.”

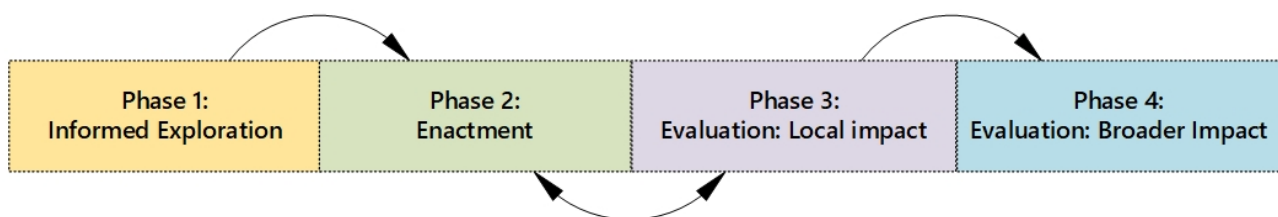
## 1.6 RESEARCH METHODOLOGY

Plomp (2010:9) defines educational design research (EDR), also known as design-based research (DBR), as “a systematic study of designing, developing and evaluating educational interventions as solutions, which aims at advancing our knowledges about the characteristics of these interventions and the process to design and develop them.” EDR has various research functions that echo the type of research question that must be answered, namely, to describe, to compare, to evaluate, to explain or to predict, and to design and develop (Plomp, 2010).



In this study EDR was used as a methodology to investigate, design, implement and integrate a series of technology-based interventions to improve the digital literacy of adult learners in a blended learning environment. The collaborative nature of EDR enabled me to work with stakeholders (programme coordinator(s), academics, subject matter experts, LMS administrators, adult learners, support staff of the PGDipNE and an instructional designer as a consultant) in designing effective teaching and learning opportunities, through a process of iterative cycles of interventions in the current educational setting and using technology to improve the adult learners' digital literacy.

In the EDR process, the Integrative Learning Design Framework (ILDF) was used as guiding framework. ILDF is the integration of systematic processes that combine the best of design research and the diffusion of educational innovations (Bannan, 2013: 115). This framework encompasses iterative cycles in a technology-based design effort, conducted to improve the technology system with “emphasis on the learning that can result in the context and activity of design” (Bannan, 2010: 55). The ILDF consists of four phases, namely Phase 1: Informed exploration, Phase 2: Enactment, Phase 3: Evaluation local impact and Phase 4: Evaluation broader impact (Bannan, 2010) (see Figure 1.1).



**Figure 1.1 Integrative Learning Design Framework**

**Source: Adapted from Bannan, 2010, n.p.**

Each phase provides input or feedback to the next phase, contributing to the articulated improvement of every phase. The impact of any changes, as collected from the iterative cycles, must be considered across the entire scope of the research from initiation, through implementation, to adoption (Bannan, 2010). The significance of ILDF is the learning that occurs because of the data generated during each phase, as the context of the study is understood, applied and refined during these cycles. The repetition of the cycles of operation in the various phases not only assists in the improvement of the design of the intervention, but also contributes to a deeper understanding of all the variables that influence the educational practices. Addendum A provides a graphical illustration of the ILDF with detail about the cycles of each phase. The four phases of the ILDF are briefly explained below.

Phase 1: Informed Exploration deals with the problem identification, needs analysis and characterisation of the audience, highlighting all the contributing factors in the context of the

educational environment that should be taken into consideration and the theory development, inter alia by surveying the literature. The data collected from Phase 1 informs Phase 2 (Bannan, 2010).

Phase 2: Enactment involves the development of concepts to address the problem(s) identified in Phase 1. This conceptualisation leads to the design of the intervention that goes through repeated cycles of testing and refinement, and finally brings about a detailed design of the technology intervention or a series of interventions to address all the related problems (Bannan, 2010).

Phase 3: Evaluation of Local Impact consists of the decisive testing of the technology intervention in the learning environment, fine-tuning of the design or theory and the implementation of the intervention(s) (Bannan, 2010).

Phase 4: Evaluation of Broader Impact entails the publishing of the results, exploring the possibilities of adoption and diffusion and finally includes recommendations (Bannan, 2010).

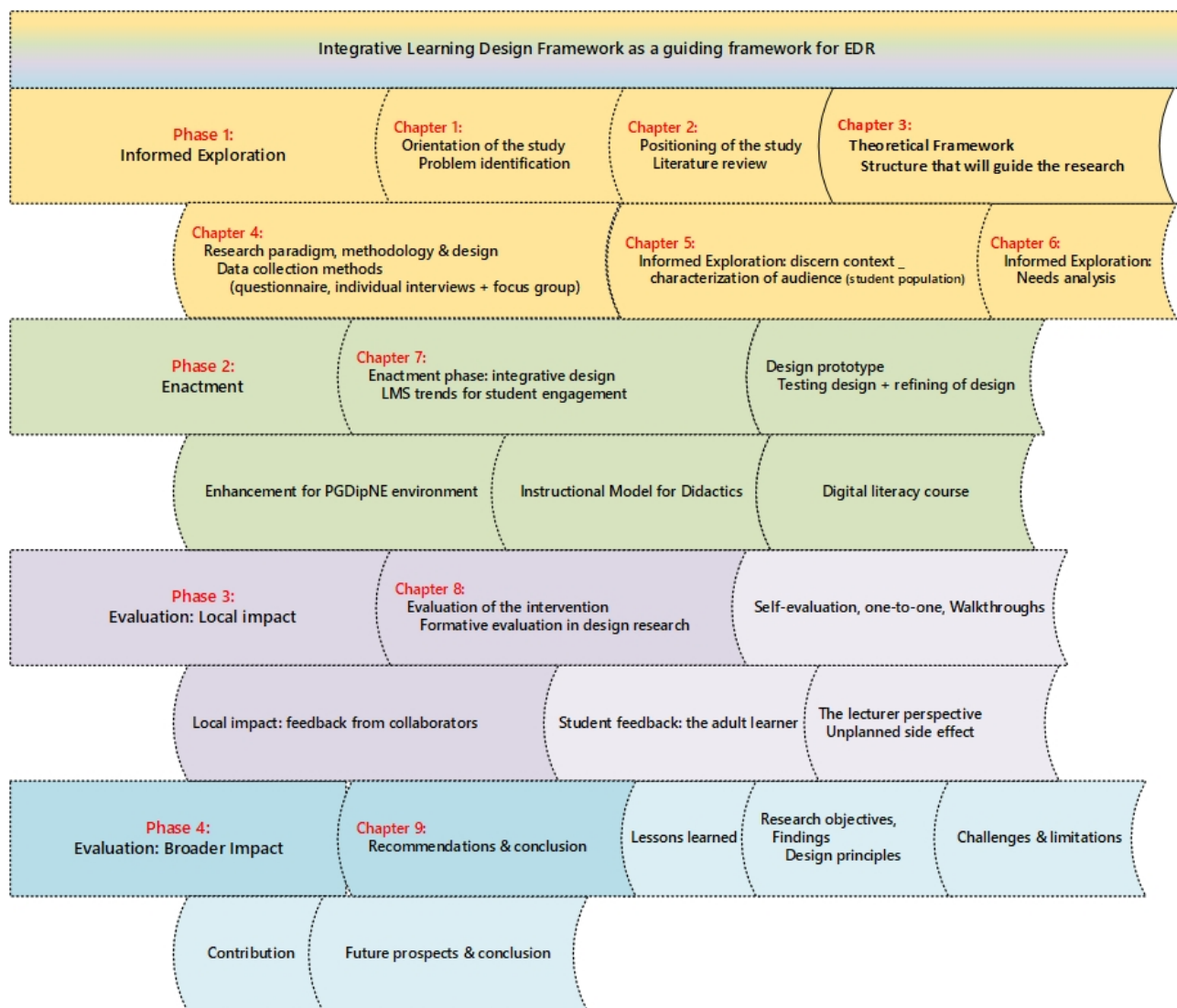
## **1.7 ETHICAL CONSIDERATIONS**

Ethical clearance for the study was granted by the Humaniora Research Ethics Committee of Stellenbosch University and institutional permission for the research was granted by the Division of Information Governance. The purpose and objectives of the research were explained to participants by means of an electronic consent form and a written consent letter that participants had to sign. In addition to the letters of consent, an information letter was distributed to the students to inform them about the survey. Participation was voluntary and did not involve any remuneration.

The aim of the study, conducted as educational design research, was to benefit adult learners and to contribute to the strategic goals of the university; therefore, my focus was to protect the interests of the participants. The interviews were recorded with the permission of the participants and stored in a safe environment. The participants were assured of anonymity and that the data would be handled in a confidential manner. As the researcher, I was not in a position of power vis-a-vis the students, which reinforced my objectivity.

## **1.8 STRUCTURE OF THE STUDY**

This study is organised into nine chapters that broadly correspond with the EDR framework. To assist the reader with her/his understanding of the flow of my argument in this dissertation, Figure 1.2 provides a graphical illustration of the study in relation to the phases of the ILDF.



**Figure 1.2 Structure of the study**

**Chapter 1** focuses on the rationale of the study by identifying the research problem, highlighting the aim of the study and the research approach. The concept of EDR, with ILDF as the guiding framework for the study, is introduced.

**Chapter 2** positions the study in relation to Phase 1: Informed Exploration of the ILDF. This involved reviewing the literature that underpins the study. The survey of the literature brings together the phenomena impacting HE from an international and national perspective, and global and national trends in the health profession with a closer look at nursing education. The needs of health professionals' education, specifically those of nurse educators, are discussed to explain the context in which the study is situated. The focus then shifts to the fourth industrial revolution, specifically its impact on HE in relation to emerging technologies and 21<sup>st</sup> century skills, digital literacy, universal design principles in education and multimedia learning with the multimedia principles as the focal point.

**Chapter 3** articulates the theoretical underpinning of the study with an overview of adult learning theories and a focus on the technology considerations for a specific learning orientation. Jarvis's model of experiential learning with a comprehensive explanation of the various learning paths is presented. The chapter is concluded with Knowles's andragogical assumptions applied to eLearning for adult learning.

**Chapter 4** discusses the research paradigm, methodology and design. EDR is introduced, as well as the paradigm adopted for the study and a systematic description of the phases of the ILDF as the guiding framework for EDR. The chapter is concluded with ethical considerations.

**Chapter 5** starts with one of the processes in Phase 1: Informed Exploration of the ILDF, that delves into the problem identification, in order to understand the context in which the study is situated and takes a closer look at the postgraduate diploma in Nursing Education. This includes the current practices and patterns of usage of the learning management system (SUNLearn) and an analysis of the core modules of the programme.

**Chapter 6** outlines the characterisation of the audience, i.e., the students enrolled in the programme, and continues with the needs analysis that took place in two phases. Firstly, a survey was conducted in the form of an online questionnaire to ascertain the current level of exposure to technology and to determine the digital literacy level of the population. Secondly, focus group discussions were conducted with the students to illuminate the underlying challenges they were experiencing. Finally, the implications of the underlying challenges are considered.

**Chapter 7** starts with Phase 2: Enactment of the ILDF, which brings together the analyses of Phase 1 with the integration of the design of the intervention(s). The importance of flexibility when doing EDR and adapting the study as guided by the data, led to the inclusion of the benchmarking of Moodle themes, as described in this chapter, and how this was applied to the study.

**Chapter 8** coincides with Phase 3 of the ILDF. The formative evaluation in design research is discussed including the criteria for formative evaluation. The user acceptance testing with the programme coordinators, students and lecturers are highlighted leading into the findings of the focus group discussion with the students who evaluated the intervention.

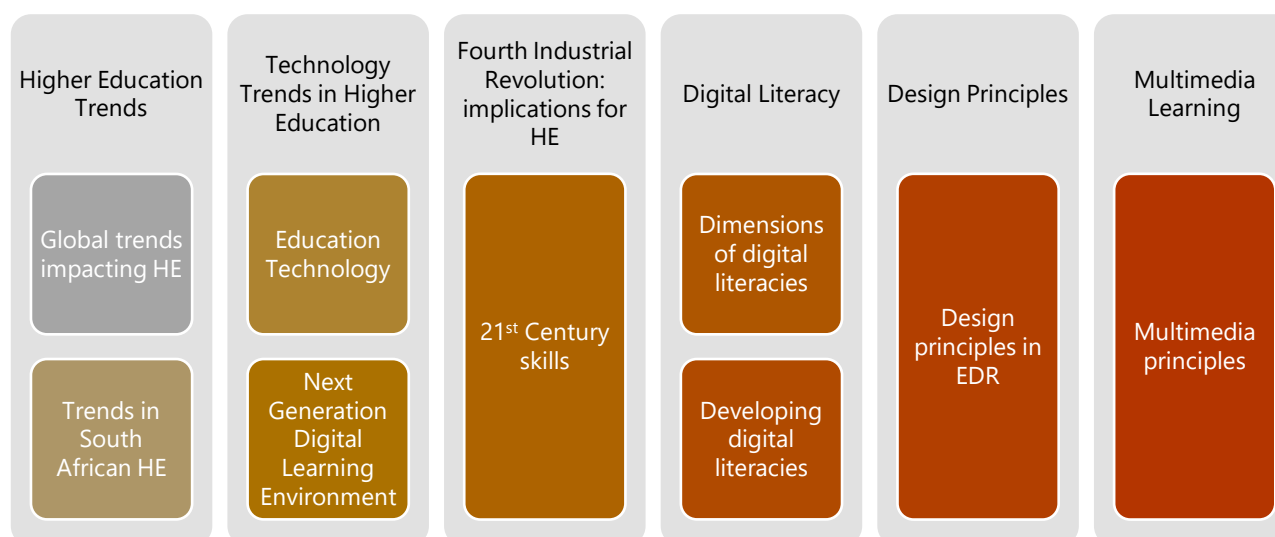
**Chapter 9** starts with a recap of the study. This is followed by the lessons learned, and an explanation of how the research aim and objectives were realised. Furthermore, the design principles which were applied are noted, leading into the challenges and limitations of the study. The chapter is concluded with the contribution of the study to the body of knowledge, recommendations, and conclusion.

## CHAPTER 2

### POSITIONING OF THE STUDY

#### 2.1 INTRODUCTION

The main aim of this research project was to investigate, through educational design research (EDR), how technology can be used to improve the digital literacy of adult learners in a blended learning environment. As an EDR study, the conceptualisation process, which is part of the Informed Exploration phase, is critical for the success of the study. The Informed Exploration phase should address complex problems in a real-world context (Herrington, McKenney, Reeves & Oliver, 2007). Therefore, this chapter focuses on the contextualisation of the study by discussing HE trends, technology trends in HE, the fourth industrial revolution and its impact on HE, digital literacies in HE and design principles in HE as shown in Figure 2.1. The discussion of each of these topics starts with an international focus, followed by a national focus and then highlighting its impact on HE.



**Figure 2.1 Phase 1 - Informed Exploration (literature review)**

The contextualisation starts with a consideration of the main functions of universities and how these functions are influenced by phenomena like globalisation, internationalisation, democratisation and massification. The National Development Plan 2030 for South Africa articulates three main functions of universities.

Firstly, universities must educate and train people in high-level skills for employment (South African Government, 2013: 318). The knowledge economy increasingly requires highly skilled workers, accentuating the importance of a university education, not only for individual advancement, but also for national development.

Secondly, universities are the dominant producers of knowledge, and they must also critique information and find new local and global applications for existing knowledge (South African Government, 2013:318).

Thirdly, HE must contribute to social mobility by creating more opportunities for people (South African Government, 2013:318). The social mobility function is closely related to the democratisation and massification of HE.

The phenomena highlighted above not only influence the main functions of universities, but also call into question the fundamental purpose of Higher Education Institutions (HEIs). According to Blessinger (2015c) the principles of democracy include freedom, responsibility, equality, and protection of universal human rights. These are of particular importance in South Africa with a history of discrimination and inequality. For HE this means, inter alia, programme offerings and teaching and learning strategies that can be extended to markets beyond that of traditional students.

Access to HE is no longer viewed as the privilege of 'traditional' students between the ages of 18–24. The reality facing HEIs is larger numbers of 'non-traditional' students, i.e., older students or working adults who demand lifelong learning opportunities (DHET, 2013).

In the following section a close look is taken at the HE trends from an international perspective and then the focus is narrowed to South African HE trends.

## **2.2 HIGHER EDUCATION TRENDS**

The landscape of HE is changing. The drivers of change come in the form of the demographics of students who enrol, the availability and rapid development of new technologies and the delivery modes of programmes that influence the learning and teaching strategies of institutions. These changes are shaped by macro forces like society, technology, economics, and politics.

### **2.2.1 Global trends impacting HE**

Globalisation is defined as the process of interaction and integration among people, companies and governments worldwide (Globalization, 2019). The associated social and cultural aspects are driven by a primarily economic process. Internationalisation, in response to globalisation, involves the development and exchange of goods and services, including HE offerings. Whereas HE must be globally competitive, it should also have the ability to address local needs. Hence, HE must develop, design and implement learning strategies that can be applied to a local context, but which could also enhance international competitiveness.

Several reports on global trends impacting HE have been published. A report (Weimer, 2017) distinguishing ten trends changing global HE emphasises the importance of awareness of the issues

impacting HE, but also the criticality to respond. The report (Weimer, 2017) highlights ten trends as illustrated in Figure 2.2.



**Figure 2.2 Ten trends changing global HE**  
Source: Weimer, 2017

Trend one (Shifting global demographics) takes into account the combined influence of a declining fertility rate and an increase in life expectancy (Weimer, 2017). With the average age in many countries rising, HE mobility and enrolment opportunities for adult learners are becoming more important, putting further pressure on the diversification of academic offerings.

Global Trend two focuses attention on the expansion of education for all (Weimer, 2017). This supports the development of and access to offerings that not only boost the skills required for the knowledge economy, but also that adult learners are able to apply for. Trend three, national internationalisation strategies, pertains to increasing the recruitment of the necessary skills to boost economic growth (Weimer, 2017). Trend five, multi-sector cooperation, relates to the field of international HE in supporting the production of graduates with workforce-ready skills (Weimer 2017).

Trend eight, brand and value, highlights the changing role of the student with a strong focus on the factors that influence the selection of the institution for study. Barber, Donnelley and Rizvi (2013) portray the role of students as consumers who are looking for an academic package that suits their



preferences and will boost their career opportunities. Priorities in the selection process include the quality of the course, career prospects, and rating of the academics, as illustrated in Figure 2.3.



**Figure 2.3 Student priorities when choosing an institution for studying abroad**

**Source: Weimer, 2017**

Trend ten, a focus on the student experience (Weimer, 2017), could help to attract and retain students. The student experience is inclusive of non-tangible elements like feeling welcome on campus, effective career services and accessibility to student accommodation (Weimer, 2017). Trend six, educational technology, involves the mode of delivery and the impact of that mode on teaching, learning and administration. Of importance is to explore, integrate and implement these technologies that could enable the changing trajectory of the HE industry.

Another perspective is provided by the Education Dive report by Chatlani (2018) that highlights eight global trends that will impact HE, as shown in Figure 2.4. The first trend, labour market shifts and the rise of automation (Chatlani, 2018), introduces the concept of lifelong learning. The idea is that during his/her lifespan, any individual must be able to take up a new career and to radically reskill, upskill and have resilience to adapt to the demands of the knowledge economy. This would be one of the ways to counteract the rapid advancement of technology leading to the automation of routine tasks whilst leaving the individual with a redundant competency.

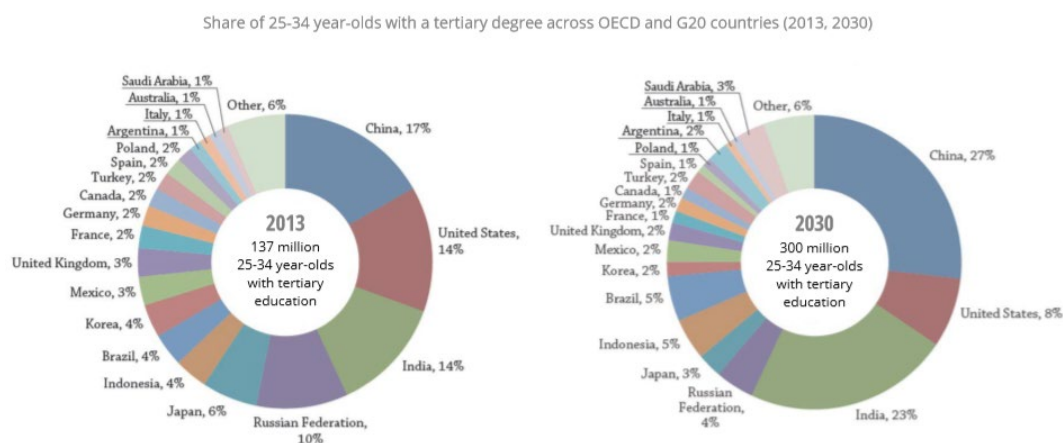


**Figure 2.4 Education Dive - eight global trends impacting HE**

**Source: Chatlani, 2018**



Trend two, economic shifts and moves towards emerging markets (Chatlani, 2018), emphasises the mobility of students. According to the UNESCO Institute of Statistics data report (2018, in Chatlani, 2018), 75 per cent of global STEM (Science, Technology, Engineering and Mathematics) graduates are located in the BRICS nations (Brazil, Russia, India, Indonesia, China and South Africa), compared to eight per cent in the United States and four per cent in Europe. This necessitates discussions among HE institutions on strategies for international collaboration to recruit skilled graduates, especially for critical labour markets. Trend three, growing disconnect between employer demands and college experience (Chatlani, 2018), should not only stimulate the use of technology in HE, but also the development of innovative approaches to offer students lifelong learning skills. The expectation is that HEIs must be able to respond to the needs of the workplace and of society. Trend seven, the rise of non-traditional students (Chatlani, 2018; OECD, 2017b) - as shown in Figure 2.5 - estimates that there will be a total of 4.3 million more students over the age of 24 enrolled across OECD and G20 countries from 2013 – 2030.



**Figure 2.5 Rise of the non-traditional student**

**Source: OECD, 2017b:10**

The call is not only for creative curriculum and programme development, but also for increased institutional collaboration. As argued by Holmes (2018, in Chatlani, 2018, n.p.): “Institutions will have to share resources and utilise technologies like massive open online course (MOOC) in a more creative fashion, utilizing globally but accessing locally”. To accommodate the demands of adult learners, the format of the content, the delivery mode of the programme and the curriculum must have a valuable long-term benefit for employability and economic growth.

The International Trends in Higher Education 2016–2017 report (Griffith, 2017) summarises the international trends in HE in two broad themes: firstly, the new developments in international HE, and secondly, in-depth student mobility as shown in Table 2.1.

**Table 2.1 International trends in HE 2016 - 2017**

<b>New development in international HE</b>	National governments increasingly seek to drive internationalisation	<b>In-depth mobility</b>	Patterns in student mobility
	National focus on quality assurance		Government and institutional initiatives to promote mobility
	Graduate employability takes centre stage		Use of English as a medium of instruction
	Universities in the developing world increasingly assume a regional or global role		Looking ahead: growing local capacity

---

**Source: Griffith, 2017: 6 - 18**

---

Internationalisation strategies encompass more than international student recruitment. HEIs' internationalisation strategies now include collaboration between universities and industry and, more importantly for this study, encourage student mobility (Griffith, 2017). These strategies have an impact on the HE sector, the aspirations of industry and the ability of HEIs to accommodate the needs of a diverse student population.

There are clear similarities between the Education Dive report (Eight global trends impacting HE) (Chatlani, 2018), the European Association for International Education report (Ten trends changing global HE) (Weimer, 2017) and the University of Oxford report (International Trends in HE 2016-17) (Griffith, 2017) in terms of particularly the priority afforded to non-traditional students and ways of recruiting and accommodating them.

Another priority is improving graduate employability. Employability is defined as “the possession of relevant knowledge, skills and other attributes that facilitate the gaining and maintaining of worthwhile employment” (British Council, 2014). The contributing factors that put graduate employability on the radar include employers' scepticism about the job-readiness of graduates, the perceived lack of graduates' ability to innovate by applying conceptual learning to real-world problems (India Today, 2019), and the lack of basic technical and transferable skills found in particularly African university graduates (British Council, 2014).

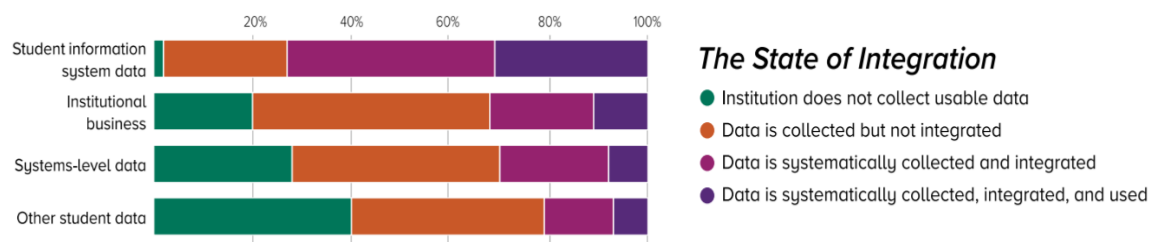
Massification of HE opens international higher education markets with growth in the number of universities and offerings (Griffith, 2017). HEIs competing to attract and retain students experience tensions between national quality assurance requirements and the quality of the course as a student priority. Internationalisation furthermore creates transparency about the ranking, reputation, and academic quality of institutions. For students, the selection of an institution is no longer limited by time or space, and non-traditional students like adult learners are now able to base the selection on their priorities, choosing institutions and programmes that are aligned to their needs, with a plethora of possible alternatives.

More recently an increased focus on the challenges and complexities with regard to data and information management and digitalisation processes, practices and structures has become evident, as shown in Table 2.2.

**Table 2.2 Higher Education trends over a three-year period**

2020	2019	2018
<b>Sustain</b>	<b>21<sup>st</sup> Century business strategy</b>	<b>Institutional adaptiveness</b>
Information Security	Sustainable funding	Institution wide IT strategy
Privacy	Integrative chief information officer (CIO)	HE affordability
Sustainable funding	HE affordability	Change leadership
HE affordability		<b>IT Adaptiveness</b>
<b>Drive Digital transformation</b>	<b>Empowered students</b>	Information security
The integrative role of the CIO	Student success	IT staffing and organisation model
<b>Innovate</b>	Student-centered institution	
Student-centric HE	<b>Trusted Data</b>	<b>Improved student outcome</b>
Student retention & completion	Information security strategy	Student success
Improved enrolment	Privacy	Student-centered institution
<b>Simplify</b>	Digital integrations	<b>Improved decision making</b>
Digital integrations	Data-enabled institution	Data enabled institutional culture
Administrative simplification	Data management and governance	Data management and governance
		Digital integrations
<b>Source: Grajek, et al., 2020b; Grajek, et al., 2019; Grajek, et al., 2018</b>		

Some of the important trends identified above include the emphasis on creating student-centered institutions, including understanding and advancing the role of technology in optimising the student experience (Grajek, et al., 2019:9). Digital integrations i.e. ensuring system interoperability, scalability and extensibility, as well as data integrity, security, standards and governance across multiple applications and platforms is another important trend (Grajek, et al., 2019, n.p.). This is further illustrated by Figure 2.6 which shows that only about 30% of student information system data are systematically collected, integrated and used, whereas this percentage falls to 10% or less for other forms of data (Grajek, et al., 2019).



**Figure 2.6 State of digital integration across HEIs**

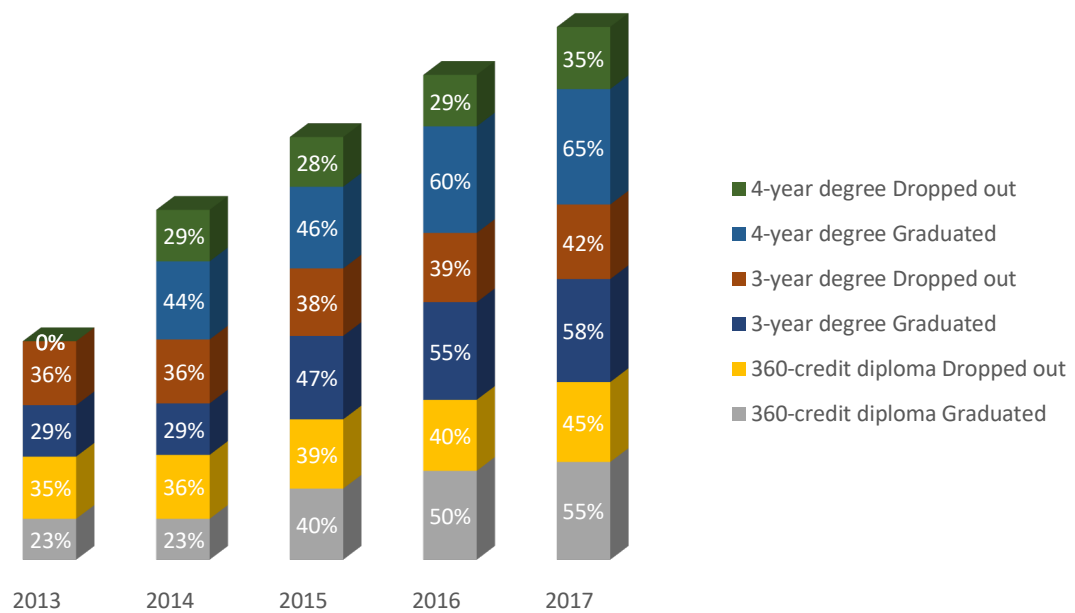
**Source: Adapted from Grajek, et al, 2019**

The state of integration depicted in Figure 2.6 reflects the dismal reality of the lack of collaboration between practices, structures and standards across multiple applications and platforms in HEIs. Rapid advancements in educational technologies are taking place, while HEIs are lagging in their implementation and exploitation of these technologies. The lag in digital integration affects the ability of HEIs to transform into student centric institutions. In spite of the fact that the COVID-19 pandemic has fast-tracked and intensified the digital transformation of many HEIs internationally, HE in South Africa faces a host of other challenges.

## 2.2.2 Trends in South African higher education

Some of the main policy objectives of South African higher education reflect international trends, comprising “expanded access, improved quality and increased diversity of provision; a stronger and more cooperative relationship between education and training institutions and workplace; responsive to the needs of individual citizens, employers in both public and private sectors, as well as broader societal and development objectives” (DHET, 2013: xi). The democratisation of South African HE has led to increased enrolment of students from different socio-economic backgrounds and levels of preparedness for the HE environment. According to MacGregor (2014), after two decades of democracy, South African vice-chancellors have identified persistent challenges as student access and success, research and postgraduate education, transformation, securing the next generation of academics, institutional diversity and funding growth.

Student access indicate a marginal growth in the overall participation rate from 19 per cent in 2012 to 21 per cent in 2017 (CHE, 2017), but the higher education system is still characterised by high attrition and low graduation rates. This is illustrated by the accumulative graduation and dropout rates for the different undergraduate qualification types with 2012 as the first year of enrolment as summarised in Figure 2.7.



**Figure 2.7 Accumulative throughput rates: Diploma, 3–4-year Bachelors' degrees, 1st of enrolment 2012**

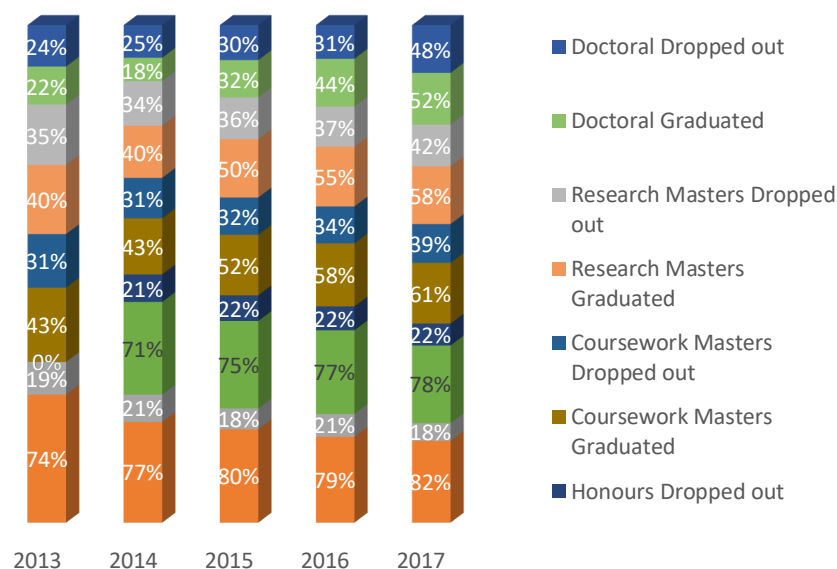
**Source: CHE – Vitalstats, 2017**

Widened access to higher education has produced changes in the structures of institutions, in curricula becoming more relevant for economic purposes, in pedagogy becoming more focused on competence-based approaches, in research becoming more relevant and in the strengthening of institutions' relationships with external communities (CHE, 2016). Open access for all meant that HEIs needed to provide adequate infrastructure to meet the “growth, equity and quality objectives” (DHET, 2013) as envisaged in policy documents, but the impact of South Africa's historical legacy of inequality has far-reaching consequences. Some HEIs, especially historically black institutions, still suffer from challenges consisting of poor infrastructure, lack of teaching facilities and resources, inadequate financing, underqualified and limited teaching staff, and low student achievement (DHET, 2013).

Massification has produced rapid growth in the number of higher education institutions, particularly private higher education, enrolment rates and academic offerings, but the academic staff complement, support for professional development did not grow at the same pace (DHET, 2013). Moreover, expanded access is surfacing underlying questions about the relevance of curricula, prevalence of rote learning and shortage of qualified staff (DHET, 2013). The shortage of qualified staff inherently brings to the fore the relevance of curricula and pedagogy. Adapting pedagogy to more competence-based approaches to equip graduates with the skills for the knowledge economy, requires qualified staff. Students from every race and economic background are at risk of falling behind or never embarking successfully on a HE journey if the “glaring gaps” are not closed (Govender, 2013, n.p.). These gaps include financial, academic, and psychosocial barriers. Closing

these gaps require a holistic approach. Scott (1995) articulates that “massification is not just a linear expansion of participation, it is an integral part of modernization, with associated socio-economic, cultural and science and technology changes”.

Research and postgraduate output still mainly depend on institutions with a strong research focus and their contributions to science and knowledge production in SA are significant, relative to the rest of Africa. However, in relation to the national economic and social development needs, postgraduate enrolments and output remain low (MacGregor, 2014). The accumulative throughput rates of the postgraduate cohort with the first year of enrolment in 2012 for honours, coursework masters, research masters and doctoral degree (excluding UNISA) are illustrated in Figure 2.8 The drop-out rate for honours has remained constant varying from 21 to 22 per cent from 2013 to 2017 respectively; the coursework masters dropout rate has increased from 31 to 39 per cent from 2013 to 2017, while dropout rates for research masters increased from 35 to 42 per cent from 2013 to 2017 and for doctoral degrees from 24 to 48 per cent from 2013 to 2017 respectively (CHE, 2017).



**Figure 2.8 Accumulative throughput rates: Postgraduate, 1st year of enrolment 2012**

**Source: CHE – Vitalstats, 2017**

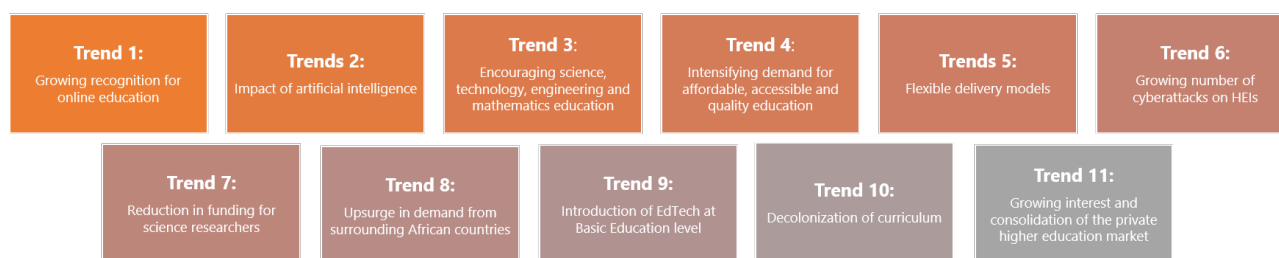
The challenge of transformation of HE is far beyond access and student success, but also relates to the institutional and academic cultures that were part of the historical legacies of the SA higher education system (MacGregor, 2014). HEIs are now faced with the challenge of producing and retaining the next generation of academics and transforming the social composition of the academic workforce. The failure to invest in producing and retaining the next generation of academics would not only constrain the goals of transformation but could impede the contribution of HEIs to democracy and development (MacGregor, 2014).

Policymakers are not unaware of the challenges to the HE system because of the increasing diversity of the student population and social and workplace needs. This has led to two dimensions of establishing a new differentiated landscape. The one dimension was institutional restructuring and the second was restricting institutions to specific qualifications and courses. The formal structure and format of academic offerings are often a barrier to entry for non-traditional students or students with an articulation gap, and the notion of the recognition of prior learning has not sufficiently taken root at all institutions to overcome these barriers. To add to the complexity, some HEIs do not have the staff complement and flexibility required to offer education solutions to a diverse student population (DHET, 2013).

In reality, it is not only about a diverse student population. The democratisation of HE also calls for diversification in the type of HEIs, how they are structured, their strategic focus and their academic offerings in order to cater for everyone who wish to educate themselves (Blessinger, 2015b). There is an increased demand for HE across demographical boundaries and HE increasingly needs to respond to the needs and challenges of society. A common ground with a shared purpose to respond to society must be found even though every HEI, whether public or private, is shaped by political, economic, social, technological, environmental and legal factors and historical legacies. The design of academic offerings should be flexible to cater for lifelong learning opportunities for members of the society who need to be skilled or wish to reskill themselves. Viljoen (2018, n.p.) explains that HEIs tend to focus on the youth, but “forget that there is a large number of people between the ages of 30 and 59 with little to no HE experiences”. Once someone has graduated with a specific qualification, it will no longer last him/her throughout a working life. Advancements in technology could be enabling, but more fundamentally they change how we operate (Viljoen, 2018). That requires an upskilling or reskilling of human resources to advance economic growth.

These rapidly changing conditions are calling for an era in HE where lifelong learning is “increasingly viewed as a basic human right” (Blessinger, 2015a, n.p.). The importance of lifelong learning stems from the knowledge economy. In addition, the era of the fourth industrial revolution has heightened the need for HE to be more innovative to remain relevant (Karodia, 2019), and the massification of HE has led to rapid growth in private HE that offers an array of academic offerings with various modes of delivery. The top trends in SA higher education are shown in Figure 2.9.





**Figure 2.9 South African higher education trends**

**Source: Karodia, 2019**

Trend 1 is identified as “Growing recognition for online education.” The attraction of online education is accessibility, availability of the resources which make ‘education for all’ possible and education formats that transform the way students learn. According to Karodia (2019), enrolments in online programmes are increasing, driven by advances in technology. Moreover, online education has the potential to further democratise HE. “Information and communication technology (ICT) have significant potential to assist students who are currently disadvantaged by gender, disability, indigenous, ethnic and socio-economic background” (Blackmore, Hardcastle, Bamblett & Owens, 2003: iii).

Trend 2, impact of artificial intelligence (AI), means that work will increasingly shift to machine operated procedures. AI increases the possibilities of monotonous jobs becoming obsolete for humans and being taken over by robots. This will lead to non-traditional, adult learners, looking for opportunities to upskill or reskill to develop their careers. HEIs will have to find innovative approaches to equip students by means of curricula that are relevant and pedagogy which would equip them with the required skills.

Trend 3 is identified as encouraging science, technology, engineering and mathematics education. The prediction is that in future 80 per cent of all jobs would require graduation with skills in the STEM fields (Karodia, 2019). In these fields the systemic faults, particularly those of the basic education system, affect learning by students with different levels of academic preparedness. The articulation gaps “encompass a range of facets of learning such as conceptual development, academic literacies and socialization” (CHE, 2016:164). Extended degree programmes are one initiative to address systemic faults that restrict access or success, but the potential of digital technologies must also be unlocked for the successful integration, dissemination and enhancement of digital literacy in all academic programmes.

Trend 4, intensifying demand for affordable, accessible and quality education, is on the rise due to the sluggish South African economy and high unemployment rates (Karodia, 2019). Students from poor socio-economic backgrounds struggle to pay for education despite the massification of HE. The



lack of funding for students not only militates against equity of opportunities but could also hamper broader societal and development objectives.

Trend 5, namely flexible delivery modes, generates prospects for adult learners in the form of lifelong learning opportunities and alleviates the pressure on the infrastructure of HEIs. Parallel to flexible delivery modes is the development of content that is appropriate for the mode of delivery. Appropriate pedagogical approaches must be developed to fit the mode of delivery, but “the lack of digital literacy among academic staff” (CHE, 2016:17) poses a challenge to the full understanding of digital technology in teaching and learning.

Trend 6, the growing number of cyberattacks on HEIs, could potentially be damaging to the reputation and sensitive data of HEIs. A data breach at a university could include access to the student information system for the issuing of qualifications, which could consequently raise questions about the legitimacy of graduates’ qualifications.

Trend 7, reduction in funding for science researchers, could further impede the national economic and social development of SA and the country’s global competitiveness.

Trend 8, upsurge in demand from surrounding African countries, relates to SA being chosen as the preferred country for higher education by a large proportion of students from sub-Saharan Africa.

Trend 9, introduction of ‘EdTech’ at basic education level, could improve accessibility to higher education. Using technology as a tool to transform education and to prepare learners for a knowledge economy could increase the competitiveness of HEIs.

Trend 10, decolonization of curriculum, “is a process of institutionally embodying the theoretical, historical, literacy, artistic, other forms of expression and experiences of indigenous people” (Karodia, 2019). For SA and Africa, the transformation of the curriculum can position HE in the lead internationally and in return promote economic development.

Trend 11, growing interest and consolidation of private HE markets, could dramatically impact both access and the quality of education. Private HE needs careful monitoring and evaluation of their qualifications to retain legitimacy in the workplace and in society.

From the above exposition it is clear that two trends dominate South African HE as they do internationally, namely widened access leading to greater student diversity and more non-traditional students entering HE, and the impact of technology on both the operations and core functions of HEIs. The COVID-19 pandemic has, however, highlighted the digital divide in South African higher education and the challenge to use the available data to turn the tables on student success and retention for the better. Mbizule (2017) cautions that the integration of ICT should not create a digital divide for students as a result of a lack of infrastructure for internet access. According to Mbizule (2017), internet access is vital if ICT is used as a means for teaching and sharing educational

resources. The high cost of data implies that free internet access must be a priority in SA and that the government should create sustainable partnership with service providers (Mbizule, 2017).

In the next section attention is paid to technology trends with particular emphasis on higher education.

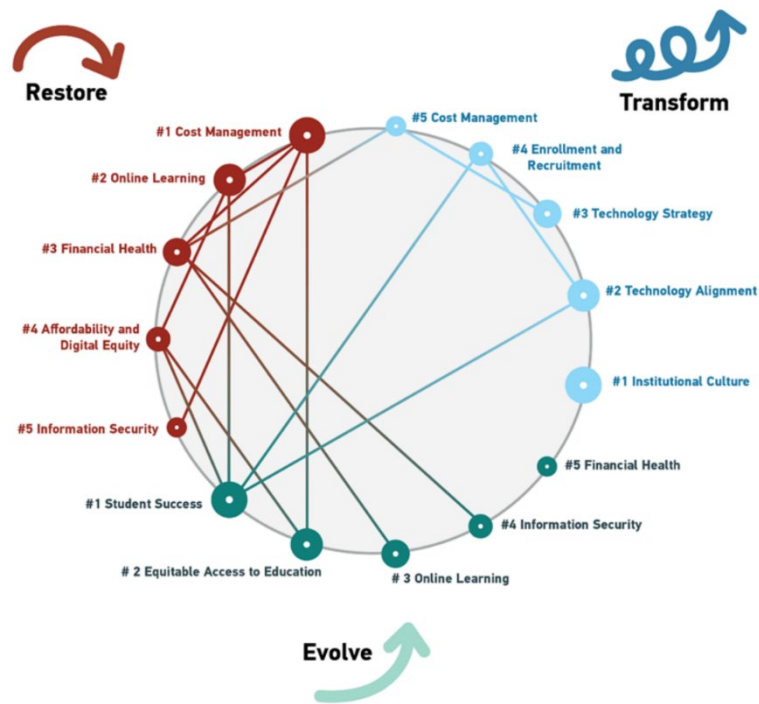
## **2.3 TECHNOLOGY TRENDS IN HIGHER EDUCATION**

Learning experiences should be supported by a learning design framework that directs the choices about what, when, where and how to teach (Smart Sparrow, 2018). These decisions include the content, structure, timing, pedagogical strategies, sequence of learning activities, the type and frequency of assessment as well the nature of the technology used to support learning (Smart Sparrow, 2018, n.p.).

Similarly, the management of information technology is supported by a framework. The phrase “People Process Technology: The Golden Triangle” (Halo, 2014, n.p.) symbolises the importance of three equal parts. ‘People’ focuses attention on the importance of user needs. ‘Process’ includes the goals that should be taken into consideration to drive change. ‘Technology’ involves educating people to capitalise on the true value of a technology investment. Technological advancement creates new opportunities and has an impact on how we do things, how we communicate, how we learn, how we teach, how we interact, how we shape our academic offerings and how we embed technology as part of the HEI’s daily operations. In HE the preponderance of long-term planning has over the past year given way to shifting to flexibility, agility and coping with the unexpected. After the pandemic HEIs must restore, evolve, and transform (Grajek, Alander, Anderson, Anne, et al., 2020a), and redefine the role of technology as part of that recovery. Grajek, et al. (2020a) considered three possible scenarios with the underlying assumptions for each scenario:

- restore (focused on figuring out what to do to get back where we were before the pandemic);
- evolve (focused on adapting to the new normal), and
- transform (focused on redefining the institution and taking an active role in creating an innovative future for HE).

Using correlation analysis, Grajek, et al. (2020a) found patterns within and across the scenarios, identified nineteen potential top IT issues for 2021 and prioritised the themes with the underlying assumptions (restore, evolve and transform) as shown in Figure 2.10.

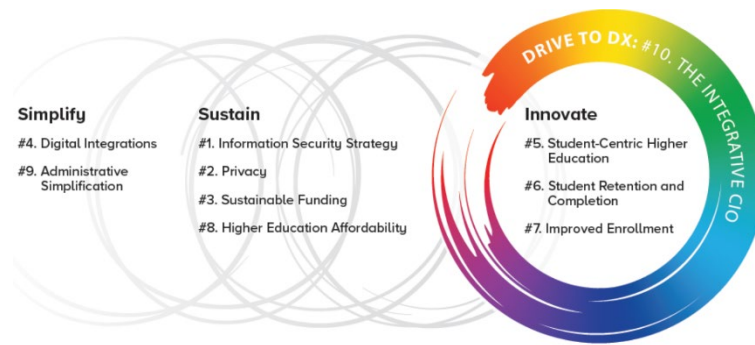


**Figure 2.10 EDUCAUSE Top IT issues 2021**

Source: Grajek, et al., 2020a, n.p.

Technology shapes our future. Used appropriately, technology can benefit HE institutions, inter alia, to equip graduates with skills related to their fields of study and required for the knowledge economy. Understanding the real benefits of technology and how technology could change the trajectory of HEIs starts with digital transformation.

The definition of digital transformation is “a series of deep and coordinated culture, workforce, and technology shifts that enable new educational and operating models and transform an institution’s operations, strategic direction and value proposition” (Grajek & Reinitz, 2019, n.p.). HEIs are, however, struggling to become more efficient in the use of technology to better understand and support students, and, more importantly, to become more student centric (Grajek, Al-idrissi, Aractingi, Bawa, et al, 2020b). A staggering reality for the education sector, according to the Global Education Technology market statistics (HoloniQ, 2019), is that education is a digital laggard with less than three per cent of overall expenditure allocated to digitising the education sector. The drive and focus for HEIs to become more relevant, effective and efficient places of higher learning in 2020 can be summarised in four key themes (to simplify, sustain, innovate and drive digital transformation) as shown in Figure 2.11.



**Figure 2.11 Higher Education drive and focus for 2020**

Source: Grajek, et al, 2020b:8

The EDUCAUSE 2020 top 10 information technology issues illustrate the importance for HEIs to transform old practices and structures to improve efficiency, use data analytics throughout the student lifecycle and applying data and technology to innovate and improve student outcomes and experiences (Grajek, et al., 2020b:7). A closer look therefore needs to be taken at educational technology.

### 2.3.1 Educational technology

The aim of educational technology (EdTech) (also referred to as instructional technology) is to improve education (Kurt, 2015). Educational technology is defined as “the process of integrating technology into education to build better teaching/learning experiences that result in higher learning outcomes” (Bui, 2020, n.p.). The common advantages of educational technology include that it creates opportunities for innovative teaching methods, can improve collaborative teaching and can add value to the teaching and learning process (Bui, 2020). The current top ten educational technology trends are eLearning, video-assisted learning, blockchain technology, big data, artificial intelligence (AI), learning analytics, gamification, immersive learning with virtual reality (VR) and augmented reality (AR), STEAM (Science, Technology, Engineering, Arts and Mathematics) and social media in learning (Bui, 2020). Dani (2019) identifies collaborative learning, learning outside the classroom environment, social media in learning, interactivity in classroom, data management and analytics, immersive learning with AR and VR, gamification in education and online data and cybersecurity as trends and technologies that impact teaching and learning (Dani, 2019).

In relation to this study eLearning, video-assisted learning, collaborative learning, social media in learning and learning outside the classroom environment are of particular importance. The electronic delivery (eLearning) of education rapidly became a top trend as a result of COVID-19, leading to an increase in demand for online platforms and content (Bui, 2020). Video-assisted learning that embeds instructional design principles is extremely useful to make content more comprehensible to improve student outcomes (Bui, 2020). Social media in learning build “a culture of collaboration and

sharing, leading to an improved learning experience” (Bui, 2020, n.p.). Dani (2019) argues that social media in learning, if incorporated into the learning process, builds a culture of sharing, collaboration, increased engagement, enhances the learning process and allows the student to start building peer networks. Collaborative learning can build students’ collaborative skills, and the exchange of information through group activities or tasks can assist with the understanding of concepts or theory and increase engagement (Dani, 2019). Learning outside the classroom environment (Dani, 2019) is possible by designing content that is responsive and device agnostic.

Content that is device agnostic with features embedded as part of the content design, enhances the learning experience, provides students with the flexibility to learn at their own pace and time, whereas adopting mobile learning into a learning management environment, creates additional benefits for the students (Dani, 2019). Bringing technology into the classroom can change the environment into an interactive education setting where students can get involved in the learning process (Dani, 2019). Technology bridges the gap of interconnectivity and accessibility between the student/lecturer, peer-to-peer, that over time helps students to improve their interpersonal skills (Dani, 2019).

More importantly for HE, the adoption of learning management systems (LMS), amongst other technologies, changed the way we communicate with and deliver content to students. An LMS is a web-based platform for training programmes and information-sharing among individuals, giving them flexibility to access it from their workplace or home (G-Cube, 2017). An LMS should be an integral part of educational technology strategies, providing a central repository for content, student access irrespective of the mode of delivery, the ability to track students’ progress and performance, a medium to conveniently update course content and the possibility to integrate social learning experiences (Pappas, 2016).

The integration of technologies can be effectively leveraged if an LMS is used for what it was designed for. The purpose of an LMS is to “plan, execute and assess a specific learning process” (Sharma, 2015, n.p.). Lecturers are, however, often not aware of how to combine the various technologies to build a learning management ecosystem that is compatible with the delivery mode of the programme.

### **2.3.1 Next Generation Digital Learning Environment**

Beyond learning management ecosystems, Baker (2017) envisages the next generation digital learning environment (NGDLE) that points to a vision of serving the needs of society through education. According to Baker (2017), the NGDLE consists of five areas: interoperability; personalisation; analytics, advising and learning assessment; collaboration; accessibility and universal design.

- The interoperability area covers adaptability, extendibility (as the ecosystem evolves), content (which can easily be exchanged between systems), discipline specific apps and learning data available to trusted systems (Baker, 2017: 30). This area would assist HEIs to be more agile in their delivery to the student population with its changing needs.
- The personalisation area includes individual preferences, institutional autonomy, lecturers not being constrained by software design, and a clear individual learning path with student choices (Baker, 2017: 30). The personalisation area provides flexibility to design content with applications that students are familiar with, and not be restricted to software designs that are compatible with what has been deployed within the institutions.
- The analytics, advising and learning assessment area covers the ability to identify at-risk students, course progress, and adaptive learning pathways, and enables integrated planning and assessment of both student performance and the environment support platform and data standards (Baker, 2017: 30). This provides HEIs with trusted data to improve decision-making.
- The collaboration area is concerned with the persistence of individual spaces, the encouragement of students as creators and consumers, and courses that include public and private spaces (Baker, 2017: 30). The collaboration area will allow students to interact with one another other in a comfortable learning space.
- The accessibility and universal design area cover the support of different types of material, enablement of adaptive learning, accessibility as part of the design for the learning experience and a design that includes measurement rubrics and quality control (Baker, 2017: 30). Accessibility is one of the critical areas for students, but in addition to that, the material must be relevant.

These emerging technologies and practices describe the more collaborative nature of a holistic learning and teaching approach (Brown, McCormack, Reeves, Christopher Brooks, et al., 2020). In the next section, a closer look is taken at emerging factors that impact learning and teaching by discussing the 4IR.

## **2.4 THE IMPLICATIONS OF THE FOURTH INDUSTRIAL REVOLUTION (4IR) FOR HIGHER EDUCATION**

The 4IR is the “ongoing automation of traditional manufacturing and industrial practices, using modern smart technology that can analyse and diagnose issues without human intervention” (Moore, 2019, n.p.). This revolution (4IR) is evolving exponentially and has the potential to disrupt every industry (Belyh, 2020). More critical is the fact the 4IR is a global change with new solutions and new technologies (Belyn, 2020). This is translated into HEIs preparing students for technologies that are either evolving or have not been invented, and anticipating how to solve complex problems that must

still manifest (Salson, 2018, n.p.). The technologies driving the 4IR include AI, blockchain, faster computer processing, virtual reality and augmented reality, biotechnology, robotics, the internet of things (IoT), 3D printing, and nanotechnology (McGinnis, 2020). In this section, a closer look is taken at some of the implications of the 4IR for higher education by discussing the skills and literacies required for the 21<sup>st</sup> century and digital literacy.

### **2.4.1 21<sup>st</sup> Century Skills**

Individuals require a mix of skills to thrive in and contribute to an innovation-driven economy; these changes in the knowledge economy are driving changes in the labour market and technology is driving automation in the workplace (World Economic Forum, 2017). The top four learning skills required by graduates that are enhanced by a digital literacy intervention are critical thinking (problem-solving), creativity, communication, and collaboration (World Economic Forum, 2017; Stauffer, 2020). These skills focus on how students will approach complex challenges (Salson, 2018), inter alia, brought about by technology enhancement and innovation. Critical thinking is the ability to analyse and evaluate information to form a judgement (World Economic Forum, 2017, n.p., Cultivating Digital Literacy, 2018, n.p.). The acquisition of these skills will help individuals to work independently, take initiative and continuously learn from their mistakes by redefining the process to create more effective solutions to the problems they are facing (Wabisabi Learning, 2020). Research shows that in order for effective problem solving to occur, several aspects are involved, namely (1) learn from past mistakes or previous problems, (2) do things differently for existing problems by finding new ways to tackle the problem at hand, (3) solve problems as a group or individually and (4) adapt one's behaviour to different environments (Kampen, 2019).

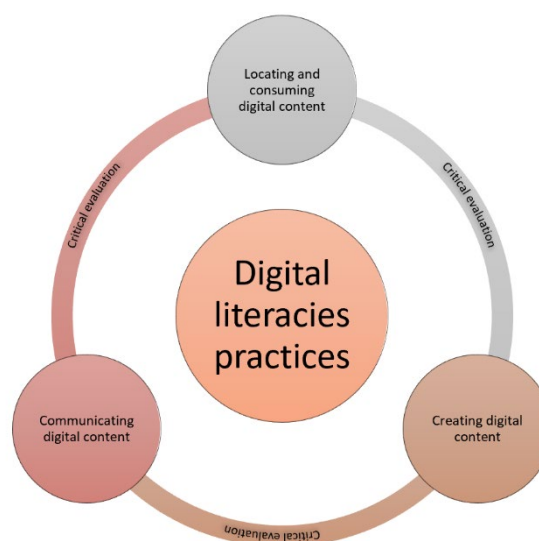
Creativity is the “ability to imagine and devise innovative new ways of addressing problems, answering questions or expressing meaning through the application, synthesis or repurposing of knowledge” (World Economic Forum, 2017, n.p.). Students are facing a future where development and innovation of new technologies will continually be changing, and influenced by the 4IR, they will find themselves in a state of constant stimulation and neural development through technology use (World Economic Forum, 2017). The cultivation of creativity in students speaks to the lecturer's willingness to change the classroom setting to fit the needs of the students. The various strategies lecturers could consider include flexible seating, inquiry-based learning, interdisciplinary teaching and emphasizing student collaboration (Kampen, 2019). Students are using social media to express themselves to display their creative edge and find their own unique identity (Cultivating Digital Literacy, 2018; World Economic Forum, 2017).

Social media fosters a feeling of networking, staying in touch and virtually staying connected. Communication (talking to others) and collaboration (working with others) (Stauffer, 2020) involve the coordination with others to not only convey information but the ability to work in partnership with



others to either achieve a goal or create something new (Cultivating Digital Literacy, 2018; World Economic Forum, 2017). The techniques for cultivating collaboration are (1) encouraging lecturers to assign collaborative projects; (2) provide extracurricular activities that actively involve students and (3) encourage lecturers to collaborate (Kampen, 2019, n.p.).

Littlejohn, Beetheam and McGill (2012) argue that HEIs must be prepared to radically change their practices for the successful development of lifelong digital learners. Students must be able to understand facts, figures, statistics, and data; understand the methods and outlets of published information and the information age made possible by the exponential developments through technology innovation (Stauffer, 2020, n.p.). The intellectual processes associated with digital literacies can be distinguished in three categories as shown in Figure 2.12 (Spires & Bartlett, 2012) along a continuum of critical evaluation.



**Figure 2.12 Digital literacies practices**

**Source: Adapted from Spires & Bartlett, 2012**

Locating and consuming digital content concentrates on simplifying the navigation for internet users with the ability to create a mental model to locate, comprehend, and consume the content (Spires & Bartlett, 2012:10). This practice assumes that some basic skills have been mastered that includes a working knowledge about search engines, basic literacy skills, general knowledge about resources' availability on the internet and knowledge about the field of study (Spires & Bartlett, 2012). The creating digital content category places emphasis on the personalisation of learning. As a student navigates through the content, it is important that the student is guided by the enquiry and not the technology (Spires, Medlock Paul & Kerkhoff, 2017). However, it is not just about how technology is used in teaching but also what is taught about technology because technology enables students to solve problems across a range of disciplines (Ventimiglia & Pullman, 2016). This practice will require lecturers to understand their students in order to locate and utilise a variety of digital resources to



meet their needs (Spires & Bartlett, 2012). The communicating digital content category indicates social networking sites as one method to communicate effectively. The reasoning behind the social networking sites highlights features like easy to use, facilitative in creating online communities, social, participatory, and collaborative (Spires & Bartlett, 2012). There is an underlying assumption that lecturers responsible for curriculum development keep abreast with the latest technology developments and understand how to embed technologies to promote the digital literacy of students (Trilling & Fadel, 2009). Digital literacies should be understood as a synergy between these practices that are altered by technology developments in an increasingly digital age (Spires & Bartlett, 2012). In the next section, digital literacy is discussed in the context of HE, taking a closer look at the dimensions of digital literacy and developing digital literacy.

## **2.5 DIGITAL LITERACY**

Digital literacy is defined as “the ability to use information and communication technologies to find, understand, evaluate, create and communicate digital information, an ability that requires both cognitive and technical skills” (American Library Association, 2011, n.p). Digital literacy is less about the tools and more about thinking, the skills and standards based on the tools and platforms (Johnson, Adams Becker, Estrada & Freeman, 2014). Furthermore, digital literacy is an iterative process that involves students learning about, interacting with, demonstrating how they use and then sharing their knowledge (Johnson, et al., 2014). Digital literacy is characterised as a life-long practice, a skill set that revolves around a blend of being technically savvy to developing capabilities that will equip the individual for living, learning, and working in a digital society (Johnson, et al., 2016). The availability of digital technologies has transformed the way people interact, communicate and do business.

The way we do business, especially in HE with the plethora of technologies that are available, led to digital literacy being listed as a significant challenge impeding technology adoption in HE. Research done by New Media Consortium (NMC) and the EDUCAUSE Learning Initiative (ELI) Higher Education Report annually review technology trends for HE institutions (Johnson, et al., 2015; Johnson, et al., 2016; Adams Becker, et al., 2017; Adams Becker, et al., 2018; Alexander, et al., 2019). The reports are categorised in three sections, namely (1) key trends accelerating technology adoption in HE, (2) significant challenges impeding technology adoption in HE, and (3) important developments in educational technology for HE. In the solvable category, i.e. challenges which are understood and with a known solution, digital literacy has been identified five consecutive years in a row. The challenges listed over five years for this section of the reports are shown in Table 2.3.

Table 2.3 Significant challenges impeding technology adoption in HE

2019	2018	2017	2016	2015
<i>Improving digital fluency</i>	<i>Improving digital literacy</i>	<i>Improving digital literacy</i>	<i>Improving digital literacy</i>	<i>Adequately defining and supporting digital literacy</i>
<b>Increase demand for digital learning and experience and instructional design expertise</b>	Authentic learning experience	Integrating formal and informal learning	Blended formal and informal learning	Blended formal and informal learning

Source: Alexander, et al., 2019, Adams Becker, et al., 2018; Adams Becker, et al., 2017; Johnson, et al., 2016; Johnson, et al., 2015

In 2015, defining and supporting digital literacy as an “iterative process that involves student learning about, interacting with and the demonstrating or sharing their new knowledge” was identified as a significant challenge impeding technology adoption in HE (Johnson, et al., 2015:24). In 2016, improving digital literacy was cited again as an impeding challenge, adding “developing a consensus of all the elements *digital literacy* encompasses” (Johnson, et al., 2016:24) as a notable obstacle to improving digital literacy.

Digital literacy from an educator’s perspective differs from that from a student’s perspective. Using technology for educational processes as a teaching tool is innately unlike learning with technology (Johnson, et al., 2016:24). In 2017, digital literacy transcended from simply gaining technological skills to “generating a deeper understanding of the digital environment, enabling intuitive adaptation to new contexts and co-creation of content with others” (Adams Becker, et al., 2017:24). According to the panel, HEIs are struggling to obtain institutional support and buy-in for the development of digital literacy across the curriculum and at the same time encouraging a joint ownership of obligation for improving digital literacy (Adams Becker, et al., 2017). In 2018, improving digital literacy was once again cited, although the complexities associated with the implementation of digital literacy practices in terms of institutional innovation and resources allocated to the innovation were also highlighted (Adams Becker, et al., 2018). In the following section, a closer look is taken at the dimensions of digital literacies.

### 2.5.1 Dimensions of digital literacies

The 21<sup>st</sup> century opens a plethora of opportunities for students in the form of technology trends in HE and especially their accessibility to students (Ventimiglia & Pullman, 2016). However, having

access and opportunity does not translate in being digitally literate. Digital literacy includes the ability to identify and create digital solutions, adopt new tools, and find new ways of doing things in different fields. Lankshear, Snyder and Green (2000) discuss literacies that are concerned with technologies and pedagogies in terms of three dimensions namely the operational dimension, cultural dimension and critical dimension.

The operational dimension is concerned with developing performance with linguistics systems, procedures, tools, and techniques involved in making and interpreting texts. An example of the operational dimension would be the ability to read and write in context with clear instructions as part of routine tasks (Lankshear, et al., 2000). The cultural dimension builds on the operational dimension to enhance the student's ability to participate in the discourses of the social world. An illustration of the cultural dimension relates to the student's ability to relate text and information to real-life practices (Lankshear, et al., 2000). The critical dimension involves the means to transform and actively reproduce existing literacy practices, developing the ability to evaluate, critique and redesign a resource through the mediation of these practices. An example of the critical dimension would be the ability to use literacies in combination with innovation, transformation, improvement and adding value to social practices (Lankshear, et al., 2000).

## **2.5.2 Developing digital literacies**

The significance of digital literacies lies in the value of being able to contribute to the knowledge economy, developing skills to use, create, analyse and share information, understand how technology is impacting the world around us, all of which is essential for lifelong learning (Grajek, et al., 2019). According to Littlejohn, et al., (2012: 554), findings in literature and auditing of practices demonstrate that the development of lifelong digital learners include:

- Authentic tasks in programmes of study
- Explicit exploration of academic and professional practice in digital environments
- Time and opportunity for all academic and support staff to explore the changing modes of scholarship and professionalism
- Consideration of how forms of academic communication is constructed
- Recognition of learners' existing knowledge practices as resources for learning
- Academics and teaching staff should explore and share a variety of educational approaches.

The development of a skillset brings to the attention digital literacy 'social practices' (Littlejohn, et al., 2012). According to Littlejohn, et al. (2012:549 - 550) social practices are "situated in specific social and cultural contexts from which they derive their meaning and on which they are significantly dependent for their performance". The literature (Littlejohn, et al., 2012) shows that the situated

knowledge of these practices has several implications for the development of digital literacies of students:

- Literacies must be foundational capabilities (reading, writing and numeracy): This suggests that the impact on the student is lifelong/life wide. As the knowledge economy and the 4IR fuel new ways of working and employability, political and economic globalisation, and the adoption of technology-enhanced learning approaches, academics become more aware of the foundational nature of digital capabilities. Academics' understanding of the importance of foundational capabilities evolves as they deal with the diverse ICT skills, experiences, and preferences among students (Littlejohn, et al., 2012: 550).
- Extended literacy practices should develop continuously (Littlejohn, et al., 2012): Personal styles and preference will emerge providing premises for digital literacy practices. In the context of their field of study, students start to qualify their preferences and their different styles of using technologies stimulate new forms of diversity among students (Sharpe, 2010; Luckin, Clark, Logan, Graber, et al., 2009).
- The digital practice that emerges in a complex situation such as a learning activity will involve an interaction between personal capabilities or dispositions and the environment supporting action (Littlejohn, et al., 2012:550): The participation in "subject specific tasks with subject specialist technologies" (Littlejohn, et al., 2012:550) stimulates students to become more competent in specialised fields.
- Digital literacies must have a bearing on individual identities: This is critical, especially for how a stance is adopted about knowledge in digital forms (Littlejohn, et al., 2012; Johnson, 2008).

Literacies are continually evolving (Littlejohn, et al., 2012:551). Technology embedded appropriately into the curriculum is seen as enablement, and the advancement of technology does not only influence the tempo at which students discover, but also how the information is gathered and used (Adams Becker, et al., 2018). Ventimiglia and Pullman (2016) argue that if traditional literacy has been about independence, digital literacy should be about intellectual freedom (see Table 2.4).

**Table 2.4 Traditional literacy versus digital literacy**

<b>Traditional literacy</b>	<b>Digital literacy</b>
Finding information	Vetting information
Reading (immersion)	Skimming (searching for solution)
Note-taking - transcribing	Curating – linking
Prose composition	Multimodal composition <ul style="list-style-type: none"> <li>• Information design</li> <li>• Data visualisation</li> <li>• Dynamic storytelling (video)</li> <li>• Coding/programming</li> </ul>
Static artefacts	Dynamic assets (multiple, diverse reusable)
Learns from 'lecturers'	Teaches self
Permanence	Change

**Source: Ventimiglia & Pullman (2016:40)**

HEIs are now “charged with developing students’ digital citizenship, promoting the responsible and appropriate use of technology, including online communication etiquette and digital rights and responsibilities in blended and online learning settings” (Adams Becker, et al., 2018:26). Ventimiglia and Pullman (2016:40) suggest the following to integrate digital literacy into the curriculum:

- *Find and vet information online*: it is crucial that students are able to determine the quality and validity of information
- *See problems from a digital perspective*: students need to be able to analyse a problem and determine how to solve it
- *Become self-directed learners*: students should know how to take advantage of the wealth of information on the internet to become lifelong learners
- *Obtain digital solutions*: students must be able to keep abreast with technology developments, learn to evaluate technology to best solve the problem at hand and not just used tools/technology that they have used before or are most comfortable with
- *Learn software quickly*: technology is also evolving (changing or improving), students must be able to learn how to use the upgraded versions or similar releases
- *Design and create digital solutions*: students must develop a skillset that allow them to create a digital toolset that match their field of expertise.

As digital literacies are continually evolving, according to Alexander et al. (2019) the focus has shifted from digital literacy (understanding how to use the tools) to digital fluency (ability to create something

new with the tools) (Sparrow, 2018). The concept of digital fluency acknowledges that the changes in technology impact the teaching strategies of HEIs and highlights the potential impact that these strategic educational technologies have on traditional HE practices. Digital fluency is defined as “the ability to leverage technology to create new knowledge, new challenges and new problems and to complement these with critical thinking, complex problem solving, and social intelligence to solve the new challenges” (Sparrow, 2018:54). According to Sparrow (2018), digital fluency is a collection of evolving fluencies that includes (but is not limited to) curiosity fluency, communication fluency, creation fluency, data fluency and innovation fluency. These fluencies involve (Sparrow, 2018:54):

- Having questions and a desire to answer those questions (curiosity fluency). This fluency will create an awareness that students are capable of developing answers to their own questions (Sparrow, 2018). HEIs will have to provide students with practice and deep immersion in design thinking.
- The ability to communicate new knowledge across diverse populations, by selecting an appropriate and impactful medium (communication fluency). The possibilities for learning and teaching includes digital storytelling, and using AR or VR to tell a story (Sparrow, 2018) .
- A deep understanding of how to create and leverage knowledge to make something new (creation fluency). In HE the implementation of maker spaces and these spaces must provide access to tools and expertise to become inventors (Sparrow, 2018).
- The capacity to use data sets to make informed decisions, pushing the technology boundaries to process the data (data fluency). Cloud computing resources in HEIs will provide students with unprecedented access to data sets that will be bounded only by the imagination (Sparrow, 2018).
- The realisation that failure is a valuable part of the learning process (innovation fluency). This fluency requires an environment where students can take risks, fail, learn from those failures, and iterate the process to come up with new ideas (Sparrow, 2018).

The iterative process of developing these fluencies enables HEIs to prepare students for jobs that must still be defined, and to develop new skillsets depending on the new systems and new technologies to become researchers, entrepreneurs, and lifelong learners (Sparrow, 2018). In this dynamic environment, research directs the attention to design principles for education to create environments that are more accessible, usable, and inclusive for a diverse stakeholder group (students, administrators, lecturers, instructors, etc.). In the following section a closer look is taken at design principles in education, with particular reference to multimedia principles for instructional design and design principles in EDR.

## 2.6 DESIGN PRINCIPLES

Design principles are “heuristic statements in the meaning of experience-based suggestions for addressing problems” (Plomp, 2013:25) developed in a specific context to contribute to the improvement of educational practices. According to Nieveen and Folmer (2013:153), design principles serve various objectives namely:

- For researchers: design principles show the contribution of design research to the existing body of knowledge with information of how the interventions work in practice and the effects of using the intervention
- For future users: design principles provide insights in the required implementation conditions, as a guide for selecting and applying similar interventions in a specific target situation
- For policy makers: design principles provide assistance in making research-based decisions to address complex educational problems.

Design principles guide the design of an intervention that can promote engagement with students, depending on the course design and content (Herrington & Reeves, 2011). Bryson and Hand (2007) propose that if curriculum developers or designers want to improve student engagement the changes must be initiated at course level, and attention should be given to the implementation and an alignment between outcomes and delivery. Some authors (Dickey, 2005) argue that lecturers can learn from how games are designed that present gamers with challenging tasks, role playing, affirmation of performance, etc. These recommendations justify the use of design principles that serve as guidelines for lecturers and instructional designers to enhance endeavours for student engagement (Herrington & Reeves, 2011: 595). The following exemplars of design principles are a summary from seminal work in this regard:

**Table 2.5 Design principles in EDR (exemplars)**

<b>Author</b>	<b>Oliver, 2000: 5 - 9</b>
<b>Outcome</b>	Design and development of web-based materials using new technologies
<b>Design principles</b>	<ol style="list-style-type: none"> <li>1. Choose meaningful contexts for the learning</li> <li>2. Choose the learning activities ahead of the content</li> <li>3. Choose open-ended and ill-structured tasks</li> <li>4. Make the resources plentiful</li> <li>5. Provide support for the learning</li> <li>6. Use authentic assessment activities</li> </ol>
<b>Authors</b>	<b>McLoughlin &amp; Oliver, 2000: 65-68</b>
<b>Outcome</b>	Culturally inclusive instructional design
<b>Design principles</b>	<ol style="list-style-type: none"> <li>1. Adopt an epistemology that is consistent with, and supportive of constructivist learning and multiple perspectives</li> <li>2. Design authentic learning activities</li> <li>3. Create flexible tasks and tools for knowledge sharing</li> <li>4. Ensure different forms of support, within and outside the community</li> <li>5. Establish flexible and responsive student roles and responsibilities</li> <li>6. Provide communication tools and social interaction for learners to co-construct knowledge</li> <li>7. Create tasks for self-direction, ownership and collaboration</li> <li>8. Ensure flexible tutoring and mentoring roles that are responsive to learner needs</li> <li>9. Create access to varied resources to ensure multiple perspectives</li> <li>10. Provide flexibility in learning goals, outcomes and modes of assessment</li> </ol>
<b>Authors</b>	<b>Turvey &amp; Pachler, 2019: 5-6</b>
<b>Outcome</b>	Fostering pedagogical provenance through research in technology supported learning
<b>Design principles</b>	<ol style="list-style-type: none"> <li>1. Methodological and pedagogical interoperability should be prioritised</li> <li>2. The quantitative should be qualified, as far as possible</li> <li>3. Post hoc analysis should be accompanied by concurrent description and analysis</li> <li>4. Impact should be broadly and rigorously theorised</li> </ol>
<b>Authors</b>	<b>Cremers, Wals, Wesselink &amp; Mulder, 2016:327</b>
<b>Outcome</b>	Hybrid learning configurations at the interface between school and workplace
<b>Design principles</b>	<ol style="list-style-type: none"> <li>1. Fostering authenticity</li> <li>2. Creating a learning community</li> <li>3. Utilising diversity</li> <li>4. Inter-linking of working and learning</li> <li>5. Facilitating reflexivity</li> <li>6. Enabling organisation</li> <li>7. Enabling ecology</li> </ol>

**Sources: Cremers, Wals, Wesselink & Mulder (2016:327); Turvey & Pachler (2019: 5-6); McLoughlin & Oliver (2000); Oliver (2000)**



The seminal work of these authors illustrates that design principles are applicable in a range of different contexts and useful to lecturers who are considering changing their educational environment to improve student engagement or experience. Design principles are used primarily to assist curriculum developers, instructional designers, etc. in the selection, application, and development of interventions in their own environment to be able to apply procedural knowledge for a specific design (McKenney, Nieveen & Van den Akker, 2006: 73). Reeves (2006) cautions researchers against prescribing processes and procedures for lecturers/curriculum developers for implementation, but in the form of design principles research findings have the potential to bridge the gap between educational practice and theory (Wang & Hannafin, 2005).

In this study the ILDF as organising framework deepened my understanding of all the variables that influenced the practices within an educational environment (Bannan, 2013) and the systematic reflection on and documentation of the findings led to the development of design principles (Plomp, 2013:22). Throughout the iterative process, the decisions taken as part of the design process are transformed into procedural guidelines to address the issues in the educational environment. Procedural knowledge is a set of design activities that should be considered in developing an intervention(s) to be most effective or guarantee success in a specific context (Plomp, 2013:24). In EDR, the knowledge resulting from careful analysis of relevant literature, backed up by the data analysis, guides the constructing of design principles to justify the theoretical arguments (Plomp, 2013:24).

EDR is about understanding the interrelated dependencies that impacts the improvement in the context and through the design of interventions addresses the problems. One such dependency is creating an environment that serve the needs of adult learners to create a more student-centred environment, and multimedia learning supports such a model.

## **2.7 MULTIMEDIA LEARNING**

Mayer's cognitive theory of multimedia learning (2009) supports a student-centred "knowledge construction" model, in which students fuse words and images together into meaningful information, store this in their long-term memory and later use that information as channels of prior knowledge. "Knowledge construction" is described by Mayer (2009) as building a mental representation where the learner is an active sense maker, and the lecturer or content designer takes the role of a cognitive guide. According to Clark and Mayer (2011:37), there are three important cognitive processes that occur during knowledge construction: (1) selecting the words and images where attention is given to the text and the visuals of the given material; (2) organising the words and images in order to build a mental model of the relevant text and images, submitted to memory in a structured form, and (3) integration of the text and images, how they relate and making the connections with prior knowledge.

Principles of multimedia learning are classified as: reduce extraneous processing, manage essential processing, and increase generative processing.

The definitions of each classification according to Clark and Mayer, (2011:37) are:

- Extraneous processing is cognitive processing that does not support the instructional objective and is created by poor instructional layout (too much text and pictures).
- Essential processing is cognitive processing aimed at mentally representing the core material and is created by the inherent complexity of material.
- Generative processing is cognitive processing aimed at deeper understanding of core material and is created by the motivation of the learner to make sense of the material.

The challenges presented by each of the classifications can be managed by applying the appropriate technologies in relation to the context of the learner. Extraneous processing can be managed by improving the layout of the content and applying audio narration for a complex process (Clark & Mayer., 2011). Essential processing can be managed by designing content into segmented portions (Clark & Mayer, 2011). Generative processing can be managed by incorporating practical activities (Clark & Mayer, 2011).

Similar to the classification of the principles, the selection of the correct visuals for course creation also incorporates specific factors like surface features that refer to the look, how it was created, what information is conveyed and the psychological function of the visual (Clark & Mayer., 2011). The goal of the communication is another consideration that refers to the nature of the content, in other words the kind of information that is presented, like facts, concepts, principles, procedures or processes (Clark & Mayer, 2011). The psychological function of the visual refers to the ability of the visual to attract attention, connect with prior knowledge, focus attention or motivate to make connections. Visuals must be chosen in relation to the function of the visual and the information type that must be taught to support learning (Clark & Mayer, 2011).

The visuals that support learning have various functions. These functions are decorative, representational, organisational, relational, transformational and interpretive. The descriptions of the functions, as explained by Clark and Mayer (2011: 73), are as follows:

- Decorative: add aesthetics, even tone or humour, for example a person riding a bicycle in a lesson on how a bicycle pump works
- Representation: depict an object in a realistic manner, for example a photograph of equipment in a maintenance lesson
- Organisational: show qualitative relationships among content, for example a concept map or tree diagram

- Relational: visuals that summarise quantitative relationships, for example a bar graph or pie chart
- Transformational: visuals that illustrate changes in time or over space, for example an animated demonstration of a computer procedure
- Interpretive: visuals that make intangible phenomena visible and concrete, for example drawings of molecular structure.

Just as the visual types are used to support learning, the content type can also be specific to the learning objectives. Content types can be applied as a topic organiser or lesson interfaces (Clark & Mayer, 2011). Clark and Mayer (2011) distinguish five different kinds of content types, namely a fact, a concept, a process, a procedure and a principle. The different content types and descriptions with the supporting visual types are summarised in Table 2.6.

**Table 2.6 Content type, associative visual with examples that support learning**

<b>Content Type</b>	<b>Description</b>	<b>Type of visual</b>	<b>Example</b>
<b>Facts</b>	Unique and isolated information	Representational Organisational	A table of parts names and specifications
<b>Concepts</b>	Categories of objects, events or symbols designated by a single name	Representational Organisational Interpretive	A tree diagram
<b>Process</b>	Describing how something works	Transformational Interpretive Relational	Animation of how the heart pumps blood
<b>Procedure</b>	A series of steps resulting in completion of a task	Transformational	A diagram with arrows that shows how to install a printer cable
<b>Principle</b>	Guidelines that result in completion of a task, cause-and-effect relationships	Transformational Interpretive	A video showing two effective sales approaches

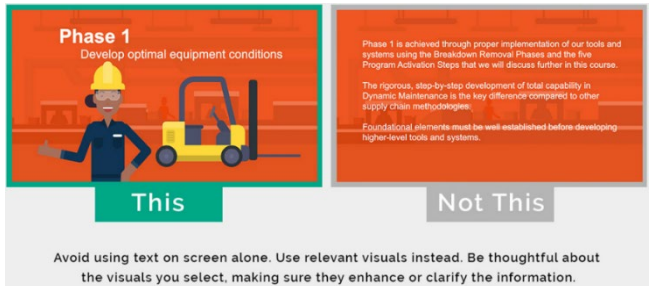
**Source: Clark & Mayer, 2011:75**

Visuals must be chosen in relation to the function of the visual and the content type that must be taught to support learning. Having introduced the foundations of the theory of multimedia learning, the focus shifts to the principles of multimedia learning. Each multimedia principle is described in terms of what the principle is about and how the principle must be applied, with a graphical illustration of each.

## 2.7.1 Multimedia principles

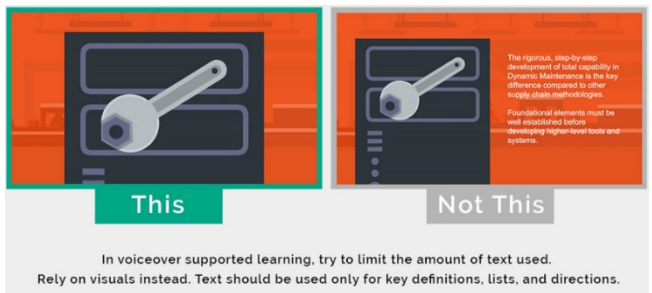
The principles that apply to and fit the theoretical framework of the study are the multimedia, modality, contiguity, redundancy, coherence, personalisation, pretraining, segmenting and signaling principles. The description and illustration of the principles are presented in Table 2.7. These principles are important as they served as guidelines for the format of the content in relation to the findings of the needs analysis.

**Table 2.7 Multimedia principles and illustrations**

Principle	Illustration
<p><b>Multimedia principle</b> is about building a mental connection between the text and visual representation. The written text and the graphic must be used to create a structured model with which the learner can connect or recall knowledge from prior experience. The recalling of knowledge from a prior experience is a commonality for the nine learning paths of the theoretical model. The multimedia principle helps the learner understand the connection between the words (spoken or written) and the images (picture, graphic, etc.), as shown in Figure 2.13.</p>	

**Figure 2.13 Multimedia principle**

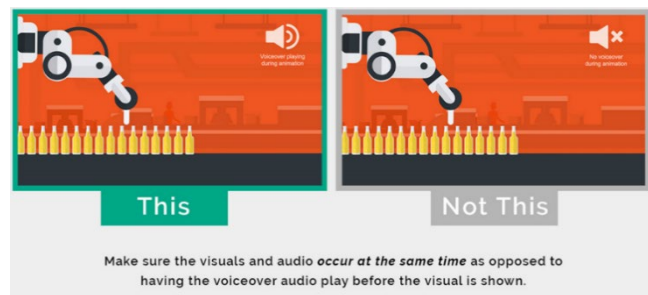
The multimedia principle is applicable for novice learners but requires understanding about the experience of the students. The multimedia principle can be applied to the design of computer-based games and simulations (Mayer & Moreno, 1999), the design of organisational visuals (Mayer & Stull, 2007) and videos in which students learn better than from reading a lesson and viewing of examples (Moreno & Oretagno-Layne, 2008).

<p><b>Modality principle:</b> The modality principle is concerned with the type or mode of media presentation of various types of content. Clark &amp; Mayer (2011:115) advise to “[p]resent words as audio narration rather than on-screen text”, as shown in Figure 2.14. There are psychological advantages to using audio in specific scenarios. The selection depends on the target group because UDE would argue that one should offer content in different forms.</p>	
--	--

**Figure 2.14 Modality principle**

The information is split across two separate cognitive channels. The words are processed via the auditory channel and the graphics are processed via the visual channel. Audio narration must be brief and clear to be effective for novice students. The on-text screen display can be used as reference for very technical terms or complex activities.

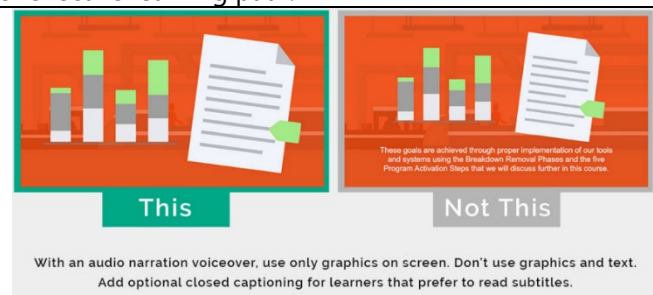
**Contiguity principle** is about keeping the audio aligned to the corresponding visual. The integration of the text and the visual results in the learner keeping the information together and making the connection based on the integration. The lecturer must consider how the text and the visual are integrated and displayed on the screen. The illustration in Figure 2.15 demonstrates when the principle is used correctly and when the principle is violated.



**Figure 2.15 Contiguity principle**

To overcome the limitations of screen size when there is too much text, a technique that could be applied is the action. This can be created with additional formatting in the design of the content. The same concept applies if audio narration is used with corresponding visuals. The narration must be synchronized with the visuals to create the integration. If the narration describes the actions of the learner when following instructions, it is important that the action and instruction are in sync. The synchronized information is incoming information that is kept in the working memory and because the information is synchronized, the information is structured. The structured information that is kept in the working memory, when used, is then classified as prior knowledge that builds back for the reflective learning path.

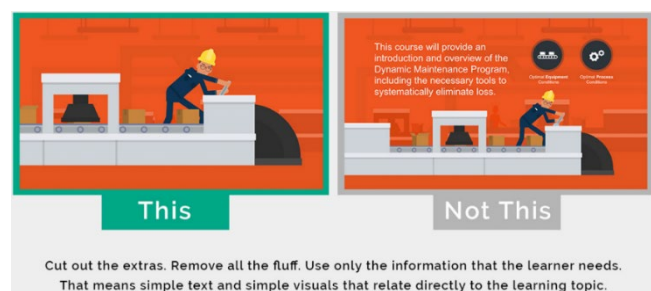
**Redundancy principle** is concerned about reducing redundant text and in the process reducing extraneous processing (Mayer & Fiorella, 2014). The idea behind the principle is to focus the learner on only one form of text, either written or verbal, but not both, as shown in Figure 2.16. The psychological benefit for the learner is that the visual channel is not overloaded with redundant information.



**Figure 2.16 Redundancy principle**

On-screen text to narration can be used in special situations when the pace of the learning allows for opportunities to process the visual representation, when spoken comprehension is difficult for the learner or when selected key words are presented (Clark & Mayer, 2011).

**Coherence principle** is concerned with the simplicity of the descriptions of content and the importance of not cluttering the display with visuals or written text that has no relation to the information that the learner needs to process. The basis of the principle is that additional material can harm learning (Clark & Mayer, 2011:151). The additions could be distracting, overloading the working memory, with a negative impact on the learner. The illustration in Figure 2.17 is an illustration of the use of the principle.



**Figure 2.17 Coherence principle**

The coherence principle is further explored in terms of audio, visuals and text. Background music and sounds to narrated animation should be avoided for eLearning content creation. The context of the learner should be taken into consideration, based on whether the subject matter is new or unfamiliar, and on time criticality, meaning the rate at which the resources are presented or when the learner is not able to control the rate of the presentation (Clark & Mayer, 2011). Extraneous visuals should be avoided if they impede the sense-making of the learner during the process of consuming the information. When applying the principle to the amount of text, care should be taken to avoid interference with the instructional goal or outcomes

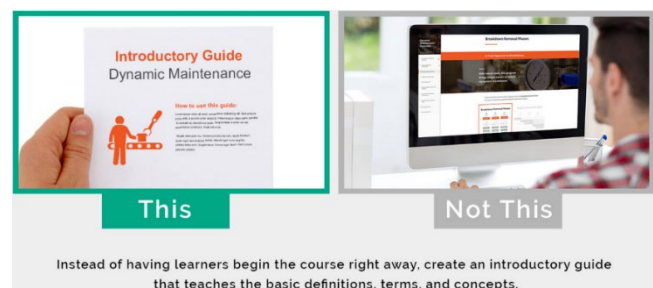
**Personalisation principle** speaks to using virtual coaches, but with a friendly human voice and a conversational style of writing instead of a formal style (Clark & Mayer, 2011). The benefit of this principle is the creation of an educational setting in which the learner could engage with the content as a “social conversational partner”, according to Clark & Mayer (2011).



**Figure 2.18 Personalisation principle**

The conversational style, as shown in Figure 2.18, is the inclusion of words like “I”, “you” or “our”, etc. to draw the student into the conversation. The principle must be applied as having a one-to-one conversation with the student and a lecturer should try to avoid a stiff academic language ( Davis & Norman, 2016).

**Pretraining principle** is about defining key terms or concepts before taking a deep dive into definitions, descriptions or lengthy explanations of a process. A novice learner is easily overwhelmed by magnitude or difficulty of the content. The basis of this principle is scaffolding the learning, as shown in Figure 2.19, to help the learner ascertain prior knowledge before the lesson is introduced.

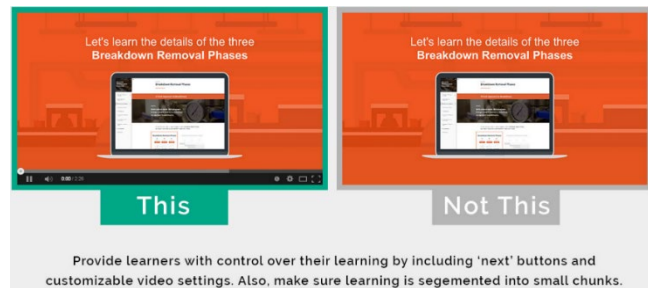


**Figure 2.19 Pretraining principle**

The pretraining principle can be addressed by creating an initial “how to guide” that starts with basic terms and concepts to help the students familiarise themselves with the terminologies (Davis & Norman, 2016; Mayer, 2009). Novice students require orientation about key terms, or how to use an application like for example Microsoft Word (MS Word), before they are required to perform an activity that uses MS Word.



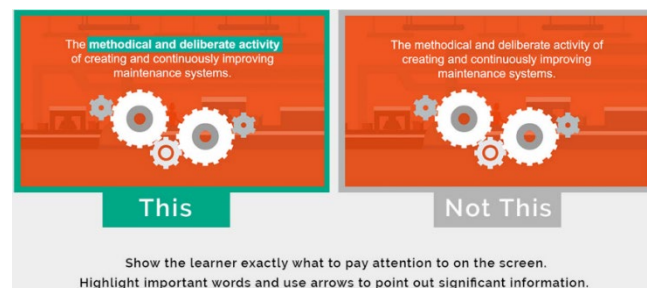
**Segmenting principle** is about giving a student the ability to control the pace of the lesson (Davis & Norman, 2016). According to Mayer (2009), students perform better on a recall test when they can control the pace of the lesson. The illustration in Figure 2.20 indicates the use of the pause button with the voice over.



**Figure 2.20 Segmenting principle**

The principle suggests that the lesson is broken down into smaller pieces. The principle, if applied correctly, provides learners with more control over their learning process to learn at their own pace.

**Signaling principle** suggests that a lecturer adds prompts to direct the learners' attention (Davis & Norman, 2016). Multiple pieces of information could be unavoidable for some of the lessons but directing the learners' attention will help them to focus on important cues to integrate the information and so to be able to construct a mental model.



**Figure 2.21 Signaling principle**

The idea of the principle is to highlight important terms, as shown in Figure 2.21, to focus the students' attention. In addition to highlighting, using animated arrows can also be useful to point out significant information or designing a PowerPoint with sections to indicate progression to a new topic.

**Source of illustrations: DeBell, 2020, n.p.**

The field of multimedia learning for instruction is gaining traction to increase accessibility to all students amid a pandemic that drove innovation and adoption of technology. The amalgamation of the various principles emphasises the importance of understanding the students and adapting HEIs practices to become more student centric.

## 2.8 CONCLUSION

This study is positioned at the intersection of the complexity related to the trends in HE, the trends in technology that impacts HE, and design principles in education with a specific focus on the design principles for EDR. The literature illustrates the fine balance of how HEIs remain relevant despite the challenges that have to be addressed - even after two decades of democracy for South African HE. Availing the opportunity of HE to anyone who qualifies for higher learning, in conjunction with open access, did not necessarily undo the historical backlogs in SA. The inequalities are not limited to the level of education of the diverse student population, but also highlight the lack of adequate teaching

facilities and infrastructure at some HEIs. The rapid growth in student numbers was not followed by a proportional increase of the academic staff complement of HEIs.

The various phenomena like globalisation, internationalisation, democratisation and massification of HE, and technology trends underline the interrelated dependencies between delivery modes, technology adoption for curriculum innovations and diverse student needs. Educational technologies provide an innovation vehicle to enhance the digital literacy of students amidst the challenges of the interplaying sectors. The rapid advancement in technology has changed learning environments, challenges traditional modes of delivery and impacts on how we engage with the student population in this information age. The next chapter clarifies the theoretical framework of the study with a focus on adult learning theories.



## **CHAPTER 3**

### **THEORETICAL FRAMEWORK**

#### **3.1 INTRODUCTION**

A theoretical framework is defined as “a structure that guides research by relying on a formal theory...constructed by using established, coherent explanation of certain phenomena and relationships” (Eisenhart, 1991: 205). In addition to guiding the research, the theoretical framework also provides representational language that reflects the underlying epistemologies (Young, 2008). The attributes and representational language of the framework shape the understanding of the research problem and the rationale for investigating the issue (Gentner, 2003). Theoretical frameworks also serve as important cornerstones for the researcher’s eventual conceptual framework.

The purpose of this chapter is to review the theoretical underpinnings of adult learning as building blocks for the development of a series of interventions for adult learners in a blended learning environment. Foundations of adult learning provide insight into the learning process and are important when considering the designing of an intervention for adult learners.

The research problem of this study relates to adult learners with a wealth of experience entering a blended learning environment (Fasokun, Katahoire & Oduaran, 2005; Viljoen, 2018), in order to pursue a career as nurse educators and to move from a clinical to a non-clinical field with no prior knowledge of the field of Education (Fürst, 2017). In adult education, prominent theorists identify experience as a key element of the learning process and Dewey (1938:25), for example, noted that “all genuine education comes about through experience” (see also Merriam, Caffarella & Baumgartner, 2007: 162). The combination of factors such as the adult learners’ entry into the blended learning environment, their limited prior exposure to ICT in an educational setting, and their situatedness as novices in the field of Education motivated the choice of Jarvis’s model of experiential learning (2012) as theoretical framework. As novices in the field of Education, these students must be able to master the theoretical concepts in each of the modules in the programme and used the acquired knowledge to develop their expertise as nurse educators.

The learning theories presented in this chapter were explored to understand the foundations upon which the experiential learning theory of Jarvis (2012) has been developed. Jarvis (2012) built his theory around the argument that in every experience there is a connection between the interrelated elements of body, mind, self and the situation in which the individual finds her/himself. The experiential learning theory was used as a guide to better understand how these interrelationships in the targeted programme created opportunities for learning for the adult learners (Grant & Osanloo,

2014). Jarvis's model of experiential learning also introduces an integrated way of looking at the research study (Brown, 2015). The discussion below includes key considerations, implications and features applicable to adult learners when designing a series of interventions for a blended learning environment.

## **3.2 ADULT LEARNING FOUNDATIONS**

Adult learning is complex and there is no single theory that explains how and why adults learn (Merriam, et al., 2007). Adult learning theories provide a foundation to define and explain learning and teaching practices that must be considered for adult learners. Importantly, a learning theory “offers clarity, direction and focus throughout the instructional design process” (McLeod, 2003: 35). Each theory highlights an aspect of adult learning, and the combined insight afforded by the various learning theories can guide the instructional design effort for a series of technology-based interventions for an adult learning education environment. In addition, the overall professional development of adults closely links the educational setting and their career in the development of their skills, knowledge and attitudes (Fasokun, et al., 2005).

In an educational setting, adult learners must draw from their experiences in the context by relating and organizing concepts introduced and discussed in the educational setting and creating a meaningful mental model (Tennant & Pogson, 1995; Barkley, 2009; Sambell, 2011). In the following section the relevant learning theories, namely behaviourism, cognitivism, humanism, social learning theory and constructivism are discussed with a brief consideration of the history, key concepts and how the learning theory can be used to better understand how to cater for adult learners in a blended learning environment.

### **3.2.1 Behaviourism**

This learning theory was developed by Thorndike (1913), Watson (1913), Pavlov (1927) and Skinner (1974) and proposes that learning is a change in observable behaviour that is triggered by external stimuli in the environment (Skinner, 1974; Skinner, 2011). Behaviourism is defined as “a learning theory focusing on observable behaviors and discounting any mental activity where learning is simply defined as the acquisition of new behavior” (Pritchard, 2009:6). According to Skinner (2011), all behaviour is caused by external stimuli, the response to which is behaviour that can be explained without understanding the mental state or consciousness of the individual. The behaviour can be shaped through positive or negative reinforcement (Watson, 1913).

This learning theory is based on three underlying assumptions about the learning process: observable behaviour, the environment shapes the learning, and the principle of contiguity and reinforcement. Observable behaviour means that learning is manifested by change in behaviour (Merriam & Caffarella, 1999; Skinner, 2011). Secondly, behaviourism assumes that elements in the

environment determine what is learned (Merriam & Caffarella, 1999; Skinner, 2011). Thirdly, the principle of contiguity and reinforcement relates to events that occur or are repeated, where contiguity refers to “how close in time two events must be for a bond to form” (Merriam & Caffarella, 1999:251), and reinforcement refers to “any means of increasing likelihood that an event will be repeated” (Merriam & Caffarella, 1999:251).

These events can either strengthen or weaken behaviour, which explains Thorndike’s major contribution to understanding learning known as the S-R theory of learning (Merriam & Caffarella, 1999). The S-R theory posits that certain connections, through trial and error, are made between sensory impressions or stimuli (S) and the behaviour or responses (R) that follow. The S-R theory was refined by Pavlov (1927) who added the concepts of reinforcement and conditioned stimulus. Classical conditioning, a term coined by Pavlov, involves the “reinforcement of a natural reflex or some other behavior which occurs as a response to a particular stimulus” (Pritchard, 2009:6). Pavlov identified four stages in the process of classical conditioning. After the initial connection between the stimulus and response, the stages are acquisition, extinction, generalisation and discrimination. Acquisition involves the initial learning of the conditioned response. Extinction is about the disappearance of the conditioned response once learned. Generalisation involves a similar response to stimuli without triggering the conditioned response. Discrimination refers to “a conditioned response to one stimulus but not to another stimulus” (Pritchard, 2009:7).

Skinner (1971) took this work further in his contributions on the reinforcement of the response, referred to as operant conditioning. Reinforcement is a key aspect of operant conditioning and refers to “anything that has the effect of strengthening a particular behavior and makes it likely that the behavior will happen again” (Pritchard, 2009:8). According to Skinner (2011), most human behaviour is controlled by rewards (positive reinforcement) or punishment (negative reinforcement) (Pritchard, 2009; Skinner, 2011). In other words, the learning of the individual is shaped by incitements in the environment in which the individual finds her/himself. The incitement creates specific responses, and the repetitions of these incitements trigger the connections that result in learning (Cohen, 1999).

Responses are based on elements in the environment, which implies that the arrangement of the stimuli and conditions in the environment are critical factors. The learner is typified as being reactive in the situated environment, and behaviourists usually prescribe tactics that will build or strengthen stimuli and responses (Winn, 1990). These tactics could include segmenting a learning task with instructional cues, recalling facts, procedures that force a chain of events, or generalisation through the illustration of concepts (McLeod, 2020). The theory can further be applied to repetitive practice that will reinforce behaviour by providing incentives to participate. The theory accentuates five key principles in relation to eLearning design, as identified by Ertmer and Newby (2013:56) and Ally (2004: 20-21):

- An emphasis on producing observable and measurable outcomes in students [behavioural objectives, task analysis, criterion-referenced assessments]
- Pre-assessment of students to determine where instruction should begin [learner analysis]
- Emphasis on mastering early steps before progressing to more complex levels of performance [sequencing of instructional presentations, mastery of learning]
- Use of cues, shaping and practice to ensure a strong stimulus-response association [simple to complex sequencing of practice, use of prompts]
- Use of reinforcement to impact performance [tangible rewards, information feedback].

This learning theory can be used to shape a student's behaviour in the educational setting, but the process of learning may seem cold or forced, even mechanical. Behaviourism works well to teach students the 'what' (facts, basic concepts and skills), but at the root of the theory is the assumption that a student is able to work at her/his own pace (Ally, 2004). The rationale for the inclusion of this learning theory relates to the core competencies that nurse educators must acquire. Behaviourists support the development of skills and suggest that the desired behaviour is measured through the application of knowledge in a practical setting (Keating, 2015); this can be linked to one of the desired learning outcomes of a nurse educator.

The next learning theory that has been included is cognitivism. Cognitivism focuses on the meaning making of the new knowledge and skills that an adult learner has acquired, which involves memory, thinking, reflection, abstraction and motivation (Ally, 2004:21).

### **3.2.2 Cognitivism**

Cognitivism places emphasis on the internal mental process of learning where the locus of control lies with the individual. Cognitivism refers to the "study of the mind and how it obtains, processes and stores information" (Clark, 2018:176). This learning theory basically argues that the student is like a central processing unit that processes information; it focuses on the inner mental processes such as thinking, problem-solving, reasoning, planning, etc. (David, 2014).

Some of the key theorists include Piaget (1980) for his contribution on cognitive development stages, and Gagné (Clark, 2017) for his contributions about the conditions of learning. The stages of cognitive development identified by Piaget (1980) are sensorimotor, preoperational, concrete operational and formal operational (David, 2014; Jarvis, 2004). Piaget's theory of cognitive development not only inspired the field of developmental psychology (Pritchard, 2014), but also played a primary role in elementary curriculum development (Clark, 2018). According to Piaget (1980), learning is a process of adjustment to environmental influences (Pritchard, 2014). The process of adjustment can take the form of one of two basic processes, namely assimilation and

accommodation. Assimilation is defined as “the process whereby new knowledge is incorporated into existing mental structures and where the knowledge bank is increased to include new information” (Pritchard, 2014:20). Accommodation, on the other hand, requires that mental structures be altered in order to cope with new experiences (Pritchard, 2014). The stages of cognitive development were mainly focused on children, but Piaget’s descriptions of the two processes of adjustment can be applied to learners of all ages (Clark, 2017).

To help learners process and understand new content, Gagné (Clark, 2017) proposed nine conditions of learning that should be addressed in the planning and designing of instruction. The nine conditions of learning are: gaining attention, informing learners of objectives, stimulating recall of prior learning, presenting the content, providing learning guidance, eliciting performance and practice, providing feedback, assessing performance and enhancing retention and transferring it to the job (Kelly, 2012). In this learning orientation the assumption is that a learner’s thoughts, beliefs, attitudes and values are considered in the learning process (Winne, 1985).

Cognitivism highlights the role of the environment in the facilitation of learning and the use of feedback, which is also common in behaviourism. Feedback, in the cognitivist paradigm, is used to guide or support accurate mental connections (Thompson, Simonson & Hargrave, 1992). This learning orientation is appropriate to assist learners in understanding complex forms of learning such as reasoning, problem solving and information processing (Schunk, 1991). The cognitivist principles that should be considered in the design of learning resources in a blended learning environment are the following (Ertmer & Newby 2013:60):

- Emphasis on the active involvement of the learner in the learning process [learner control, metacognitive training, for example, self-planning, monitoring and revising techniques]
- Use of hierarchical analyses to identify and illustrate prerequisite relationships [cognitive task analysis procedures]
- Emphasis on structuring, organizing and sequencing information to facilitate optimal processing [use of cognitive strategies such as outlining, summaries, etc.]
- Creation of learning environments that allow and encourage students to make connections with previously learned material [prior knowledge, use of relevant examples, analogies].

For adult learners, technology that will support this paradigm includes the use of flash cards and memory games that can help to retain information. The use of various informational types that include videos and/or sound, in combination with other media that can be used on mobile devices will also facilitate learning. To achieve the most efficient learning, content must be presented in an organised manner. Cognitivism is therefore considered to be a teacher-centred approach, because of the importance of how the content must be designed even if learners are active participants (Clark,

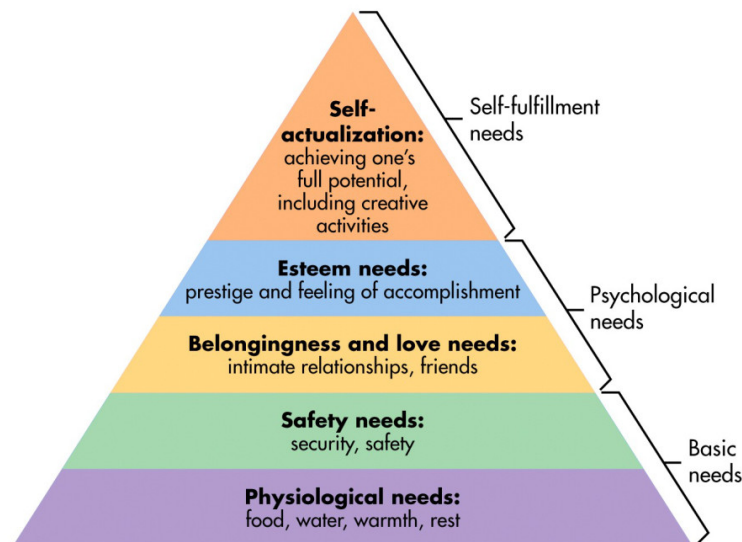
2017). In reaction to the teacher-centred approach of cognitivism, humanism as a learning theory that is more focused on person-centred education gained ground.

### 3.2.3 Humanism

The humanist orientation views learning through the lens of the human being. This theory believes in humans' potential for personal growth, and that perceptions are centred in experience (Merriam & Caffarella, 1999; David, 2014). Humanism views learning from the perspective of personal potential for growth. Humanists believe that "(t)here is a natural tendency for people to learn and that learning will flourish if nourishing, encouraging environments are provided" (Cross, 1981: 228). Maslow, Rogers and Knowles are key proponents of the humanist learning orientation. According to Maslow (1970) and Rogers (1983), the basic assumptions of the humanist learning orientation are:

- Human beings can control their own destiny.
- People are inherently good and will strive for a better world, which emphasises the importance of values and the personal growth of the individual.
- People are free to act. Exercising free will is referred to as a personal agency that encapsulates the choices we make in life, the pathways we select and their after-effects.
- Behaviour is the consequence of human choice.
- People possess unlimited potential for growth and development. All human beings have an internal and continuous motivation to enrich themselves, even though the path we select or how we go about the process may differ.

The theory is based on Maslow's hierarchy of needs which starts with basic needs (hunger and thirst) at the lowest level, and progresses to psychological needs (belonging and love, self-esteem) and self-fulfilment (the need for self-actualization), as shown in Figure 3.1 (McLeod, 2020).



**Figure 3.1 Maslow's hierarchy of needs**

**Source: McLeod, 2020, n.p.**

As a therapist and educator, Rogers (1983) attributed personal growth and development to significant learning. He (Rogers 1983: 20) characterized significant learning as follows:

- Personal involvement: the affective and cognitive aspects of a person should be involved in the learning event
- Self-initiated: a sense of discovery must come from within
- Pervasive: the learning has an impact on the behaviour, attitude or even the personality of the learner
- Evaluated by the learner: the learner can best determine whether the experience is meeting a need
- Essence is meaning: when experiential learning takes place, its meaning to the learner becomes incorporated into total experience.

The most important role for the lecturer is not providing the content but fulfilling the role of facilitator in the process of learning (Merriam & Caffarella, 1999). Further implications in an educational setting include, whenever possible, allowing students to have a choice of activities or selection of tasks, teaching students to set realistic and challenging goals, and including groupwork as part of the activities to develop social and affective skills. Content designed in the format of a digital story or scenario-based group work in a blended learning environment would assist educators or lecturers to create a conducive learning environment. The underlying assumptions of this learning theory is that any human being can take responsibility for her/his learning. The focus of this learning theory centres



around the individual and downplays the importance of the social component which is highlighted in social learning theory.

### 3.2.4 Social learning theory

Social learning theory is a comprehensive model that integrates behaviourism and cognitivism as a foundation to explain the reciprocal relationship between an individual's behaviour and environmental factors that contribute to learning experiences. This theory suggests that learning occurs because of the observation of others in a social setting (Merriam & Caffarella, 1999). Social learning theory was initially outlined by Bandura and Walters (1963), and further characterized by Bandura (1977) with the following crucial views as cited by Grusec (1992: 781 - 782):

- Learning is not purely behavioural; it is rather a cognitive process that takes place in a social context.
- Learning can occur by observing behaviour and by observing the consequences of the behaviour (vicarious reinforcement).
- Learning involves observation and the extraction of information from these observations about the performance of behaviour (observational learning or modelling).
- Reinforcement plays a role in learning but is not entirely responsible for learning.
- The learner is not a passive recipient of information (cognition, environment and behaviour mutually influence each other; this is reciprocal determinism).

According to Bandura (1976: 392), "[v]irtually all learning phenomena resulting from a direct experience can occur on a vicarious basis through observation of other people's behaviour and its consequences for the observer". The observation or modelling of others can have a positive or negative impact on the observer's behaviour, because the modelling of others includes their behaviour, their attitudes or their emotional reactions (Culatta, 2020). Bandura (1977) outlines three types of modelling stimuli:

- Live models, where a person demonstrates the desired behaviour
- Verbal instruction, in which an individual describes the desired behaviour in detail and instructs the participant on how to engage in the behaviour
- Symbolic, in which modelling occurs by means of media. Stimuli can be either real or fictional characters.

The components underlying observational learning are attention (the individual must first pay attention to the model), retention (the individual must be able to remember the behaviour that has been observed), motor reproduction (the ability to replicate the behaviour that the model has just



demonstrated), and motivation (an individual must want to demonstrate what was learned) (Bandura, 1977). Bandura (1986) believed that the circumstances in the environment and the individual's behaviour have an impact on each other, known as 'reciprocal determinism'. The individual either influences or is influenced by the environment. He (Bandura, 1973) thus argued that the individual's behaviour also influences the environment. Seeing that social learning theory involves attention, memory and motivation, it is sometimes called a bridge between cognitivism and behaviourism (Bandura, 1973).

Social learning theory will be supported by technology with the use of case studies in learning activities, digital storytelling facilitated by group work, and designing the activity to include personal experiences (Friel, 2019). eLearning activities (for example using video and audio to recreate an experience), forums and discussion groups are useful to support learning in a blended learning environment. Constructivism as a learning orientation to understand how a learner makes sense in order to construct knowledge is discussed next.

### **3.2.5 Constructivism**

The work of Dewey (1929), Bruner (1961), Vygotsky (1962) and Piaget (1980) all contributed to the historical roots of the constructivist learning theory. This learning theory has roots in philosophy, psychology, sociology and education (Bada, 2015). Vygotsky's social development theory is one of the foundations of constructivism.

Many theorists distinguish three forms of constructivism, namely (1) sociological, (2) psychological and (3) radical constructivism (Yilmaz, 2008). The three forms of constructivism share the epistemological assumption that knowledge or meaning is not a process of discovery but rather the internalisation of occurrences, and through that process the learner makes sense of what has happened to construct knowledge or meaning (Richardson, 2003). From a constructivist orientation, the learner is an active constructor of information, and prior knowledge is used as catalyst to process new information (Merriam & Caffarella, 1999).

Sociological constructivism is defined as the theory that posits that bodies of knowledge or disciplines that have been built up are "human constructs, and that the form that knowledge has taken in these fields has been determined by such things as politics, ideologies, values, the exertion of power and the preservation of status, religious beliefs and economic self-interest" (Phillips, 2000:6). Psychological constructivism elucidates the process an individual goes through when constructing meaning of the external factors in the environment. Shared meaning-making with others becomes prior knowledge (Phillips, 2000; David, 2014). Knowledge is constructed in the context of the personal experience and the social engagement in the environment in which the individual finds her/himself (David, 2014). Radical constructivism provides a theory of knowledge where the knowing

individual “creates meaning and understanding through active learning...based on the ‘knowing individual’s’ own experience and interpretation” (Von Glasersfeld, 2013:1).

Gergen (1995) differentiates between two categories of knowledge, namely exogenic (or word centred) and endogenic (or mind centred). In the exogenic tradition, the emphasis that knowledge is copies the contours of the world and in the endogenic tradition knowledge comes from the experience of the individual (Gergen, 1995). There are two important perceptions about constructed knowledge. The first is that new knowledge is constructed using experience, understandings, interactions, etc. of what a learner already knows (Phillips, 1995). The second perception about constructed knowledge is that learning is active, not passive. This means that learners will engage with and confront the current situation in the light of what they encounter, drawing from existing knowledge, and will adapt their knowledge of the new experience if they can recall knowledge from a known or previous experience (Phillips, 1995). In an educational setting the experience of adult learners is critical, because adult learners draw from their experiences to construct meaning of the theories and practical work they take on (Bennett-Goleman, 2001; Fry, Ketteridge & Marshall, 2009).

Key concepts within constructivism which relate to the construction of a learner’s new knowledge are assimilation and accommodation. Assimilation involves the evaluation of the existing to make room for the new experience. Learners develop new outlooks and afford themselves the opportunity to rethink understandings to avoid misunderstandings and possibly alter their perceptions (Bada, 2015). Accommodation is about “reframing the world and new experience into the mental capacity already present” (Bada, 2015:67). A learner has a specific frame of reference, and accommodation is about adapting the frame of reference when things do not operate in that context, and aligning the expectation with the outcomes (Bada, 2015).

The alignment with the expectations of a learning environment from a constructivist point of departure must take the following into consideration (Ertmer & Newby, 1995:65):

- An emphasis on the identification of the context in which the skills will be learned and subsequently applied [anchoring meaning in context]
- An emphasis on learner control and the capability of the learner to manipulate information
- The need for information to be presented in a variety of different ways [actively use what is learned]
- Supporting the use of problem-solving skills that allow learners to go “beyond the information given” (Ertmer & Newby, 1995:65) [revisiting content at different times, in rearranged context, for different purposes and from different conceptual perspectives]
- Assessment focused on transfer of knowledge and skills [presenting new problems and situations that differ from the conditions of the initial instruction].

These considerations build on the key concepts of the learning theory that would assist the learner in the assimilation or the accommodation of the new understandings or knowledge creation. Learning activities for students could include the use of their mobile devices to record various types of media in the context of the environment.

### **3.2.6 Summative perspectives**

The analysis of the most prominent learning theories reveals that each of the theories has a specific focus. Behaviourism focuses on changing the behaviour of the learner in an educational setting and can be used to teach learners basic skills or facts. Cognitivism focuses on internal processing and can be used to teach processes and principles. Humanism emphasises the individual's personal action to fulfil a goal or accomplishment. Social learning theory highlights the interaction with and observation of others in a social context. The constructivist orientation is about the construction of meaning from experiences. All the key concepts create an interesting narrative for the development of learning resources for the adult learners in the PGDipNE. The five theories are summarised in Table 3.1 in terms of theorists, view of the learning process, locus of the learning, purpose of education, role of the teacher, and the manifestation in adult learning.

**Table 3.1 Summary of adult learning foundations**

<b>Aspect</b>	<b>Behaviourist</b>	<b>Cognitivist</b>	<b>Humanist</b>	<b>Social learning</b>	<b>Constructivist</b>
Theorists	Pavlov, Skinner, Thorndike, Watson	Piaget, Bruner, Gagné, Lewin	Maslow, Rogers	Bandura, Rotter	Dewey, Piaget, Vygotsky
View on learning process	Change in behaviour	Internal mental process	A personal act to fulfil potential	Interaction with and observation of others in social context	Construction of meaning from experience
Locus of learning	Stimuli in external environment	Internal cognitive structuring	Affective and cognitive needs	Interaction of person, behaviour and environment	Internal construction of reality by individual
Purpose of education	Produce behavioural change in desired direction	Develop capacity and skills to learn better	Become self-actualized, autonomous	Model new roles and behaviour	Construct knowledge
Role of the teacher	Arranges environment to elicit desired response	Structures content of learning activities	Facilitates development of whole person	Models and guides new roles and behaviour	Facilitates and negotiates meaning with learner
Manifestation in adult learning	Behavioural objectives Competency-based education Skill development and training	Cognitive development Intelligence, learning and memory as function of age Learning how to learn	Andragogy Self-directed learning	Socialization Social roles Mentoring Locus of control	Experiential learning Self-directed learning Perspective transformation Reflective practice

**Source: Merriam & Caffarella, 1999:264**

In a nutshell, behaviourists define learning as a change in behaviour; cognitivists focus on the internal mental processes; a humanist focuses on human nature; social learning focuses on the social setting, and constructivists suggest that construction of own knowledge is a result of experiences (Merriam & Caffarella, 1999:265). The adoption of a learning orientation by a lecturer, educator or programme developer is subject to the orientation of that individual to the learning process. The research population of adult learners provided the rationale for including andragogy as part of the theory analysis.

### **3.3 ADULT LEARNING THEORY OR ANDRAGOGY**

Andragogy can be defined as “the art and science of helping adults learn” (Knowles, 1980:43) and places the adult as the subject in the learning process. The adult learner as a self-directed, responsible individual is the “principal performer” (Zmeyov, 1998: 106). Zmeyov (1998:106)

describes andragogy as “the theory of adult learning that sets out scientific fundamentals of the activities of learners and teachers in planning, realising, evaluating and correcting adult learning”.

Andragogy makes a strong case that the needs of adult learners should predominate when interpreting learning theories for the improvement of educational settings that involve adult learning and training (Holton, Swanson & Naquin, 2001; Fasokun, Katahoire & Oduaran, 2005). Adults differ from younger learners in important ways; for example, adults need to develop pathways for their careers and to negotiate and control their own learning processes (Hillier, 2002:91). The andragogical model emphasises the importance of the learners’ work experiences, given the vocational nature of their courses and the criticality to their employment (Youde, 2018). The pertinence of their employment relates to their roles and responsibilities, but even more crucial is the relevance of their life experiences, as confirmed by Hooks (1994), Elias and Merriam (1995), Tennant and Pogson (1995), Kasworm (2008) and Kanuka (2011). The development of unique teaching and learning methods for adult learners is justified by the principles of the andragogical model.

Knowles, Holton and Swanson (2015) identify the following six principles: (1) need to know: adults need to know why they are learning a topic before learning commences; (2) learners’ self-concept: adults need to be responsible for their decisions on education; (3) role of learners’ experiences: adults use experiences as the basis for learning activities; (4) readiness to learn: adults are more interested in learning if there is an immediate relevance to work; (5) orientation to learning: adult learning is problem-centred rather than content orientated, and (6) motivation to learn: adults’ most potent motivators are intrinsic.

The andragogical model not only set the principles for adult learning, but also recognizes “the lack of homogeneity among learners and learning situations and illustrates that the learning transaction is a multifaceted activity” (Knowles, et al., 2015:79). More importantly, the assumptions of the model can be leveraged as a starting point to create learner-centred approaches within blended learning strategies (Blondy, 2007), mostly for developing students capable of self-directed learning who need to cope with limited input from the lecturers (Kember, 2007).

In light of the unique teaching and learning methods for adult learners and their changing educational needs, Zmeyov (1998: 106) adds three additional assumptions of andragogy: (1) the learning of an adult is largely determined by his/her life context; (2) the adult learning process is characterised by the leading role of the learner himself or herself, and (3) the learner and teacher co-operate in all stages of learning.

Each learning theory can shed light on adult learning from a very specific perspective. From a behaviourist point of view, learning results when there is a change in the behaviour of the learner. The cognitivist theory focuses on the learning that results after the internal mental process has been

completed. The humanist believes in the potential of each human being. The social learning theory brings the social setting as an important component into the educational setting. Constructivism suggests that learners construct knowledge and that constructed knowledge, once shared with other, will be used as a reservoir reference for prior knowledge. Andragogy emphasises how these principles can be leveraged to create a learner-centred approach as a point of departure within blended learning strategies. Andragogy and the other prominent learning theories, however, do not elaborate on the social context about the learner.

The social context, in the case of the adult learners who enrolled for the PGDipNE, has been highlighted by the programme coordinator as a possible factor that has been neglected (Fürst, 2017). These students enter the PGDipNE as novices to education and training. Their transition from a clinical to a non-clinical programme comes with a realisation that their prior knowledge is inadequate (Jarvis, 2012) or limited. In the light of this context, experiential learning theory is proposed as the theoretical framework for the study.

### **3.4 THEORETICAL FRAMEWORK: JARVIS'S MODEL OF EXPERIENTIAL LEARNING**

This study explored the challenges of adult learners with limited exposure to ICT in a blended learning environment. The limited prior exposure to ICT was, however, not the only featuring factor of this learning context. These adult learners applied their knowledge in a clinical programme and their core competencies were built around a clinical environment in the health profession. From the familiar clinical environment, they enrolled for a postgraduate diploma in a non-clinical field as beginners in the field of education and training. More pertinent is the mismatch in the entry qualification levels of the learners, because there was no standardisation of the nursing qualifications offered by the various educational institutions in the health profession (DoH, 2019). This context makes it prudent to include a learning theory that not only pays attention to the context of the learners, but also to the holistic nature of the learner. Jarvis's holistic approach to learning hence provides an appropriate framework for the research study.

Jarvis (2009) theorises that learning is essentially human and to study learning, it is essential that one understands the person or learner in her/his entirety. Jarvis (2005) regards individuals as having existence, and our mind and/or self as our fundamental nature. Therefore, the learning process is defined as "that of a human essence emerging from human existent", and that "essence does not merge unaided...human existent needs to have experiences and learn if the human essence is to emerge and develop" (Jarvis, 2009: 30). Jarvis (2009, 2012) argues that all learning begins with 'disjuncture' or a state of being disconnected. This state can manifest with either "an overt question or with a sense of unknowing" (Jarvis, 2009:22), or when you realise that your prior knowledge is inadequate to resolve a problem or a situation that you are faced with (Jarvis, 2012). Jarvis's

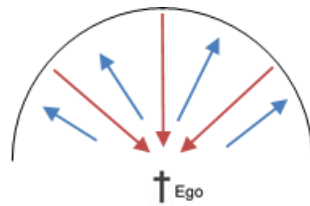
argument is that a multi-disciplinary, integrated theory would constitute the most comprehensive understanding of learning. With that line of argument, he expanded his initial definition of learning to include learning as a process that involves the whole person within a social situation. The expanded definition states that:

Human learning is the combination of processes throughout a lifetime whereby the whole person – body (genetic, physical and biological) and mind (knowledge, skills, attitudes, values, emotions, beliefs and senses) – experiences social situations, the perceived content of which is then transformed cognitively, emotively, or practically (or through any combination) and integrated into the individual person's biography resulting in a continually changing (or more experienced) person (Jarvis, 2009:25).

Central to Jarvis's model of learning is that learning is social and involves the elements in the social context, and that the mind and body are integral parts of the learning process (Jarvis, 2009, 2012). He maintains that we experience the world through our bodies, and the interactions of our bodily sensations that we experience as part of our journey are the beginning of our learning (Jarvis, 2009). The senses (as we feel, touch, taste, see and smell) experience the surroundings; our cognitive ability and processing of the experiences give meaning to the sensations (Jarvis, 2009). This process, Jarvis argues, does not happen in isolation but is rather a social construct - in other words "nearly all meanings will reflect the society into which we are born" (Jarvis, 2009:25).

For this study the following assumptions which, according to Jarvis (2012), apply to the learning process, are of importance:

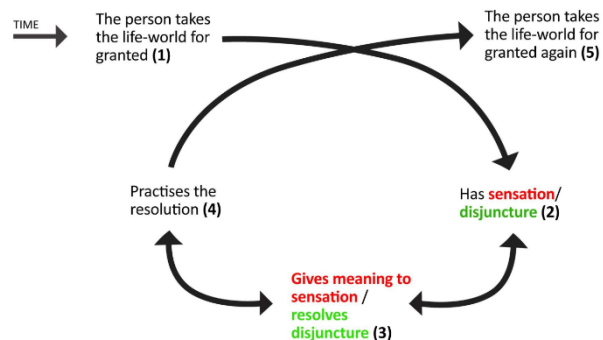
- Learning takes place in a social context in which the learner functions. Theoretically it can be argued that individuals in the same place and time, subject to the same external phenomena, have experiences that are similar but not identical, as culture is internalised and carried by individuals. The cultures carried by individuals are introduced when people meet, and the commonalities of their culture enable meaningful meeting to occur (Jarvis, 2012). For practical purposes, culture is depicted as if it is objectified. The diagram in Figure 3.2 serves as a graphical illustration to explain the social context in which the learner functions. In the figure ego is the learner. The arc represents the objectified culture of the learner's social context. The orange inward arrows are representative of the process of internalisation of the culture, while the blue externally facing arrows represent the process of externalisation. The combination of the blue and orange arrows represents the social interaction that the learner encounters. The internalised culture is carried by the learner, and when people meet it is the commonality they share that makes the meeting meaningful. The exchange of sub-cultural differences, or how individuals respond to the differences in their social interaction, creates an opportunity for learning to occur.



**Figure 3.2 The internalisation and externalisation of culture**

Source: Jarvis, 2012:5

- The sense experience starts when we are concerned with the meaning of an interaction. Jarvis (2012) describes the failure (1) to create meaning of the interaction as disjuncture and as the starting point for the discussion, as shown in Figure 3.3. In other words, if we draw a parallel to the first discussion of the learning process in association with culture in the social context, there is no connecting arrow to the sub-culture of the learner in the social interaction. The individual or the learner ignores or takes the social context for granted. A sensation or disjuncture is experienced (2). The individual finds him/herself in a situation where the predicament caused by the sense experience can be resolved by giving meaning to the sensation or finding a resolution to the disjuncture (3). The continuation of the resolution of meaning making results in learning to put into practice (4) what you have just learned or to live in ignorance. The result is still a changed individual who has learned from prior knowledge or chose to live with the disjuncture (5). The presence of a similar sense experience repeats the dilemma for the individual, resulting in a process of trial-and-error learning at both stages (between stages 2 and 3 or stage 3 and 4).



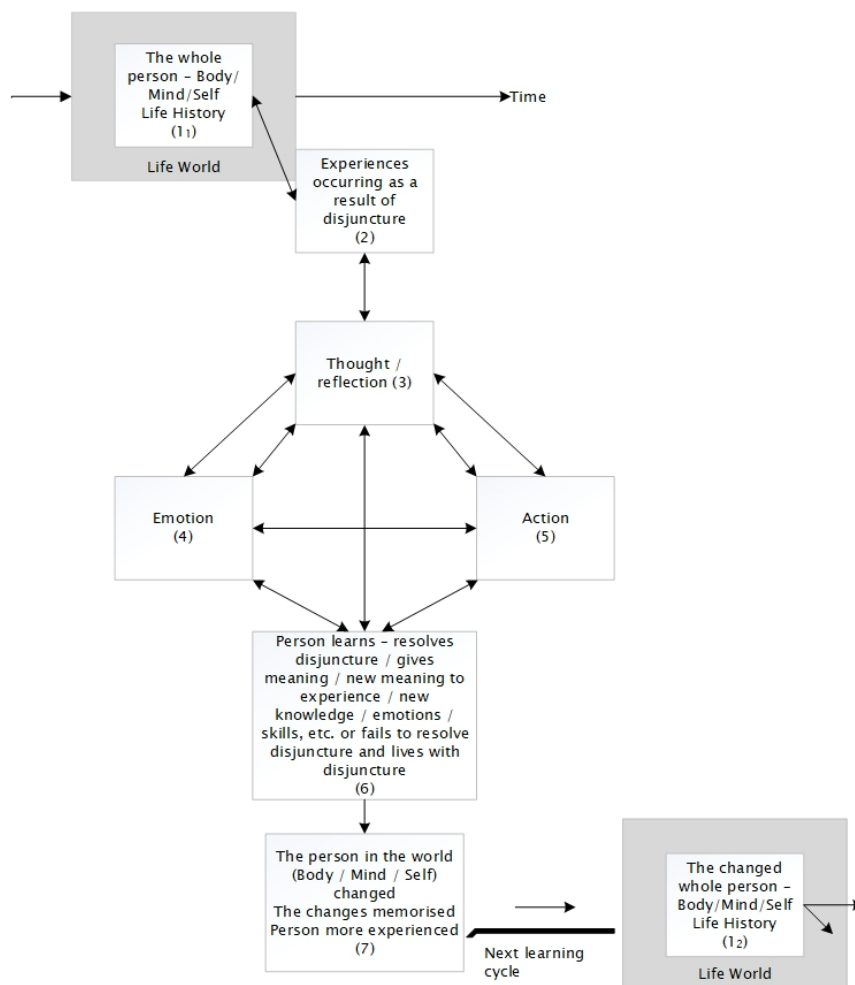
**Figure 3.3 The transformation through sense experience**

Source: Jarvis, 2012:6



- Transformation of the individual through learning: Jarvis combines the social context (Figure 3.4) with the sense experience (Figure 3.3) to include the concept of the whole person, increasing the complexity of the learning process. Jarvis (2012) centres his argument on the premise that the learning process involves the whole person and the elements in the social context of the individual, and that the mind and body are integral parts of the learning process, as shown in Figure 3.4. Over time, if a disjuncture occurs, when ignorance or the 'taken for granted' state is no longer a viable option, the experience (2) forces the individual to act. The experience can be transformed by either thought/reflection (3), emotion (4) or action (5). The impact of the experience leaves a changed individual; irrespective if the disjuncture has been resolved, the individual finds meaning, discovers a new skill or knowledge, works through emotions, or decides to live with the disjuncture (6). The underlying fact is that the process that the individual had to work through brought about the transformation (7). The next cycle of the process starts when another scenario or dilemma triggers the next experience. (1<sub>2</sub>).

Experiential learning can be traced back to the work of Dewey who posited that learning is not only the experience, but that the learning process is only completed when we reflect upon the experience (Beard & Wilson, 2013), and that knowledge is created through the transformation of experience (Kolb & Kolb, 2009). Kolb (1984:41) argues that "[t]he process whereby knowledge is created is through the transformation of experience. Knowledge results from the combination of grasping and transforming experience". The elements of experience, reflection and transformation are incorporated into the Jarvis model, as illustrated in Figure 3.4



**Figure 3.4 Transformation of a person through learning**

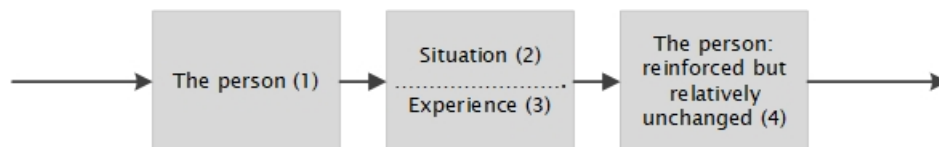
**Source: Jarvis, 2012:8**

Jarvis's model is initiated when an individual moves into a social situation in which a potential experience could lead to a learning opportunity (Merriam & Caffarella, 1999). Jarvis (2012:10) argues that "learning is a complex process that stem(s) from social experience and it is that nature of interaction that provides different learning experiences". The model includes nine paths that an individual could follow, though not all paths result in learning. The paths are categorized as non-learning, non-reflective and reflective. The typical responses for the non-learning paths that do not result in learning are presumption, non-consideration and rejection (Merriam & Caffarella, 1999). Preconscious, practice and memorisation represent the responses for the non-reflective paths (Merriam & Caffarella, 1999). Contemplation, reflective practice and experimental learning are the responses for the reflective learning paths. Jarvis (1987:27) refers to these responses as the "higher forms of learning". The reflective paths virtually create a necessity for involvement. In the context of Jarvis's model, contemplation refers to "thinking about what is being learned"; reflective practice is "akin to problem solving", and experimental learning refers to the individual's "experimenting on the

environment” (Merriam & Caffarella, 1999:284). In the next section, each of the learning paths is explained with a detailed graphical representation of the path.

### 3.4.1 Non-learning paths

Non-learning is defined as “where a person either does not respond to a potential learning situation or responds through a patterned behaviour” (Bhat, 2004:8). The non-learning process can result in presumption, non-consideration or rejection (Dyke, 2017). Presumption implies that learners rely on “un-reflected past socialization to guide their actions in the present” (Dyke 2017: 5).



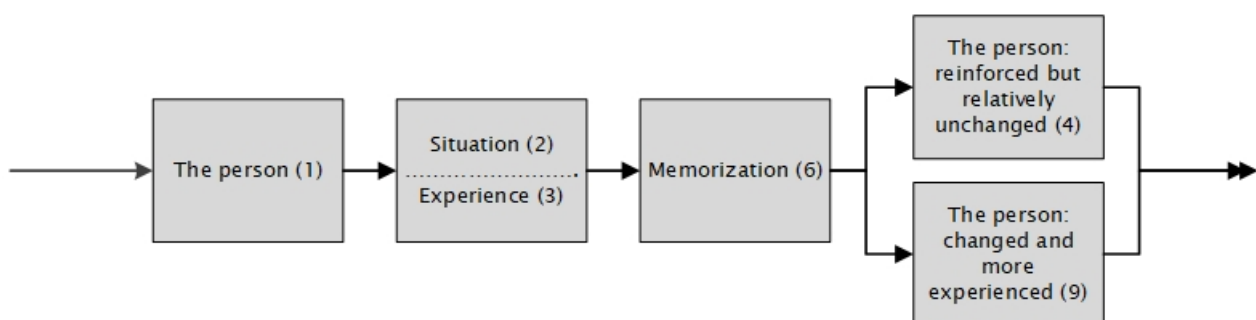
**Figure 3.5 Non-learning path**

**Source: Derived from Jarvis’s model of learning, 1987**

The other alternatives are that “no thinking or engagement occurs” (non-consideration) (Dyke 2017: 5), or that individuals simply reject a learning opportunity. The non-learning path that is followed in either of these scenarios is shown in Figure 3.5 (process flow derived from Jarvis model as shown in Figure 3.12 1 to 4).

### 3.4.2 Non-reflective learning paths

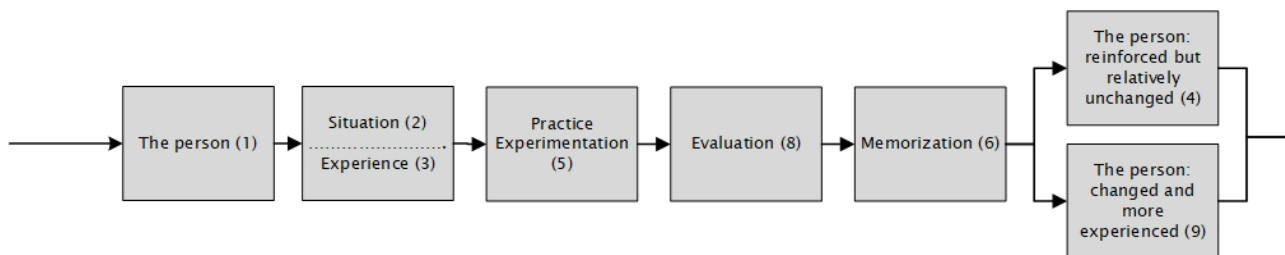
Non-reflective learning can follow any one of three different paths. In the first path the learning process involves a person (1), the situation (2) or the experience (3) in daily life, the person recalls similar situations or experiences from memory and acts accordingly (6), the person’s learning is reinforced (mechanical reaction) but relatively unchanged (4), or the person is changed and more experienced (9). The first path is shown in Figure 3.6 (process flow derived from Jarvis’s model, as shown in Figure 3.12).



**Figure 3.6 Non-reflective path (no practice)**

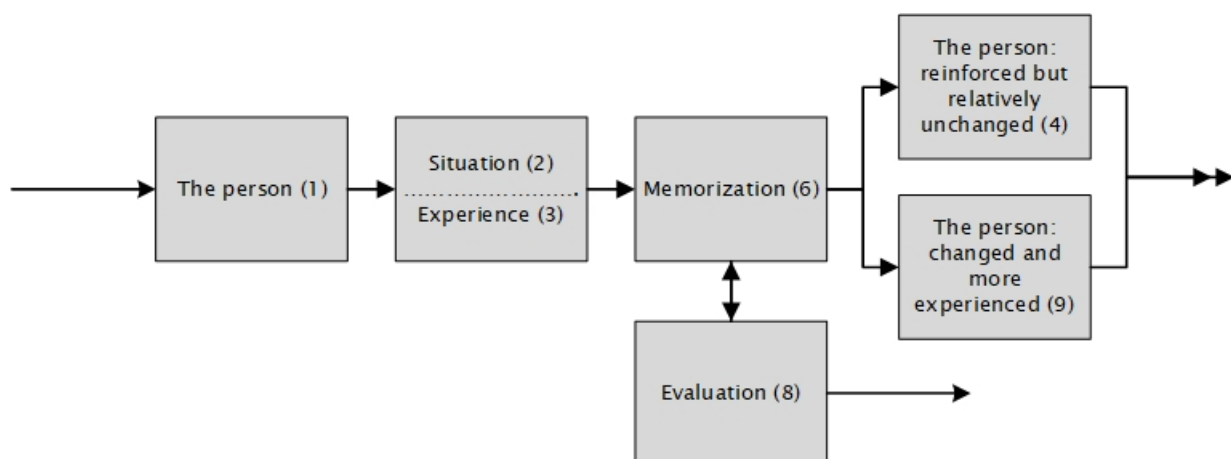
**Source: Derived from Jarvis’s model of learning, 1987**

The second path is non-reflective learning with the acquisition of a manual or physical skill. The learning process starts with an individual (1), the person is exposed to a situation/experience to acquire a manual or physical skill (2-3), the skill is either practised or there is experimentation (5), the skill or experimentation is evaluated (8), and the acquired learning is recalled from memory (6). In a training situation where reflection is not necessarily involved, the individual can either be unchanged (4), or changed and more experienced (9). The second path of non-reflective learning for the acquisition of a skill is shown in Figure 3.7 (process flow derived from Jarvis's model, as shown in Figure 3.12).



**Figure 3.7 Non-reflective path acquisition of skill**  
**Source: Derived from Jarvis's model of learning, 1987**

The third path of non-reflective learning is memorisation (reflection on situation or experience). The learning process starts with an individual (1), who has an experience or situation (2-3), memorises the situation or experience (6), goes through a process of evaluating the situation or experience (8), reflects on the situation or the experience (6) and is either unchanged (4) or changed and more experienced (9) by the chain of events.



**Figure 3.8 Non-reflective path (memorisation)**  
**Source: Derived from Jarvis's model of learning (1987)**

This learning process is shown in Figure 3.8 (process flow derived from Jarvis's model as shown in Figure 3.12). The evaluation of the situation or the experience is an iterative process as the person recalls from memory.

### 3.4.3 Reflective learning paths

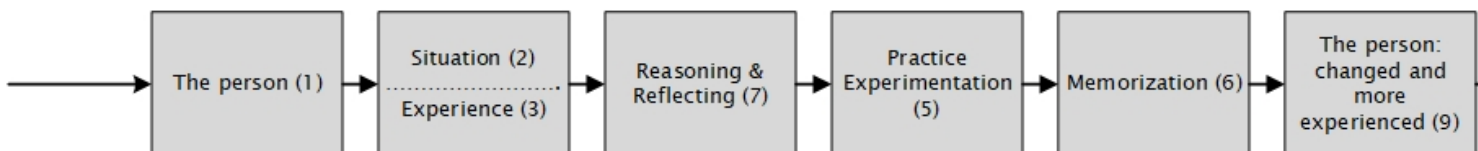
Reflective learning in the Jarvis's model also has different paths, namely the contemplation path, the reflective practice path and the experiential learning path. The contemplation path is "when one considers an experience and makes an intellectual decision about it" (Dyke 2017: 5). The learning process starts with an individual (1) who goes through an experience (2-3), reasoning and reflection occur (7), the events are evaluated (8), the new knowledge, skill or emotions are memorised (6) and the individual is changed and more experienced after the chain of events (9). The contemplative learning process is shown in Figure 3.9.



**Figure 3.9 Reflective path (contemplation)**

**Source: Derived from Jarvis's model of learning (1987)**

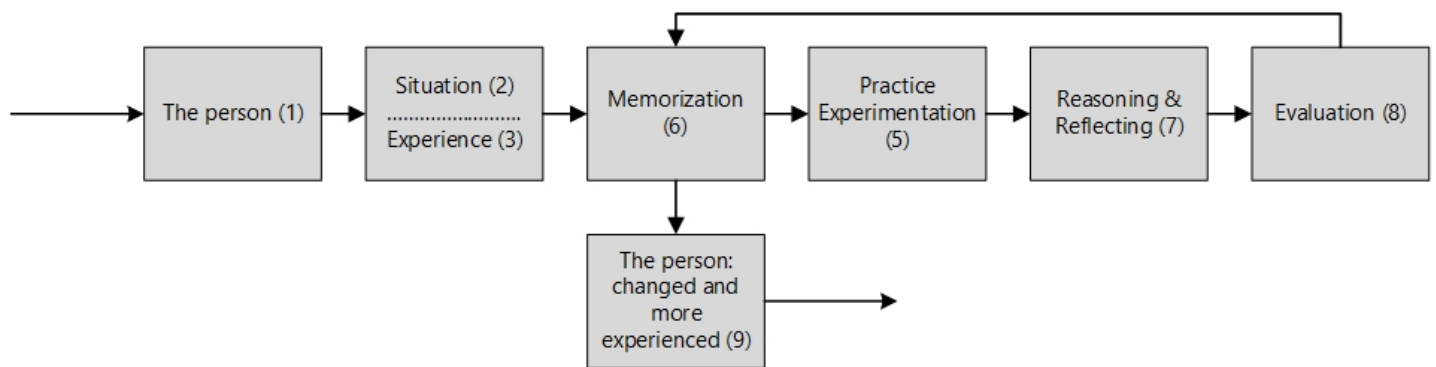
The reflective practice learning process happens when an individual makes a reflection "on and in action" (Dyke 2017: 5). The reflective practice learning process starts with an individual (1) who goes through an experience (2-3), a reasoning or reflection on the event occurs (7), the individual practices or experiments (5), memorizes (6) and is changed and more experienced because of the reflective practice. The learning process is shown in Figure 3.10.



**Figure 3.10 Reflective path (reflective practice)**

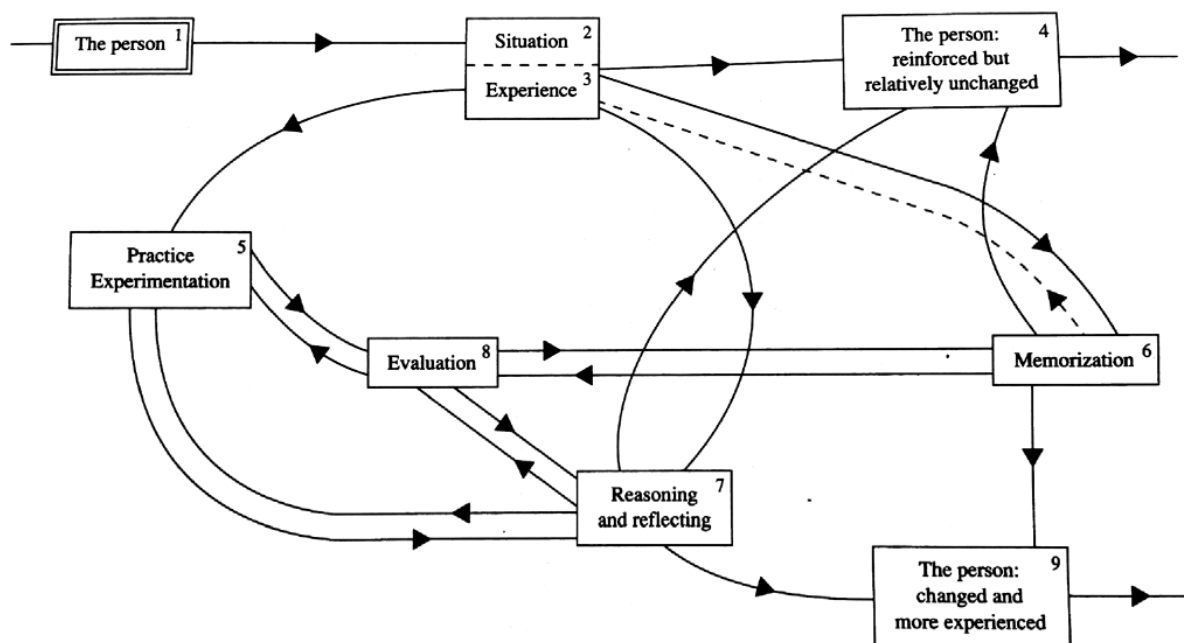
**Source: Derived from Jarvis's model of learning (1987)**

The experiential reflective learning path according to Jarvis is described as "the way in which pragmatic knowledge may be learned" (Bhat, 2004:9). The learning process starts with an individual (1) who goes through an experience or situation (2-3), memorises the event(s) (6), the individual practices or experiments (5), engages in reasoning and reflection (7), evaluates the event (8), goes back to memorisation of the event(s) (6) and is changed and more experienced (9).



**Figure 3.11 Reflective path (pragmatic knowledge)**  
**Source: Derived from Jarvis's model of learning (1987)**

This learning path is shown in Figure 3.11. From the illustrations it is clear that Jarvis's model demonstrates that learning follows different paths. The integrated model that includes all nine learning paths (non-learning, non-reflective and reflective), as discussed above, is shown in Figure 3.12.



**Figure 3.12 Jarvis's learning model process**

**Source: Jarvis (1987: 25)**

Experiential learning has particularly been applied to three areas of educational endeavour: field-based experiences, prior learning assessment and experiential classroom-based learning (Lewis & Williams, 1994). The three areas of experiential learning and descriptions are summarised in Table 3.2.

**Table 3.2 Major experiential learning categories with descriptions**

<b>Category</b>	<b>Description</b>
Field-based experiences	Doing the job that you were trained to do with practitioners in your field  Activities that are included in this field are internships and practicum assignments
Prior learning assessment	Credit or certification is given for knowledge attained from life experiences
Experiential classroom-based learning	In a formal setting this includes teaching methods that involve the students in doing activities and reflecting on what they did

**Source: Lewis & Williams, 1994: 7 -8**

The emphasis in the three categories is on the theoretical underpinning of experiential learning, defining experiential knowledge as “knowledge gained through direct encounter with a subject, person or thing” (Burnard, 1989:6). The experiential learning model also makes a distinction between primary and secondary experiences (Dyke, 2017). Primary experiences are the concrete first-hand experiences of practice that are gained through everyday aspects of life as we interact with our families and households, schooling, workplace, and interaction we have with the various people in the different settings. On the other hand, secondary experiences are gained from educational settings, for example the language used, the lectures, discussions and the technology used in the diverse delivery modes of the course (Dyke, 2017). The primary and secondary experiences are seen in relation to each other, and when new information is introduced that prevent individuals from making sense of their past experiences, disjuncture occurs - this creates conditions for learning. It is in the creation of these uncertain conditions that a more “enabling environment for learning is produced” (Dyke, 2017: 28).

Disjuncture or feeling the disconnect can be either ignored or go unnoticed, depending on the extent. Disjuncture creating uncertainty and uneasiness requires action in order to close the gap to restore balance for the self. “There is a sense in which learning occurs whenever harmony between us and our world has been broken, so that the relationship between our present understanding and our experience of the ‘now’ needs to be established or re-established” (Jarvis, 2012:12). It is the present understanding and experience of the ‘now’ with the need to be established or re-established that draws the attention to Jarvis’s model of experiential learning as a lens and focal point for this study. These students find themselves in a position of uncertainty, having to rebuild their knowledge as beginners to the field of education and training. They are introduced to a blended learning environment, with limited exposure to the use of ICT in a learning environment, with field-based training in a clinical field transferring into a non-clinical field.

In a blended learning environment, an experiential learning activity is associated with the following attributes:

- Action – the learner is not a passive receptacle but an active participant and there is physical movement (Burnard, 1989:14)
- Reflection – learning only occurs after the action is reflected upon (Burnard, 1989)
- Phenomenological – objects or situations are described without assigning values, meanings or interpretations; the learner must ascribe meaning to what is going on (Burnard, 1989:14)
- Subjective human experience – a view of the world that is the learner's (Burnard, 1989)
- Human experience as source of learning (Burnard, 1989:14).

The key features of experiential learning coincide with the principles of multimedia learning for instructional design in a blended learning environment. These principles were discussed in Chapter 2 and used as a conceptual framework for designing a series of technology-based interventions for the PGDipNE.

### **3.5 CONCLUSION**

The purpose of this chapter was to discuss the learning orientations that underpin adult learning theory or andragogy. Each of these learning orientations was summarised based on who the theorist(s) were, a view on the learning process, what the locus of the learning was, the purpose the theory served in education, the role of the teacher and how the theory manifests in adult learning. This was followed by an exposition of Jarvis's model of experiential learning.

I argued that this model provides an appropriate theoretical framework for the study as it brings the social context of the participants of the targeted programme to the fore, in addition to providing a plausible model of the learning paths followed by adult learners. I also drew on the andragogical assumptions of adult learning and related these assumptions to the application of technology in a blended learning environment.

In the next chapter the focus was on the research paradigm, methodology and design of the study. The complexity of the problem to be solved in an educational setting (enhancing the digital literacy of adult learners in a blended learning context), and the nature and characteristics of educational design research (EDR), placed the study in a pragmatic paradigm. From a pragmatic perspective, reality is constantly renegotiated, debated and interpreted to consider its usefulness in new unpredictable situations (Patel, 2015). The research paradigm mainly refers to a research culture or tradition with a set of beliefs, values and assumptions that a community of researchers has in common.



## **CHAPTER 4**

### **RESEARCH PARADIGM, METHODOLOGY AND DESIGN**

#### **4.1 INTRODUCTION**

Chapter 2 emphasised the complexities of the various contexts that could potentially impact adult learning. The phenomena influencing HE and technology trends in HE are all contributing to the quality of education leading to a qualification for adult learners in Nursing Education. Adding to these challenges, in the context of SA, are the various levels of academic preparedness of a diverse student population, resulting mainly from poor quality in the bulk of the basic education system, and the lack of proper infrastructure or teaching facilities at some, particularly historically disadvantaged, HEIs. Technology is increasingly acting as an agent for digital transformation, in both the HE sector and the healthcare sector, creating bigger expectations in terms of the competencies and skills that graduates require. The assumptions underpinning adult learning and how adult learning is challenging traditional teaching methods were discussed in Chapter 3.

These complexities referred to above and discussed in more detail in Chapters 2 and 3, point to the need for a suitable research approach aimed at developing solutions for problems in a real-world educational setting (Reeves, 2006), such as educational design research (EDR). Research that is disconnected from practice “may not account for the influence of contexts, the emergent and complex nature of outcomes, and the incompleteness of knowledge about which factors are relevant for prediction” (DBRC<sup>1</sup>, 2003:5). This study is about addressing a practical question with regard to enhancing the digital literacy skills of adult learners in Nursing Education with limited prior exposure to using technology in a blended learning environment. In collaboration with the academics, students and administrators of the programme, the purpose of the research was to design a series of technology-based interventions and to evaluate the effectiveness of the intervention in an authentic setting. Consequently, a pragmatic paradigm was embraced to investigate the research question through EDR, employing a combination of qualitative and quantitative data collection methods.

The purpose of this chapter is to explain the research paradigm, methodology and design. In addition, the Integrative Learning Design Framework (ILDF) is proposed as a conceptual framework for the study. Each phase of the ILDF is explained together with the data collection methods for each phase.

---

<sup>1</sup> The Design-Based Research Collective (DBRC) is a group of faculty and researchers founded to examine, improve and practice DBR methods in education (see <http://www.designbasedresearch.org>)

## 4.2 RESEARCH PARADIGM: PRAGMATISM

Research allows an individual to learn more about a specific topic by following a systematic process of enquiry, which includes guidelines of how data should be collected, analysed and interpreted, framed by a theoretical framework. Research, according to Bless and Higson-Smith (2000:3), is “the scientific method of acquiring knowledge, also called scientific research, a systematic investigation of a question, phenomenon or a problem, using certain principles”. The reasons why research is conducted may vary, but education research is primarily an endeavour to “understand, describe, predict or control an educational or psychological phenomenon or to empower individuals in an educational or psychological context” (Mertens, 2010:2). The different ways of knowing or gaining understanding through the systematic process of enquiry, according to Mertens (2010), is influenced by the researcher’s research paradigm, while the theoretical framework guides how the data is analysed and interpreted to gain deeper knowledge of the phenomenon.

A research paradigm is “the set of common beliefs and agreements” shared by researchers regarding “how problems should be understood and addressed” (Kuhn, 1962). This is a worldview, a specific way of perceiving the world that influences how the research process is conducted in order to answer the research questions. According to Guba (1990), a research paradigm has mainly three dimensions, namely its ontological, epistemological and methodological dispositions. Ontology is concerned with the nature of reality (Saunders, et al., 2009). Ontological questions are about the way the world operates (Saunders, et al., 2009). Epistemology is internal to the researcher and how the researcher goes about uncovering the knowledge and learns about reality (Edirisinha, 2012). Methodology refers to “the theory of how research should be undertaken” (Saunders, et al., 2009:3). Methodology is concerned with the process of discovery.

There are several research paradigms that would ultimately guide the methods used in the process of discovery. Methods are the specific techniques and procedures used to collect and analyse data (Scotland, 2012). A research paradigm based on pragmatic ideology and concerned with the practical consequences of a series of technology-based interventions, promoting mixed-method research (Teddle & Yu, 2007) and incorporating qualitative and quantitative data collection methods was used for this study. A pragmatist believes that “reality is constantly renegotiated, debated, interpreted and therefore the best method to use is the one that solves the problem” (Patel, 2015). To clarify the preference for the pragmatic paradigm of the study, Table 4.1 provides a summary of five research paradigms that are common in social science research, as cited by Patel (2015).

**Table 4.1 Summary of social science research paradigms**

<b>Paradigm</b>	<b>Ontology</b>	<b>Epistemology</b>	<b>Methodology</b>	<b>Method</b>
	What is reality?	How can I know reality?	How do you go about finding out?	What techniques do you use to find out?
<b>Positivism</b>	There is a single reality or truth (more realist)	Reality is measured and hence the focus is on reliable and valid tools to obtain that	Experimental research Survey research	Usually quantitative, could include sampling, measurement and scaling  Statistical analysis Questionnaire Focus group interview
<b>Constructivist /interpretive</b>	There is no single reality or truth  Reality is created by individuals in group (less realist)	Reality needs to be interpreted. It is used to discover the underlying meaning of events and activities	Ethnography Grounded theory Phenomenological research Heuristic inquiry Action research Discourse analysis etc.	Usually qualitative, could include qualitative interview, observation, participant – nonparticipant, case study, life history, narrative, etc.
<b>Pragmatism</b>	Reality is constantly renegotiated, debated, interpreted, considering its usefulness in new unpredictable situations	The best method is one that solves problems. Finding out is the means, change is the underlying aim	Mixed methods Design-based research Action research	Combination of any of the above and more, such as data mining expert review, usability testing, physical prototype
<b>Subjectivism</b>	Reality is what we perceive to be real	All knowledge is purely a matter of perspective	Discourse theory Archaeology Genealogy Deconstruction	Auto-ethnography Semiotics Literary analysis Pastiche
<b>Critical</b>	Realities are socially constructed entities that are under constant internal influence	Reality and knowledge are both socially constructed and influenced by power relations from within society	Critical discourse analysis, critical ethnography, action research	Ideological review  Civil action open-ended interviews, focus groups, open-ended questionnaires, open-ended observations and journals

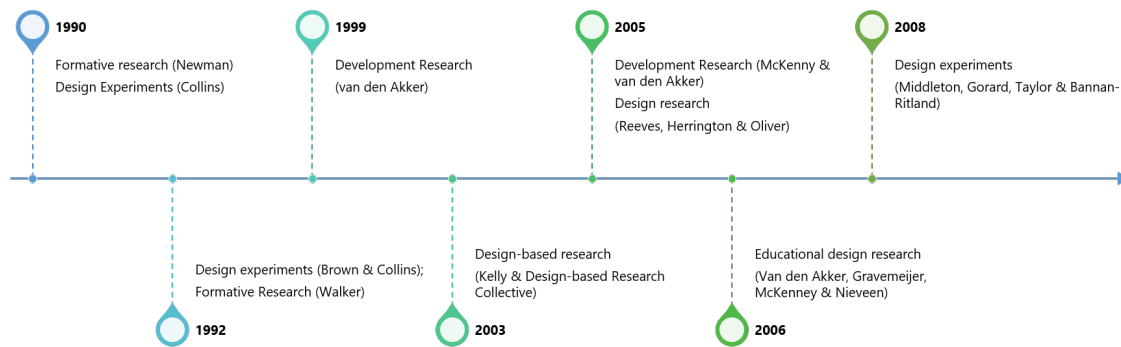
Source: Patel, 2015, n.p.

From the summary of five social science paradigms above, it is evident that the pragmatic paradigm was most appropriate for this study, as the primary purpose was to solve a problem, and change in the teaching and learning context was the aim. Through a pragmatic lens the process of investigation is results-driven and concerned about discovering the meaning behind things (Johnson & Onwuegbuzie, 2004), or it can have a focus on intervention-based research (Biesta, 2010). In order to design an intervention in a real-world context, this approach highlights the importance of communication and “shared meaning-making” (Shannon-Baker, 2016), placing primary importance on the research question (Tashakkori & Teddlie, 2003; Saunders, et al., 2009). As a pragmatist, one can combine different perspectives that bring depth to the collection and interpretation of the data (Saunders, et al., 2009).

#### **4.3 RESEARCH METHODOLOGY: EDUCATIONAL DESIGN RESEARCH**

The methodology adopted for this study was educational design research (EDR), also known as design-based research (DBR). According to Anderson and Shattuck (2012: 16), design-based research (DBR) “evolved at the beginning of the 21<sup>st</sup> century as a practical research methodology that could effectively bridge the chasm between research and practice in formal education”. The origin of the methodology can be traced back to the work of Collins (1990:4) who wanted to develop a methodology for “carrying out design experiments, to study different ways of using technology in classrooms and schools; and to begin to construct a systematic science of how to design educational environments so that new technologies can be introduced successfully”. Brown (1992:143) had a similar goal - “to work toward a theoretical model of learning and instruction rooted in a firm empirical base”. The usefulness of the methodology lies particularly in its potential to enable the discovery of “how, why and when” (DBRC, 2003:5) technology interventions work in education settings, within the “messiness of real-world practice, with context being a core part of the story” (Barab & Squire, 2004: 3).

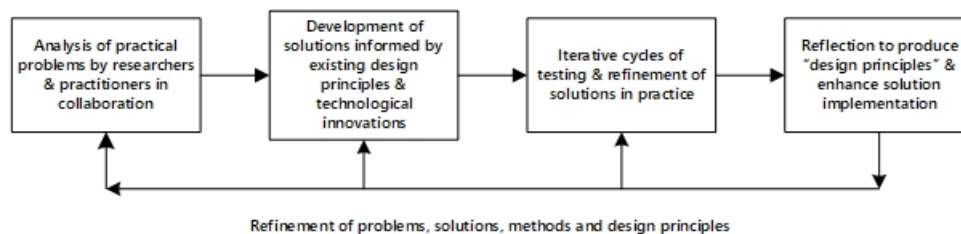
EDR is not an approach. According to Barab and Squire (2004:2) it is defined as “a series of approaches, with the intent of producing new theories, artefacts, and practices that account for and potentially impact learning and teaching in naturalistic settings.” This ‘series of approaches’ has been associated with a variety of nomenclature. Kelly (2003) uses DBR, while “formative research” (Newman, 1990), “design experiments” (Collins, 1990; Brown, 1992; Collins; 1992), “development research” (Van den Akker, 1999; McKenney & Van den Akker, 2005), “design research” (Reeves, Herrington & Oliver, 2005) and “educational design research” (Van den Akker, Gravemeijer, McKenney & Nieveen, 2006) were used in different eras, as illustrated in Figure 4.1. In this study preference is given to the term EDR.



**Figure 4.1 Nomenclature used by various authors for educational design research**

**Source: Adapted from McKenney & Reeves, 2012, n.p.**

EDR is defined as “the systematic study of designing, developing and evaluating educational interventions” (Plomp, 2010:9). What sets EDR apart from other forms of research is its “being situated in a real education context” and “focusing on the design and testing of a significant intervention” (Anderson & Shattuck, 2012:16). Irrespective of what EDR is called, one of its distinguishing characteristics is its capacity to bring together theoretical contributions and the practicality of interventions in the learning environment, as shown in Figure 4.2 (Van den Akker, et al., 2006). This methodology placed educational technology research on a different trajectory.



**Figure 4.2 Distinguishing characteristics of EDR**

**Source: Adapted from Reeves, 2006: 59**

EDR as an alternative model of inquiry into education practices is distinguished by the following characteristics, as cited by Collins (1992) and Brown (1992):

- addressing complex problems in real contexts in collaboration with practitioners
- integrating new and hypothetical design principles with technological affordances to render plausible solutions to complex problems
- conducting rigorous and reflective inquiry to test and refine innovative learning environments, as well as to define new design principles.

To understand EDR as an alternative model of inquiry, it is important to understand what sets EDR apart from, for example, traditional psychological methods. The differences between traditional psychological methods and EDR are summarised in Table 4.2. EDR captures the social interaction, changing the role of the participants from merely subjects to collaborators (Barab & Squire, 2004). Academics can, for example, assist in the formulation of the research questions in the context of the environment and provide inputs for the refinements of the design. The variables in the location of the research are incorporated as part of the design to include the reality of the situation. EDR involves flexible revisions, as each iterative cycle has an impact on the design.

**Table 4.2 Differences between psychological experiments and EDR**

<b>Category</b>	<b>Psychological experiments</b>	<b>Educational design research</b>
Location of research	Conducted in laboratory	Conducted in the messiness of a real-world setting
Complexities of variables	Involves a single or a couple of dependent variables	Involves multiple dependent variables that might have an impact on the intervention in the learning environment
Focus of research	Identifies a few variables and holding them constant	Situation is characterized in all its complexity – with the possibility of any unknown variable being introduced
Unfolding procedure	Uses fixed procedures	Involves flexible design revision – initial design is tentative based on the context and changing variables
Social interaction	Subjects are isolated to control interaction	Participants are invited to collaborate – social interaction happens frequently
Characterising the findings	Testing hypothesis	Involves looking at multiple related or unrelated aspects of design and development in the active setting
Role of the participants	Participants are treated as subjects	Collaboration with various participants to share their expertise into producing and evaluating the intervention

**Source: Adapted from Collins, 1999, n.p.**

EDR usually has a number of phases. These phases include a needs analysis, a prototyping phase and an assessment phase (Plomp, 2010). The prototyping phase concentrates on the iterative cycles

and the evaluation. The assessment phase explores the scalability and transferability of the intervention. The DBRC (2003:5) proposes the following characteristics as part of good EDR:

- The goals of designing learning environments and developing theories or ‘prototheories’ of learning are interwoven.
- Development and research are done through continuous cycles of design, enactment, analysis and redesign.
- Research on designs must lead to shareable theories that help communicate relevant implications to educational researchers or designers.
- Research must give account of how designs function in authentic settings. The account must focus on the interactions that enhance the design science of education, especially around the learning issues involved.
- Research relies on methods that can document and connect the processes of enactment to outcomes of interest.

According to Bannan (2010:56), “design research attempts to progressively and dynamically generate (exploratory research), improve (constructive research) and learn about (empirical research) a particular phenomenon from interconnected research and design cycles”. The interconnected research and design cycles require careful orchestration. The ILDF provides a comprehensive guiding framework that allows the researcher to gain understanding and incorporate the generated knowledge into the activity of design to improve the final intervention that can be used in an educational setting (Bannan, 2010). ILDF provides a systematic review framework that includes a wide array of variables, context and the process of design to “consciously consider design decisions” (Collins, 1993: 1). For this study, EDR was adopted as the research methodology with ILDF as the guiding framework.

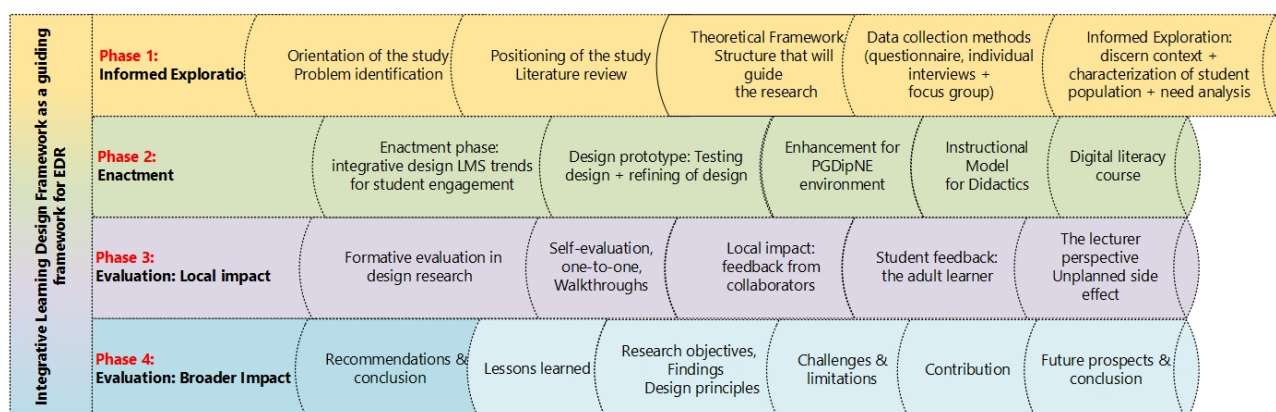
#### **4.4 RESEARCH DESIGN: INTEGRATIVE LEARNING DESIGN FRAMEWORK**

Design research brings together the context of the educational setting and the changing variables of the social interaction, using the information from the one phase to inform the next phase to design a prototype, refines the intervention as feedback is received from the collaborative nature of the approach, and assesses the impact of the intervention and the scalability and transferability of the intervention to be used in the environment. Design research crosses over domains of social science, behavioural science and communication theory. ILDF, drawing on instructional design traditions (Dick & Carey, 1990), product design (Ulrich & Eppinger, 2000), usage-centred design (Constantine & Lockwood, 2001) and diffusion of innovation (Rogers, 1995), is therefore an appropriate guiding framework or research design for an EDR project (Bannan, 2013:115).



ILDF presents a “meta-methodological view that attempts to integrate the best of design, research and diffusion of educational innovations” (Bannan, 2013:115). With this framework the researcher is challenged to consider the entire scope of the research from an initial concept, prototype, final design, to the diffusion of results and adoption. The results of each phase are used to improve the intervention. The emphasis of ILDF is placed on the “learning that can result in the context and activity of design” (Bannan, 2013:116).

The process model of ILDF encompasses Informed Exploration, Enactment, Local Evaluation and Broad Evaluation as the four phases. The Informed Exploration phase includes the needs analysis, literature survey, theory development and audience characterisation. The Enactment phase is about researching the design, articulating the prototype and completing the detailed design. The Local Impact Evaluation phase includes preliminary testing, refinements of the intervention and implementation. The Broader Impact Evaluation focuses on the evaluation of the intervention in the educational setting, diffusion of the results and adoption. The ILDF with each phase, as adopted for this study is illustrated in Figure 4.3.



**Figure 4.3 Integrative Learning Design Framework**

**Source: Adapted from Bannan, 2010, n.p.**

ILDF is concerned with problem identification in order to design an intervention that can be adopted in a learning environment in support of the learning goals and to meet the requirements of the intended population (Bannan-Ritland, 2003). ILDF will be used as a guiding framework for the EDR project of the present study.

## 4.5 RESEARCH POPULATION

The research population consisted of adult learners re-entering HE in an academic programme delivered by a combination of block contact and online delivery in a blended learning approach with the use of technology for teaching and learning. As pointed out in Chapter 2, massification of HE is accompanied by broadening access for a wider student audience. This implies that HEIs need to accommodate not only traditional students, but also non-traditional students, such as adult learners.



The institutions' business processes, academic offerings and systems hence need to accommodate the needs of the wider student audience.

In this study, the intake of adult learners into a Postgraduate Diploma in Nursing Education (PGDipNE) that adopted a blended learning approach incorporating the use of technology for teaching and learning, surfaced some underlying challenges. Computer literacy is a prerequisite for admission to the programme, but the Department of Nursing did not have a system in place to determine the level of literacy when students applied for the programme. Even though computer literacy was a prerequisite for the programme, the enhancement of the students' digital literacy skills, being one of the core competencies for nurse educators, was the focus of the study. The students are mostly adult learners with academic qualifications from various HEIs. The students' exposure to an eLearning platform or LMS and use of technology for teaching and learning purposes was either limited or they had no exposure to these technologies before. Some of the adult learners transferred from a clinical to a non-clinical programme, with the result that they were also novices to the field of Education.

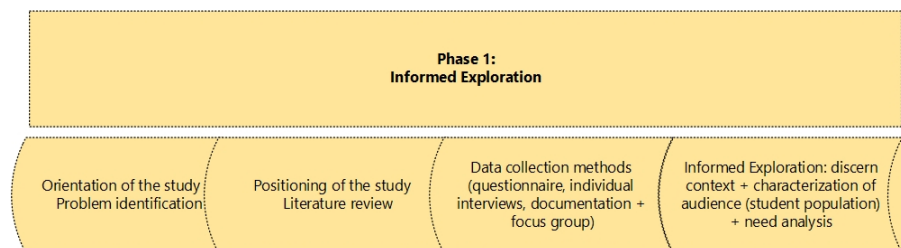
The research population consisted of the 2018 and 2019 cohorts ( $n = 80$ ) of students enrolled for the PGDipNE in the Nursing and Midwifery Department, Faculty of Medicine and Health Sciences, Stellenbosch University. The PGDipNE is a one-year programme, but some of the students elected to complete the programme over a two-year period. The students were surveyed before entering the programme. Eventually 36 of the 80 students agreed to participate in the research project, and joined the workshops and focus group discussions, which amount to a student participation rate of 45%. The number of participants, which included not only the students, but also the programme coordinator(s), programme administrator and lecturers was sufficient to provide me with rich data and knowledgeable input for the development, refinement and enhancement of the designed intervention.

#### **4.6 DATA COLLECTION AND ANALYSIS**

As the researcher in this study I took on various roles that included conducting the research for the purpose of attaining a PhD degree, being an employee in the Information Technology (IT) Division of the university, as well as being an observer of the interaction of the students with the lecturers. As the primary researcher, I also directly participated in the design and implementation of the intervention in the learning environment, highlighting the participatory aspect of the study. In the same way, as a pragmatist, I had to be able to "maintain subjectivity in my reflections on research and objectivity in data collection and analysis" (Shannon-Baker, 2016:322).

The pragmatist paradigm adopted for this study allowed me to use multiple methods of data collection and analysis. ILDF as the research design and guiding framework is not a specific data collection or analysis method, but a comprehensive process for the data collection that informs the

design of the intervention. In keeping with the EDR process which involves integrative use of multiple data gathering methods, data was collected throughout the informed exploration phase using a questionnaire in the form of a survey, analysing lesson plans, conducting interviews with the various collaborators (programme coordinators, programme administrator, lecturers, subject matters experts (instructional design, learning management system), conducting group interviews, analysing the records in the learning management system (LMS) and considering reflections on past initiatives for the PGDipNE. The data collection methods used are linked to each phase of the ILDF. The data collection methods for phase 1 are shown in Figure 4.4.



**Figure 4.4 Phase 1: Informed exploration – data collection methods**

**Source: Adapted from Bannan, 2010, n.p.**

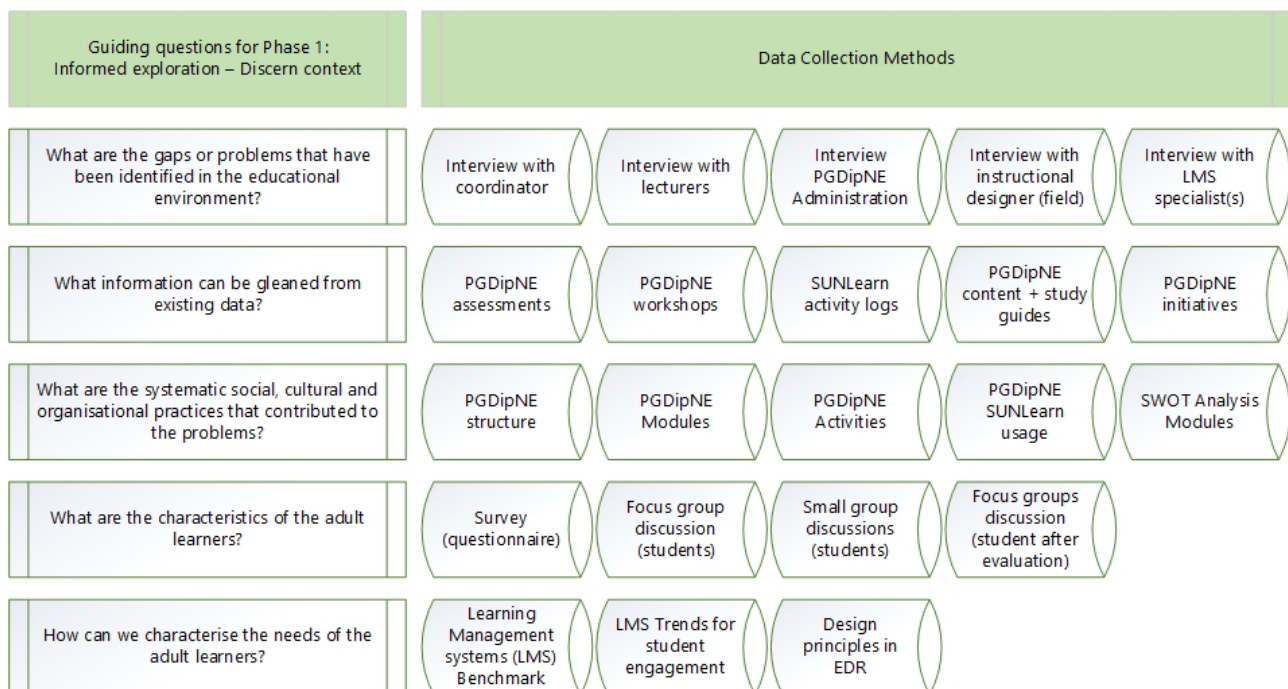
EDR involves multiple dependent factors that might influence the design of the interventions in the learning environment. Caffarella (2002: 58) refers to understanding the context as “discerning the context”, highlighting that “people who develop education and training programs for adults do not work in a vacuum.” Therefore, the current context of the environment was important and was included as part of the data collection. The data collection methods are discussed in section 4.6.1.

#### **4.6.1 Phase 1: Informed Exploration**

For this study, the first phase included problem identification that consisted of an interview with the programme coordinator who identified computer literacy as the main underlying issue since adopting a blended learning approach consisting of a combination of block contact and online delivery. From the programme coordinator perspective, the programme needed a computer literacy training course that included (1) using the computer and managing files, (2) changing passwords, (3) using Microsoft Word and PowerPoint, (4) web browsing, (5) communication that involved sending and receiving emails and (6) orientation to the learning management system. This information was used to design a survey in the form of an online questionnaire.

The questionnaire was reviewed in collaboration with the programme coordinator and distributed electronically to the adult learners. The initial findings of the survey revealed that the adult learners actually did not have a problem with computer literacy. Individual interviews were also conducted with the programme coordinator and administrator. Each of these stakeholders had different interactions with the students and understood the challenges from their respective perspectives. During the individual interviews, the programme coordinator and administrator shared

documentation about the initiatives that had been implemented after adopting a blended learning approach, the digital literacy training, and a research project to enhance the learning and teaching strategies. The documentation was reviewed, and the data gathered from the documentation assisted in defining the problem (see Figure 4.5). The data collection was guided by a structure with guiding questions for the research and a data collection method to best answer the guiding questions to understand the interrelated factors in the educational environment.



**Figure 4.5 Phase 1: Discern context (guiding questions and data collection methods)**

**Source: Adapted from Bannan, 2010:54**

The research on the developments in nursing education and the broader health professions education highlighted the competencies a nurse educator required; this shifted the focus from computer literacy to digital literacy. The need for digital literacy and the findings of the survey were used as an input for the focus group discussion with the lecturers. The focus group discussion was used to gauge the lecturers' understanding of the problems students were experiencing. The focus group discussion with the lecturers included an analysis in the form of the strengths, weaknesses, opportunities and threats (SWOT) of each of the modules and the programme as a whole. This included the implementation of the LMS at the university. In the context of Stellenbosch University, the LMS is branded as SUNLearn. Documents explaining the Department of Nursing's journey to the adoption of SUNLearn, as well as a review of the current practices of the Department of Nursing that consisted of the SUNLearn usage, lesson plans, study guides and how this content reflects on SUNLearn, were investigated. The findings from the various data sources were shared with the

programme coordinator and instructional design consultant, and used as input for the focus group discussion with the students.

The characterisation of the student population was twofold. A survey was conducted in the form of an online questionnaire to gain an understanding of their current level of exposure to technology and to determine the digital literacy level of the student population. The questionnaire was designed by using the data collected from the problem identification, reviewing the existing digital training resources of the Nursing Department, and reviewing testing procedures of other training institutions. The survey results were exported in an Excel format for analysis using Microsoft Excel. Exploratory data analysis was performed, and the main characteristics of the students' level of exposure to technology were depicted visually (see 6.2 in Chapter 6). Exploratory data analysis emphasises the use of diagrams for the interpretation of the data (Saunders, et al, 2009: 428). This was followed up with focus group discussions with the students to add richness to the needs analysis and to compare the data.

The group consisted of 36 students, divided into ten smaller groups of three to four participants per group. The purpose of the discussion was explained to the entire group and their consent to participate was obtained. The open discussions were also used to build rapport, to provide the opportunity for questions about SUNLearn and the relevant terminology, to provoke discussion about the challenges they experienced as students and to gain insight into their general expectations of technology in the classroom. The group was then divided into smaller groups to have an in-depth discussion about the use of technology. The role of technology in a social context, i.e., using social media, was discussed to understand what they found attractive about social media. For students, it is important that the educational setting supports their academic journey, and for adult learners it is also important that technology that could help them enhance their professional development is applied. Each group discussed the role of technology in the different elements of their journey, wrote a summary about their group discussion and drew an illustration about the use of technology in the PGDipNE. The purpose was to gain insight into their experiences with the SUNLearn platform, to understand their expectations when using an online platform for learning, as well as gain their perspectives on the role of technology in learning. The focus group discussions were recorded with a digital voice recorder, with the permission of the participants, after which they were transcribed for analysis.

Content analysis was used for the analysis of the individual interviews and the focus group discussions. Content analysis involves coding, categorising (using Jarvis's experiential learning framework), comparing and drawing theoretical conclusions from texts. The process involved breaking down the text into units of analysis, undertaking statistical analysis of the units and presenting the analysis in as economical a form as possible (Cohen, Manion & Morrison, 2007: 476).

The content analysis was only used for the student focus group discussion because the interviews with the lecturers focused on specific elements in the educational environment pertaining to the role each had to fulfil.

The data collection, as part of phase 1, also included surveying the literature to gain an in-depth understanding about the curriculum developments and challenges in the health education profession. The literature review was extended to the global trends in HE from an international and national perspective, the technology trends impacting HE and trends in educational technology. The embedding of the intervention as part of the PGDipNE required that the current practices of this section of the Nursing Department had to be understood as input for the prototyping of the intervention.

The data from each phase of the ILDF was triangulated to enhance the reliability and validity of the findings. Triangulation refers to “the use of different data collection techniques, to ensure that the data are telling you what you think they are telling you” (Saunders, et al., 2009: 146). For this purpose, both qualitative and quantitative data was collected from students and qualitative data was collected from the lecturers, systems administrators, coordinator(s) and programme administrator.

#### **4.6.1.1 Validity and reliability of the data**

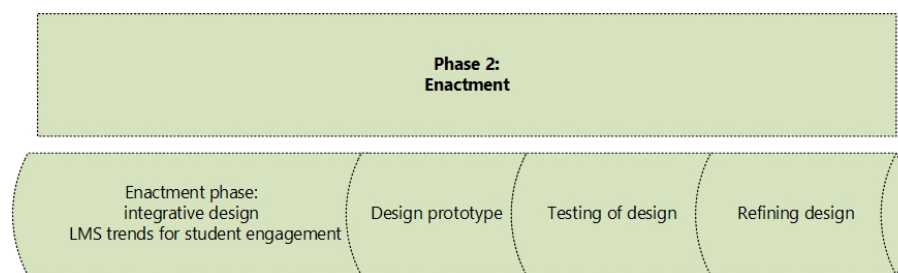
To firstly ensure that the data was analysed in a reliable manner and that the conclusions drawn from the different data collection methods (survey, focus group discussions, interviews, analysis of programme documents, usage logs from SUNLearn) were valid, a number of steps were taken.. Validity is about really measuring what was intended to be measured (Bakker & Van Eerde, 2013:23). The internal validity (quality of the data and soundness of the reasoning that led to the conclusions) (Bakker & Van Eerde, 2013:24) was ensured by sharing the transcripts, findings and possible implications with the programme coordinator(s). The data was also triangulated with other initiatives and research material provided by the coordinator and some of the lecturers involved with the programme. The external validity of the data was strengthened through a process of consultation with the instructional design consultant, learning technology specialist and programme coordinator. The consultation with the instructional designer assisted me in understanding the design principles used in other contexts.

The interviews with the programme coordinators were recorded (with their permission) with a digital voice recorder, transcribed and taken back to the source (programme coordinator). By doing this, the internal reliability of the data was ensured. Internal reliability refers to “the degree of how independently of the researcher” the collection and analysis of the data were conducted. The transcripts of the focus group discussion(s) were either the responsibility of the lecturers or the students. The data collected from the students was analysed by identifying themes (discussed in section 6.3.2). The external reliability (denoting replicability) of the research was strengthened by a

procedural guide for the designing of an intervention within a similar context, using an instructional design consultant as a practitioner and having a “critical friend” in each phase of the ILDF (Plomp, 2013:42).

#### 4.6.2 Phase 2: Enactment

The data gathered from Phase 1: Informed Exploration was used to inform the Enactment Phase, as shown in Figure 4.6. In this phase I benchmarked the trends in the LMS market and investigated how the open source community has addressed the design of an LMS to enhance the student experience and to accommodate a blended learning approach in a distance learning delivery mode. The intervention designed for this study had certain limitations. Stellenbosch University uses Moodle version 3.5 as its LMS, branded SUNLearn. Moodle is a learning platform designed to provide educators, administrators and learners with a single robust, secure and integrated system to create personalised learning environments (Moodle, 2019). The enhancements thus were limited to the version of the existing platform and any changes had to be compatible with the current platform. The changes to the existing platform had to integrate seamlessly, because internal coding skills were limited. The performance of SUNLearn could not be influenced by any enhancements.



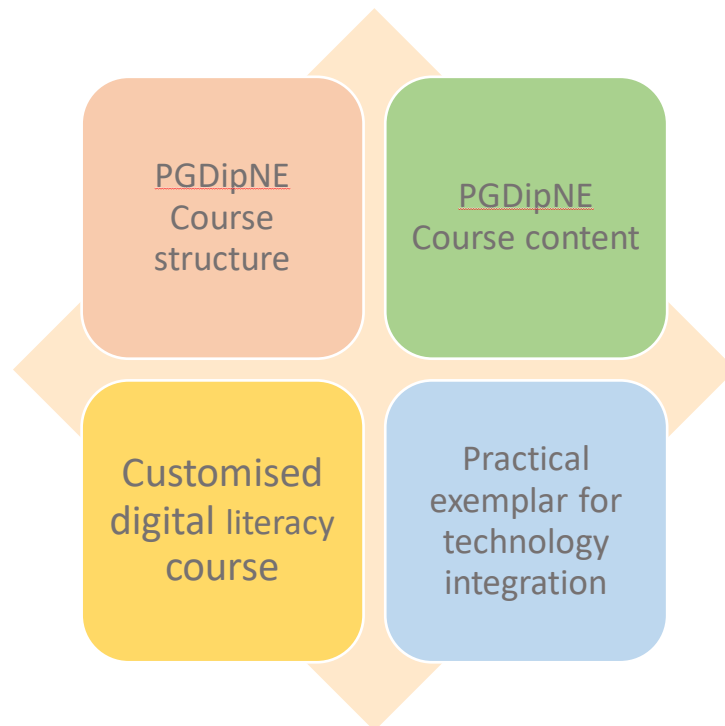
**Figure 4.6 Phase 2: Enactment - planning and design**

**Source: Adapted from Bannan, 2010, n.p.**

The data collected from Phase 1 disclosed that the ‘look and feel’ of SUNLearn was problematic for the student cohort. Further investigation into possible improvements of the existing environment revealed that the development of a integrated digital literacy course was not the only intervention that would resolve the interrelated issues in the educational environment for PGDipNE. This steered the direction of the research into the trends that the Moodle community has adopted to improve the student experience. Moodle developers were starting to focus on theming to change the ‘look and feel’ for a more user-centered experience. A Moodle theme allows the design to be device agnostic and allows adaptability at various programme levels. This adaptability meant that the changes could be isolated for the current study without having an impact on the entire SUNLearn platform. Various theme developments were investigated and benchmarked against very specific criteria. The criteria included compatibility with the current version of Moodle implemented at the university, customisation options, course formats, statistics of student performance (course progress and



activities) and user experience. This led to a series of interventions to improve the student experience that included the redesign of the PGDipNE course structure, integrating the PGDipNE course content as part of SUNLearn (with a standardised template for all the modules), a customised digital literacy course and an exemplar for the Didactics module that could practically demonstrate how to integrate technology into course design, as shown in Figure 4.7.

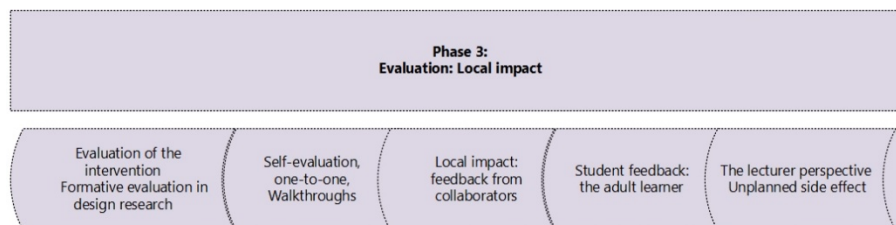


**Figure 4.7 Series of interventions to address the complexity of challenges in the setting**

The implementation of the SUNLearn theme for the PGDipNE was evaluated in collaboration with the system administrators of the SUNLearn platform to ensure that the design would not impact the performance of the SUNLearn ecosystem for purposes of administration and maintenance. The changes to a more student-centered focus were reviewed by the programme coordinator, administrator and lecturers of the PGDipNE. This led to a discussion of the layout of the modules with the lesson plans, activities and additional resources to assist the students on their learning paths. Each of the modules was aligned with the study guides to provide a coherent design for the learning activity, assignments and quizzes. Additional courses were designed that provided students with the necessary technology tools to improve their knowledge about the applications they required to complete their assignments. These courses were designed in the form of Shareable Content Object Reference Model (SCORM) packages and uploaded as additional resources to ensure availability and ease of use. The data gathered through the evaluation and interaction with the various role players was used to inform the iterative cycles of refining and finalising the design on SUNLearn.

### 4.6.3 Phase 3: Evaluation Local Impact

The detailed design was tested with the student cohort, and plausible adjustments and refinements of the design (as shown in Figure 4.8) were implemented on SUNLearn. The final design was implemented for the 2019 student cohort. The implementation was done in a phased approach. For the 2019 student cohort, the study guide was used as a reference to ensure a smooth transition from a hard copy to an online course that was easily accessible to the students.



**Figure 4.8 Phase 3 - Evaluation local impact**

**Source: Adapted from Bannan, 2010, n.p.**

The blended learning approach for the PGDipNE did not incorporate only face-to-face and online teaching and learning, but also interactive telematic education (ITE) broadcasts. ITE is an education technology platform that “integrates satellite, cell phone, internet and video conferencing technology to create modern and academically excellent virtual environments for postgraduate study” (Telematic Programme, 2019). The schedule of ITE broadcasts is created for the entire Nursing Department. The schedule contains the dates, session time and duration for all programmes offered by the Nursing Department. The schedule was not organised according to the programme that the students were enrolled for nor did it include only the ITE sessions that were relevant for the PGDipNE students. This schedule was uploaded as one of the student resources for the PGDipNE. Each student had to work through the schedule to compare the modules, to ensure they selected the correct module code and then they had to create a calendar event for each session, or a custom schedule that was only relevant for their own programme.

This was, however, changed to an online calendar exclusively for the PGDipNE students. The online calendar incorporates all assignment due dates for all the modules, all the quizzes of each module and all the ITE sessions of each module. The students now have the option to export the electronic calendar to their personal calendars. They have the option to adjust the calendar according to their preferences, for example, if they want to review the dates for all modules of the programme. The students also have an option to select which events/activities to export and to select a time period to either complete specific assignments or prepare for examinations. This is an important feature for adult learners who choose to follow a self-directed learning path. The students can export the calendars to their mobile devices which improve accessibility to learning content and resources.

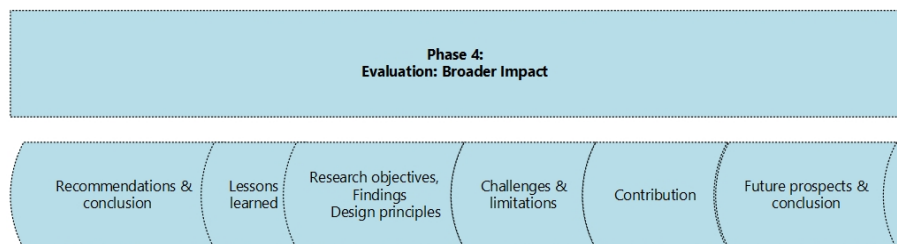


The next step in this phase included a workshop with the lecturers to demonstrate how to design lesson plans, associated activities and reflection tasks as part of a holistic design for the SUNLearn platform. The choices of which activity or resources to add depended on the module outcomes and competencies.

The importance of the knowledge sharing about the intervention relates back to the five stages of diffusion of innovation. The first two stages of the theory are about gaining the knowledge about the intervention and persuasion stage to create interest to seek information about the innovation. Stage three is about the decision for adoption or rejection and stage four about the implementation of the innovation. The process relies heavily on individuals for adoption and how the new idea, intervention or practice is accepted in the communication channels of the individuals for the adoption to be sustainable.

#### 4.6.4 Phase 4: Evaluation Broader Impact

Phase four involved the practicality for further adoption and usability for implementation in the rest of the programmes of the Nursing Department or further sustainability within the broader institution. The sustainability involves change management and training for the appropriate use of not only technology, but also the SUNLearn platform, changing old practices to integrate new practices. The cycles involved in Phase 4 of the study are shown in Figure 4.9.



**Figure 4.9 Phase 4 - Evaluation broader impact**

**Source: Adapted from Bannan, 2010, n.p.**

The study was further strengthened by the two stages of testing in DBR known as alpha and beta testing (McKenney & Reeves, 2012). Alpha and beta testing were performed as part of Phase 2. Testing included the soundness and feasibility of the designed intervention by considering the logical structure from an expert point of view. This was done with the system administrator and programme coordinator. Beta testing measured the use of the designed intervention in context, exploring local viability and institutionalisation, and was done with the lecturers and programme administrator. The testing was done by the researcher in collaboration with the system administrator.

Tessmer (1993) describes various layers of formative evaluation that could be applicable to a particular phase of the study. The formative evaluation was done in sequence that included firstly, a 'self-evaluation' to verify if the significant characteristics met the design principles highlighted in the

first phase of the ILDF; secondly, 'one-to-one evaluation' with the programme coordinator of the PGDipNE, and thirdly, the intervention was evaluated by two small groups (Tessmer, 1993).

Nieveen (1999) identifies high quality interventions by four generic criteria namely relevance, consistency, practicality and effectiveness. Relevance refers to the need for the intervention that was established during Phase 1 of the ILDF. The consistency of the intervention refers to the logical structure of the design. Practicality refers to the realistic usability of the intervention for the educational programme it has been designed for. Effectiveness of the intervention refers to the desired outcome of the intervention. The criteria of Nieveen (1999) coincide with the three stages of testing (alpha, beta and gamma). The evaluation of the intervention is discussed in more detail in Chapter 8.

#### **4.7 ETHICAL CONSIDERATIONS**

Educational design research is collaborative research. As the researcher I needed to involve staff members (lecturers, programme administrators and system administrators) and postgraduate students at Stellenbosch University, therefore it was important to protect the rights of the participants during the research study. The aim of the study conducted as educational design research was to benefit adult learners, and to contribute to the strategic goals of the University. The interviews were recorded with the permission of the participants and stored in a safe environment. The participants were assured of anonymity and that the data would be handled in a confidential manner. As the researcher, I was not in a position of power vis-a-vis the students, which reinforced my objectivity.

The ethical clearance for the study was granted by the Humaniora Research and Ethics Committee of Stellenbosch University (see Addendum B), and institutional permission for the research was granted by the Division of Information Governance (Addendum C). The purpose and objectives of the research were explained to participants by means of an electronic consent form (Addendum D) and a written consent letter (Addendum E) that participants had to sign. Participation was voluntary and without any remuneration. In addition to the letters of consent, an information letter was distributed to the students to inform them about the self-assessment questionnaire (Addendum F).

#### **4.8 CONCLUSION**

In this chapter EDR was discussed as the research methodology to design a series of technology-based interventions for an authentic educational setting. In addition, the pragmatic paradigm and why this specific paradigm was suitable for the study was discussed. The very nature and characteristics of EDR, associated with the complexity of the problem to be solved in an educational setting, placed the study in a pragmatic paradigm. The ability of EDR to bring together the theoretical contribution with a practical intervention was also highlighted. Also considered was the role of the students as participants and the collaboration with various participants who shared their expertise

with the researcher to produce, evaluate and improve the intervention in an active setting to positively influence the outcome.

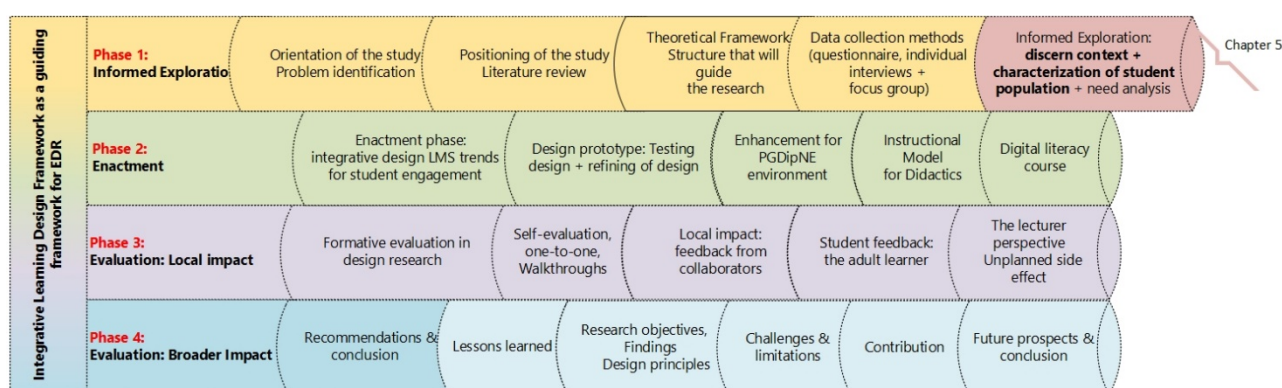
Data collection methods were incorporated as part of the ILDF as the research design that involved four phases. The chapter was concluded by explaining the testing involved to strengthen the phases of ILDF and the criteria taken into consideration for a high-quality intervention. Finally, ethical considerations were outlined. In the next chapter the informed exploration phase of the ILDF is outlined. The emphasis is on the context of the specific programme and the current practices

## CHAPTER 5

### INFORMED EXPLORATION PHASE – DISCERN CONTEXT

#### 5.1 INTRODUCTION

In the previous chapter, the learning foundations that are applicable to adult learning were discussed. The discussion included an explanation of the theoretical framework, detailing the learning paths and the applications for eLearning. The first objective of this study was to determine the level of digital literacy competency required for the blended learning environment of the PGDipNE. The second objective was to analyse the gap in the students' current digital literacy skills, and to apply the result as a basis for the design of a shareable content object reference model (SCORM) package. In order to do this, the researcher thus needed to 'discern the context' in which the research is situated. As an EDR study, understanding the context (part of Phase 1: Informed Exploration) is critical to conceptualise the purpose of the study (Figure 5.1). Figure 5.1 positions this phase within the research process of the study. McKenney, Nieveen and Van den Akker (2006:84) call this a "thorough understanding of the context i.e., insider perspective".



**Figure 5.1 Phase 1: Discerning the context within informed exploration**

**Source: Adapted from Bannan, 2010, n.p.**

In this chapter, explaining how the situated context of the current practices of the Department of Nursing was explored, was the first objective. The PGDipNE exists in the institutional ecosystem of the Faculty of Medicine and Health Sciences and the Information Technology Division of Stellenbosch University which is situated in an even bigger ecosystem of nursing education in South Africa and internationally. Understanding this bigger ecosystem of nursing education needs to take account of challenges faced by the nursing profession globally and in South Africa, and more specifically of the collaboration between HEIs, the Department of Health and the South African

Nursing Council, which has a direct impact on the availability of nurse educators for the South African health system.

## 5.2 GLOBAL TRENDS IN HEALTH PROFESSIONS

The Lancet report on the education of health professionals for the 21<sup>st</sup> century criticizes the lack of transformation in health professions since 1910 (Frenk, et al., 2010). This report by a global independent commission (one of the Lancet Commissions) proposed a comprehensive framework that considered the “connection between education and the health systems” (Frenk, et al., 2010:1923) to meet the demand for an educated workforce to address the needs of society. The proposal included the redesign of professional health education with new instructional and institutional strategies due to the acceleration of knowledge and technology development (Frenk, et al., 2010). The challenges of new infections (like the COVID pandemic), as well as environmental and behavioural risks, threaten the health security of all, making further demands on health workers (Frenk, et al., 2010).

According to the Commission, the situation is exacerbated by the fragmented, outdated and static curricula for health professionals (Frenk, et al., 2010). The Lancet Commission proposed a series of recommendations to improve the overall performance of health systems as shown in Table 5.1.

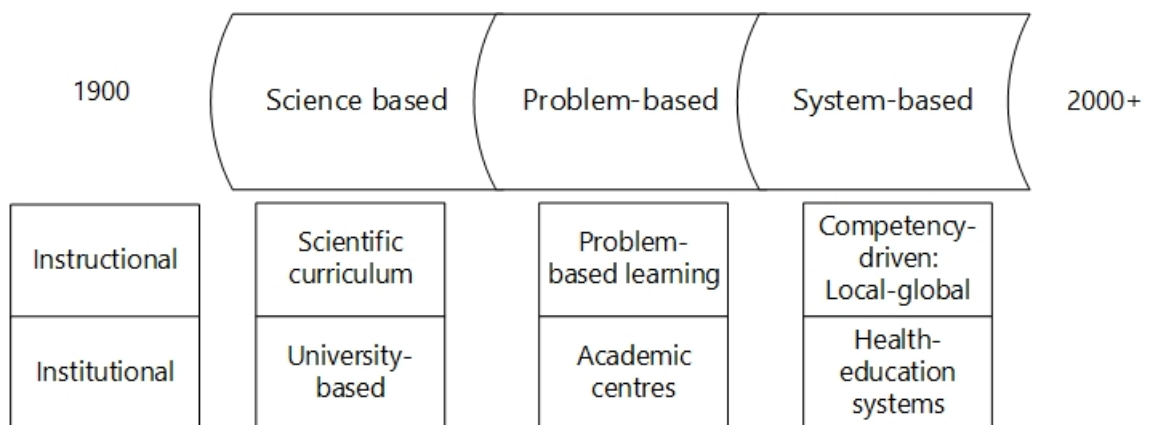
**Table 5.1 Health system improvements from an instructional and institutional perspective**

Instructional improvements	Institutional improvements
<p>Adopt competency-driven approaches to instructional design</p> <p>Adapt these competencies to rapidly changing local conditions drawing on global resources</p> <p>Promote inter-professional and trans-professional education that breaks down professional silos while enhancing collaborative and non-hierarchical relationships in effective teams</p> <p>Exploit the power of information technology for learning</p> <p>Strengthen educational resources, with special emphasis on faculty development</p> <p>Promote a new professionalism that uses competencies as objective criteria for classification of health professionals and that develops a common set of values around social accountability</p>	<p>Establish in every country joint education and health planning mechanisms that consider crucial dimensions such as social origin, age distribution and gender composition of the health workforce</p> <p>Expand academic centres to academic systems encompassing networks of hospitals and primary care units</p> <p>Link together through global networks, alliances, and consortia</p> <p>Nurture a culture of critical inquiry.</p>

**Source: Frenk, et al., 2010:1924**

The Lancet report (Frenk, et al., 2010) criticises the lack of transformation in the health profession since 1910, proposing that curricula need to be designed to address the needs of society, and highlighting the drivers of change as the testing economic times, the quest for quality teaching and

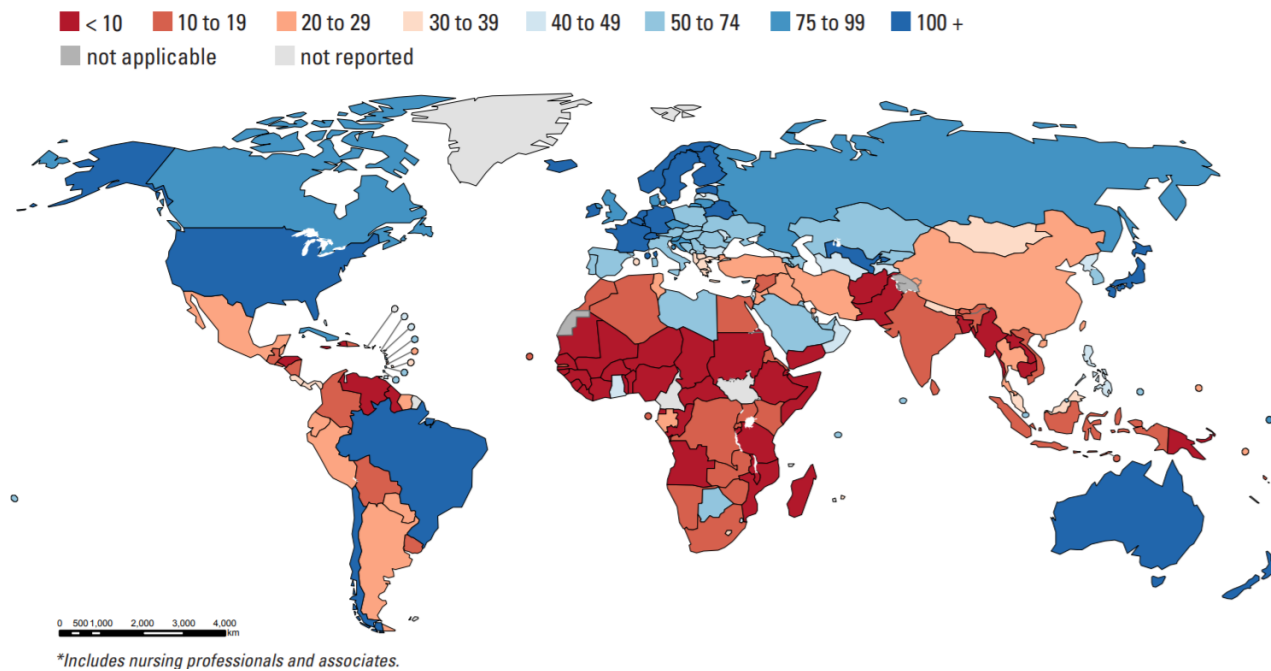
higher research outputs, as well as socio-political imperatives as part of HE transformation. Since the 1900's, in the context of curriculum development trends in health professions, three generations of transformation are evident as shown in Figure 5.2. There has been a shift to science-based curricula rather than mere information driven courses, the introduction of innovative pedagogical paradigms such as problem-based learning, and a move away from a traditional focus on subject content in favour of competency-based learning. The call for transformation of the curricula has been extended to the training of health workers.



**Figure 5.2 Three generations of curriculum transformation**

**Source: Frenk, et al., 2010:1930**

As part of health professions education, nursing education has also lately come under the spotlight, mainly because of the critical role of nurses and midwives in health promotion, disease prevention and delivering primary care (WHO, 2019; SU & saMRC, 2020). Currently this is even more so with nurses being in the frontline in the battle in the Covid-19 pandemic. Even before Covid-19 it became clear that, in order to attain the Sustainable Development Goals (SDGs), health systems, amongst other things, need to be strengthened, though the future looks bleak with an estimated global shortage of 5.9 million nurses in 2018 (WHO, 2020). The ratio of nursing staff to population cannot keep pace with population growth, with many, particularly developing countries, having fewer than 40 nurses for every 10 000 of the population, as shown in Figure 5.3. Nursing is the largest occupational group in the health sector, accounting for approximately 59 per cent of all health professionals (WHO, 2020).



**Figure 5.3 Ratio of nursing staff per 10 000 of the population, 2018**

**Source: WHO, 2020:3**

Nurses and midwives make up 59 per cent of the global health workforce. Around one million of registered nurses are over 50, which will result in one-third of the current nursing workforce reaching retirement in the next 10 to 15 years. Another challenge of the nursing profession is the limited capacity of nursing schools and educators. According to the American Association of Colleges of Nursing (AACN, 2019), nursing schools turned away 75 029 applicants who qualified for admission in 2018 due to limited clinical sites and facilities, insufficient infrastructure, clinical instructors, and budget constraints.

The ratios of nurses to population and to doctors in various countries are shown in Table 5.2. The data has been compiled from four OECD sources. The shortage of nurses in South Africa compared to many other countries is evident from these figures, with only 1.2 nurses available for every 1000 of the population, and 1.4 nurses for every doctor.

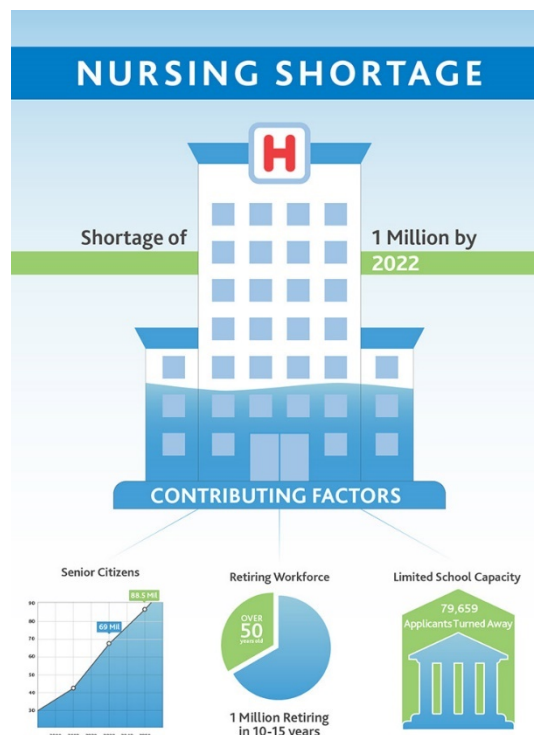
**Table 5.2 Ratio of nurses to population and to doctors in various countries**

<b>Country</b>	<b>Ratio of nurses to 1000 population</b>	<b>Ratio of nurses to 1 doctor</b>
Norway	17.5	3.9
Germany	12.9	3.2
Australia	11.6	3.3
Japan	11.0	4.6
USA	11.1	4.1
UK	7.9	2.8
Brazil	7.4	0.8
Philippines	6.0	5.2
Poland	5.2	2.2
China	2.3	1.3
Thailand	2.1	5.3
Turkey	1.9	1.2
India	1.4	1.9
South Africa	1.2	1.4
Papua New Guinea	0.6	9.7
Pakistan	0.6	0.7

**Sources: OECD, 2015; OECD, 2016; OECD, 2017a; OECD, 2018**

According to the WHO (2020), there is a global shortage of nurses and midwives with a world average of less than three nursing and midwifery personnel per 1000 of the population. The shortage of qualified nurses is the result of a combination of an aging and retiring workforce, longer life expectancy among the general public and limited training capacity, as shown in Figure 5.4. The demand for nursing staff has grown, amongst other things, because of the rise in the aging population. The prediction is that by 2030 senior citizens aged 65 and older would have increased by 75 per cent (Wolters Kluwer, 2017)





**Figure 5.4 Nursing Shortage**

**Source: Wolters Kluwer, 2017**

The demand for healthcare and healthcare professionals is increasing the need not only for nurses and midwives, but also for professionals responsible for training nursing staff. The importance of good patient care and the critical nurse shortage are driving innovation in countries like Japan and the United States (US). In Japan a robotic medical cart, named Terapio, was designed that makes hospital rounds, delivers medication, retrieves medical records and is seen as part of the nursing staff (Lippincott Nursing Education, 2017). In the US, robotic nurses are used in homes for the elderly to remind patients to take their medicine or for general reminders. The “nursebot”, referred to as Pearl, is a nurse robot that was developed by the University of Pittsburgh and the Carnegie Mellon University as part of a project called Personal Robotic Assistants for the Elderly (Lippincott Nursing Education, 2017). Robotic nurses are not a replacement for healthcare professionals but could aid with tedious tasks. Nurses and midwives still form the essential backbone of the health system, and long-term solutions must be considered to address nursing shortages and to educate practicing nurses.

Contemporary nursing practices are being questioned as a result of changes in patient and disease profiles, advances in medical and information technology, the shift from evidence-based practice, the need for lifelong learning professional development, the challenges of working in health care teams and the demand for ongoing health reforms (Institute of Medicine, 2011; WHO, 1988; WHO, 2000; Lane & Kohlenberg, 2010).

In response to the needs of society, the challenges of nurse shortages and the limited capacity of nursing schools, alternatives are being investigated to deliver nursing education solutions. Wolters Kluwer (2019) is, for example, partnering with the healthcare industry to adopt concept-based learning. A concept-based curriculum model prepares practicing nurses with scenarios they would encounter daily, challenging their critical thinking and reasoning skills. The rationale for a concept-based curriculum is assisting nurse educators to acquire skills to address the realities of the knowledge economy, but more importantly, to address the challenges that the health professions are facing. The benefits of a concept-based curriculum, as cited by Wolters Kluwer (2019), are:

- Help students take a more active role in their learning.
- Streamline content and eliminate content redundancies.
- Enable faculty to teach clinical reasoning skills more easily.
- Help students apply concepts from one situation to another and to make connections between concepts.
- Encourage students to see patterns across concepts and to use those patterns to deliver care and anticipate risks.

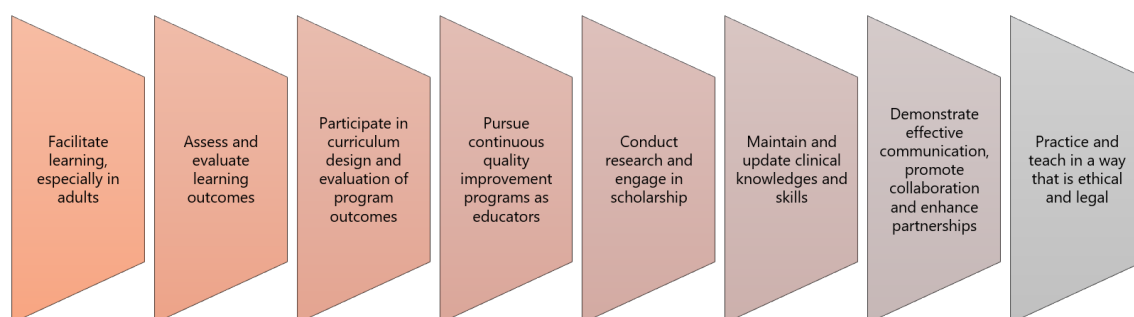
The potential benefits of a concept-based curriculum could be wide-ranging. The model reduces content repetition. There is a strong focus on the core competencies for nursing staff. Nurse educators fulfil a multidimensional role, not only in training health care workers but also in the broader health care system. Their own personal experiences enrich the way they teach and the knowledge that they can transfer to practicing nurses. The core competencies for a nurse educator, according to Halstead (2018), are:

- Facilitate learning – create an environment that is conducive for learning to achieve the desired outcomes.
- Facilitate learner development and socialisation – assist with development of nurses.
- Use assessment and evaluation strategies – use variation of strategies for evaluation and assessment.
- Participate in curriculum design and evaluation of programme outcomes – responsible to design a curriculum that incorporates the latest trends to prepare the nurses to successfully function in the health care environment.
- Function as a change agent and leader – to be able to influence nursing education and nursing practice.
- Pursue continuous quality improvements in the nurse educator's role – to have the

commitment to continuous professional development to act as advisor and role model to practicing nurses.

- Engage scholarship – realise that a vital component of the role is the teaching.
- Function within the educational environment – grasp how the political, institutional, social and economic forces influence the role and the educational setting.

A nurse educator's responsibility is also extended to making improvements to uphold nurse education, to assist students with the transitioning from a clinical to a non-clinical programme and to empower new students or novices to the profession to prosper (Nurse Practitioner Schools, 2019). A successful nurse educator requires a combination of many skills and traits. According to the National League for Nursing (NLN) and the World Health Organization (WHO), nurse educator core competencies are a combination of skills and attributes as listed in Figure 5.5.



**Figure 5.5 Nurse educator core competencies**

**Sources: Halstead, 2018; Christensen & Simmons, 2019**

The required skills and attributes demonstrate the importance of the role of nurse educators in healthcare. Their expertise allows them to identify improvement opportunities and to mitigate risks to patients, nurses and hospitals (Herzing University, 2019). A healthcare organisation depends on a nurse educator to maintain a high degree of clinical competence and assist practicing nurses to achieve a similar level of competence.

### **5.3 NURSING EDUCATION IN SOUTH AFRICA**

The call from the Lancet Commission for the reform of education for healthcare professionals for the 21<sup>st</sup> century also gave impetus to nursing education reform towards a more professional and university-based education in South Africa, which culminated in a new Framework for Nursing Qualifications (Blaauw, Ditlopo & Rispel, 2014). The improvement of nursing education has been recognised as a critical strategy for enhancing the health workforce performance and, as a result, improving the functioning of the health system (Blaauw, et al., 2014).

In SA there is an urgency to increase the number of registered nurses and midwives to provide proper healthcare to society (Geyer, 2016). The level of competency of the SA health workforce is in question, especially considering the diverse and changing needs of SA. The transformation of nursing education in South Africa includes the rationalisation of nursing institutions, changing the scope of practice and revising qualifications (Breier, Wildschut & Mgqolozana, 2009; Mekwa, 2000; DoH, 2008; DoH, 2019). However, from a legislative perspective, the scope of practice has not been amended and from a curriculum perspective, the revised education and training programmes to equip the healthcare workforce have not been approved (Geyer, 2016). The revised education and training programmes, especially for nurse educators, must be aimed at boosting health systems.

According to the South African Nursing Council (SANC, 2014: 1), Nursing Education is a “specialist field that focuses on education and training of students who are undertaking undergraduate and/or postgraduate programmes in nursing. A Nurse Educator is a professional nurse with an additional qualification in Nursing Education and is registered as such with the SANC”. Nurse educators are responsible for the teaching of nurses, and work with nursing students in the health profession. Nurse educators also design, implement and revise educational curricula and standards (Herzing University, 2019). The Nurse Educator qualification is offered by universities as a post-registration qualification that prepares nurses to be educators. The SU PGDipNE is an example of such a qualification. Qualified nurse educators are employed by nursing colleges and universities. There are currently about 10 000 nurse educators registered with the South African Council of Nursing (SANC), with only a marginal increase of qualified nurse educators year on year (Mulaudzi, Daniels, Direko & Uys, 2012).

This marginal annual increase is of great concern to the Forum for University Nursing Deans in South Africa (FUNDISA), as the global shortage of nurses and midwives would ultimately have a negative impact on patient care and come at a great cost to the healthcare industry (Mulaudzi, et al., 2012). In response to the shortage more students are enrolled, but this results in large classes. These large classes increase the student to nurse educator ratio with a knock-on effect for the standard and quality of the education and the proposed format or teaching strategy of the programme. The suggested nurse educator to student ratio is on average 1:16 (Mulaudzi, et al., 2012).

The high student to nurse educator ratio is not FUNDISA’s only concern. According to Mulaudzi, et al. (2012:1) there are other converging issues: lack of mentoring of young nurse educators, a significant number of the current experienced nurse educators who are within nine years of retirement, the programme format and structure that differ from one university to another, with consequent different outcomes in terms of the competencies of nurse educators. In addition, it is important that nurse educator programmes respond to societal needs and changes in the education environment which require a review of programme delivery to ensure relevance and

appropriateness. Kalb (2008:217) argues that the quality of preparedness of nurse educators depends on a well-balanced combination of curriculum, assessment, clinical experiential learning and qualification type.

In South Africa the nursing education system developed from a fragmented, hospital-based system to a quasi-centralised system within HEIs (DoH, 2019). The lack of equivalence in standards called for more professional and university-based nursing education to improve the overall performance of the health system. The former fragmented, hospital-based system slowly moved to a quasi-centralised system within higher education institutions (HEIs) (DoH, 2019) to standardise the offering of qualifications. The HEIs include universities, universities of technology, provincial nursing colleges and private nursing education institutions that all play a role in the education of the nursing workforce (DoH, 2019). These diverse providers, however, have their own student management systems and requirements leading to a nursing qualification. According to the DoH (2019:8), some of the programmes have not been informed by or designed around sound education principles. Issues regarding admission, progression and articulation are common, but more troubling is the failure of programme designs to include new health care developments and trends or to respond to regional or national needs. A direct consequence of these varying principles and practices of nursing education institutions (NEIs) is inconsistency in the recruitment of suitable candidates, selection processes, progression and articulation towards attainment of a full qualification (DoH, 2019).

Post-basic nursing specialisation programmes are designed to educate and train nurses to function at a higher level in a specific field of practice. However, different educational pathways lead to such specialisation qualifications. The SANC determines professional registration by area of specialised discipline and does not make a distinction based on the type of qualification (i.e., diploma, bachelor's degree, master's degree or other qualifications). All former qualifications, referred to as 'legacy nursing qualifications' as shown in Table 5.3, have been replaced with nationally comparable qualifications in nursing that have been registered on the Higher Education Qualifications Sub-framework (HEQSF) and published by the South African Qualifications Authority (SAQA).

**Table 5.3 Legacy nursing qualifications**

<b>Qualification Type</b>	<b>Duration in years</b>	<b>Professional registration with SANC</b>
Post-basic course (specialisation)	One	Area of specialisation
University degree	Four	Nurse (general, community and psychiatric) and midwife
College diploma	Four	Nurse (general, community and psychiatric) and midwife
Basic midwifery	One	Midwife
Basic psychiatry	One	Psychiatric nurse
Bridging course for enrolled nurses	Two	General nurse/psychiatric nurse
Certificate	Two	Enrolled nurse
Certificate	One	Enrolled nursing auxiliary

**Source: DoH, 2019:9**

The development of the National Qualifications Framework and subsequently the HEQSF created an opportunity to phase out these legacy programmes - a process that started in 2015 (DoH, 2019). NEIs received a notification that the last student intake into all programmes leading to national qualifications not aligned to the prescripts of NQF Act 2008 (Act 67 of 2008) and the HEQSF would be in 2019. This was published in a Government Gazette, Government Notice Number 42380 of April 2019.

The HEQSF as a unified system of higher education qualifications, including those for nursing education and training, will ensure that qualifications are updated in accordance with developments in the health and education sectors. The categories of qualifications leading to a professional registration in line with the requirements of HEQSF are shown in Table 5.4, defining the pathways for access, mobility and progression in nursing education and training career paths.

**Table 5.4 New nursing qualifications**

<b>Nursing Category</b>	<b>Qualification Type</b>	<b>NQF Level</b>	<b>Minimum Duration</b>
Registered auxiliary nurse	Higher certificate	5	One year
Higher certificate: aims to produce a nurse who will deliver basic nursing care in a variety of settings			
Registered general nurse	Diploma	6	Three years
Diploma: will enable the nurse to function as a clinically focused, service-orientated, independent registered general nurse, who can render general nursing care as determined by the appropriate legislative framework			
Registered midwife	Advanced Diploma	7	One year
Advanced diploma in midwifery: aims to produce competent, independent and critical thinking midwives who provide a wide range of midwifery healthcare			
Registered professional nurse and midwife	Bachelor's Degree	8	Four years
Bachelor's degree: aims at producing a nurse and midwife who contributes to improvement of health outcomes of individuals, families, groups and communities through providing quality, culturally sensitive and evidence-based nursing and midwifery health services			
Nurse/Midwife specialist	Post-graduate Diploma	8	One year
Post-graduate diploma: aims at producing a nurse or midwife specialist who is able to function as a clinically focused, service-orientated, autonomous, nurse/midwife specialist, able to render comprehensive scientific nursing/midwifery care, as determined by the appropriate legislative framework. This is the level where the PGDipNE is located, training specialist nurse educators.			
Advanced specialist nurse	Master's Degree	9	One year
Doctorate in nursing	Doctoral Degree	10	Three years
Master's and Doctoral degrees are either research or professional (clinical) – there are no determined equivalent professional registrations with SANC			

**Source: DoH, 2019: 10-11**

The new HEQSF makes a compromise in terms of equivalence between a general staff nurse qualification and a baccalaureate degree for professional nurses (Blaauw, et al., 2014). This is in response to the concern about a global shortage of nurses and to address the deficit in basic nursing care in SA (Blaauw, et al., 2014).

In South Africa, the evaluation of nursing education is complicated. The quality of the nurse educator impacts the quality of the nursing staff that are trained and reciprocally influences the quality and safety of patient care.

### **5.3.1 Continued Professional Development**

As an educator responsible for clinical education of nursing staff or other healthcare professionals, a nurse educator is an influential part of the healthcare system. Nurse educators are responsible for the quality of the nurses that must provide the healthcare. It is essential for nurse educators to stay abreast of the latest nursing practices and technologies, and of curriculum trends that might impact

the health profession, for the development of a relevant curriculum (Herzing University, 2019). The training of the nursing staff depends on the clinical education setting to equip them with the skills required to address the health needs of society.

The changing health services landscape involves changes in diagnostic tools and treatment methods, exponential progress in technology and extends to the changing population demographics and disease burden. This emphasises the criticality of the upskilling of health workers and the maintenance of their knowledge and skills throughout their professional careers (WHO, 2013). One such initiative is continued professional development (CPD) for healthcare workers. CPD refers to “educational activities conducted after graduation to maintain, improve and adapt the knowledge, skills, attitudes and practices of health professionals, so they can continue to safely and effectively provide health services” (WHO, 2013: 48).

CPD systems are designed to meet the learning objectives of the healthcare workforce and can be delivered in various formats, thus creating opportunities for innovation with technology, especially for healthcare workers in remote locations (Giri, Frankel, Tulenko, Puckett, et al, 2013). Effective and efficient methods must be assimilated in the educational format of CPD, like various approaches in terms of delivery mode in a blended learning format, and by using technology that matches the limited technological experience of nursing staff. Planning of the approaches must consider for example rural areas and remote locations to minimize interruption from work and to create flexibility for time sensitive schedules. To improve the overall healthcare experience, CPD systems must also be designed to meet the needs of society.

#### **5.4 STELLENBOSCH UNIVERSITY: DEPARTMENT OF NURSING AND MIDWIFERY**

The Department of Nursing and Midwifery is part of the Faculty of Medicine and Health Sciences of Stellenbosch University (SU). SU has ten faculties on eight campuses. Most of the Faculties are on the main campus in Stellenbosch, but the Faculty of Medicine and Health Sciences is located on the Tygerberg campus in the northern suburbs of Cape Town. The Department of Nursing and Midwifery offers clinical and non-clinical programmes to undergraduate and postgraduate students (Jordan, 2019). The Bachelor of Nursing degree, available since 2019, is part of the undergraduate programme. The postgraduate programmes include honours, master’s, and doctoral degrees. In addition, postgraduate diplomas are offered in Primary Health Care, Critical Care Nursing, Operating Room Nursing, Advanced Midwifery, Advanced Psychiatry, Nursing Education and Nursing Management. The Department offers most of these programmes through interactive telematic education (ITE). ITE is an education technology platform that “integrates satellite, cell phone, internet and video conferencing technology to create a modern and academically excellent virtual environment for postgraduate study” (Telematic Programme, 2019). ITE makes the University



accessible by means of technology, thereby increasing the footprint of the University both nationally and internationally.

The Postgraduate Diploma in Nursing Education (PGDipNE) is one of the programmes offered through ITE. The change in delivery mode from face-to-face to ITE showed a steady incline in the enrolment rates, but a relatively low throughput rate of 65.4 per cent from 2004 until 2009. Hence, from 2010 the programme adopted a blended learning approach, which, however, saw a further drop in the average throughput rate to 57.4 per cent. In 2014, the delivery mode of programme was amended to a combination of block contact and online delivery with compulsory workshops, with a subsequent improvement of average throughput rate to 68.4 per cent from 2014 until 2018. The year-on-year enrolments, throughput rates and graduation numbers associated with the three delivery modes of the programme are shown in Table 5.5. The rationale for the workshops is discussed as part of the SUNLearn usage.

**Table 5.5 PGDipNE delivery mode, throughput rate and graduations, 2004-2018**

	Year	Enrolments	Throughput rate by number of years in the programme			Graduations by cohort year		
			1 year	2 years	3 years	1 year	2 years	3 years
<b>Interactive Telematic Education</b>	2004	55	54.5 %	10.9 %	0	30	6	0
	2005	48	58.3 %	14.6 %	0	28	7	0
	2006	78	70.5 %	6.4 %	1.3 %	55	5	1
	2007	73	58.9 %	11 %	5.5 %	43	8	4
	2008	77	70.1 %	6.5 %	1.3 %	54	5	1
	2009	90	80 %	1.1 %	2.2 %	72	1	2
<b>Blended learning approach adopted</b>	2010	125	63.2 %	9.6 %	1.6 %	79	12	2
	2011	86	48.8 %	12.8 %	34.9 %	42	11	3
	2012	89	62.9 %	4.5 %	3.4 %	56	4	3
	2013	73	54.8 %	16.4 %	2.7 %	40	12	2
<b>Blended learning with compulsory workshops</b>	2014	94	60.6 %	10.6 %	1.1%	57	10	1
	2015	76	63.2 %	6.6 %	1.3 %	48	5	1
	2016	43	74.4 %	14 %	0	32	6	0
	2017	65	73.9 %	0	0	48	0	0
	2018	80	70 %	0	0	56	0	0

**Source: Kistner, 2020**

In the following section, one of these programmes, the PGDipNE, is discussed, focusing on the programme structure, current practices with the adoption of a blended learning approach, challenges the students experience and the characteristics of the adult learner. The current practices focus on the content design, an analysis of the primary modules of the programme, the implementation of initiatives to assist with the transition to a blended learning approach and, finally, feedback from the students. The main aim of the research project was to investigate, through educational design research (EDR), how technology could be used to improve the digital literacy of adult learners in a blended learning environment.

### 5.4.1 Programme content: PGDipNE Modules

In the following section each of the modules that are part of the PGDipNE are discussed. The rationale of the discussion is to consider the strengths, weaknesses, opportunities and threats of each of the core modules with the aim to leverage the strengths and opportunities as part of the overall enhancement of the programme. The SWOT analyses of the modules resulted from, amongst other things, the appointment of a new programme coordinator that created an opportunity to discuss the overall improvement of the PGDipNE. The lecturers of the core modules were requested by the programme coordinator to prepare a SWOT analysis of every module prior to their informal interview with the researcher. The informal interview was conducted on the 27<sup>th</sup> of June 2018 at the Tygerberg campus. The researcher was tasked with an investigation into the use of SUNLearn in the PGDipNE, also in a SWOT format. This information was used to inform the enactment phase of the ILDF.

#### a) Educational Practice

The Educational Practice module encourages critical thinking by fostering the use of observation and classification, moving to application and analysis. The outcomes of the module are centred on the enablement of students from passive listeners to active nurse educators. The module aims to develop nurse educators who are able to disseminate evidence and demonstrate the actual practice of education. A valuable element of this module is the personal experience that is gained in an appropriate work environment (Fürst & Terblanche, 2018).

The module consists of practical learning activities for the students. One section focuses on the learning log and portfolios. The students must document their experiences and reflect upon what they have discovered or what they would like to learn about. The second section consists of five teaching activities that must be evaluated by an external assessor. One of the challenges of this module is that most of the external assessors who are approached by students to evaluate their teaching activities have been out of formal education and training and are not familiar with the latest curriculum trends (Fürst, 2017). Hence, they lack the knowledge and experience to perform an informed evaluation of the students' teaching activities. The SWOT analysis of the module is presented in Table 5.6.

**Table 5.6 Educational Practice SWOT analysis**

<b>Strengths (+)</b>	<b>Weaknesses (-)</b>
Practical application of teaching and learning Students report positive experiences (aha moments, true calling) Integrated platform for PGDipNE No summative assessment	Lack of nurse educator experts to guide or do follow-ups Stand-alone module
<b>Opportunities (+)</b>	<b>Threats (-)</b>
Student exposure to the higher education environment and to trained university staff Feedback from experienced nurse educators Real world student engagement of teaching and learning Developmental intent of the module Integrated with Applied Education as a practical component – joint mark for theory and practice	Lack of buy-in from university staff to support students Varied expert opinions Experts driven by own personal philosophies

**Source: Schutte, 2018**

Even though many opportunities to improve the quality of the module exist, the lack of buy-in to support students and the shortage of nurse educators to assist with the evaluation of the practical teaching activities based on current educational paradigms, are obstacles than need to be addressed. The students fail to integrate the theory with the practical component of the content because the module is offered as a stand-alone module.

**b) Didactics**

Didactics is an important area of study in all professional teaching programmes. Didactics is a mix of theory and practice – neither theoretical knowledge nor practical skills alone are enough to develop expertise in Didactics (Hugo, 2019). Within the context of this programme, the Didactics module's strengths, weaknesses, opportunities and threats are listed in Table 5.7.

**Table 5.7 Didactics SWOT analysis**

<b>Strengths (+)</b>	<b>Weaknesses (-)</b>
Holistic approach Assessment feedback and remedial student support Learning curve and professional development Academic activity beyond subject teaching Effort to contextualise Didactics	Negative perception of students Limited reading – impact on knowledge base Time and opportunity for teaching practice limited Student study methods do not match assessment design Ill-informed and distorted idea of education at entry point
<b>Opportunities (+)</b>	<b>Threats (-)</b>
Design a delivery model to strengthen footprint Further innovation Instructional design snippets (scaffolds)	Significant attrition rate may give qualification a bad name Ability gap between NQF 6 and 8 Funding of part-time lecturers Pressure to increase student throughput whilst maintaining academic standards

**Source: Hugo, 2018**

The lack of standardisation of the nursing qualification led to students coming into the programme from varying qualification levels (NQF 6 and 8), resulting in ability gaps that have a significant impact on the quality of learning. The effect of these ability gaps is exacerbated by the students' weak knowledge base, because they are novices to Education as a field of study and struggle to apply the theory to teaching practice (Hugo, 2018). The reality is that the content must be designed to bridge the knowledge gaps while maintaining the academic standards.

#### c) Curriculum Development

Curriculum Development is the cornerstone of the programme. The purpose of the module is to develop competencies with regard to the development, design, implementation and evaluation of health sciences curricula (Fürst, 2018). This module was developed to put the following concepts regarding nursing education in perspective: nursing education in higher education, the role of the SANC in education and training of nurses, quality assurance in collaboration with the Higher Education Quality Committee (HEQC), nursing and educational philosophies, the curriculum and the role and responsibilities of the health sciences educator (Lourens, 2019).

**Table 5.8 Curriculum Development SWOT analysis**

<b>Strengths (+)</b>	<b>Weaknesses (-)</b>
Core of the programme	Novices – unfamiliar with content and concepts
Knowledge exposure at compulsory workshops	Students struggle with the philosophical component – need focus their attention and understanding
Engagement with content and concepts to be able to apply to Nursing Education	Lacks active inclusion of the nurse educator management function
Nurse educators are actively involved in the re-curriculation process	Workload too heavy
<b>Opportunities (+)</b>	<b>Threats (-)</b>
Introduction of aspects involved in curriculum development process	Heavy workload and not actively engaged as nurse educators
Sensitise to realities of accreditation visit aspects (SANC accreditation visit, HEQC online application process.)	Qualification – pie in the sky
Resource development – textbook – include current relevant examples, realities of the programme	Outdated resources
	Lack of academic interest to teach the module

**Source: Fürst, 2018**

The SWOT analysis for the module is presented in Table 5.8. As novices to the nurse educator profession, the students find the educational philosophies complex. The large number of unfamiliar theoretical concepts, understanding how to develop a curriculum, and outdated resources pose challenges to improve the module and create content that is aligned with the blended learning approach (Fürst, 2018).

**d) Educational Psychology**

Educational Psychology is a module with a key focus on adolescent and adult development. Knowledge of how adolescents and adults go through developmental dimensions assists health science educators in understanding and supporting their optimal functioning and well-being (Kempthorne, 2018). Furthermore, it can assist the nurse educator in understanding the learning process of the learner, whether he/she is an adolescent or an adult. The content of the module is valuable in a variety of situations and equips health science educators or health professionals to understand both human development and learning processes better. The SWOT analysis of this module is presented in Table 5.9.

**Table 5.9 Educational Psychology SWOT analysis**

<b>Strengths (+)</b>	<b>Weaknesses (-)</b>
Comprehensive foundational content	Labour intensive
Positive student feedback	Mark allocation does not fit the amount of work
Good results	Short module
	Personal reflections should not be used for marks
<b>Opportunities (+)</b>	<b>Threats (-)</b>
Record broadcast – YouTube	Students miss deadlines
Face-lift the study guide	Time to hand in assignments is shortly after the students have attended the broadcast, not giving enough time to go through the content
Prescribed textbook/readings	It must be evident that students understand the theory, including Turnitin and the plagiarism factor; it is difficult to determine if the students understand the content, or the students' ability to apply the theory

**Source: Kempthorne, 2018**

This is a semester module with an enormous amount of work contributing to students focusing on deadlines for assignments and not developing a deep understanding of the concepts. The content in the study guide is not updated with the latest theories and there is limited use of technology to enhance the content.

e) Applied Education: Health Care and Nursing

Applied Education: Health Care and Nursing focuses on the application of educational perspectives in nursing education, the correlation between theory and practice, the learning environment, the structuring of teaching, academic teaching strategies, clinical teaching and learning and assessment in nursing education.

f) Research Methodology

The Research Methodology module aims to equip the student with knowledge and skills of the research process, the design of a proposal for a research project and to conduct a critique of a research article. The module consists of ten study units covering the following: research in nursing, the research question and how it relates to the research process, ethics in research, critique of an article, the literature review, the research proposal, research designs, sampling, data collection and data analysis (Van den Heever, 2018).

g) Principles of Advanced Nursing Practices

This module focuses on contemporary as well as visionary aspects of ethos in the nursing profession. Professional practice is investigated to facilitate an understanding of the need for nursing

theories, philosophy, vision and mission of healthcare services. Nursing as a profession is a central theme in this module, with a focus on the control of professional practice in South Africa via legislation and the rules of practice. Knowledge of the rights of patients and professional conduct, as well as the application of ethical principles in ethical dilemmas, prepares postgraduate students for the provision of thoughtful, reflective, ethical care and leadership in the practice of nursing (Young, 2019).

The Applied Education: Health Care and Nursing module SWOT analysis is identical to that of the curriculum development module. Research Methodology and Principles of Advanced Nursing Practices are universal modules that are also part of the undergraduate programme and therefore beyond the scope of this analysis. These modules are shared between the clinical and non-clinical programmes and the focus of this research is the non-clinical postgraduate programme for adult learners.

### **5.4.2 Programme delivery mode**

According to Fürst (2017), when the PGDipNE was instituted in 1988, it struggled with low application rates with as few as six applicants for the programme. To mitigate the risk of phasing out the programme, the delivery mode was changed to distance learning. Initially this meant that students would come to campus for 'blocks' when they would receive face-to-face tuition, and the rest of the time they would be serviced by ITE. The change in the delivery mode had a positive effect on the application rate and the annual average enrolment in the programme has since been between 80 to 120 students (Fürst, 2017). The change in delivery mode did not infer a change in the design of the learning resources. ITE is used to broadcast lectures and during a broadcast session, a student can ask questions using an SMS. Each enrolled student also receives a printed study guide for each module. The study guide contains a breakdown of the module with an introduction to the specific module, expected outcomes, outline of the content, assignment topics and other assessment requirements, quizzes, and suggested timeframes for completion.

The combination of ITE and contact sessions attracted students from beyond the borders of South Africa, which not only altered the demographics of the student population, but also increased the complexity of lecturer/student engagement brought about by differences in international time zones and distance learners being more dependent on the support of lecturers. In order to enhance the student experience, the programme subsequently adopted a blended learning approach. The blended learning offering incorporates face-to-face sessions, ITE, podcasts, SUNLearn, emails, WhatsApp, skype and chat forums (Fürst, 2017). The change in the delivery mode from contact tuition to blended learning challenged the traditional learning and teaching methods used for programme delivery and surfaced the diverse needs of the enrolled adult learners.



In 1998 Stellenbosch University, in collaboration with the University of Pretoria, the Potchefstroom University (now the North-West University) and the University of the Free State embarked on an investigation into learning management systems (LMS) (Kistner, 2019). An LMS is a software application for the administration, documentation, tracking, reporting and delivery of educational courses (Ellis, 2009). Stellenbosch University and the University of Pretoria decided to implement WebCT 1.8. WebCT (Course Tools) is used by many campuses worldwide for e-learning (Kistner, 2019). With the implementation of WebCT, training was arranged for the telematic services staff who in turn provided training to the lecturers and programme administrators.

By 2003, there had been significant growth across SU in the adoption of course modules into WebCT, to such an extent that the amount of data could not be accommodated on the WebCT version that was in use at that time. Because that version of WebCT could not scale, and because there was so much data, the application was unstable (Kistner, 2019). The scalability issue led to the initiation of an eCampus project, involving a bigger stakeholder group to test the WebCT Vista version of the application. WebCT Vista was implemented in 2006, even though it contained software bugs and the limited storage space could result in the same scalability problem in the future. The WebCT Vista application was the first application that required a load balancer. A load balancer is a methodical and efficient distribution of network or application traffic across multiple servers (Citrix, 2019), generated by the activities and content uploaded by the various course modules.

In 2009, an LMS running on Blackboard and known at SU as Webstudies was adopted as part of the distance learning mode for the PGDipNE. For many of the Nursing students, accessing Webstudies was a major obstacle because of poor infrastructure and lack of connectivity. During the first semester of 2009 (Fürst, 2017), the poor infrastructure and connectivity issues led to students failing to complete their online quizzes. These obstacles forced the Department of Nursing to act and with the help of a learning management system administrator Moodle, an open-source learning management system, was implemented as a pilot in 2010. In the Department of Nursing the LMS was referred to as 'Virtual Nurse'. In the second semester of 2010 the students were able to complete their online quizzes and limited problems were experienced with connectivity (Faasen, 2018). Upon receiving positive feedback from the students about the pilot implementation of Virtual Nurse, all the course modules of the Nursing Department were gradually migrated to Virtual Nurse. Towards the end of 2011 the entire Nursing Department was using Virtual Nurse as LMS

During the same period, WebCT was bought by Blackboard. Initially it was planned that WebCT Vista and Blackboard would merge into one version, but it soon became apparent that WebCT Vista would cease to exist (Kistner, 2019). The complications identified and experienced by the Department of Nursing escalated to the rest of the campus that was still using WebCT. The University had to re-evaluate its options, and after a thorough investigation decided to switch to Blackboard

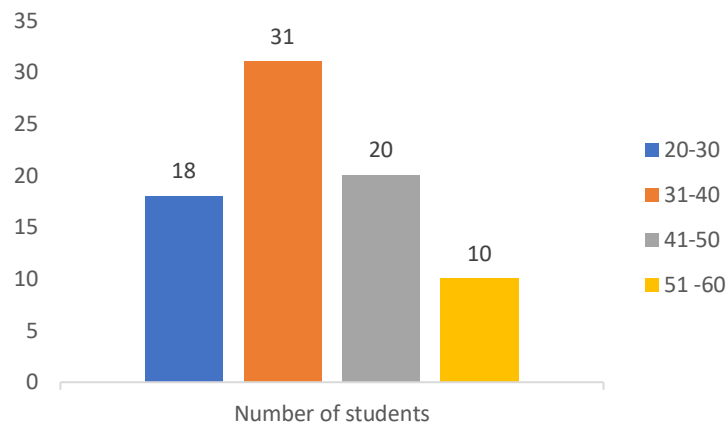
(locally known as Webstudies). Webstudies was implemented towards the end of 2011 and the beginning of 2012. Even though there were many issues with Webstudies, the dependency on internet browsers forced the migration to Blackboard 9.1.

After the successful migration of all course modules of the Nursing Department to Virtual Nurse, other challenges surfaced. The adult learners re-entering HE had limited or no exposure to using an LMS as a learning platform and lacked the basic digital literacy skills to, for example, complete assignments with the required software applications. The adoption of Virtual Nurse as an LMS did not infer that the study material or content was designed to accommodate the blended learning approach or delivery mode (Crowley, 2018). Even though the PGDipNE succeeded in increasing the number of applications as a result of the change in the delivery mode to a blended learning approach, 15 of the 95 students dropped out, with 30 per cent of the students (24 out of the 80 remaining students) who qualified for the examination (summative assessment) failed the module (Fürst, 2017).

In 2013 Blackboard 9.1 was implemented at SU, but only for first-year modules. The rest of the programmes were still running on WebCT Vista. At this stage the University was managing three LMSs, namely WebCT (running on WebCT Vista), Webstudies (running on Blackboard) and Virtual Nurse (running on Moodle). The switching between the various LMS applications created frustration for the lecturers and resistance to fully adopt the LMS as a learning environment. The turbulence created because of the instability of the other LMSs and problems with scalability, provided Moodle with an opportunity to become a robust LMS and one of the most popular learning platforms worldwide (Moodle, 2019). The pilot of Virtual Nurse on the Moodle application provided the University with the necessary evidence that the application could be used on a wide scale (Kistner, 2019). Most of the courses were migrated to Virtual Nurse, which was renamed SUNLearn, as the only official LMS at the University.

### **5.4.3 PGDipNE student demographics**

A traditional student typically enrolls to study full-time after completing high school. Such a student is dependent on parents or family for financial support, has no major responsibilities like dependents or a job and is usually between 18 and 22 years old (Choy, 2002). However, the profile of the students in the PGDipNE programme differs markedly from that of 'traditional' students. Firstly, these students, being postgraduate students, are significantly older and fall into the age group between 25 and 58 years, as illustrated in Figure 5.6. From the age distribution, it is clear that the student population registered for the PGDipNE programme can be typified as adult learners.

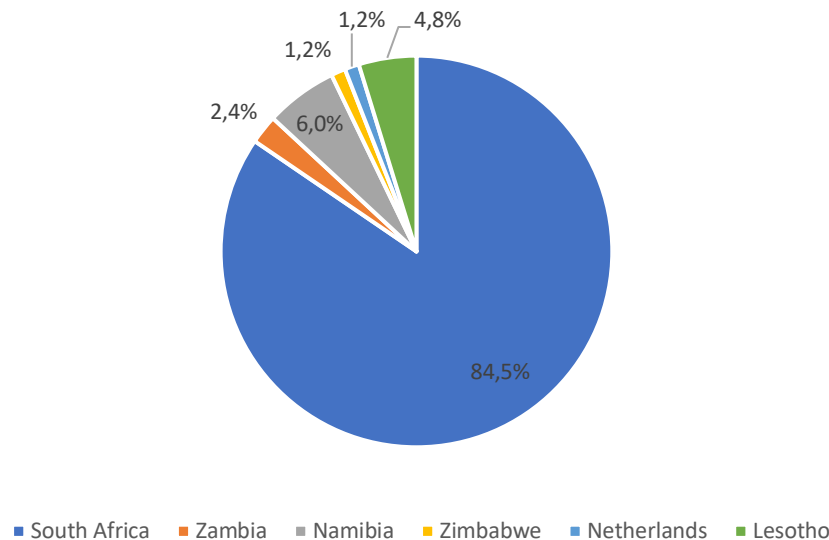


**Figure 5.6 Distribution of student population according to age group, 2018**

Another notable characteristic is that 41 out of the 80 students (51 per cent) who registered in 2018 was first time registered students at Stellenbosch University (Kleinhans, 2018). This means that 51 per cent of the students had a qualification or qualifications from other institutions. Hugo (2018) describes the situation as “an ability gap between the different qualifications” because NEIs each had their own requirements regarding the standards leading to a nursing qualification (DoH, 2019). Furthermore, historical disadvantages still affect some HEIs, resulting in challenges such as poor infrastructure, lack of appropriate teaching facilities and resources, underqualified and limited numbers of teaching staff and low student achievement (DHET, 2013).

According to the DoH (2019:8), some of the programmes offered by the diversity of nursing education providers were not informed by or designed around sound education principles. Issues regarding admission, progression and articulation were common, but more troubling was the failure of programme designs to include new developments and trends, and to adequately respond to regional or national needs. A direct consequence of these varying principles and practices of nursing education institutions (NEIs) was inconsistencies in the quality of the diplomates and graduates produced by these institutions (DoH, 2019).

Thirdly, because of the delivery mode of the PGDipNE programme, students beyond the borders of SA are also enrolling for the programme, as shown in Figure 5.7. The implications of a more international cohort of students are not only the international time zone differences that impact the engagement between lecturer and student, but also the quality or availability of the necessary infrastructure for proper internet connectivity.



**Figure 5.7 Nationality of students, 2018**

Most of the registered students for the programme are South African (84.5 per cent), but even this is not a guarantee that all students have access to the internet. Internet access is critical if information and communication technology (ICT) has been integrated into the teaching and learning. Access to the internet creates a myriad of possibilities, but challenges in this regard can also be an obstacle leading to exclusion from opportunities for learning (Mbizule, 2017).

#### **5.4.4 PGDipNE practices**

The adoption of the blended learning approach did not infer that the lecturers were able to create content fitting the blended learning approach or the delivery mode. These lecturers depended on the knowledge and expertise of the Teaching and Learning Support Team at the main campus in Stellenbosch to assist with technical support on SUNLearn. The information about what activity or resources can be used to develop or create content on SUNLearn is not a facilitated process, and often lecturers are ill-equipped to successfully use the available activities or resources to enhance the learning content for a blended learning environment (Crowley, 2017).

The rapid enhancement in technology, the update of SUNLearn to the latest version of Moodle every six months, as well as the plethora of applications that were available left the lecturers overwhelmed and they struggled to find a balance between teaching and staying abreast with the features and functionality of the applications that they needed to master. They were often unaware of the enhancements on the SUNLearn platform and how these enhancements could add value to their modules. Some lecturers explained that, even after attending a blended learning course, they still found it daunting to develop content conducive for a blended learning environment because the theoretical knowledge they acquired could not be put into practice (Crowley & Young, 2017).

This led to the continuation of traditional teaching methodologies without consideration for educational technologies that could be incorporated. The students were provided with hard copy study guides that outlined the study units, assignment guidelines, quizzes and general information for each of the modules. In contrast, the students were able to use SUNLearn as an online learning platform to manage their programme. The lack of integration between the study guides and SUNLearn made it impossible for the lecturer to track a student's progress or activity on SUNLearn (Fürst, 2017). SUNLearn was primarily used for announcements, completion of the quizzes, electronic uploading of assignments and uploading the study guide. The study guide was reprinted year after year, but the internet references that were part of the guide were not updated and students were not able to find the required internet resources to complete assignments. These enquiries were often referred to the programme administrator. During the interview with the programme administrator (Kleinhans, 2018), she explained that she was not able to assist the students with support for SUNLearn because she found the platform difficult to use.

There was no rubric for the programme that provided each lecturer with a protocol or best practices for each module. The lack of standards led to duplication of terminology used and the naming convention of files for the same content caused students to download the same file multiple times. The inconsistent use of terminology impacted the number of enquiries that the programme administrator had to deal with. The use of SUNLearn was not mandatory and communication with the students differed from one lecturer to the next, leading to misunderstandings about what SUNLearn was used for and what not (Fürst, 2017). The examination dates and broadcast dates were provided in hard copies that were uploaded for the entire Department of Nursing and Midwifery. Each student had to work through all the information to draw up a schedule of the dates and activities that were applicable to the PGDipNE.

#### **5.4.5 SUNLearn usage**

As part of the investigation the programme coordinator, Mrs. Fürst, requested me to do a SWOT analysis of the PGDipNE SUNLearn environment. As programme coordinator, she wanted to understand the strengths of an LMS and how the PGDipNE lecturers could improve the usage of SUNLearn. After reviewing all the PGDipNE modules and practices, the summary of the findings of the SWOT analysis is shown in Table 5.10.

**Table 5.10 PGDipNE SUNLearn SWOT analysis**

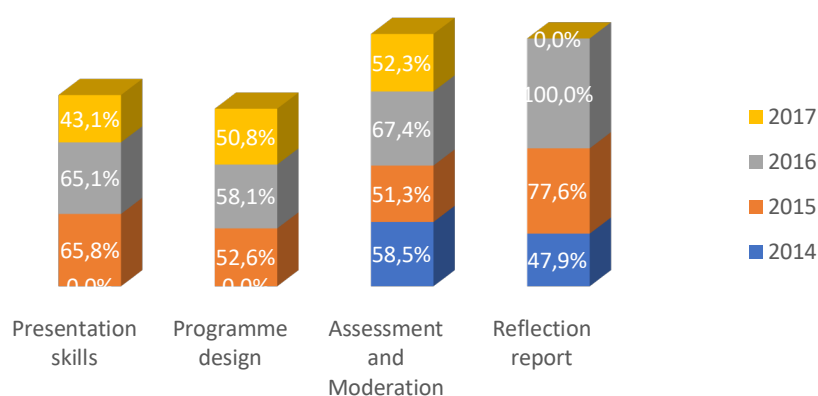
<b>Strengths (+)</b>	<b>Weaknesses (-)</b>
SUNLearn provides a central and manageable system for training and content distribution	Lack of governance and standards
Offers flexibility of access from the workplace or home	Lack of engagement from staff to use SUNLearn
Ability to manage, deliver and track progress	Limited integration between study guides and published information
Use activities to create social interaction or professional learning communities	Lack of quality control for the training material
	Lack of IT skills for SUNLearn
<b>Opportunities (+)</b>	<b>Threats (-)</b>
Create a student-centric platform	Slow to respond to the changing needs of a diverse student population (adult learners)
Rise of mobility – giving student access from anywhere	Social networking tools or apps
Social and information learning trends	Creation of instructional design content is time consuming
Adaptive learning for student tracking	Changing dynamic of the higher education environment
Create content to fit the delivery mode	

The strengths of the SWOT analysis focus on the benefits for the University of having an LMS. The threats focus on some of the concerns raised by the programme coordinator, for example, slow to respond to the changing needs of the adult learners. The students started looking for the seamless interaction they had experienced using social media apps, with the expectation that they could interact in smaller groups with the same functionality as with social media apps. The format of the content had to fit the delivery mode of the programme but creating instructional design content was time consuming. The students as well as the programme administrator shared that there was a lack of technical support, especially if they did not understand how to use SUNLearn.

Fürst (2018), the programme coordinator of the PGDipNE and Hugo (2018), the part-time Didactics module lecturer, were concerned about the throughput rate of the programme. Fürst and Hugo (2018) employed several interventions as strategies to improve student success after receiving feedback that the students found the academic support inadequate. One of the strategies was to select three themes from the Curriculum Development module, the Didactics module and the Applied Education module that would add value to the students' understanding in the form of in-contact workshops. The rationale was to help the students to develop a better understanding of the interrelatedness between the modules (Fürst & Hugo, 2018). The workshops that were introduced were poorly attended and the lecturers found that the students' academic performance improved only marginally. It became evident that the students who failed to attend the workshops were lagging in their understanding of the nursing and educational philosophies; hence attendance of the workshops was made compulsory. To promote active learning and meta-learning (analysis, critical

thinking, etc.), the students had to write a compulsory reflection report after every workshop (Fürst, 2017). Another reason for the compulsory workshops was to create opportunities for small group activities that could enhance collaborative learning and build learning communities (Fürst, 2017).

After the implementation of initiatives, like making the attendance of the workshops compulsory to improve student participation, the situation from 2014 to 2017 transpired as shown in Figure 5.8. The number of students who enrolled for 2014 was 94. The first two workshops on Presentation Skills and Programme Design were not attended by any of the students, even though attendance of the workshops was compulsory.



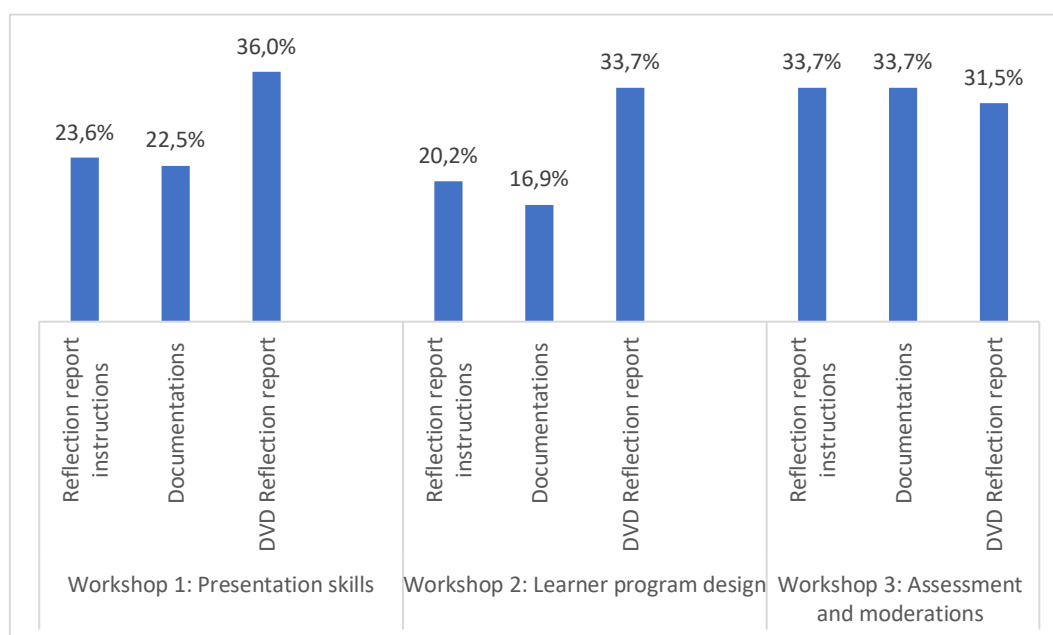
**Figure 5.8 Workshop attendance and report submission, 2014 - 2017**

The Assessment and Moderation workshop was attended by 58.5 per cent of the students in 2014, but only 47.9 per cent of the students submitted a reflection report. However, even with only 47.9 per cent of the student submitting a reflection report, 60.6 per cent of the cohort graduated. These students used the DVD of the workshops as a reference to write the reflection report. A reflection report not only fosters, but also assesses the student's capacity to disseminate content in nursing education (Fürst, 2017).

In 2015, 76 students enrolled for the PGDipNE. The workshop attendance remained similar to that of the previous year, while 77.6 per cent of the students submitted their reflection reports. The enrolments declined by 43.4 per cent (from 76 students to 43 students) in 2016, with an increase in workshop attendance and with all students submitting their reflection reports. The proportion of students who graduated in 2015 was 63.1 per cent. In 2017, there was an increase of 51.2 per cent in the enrolments (from 43 students to 65 students) for the PGDipNE, though the workshops were still poorly attended. The first workshop on Presentation Skills had an attendance rate of 43.1 per cent, the workshop on Programme Design had an attendance rate of 50.8 per cent, and the attendance rate for the Assessment and Moderation workshop was 52.3 per cent. This student cohort did not submit any reflection reports, with 73.9 per cent of the cohort graduating within

minimum time. Since the implementation of the compulsory workshops there has been an increase in the throughput rate compared to 2014, even though the student cohort have not been submitting their reflection reports.

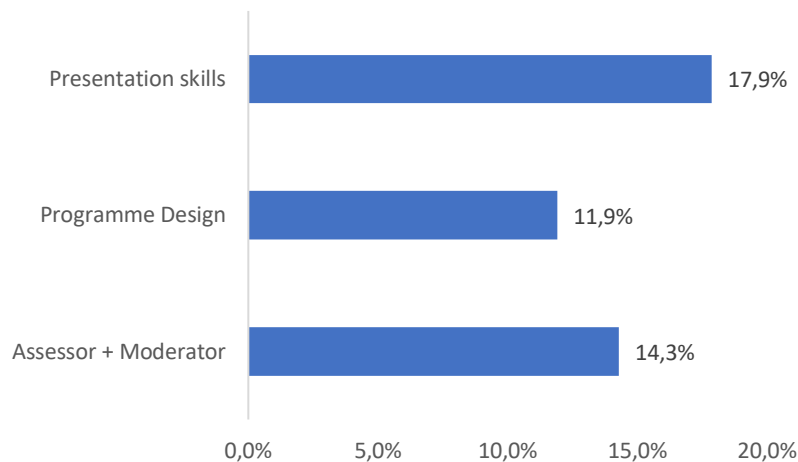
There was a slight increase in enrolments in 2018, with 80 students applying for the programme. In 2018 the overall pass rate was 70 per cent (Fürst, 2018). The 2018 data of students who accessed the resources (reflection report instructions, documentations and DVD reflection guide) in preparation for the workshops, who wrote the reflection reports or who viewed the recordings is shown in Figure 5.9. For the first two workshops, between 15 and 25 per cent of the students downloaded the documentation in preparation for the Presentations Skills workshop and the Programme Design workshop, but between 30 and 40 per cent of the students accessed the recordings of these workshops. The preparation, instructions on how to write a reflection report and the recordings of the workshops were accessed by 30 per cent of the students. The last workshop was focused on the completion of the programme and preparation for the final examinations. The students attempted to work through most of the documentation in preparation for the final examinations or requested the assistance of the lecturers to work through the learning resources (Fürst, 2018).



**Figure 5.9 Utilization report of workshop resources, 2018**

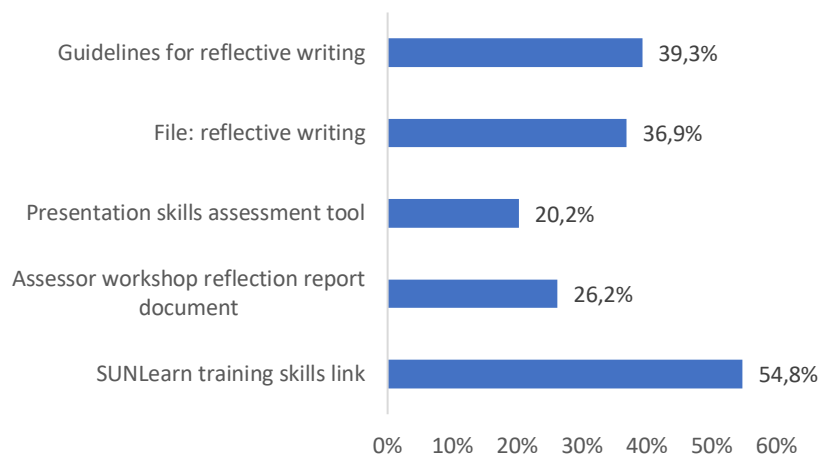
From Figure 5.9 it is clear that, in most cases, the usage of the available content or guidelines was extremely low. On average, less than 40 per cent of the students attended the workshops and even fewer accessed the content to assist them in writing the reflection reports or accessed the recordings of the workshops. The numbers of students who used SUNLearn to upload their assignments for the respective workshops are illustrated in Figure 5.10.





**Figure 5.10 SUNLearn assignment submissions, 2018**

With a pass rate of only 55,9 per cent and an electronic submission rate of between 10 and 20 per cent, it is clear that the programme was not meeting its objectives. Students who were struggling to upload their assignments requested the assistance of the programme administrator or simply requested an extension for the submission of the assignments (Kleinhans, 2018). The available resources, as explained above, were either general guidelines, training videos or how-to guides, but according to the usage activity log, the number of students accessing the resources were, as shown in Figure 5.11, very low.



**Figure 5.11 Usage activity by resource, 2018**

The outlier on the graph is the 54.8 per cent of the students accessing the SUNLearn training skills link on a regular basis. This resource was created to assist the students with the orientation to SUNLearn and to provide the students with training in a specific resource. This outlier was not only an indication that the students still required training, but also alerted the lecturers to the fact that the students were struggling. The presentation skills assessment tool, accessed by only 20.2 per cent of the registered students, provided guidelines for assessment so that the students could understand

how they would be assessed. The assessor workshop reflection report had to be handed to the assessor for the marking of the teaching activities. The results indicated that only 26.2 per cent of the students viewed or downloaded the instructions for the assessor. During the discussion with the programme administrator (Kleinhans, 2018), it transpired that most of the reports from the assessor were incomplete or they did not understand how to assess the teaching activities.

The PGDipNE that was the focus of this study had adopted, at the time of the investigation, a blended learning approach that included ITE, SUNLearn, podcasts, on-campus workshops and social media like chat forums, WhatsApp, etc. Blended learning is defined as a combination of traditional f2f [face to face] modes of instruction with online modes of learning, drawing on technology-mediated instruction, where all participants in the learning process are separated by distance some of the time" (Siemens, Gašević & Dawson, 2015:62). Separation from campus by distance is a given for the PGDipNE students. It is therefore imperative that technology mediated instruction is facilitated to support these students, especially as they had been out of formal education for some time.

## **5.5 CONCLUSION**

From a call for reform towards a more professional and university-based education for the nursing profession, this chapter has highlighted the complexities surrounding nursing education and training. The call for the overall improvement of nursing education can strengthen health systems and assist with the global shortage of health professionals amidst the challenges of new phenomena like the Covid-19 pandemic. Ten years ago, the Lancet Commission called for the reform of nursing education, but more critically proposed a shared vision that can extend beyond the limits of national borders. The connections between education and health systems revolve around the needs of the society and should result in enhancing the health profession.

After shedding light on nursing education and training, the PGDipNE was contextualised by discussing the current educational practices, usage of SUNLearn and the underlying factors contributing to the complexity of the educational setting. The PGDipNE adopted a blended learning approach, but for various reasons the utilisation of technology for the programme has not been fully explored by either staff or students.

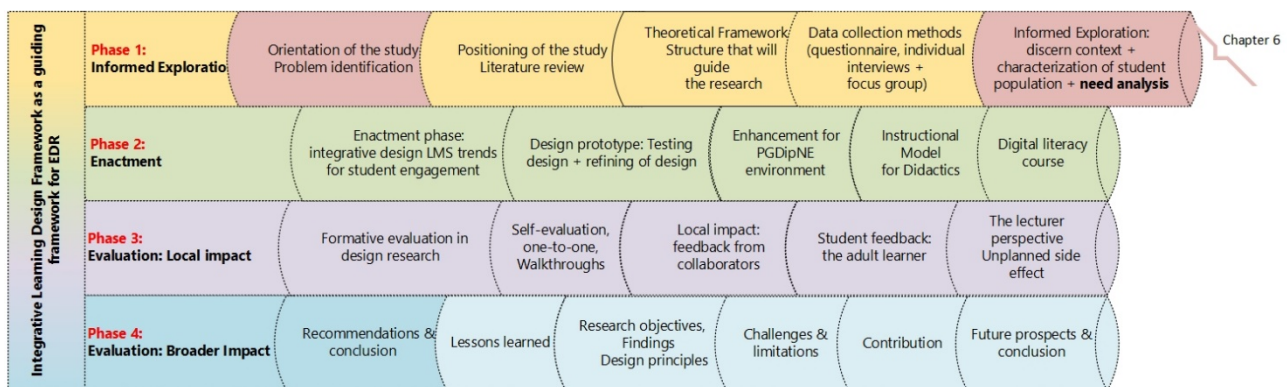
Research objective one required the researcher to determine the level of digital literacy competencies required in a blended learning environment, which implies a minimum adoption to determine how to enhance the competencies. The structure and design of the programme needed to be reconsidered to create a student-centered platform that would enhance the digital literacy not only of the adult learners, but importantly also the development of lecturers. The rapid advancement in technology and rate of change requires stakeholders to stay abreast with the technology advancements in HE. In the following chapter I shed light on the educational environment and factors influencing technology adoption.

## CHAPTER 6

### INFORMED EXPLORATION PHASE – NEEDS ANALYSIS

#### 6.1 INTRODUCTION

In the previous chapter, light was shed on the educational environment of the situated context to understand the teaching and learning methodologies that were employed as part of the blended learning approach. In this chapter the informed exploration phase of the research is discussed with the goal of understanding what factors were influencing the acquisition of digital literacy by the adult learners in the PGDipNE. The informed exploration phase included a survey, in the form of an online questionnaire, to gather information on the students' current level of exposure to technology and to determine their digital literacy level. Figure 6.1 positions this process as part of phase 1 within the research study.



**Figure 6.1 Positioning of needs analysis as part of Phase 1: Informed Exploration**

**Source: Adapted from Bannan, 2010, n.p.**

The survey results were analysed and used as a departure point for focus group discussions. The focus group discussions, informed by the results of the questionnaire, added richness to the informed exploration phase and provided insight into the shared, personal experiences of the participants in this research project. Finally, the implications of the informed exploration phase are discussed to attend to how the utilisation of educational technologies can be exploited to enhance the educational setting of the PGDipNE.

#### 6.2 SURVEY RESULTS

From the characterisation of the participants (see 5.4.3 in Chapter 5), we have learned that this group of students came from a vast array of diverse social and economic backgrounds and nationalities. The students of this group were between 25 and 58 years of age, and for almost 50 per cent of them the enrolment in the PGDipNE was their first encounter with Stellenbosch

University. Furthermore, in the bigger context of Nursing Education and Training, the students' academic background reflected the disparities that existed around nursing education and the attainment of a nursing qualification (DoH, 2019).

Taking into account the academic disparities, diverse background and the fact that almost 50 per cent of the participants were first-time entrants at Stellenbosch University, a comprehensive questionnaire was compiled. The self-assessment questionnaire (Addendum F) was divided into eight sections to obtain a self-assessment of the students' competence in the following components:

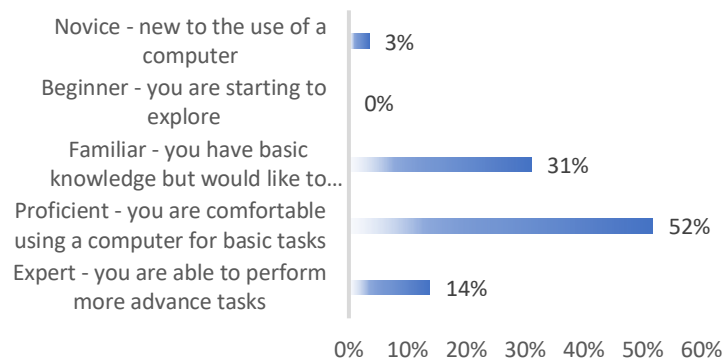
- Computer basics
- Internet Browsing
- Using email as a communication tool
- Using Microsoft Word to create documents
- Using Microsoft Excel to create a workbook
- Using Microsoft PowerPoint to create a presentation
- Security
- SUNLearn basics.

For most of the sections the questions were asked in a matrix format with a three-point Likert scale. The questionnaire was distributed to 77 respondents of the 2018 cohort who were new to the programme. The survey had a response rate of 38 per cent (29 respondents). Two respondents did not give consent, and consequently their responses were not included. The results of the survey for each of the sections are illustrated with bar charts, followed by the interpretation of the findings. At the end of the questionnaire, the students were asked if they would be willing to participate in the evaluation of the technology-based intervention. The students who indicated that they were willing had to provide their contact details, but with the assurance that their details would be kept confidential.

### **6.2.1 Computer Basics**

The PGDipNE is delivered in a combination of block contact and online delivery, therefore the first part of the questionnaire included a general section about students' access to a device, their level of comfort using a device and their ability to operate the device to perform elementary tasks. The significance of the questions is related to the structures, expertise and experience the Department of Nursing and Midwifery has to consider when creating a support team for the PGDipNE. Considering the profile of the students, it was important to estimate how comfortable these students were with using a device and to obtain a self-assessment of their competence.

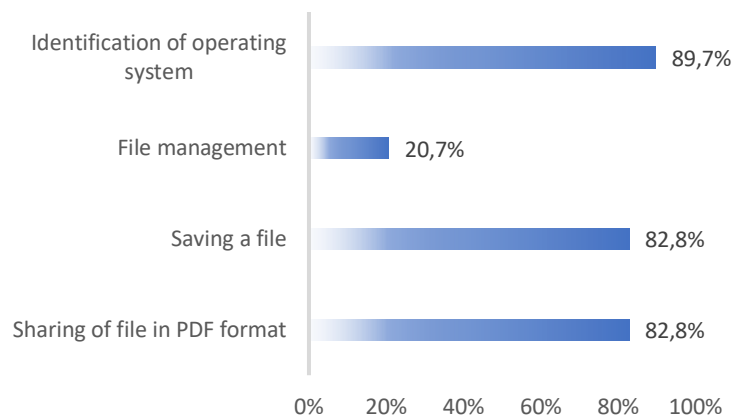
The respondents were requested to rate their level of skill with the use of a computer. The rating scale ranged from novice to expert. Each alternative was explained with a short description to avoid any confusion or ambiguity. Figure 6.2 illustrates that 31 per cent of the respondents rated their level of skill as familiar, i.e., having the basic knowledge but would like to learn more, while 52 per cent rated their level of skill as proficient, meaning that they were comfortable using a computer for basic tasks. Fourteen per cent regarded themselves as experts.



**Figure 6.2 Skills level in using a computer**

Of this group of students, 93.1 per cent owned a device (laptop with stable internet connectivity) and 6.9 per cent had access to a device. The access to a device is important because the students are required to complete assignments electronically, and some of the modules specify the application that must be used for the electronic submission.

The next question enquired about the respondents' familiarity with some computer basics. The results are shown in Figure 6.3. These students would require remote support, should they experience any technical difficulties with either their devices or with SUNLearn. Remote support is a service that permits IT Divisions/Departments or Technical Support staff to assist end-users to remotely solve computer related problems (ezTalks, 2020).



**Figure 6.3 Understanding of computer basics**

For remote support to be implemented successfully, the participants must be able to perform, with guidance, basic tasks or provide accurate information about their devices. One of the basic functions include the management of their files and how they organize their folders, how to save their documents and in which format their documents must be saved to successfully upload them to SUNLearn. The managing of files and folders is driven by the file manager application called File Explorer (in previous versions of Windows knows as Windows Explorer) (File Explorer, 2019).

The results indicate that only 20.7 per cent of the participants had a basic understanding of a significant function such as file management. The inference from the results is that the majority of the participants, namely 79.3 per cent, would require assistance and would direct enquiries to the programme administrator. This inference was confirmed by Kleinhans (2018). According to Kleinhans (2018), the most frequently asked questions involved basic navigation, file management and how to upload files in the correct file format to SUNLearn.

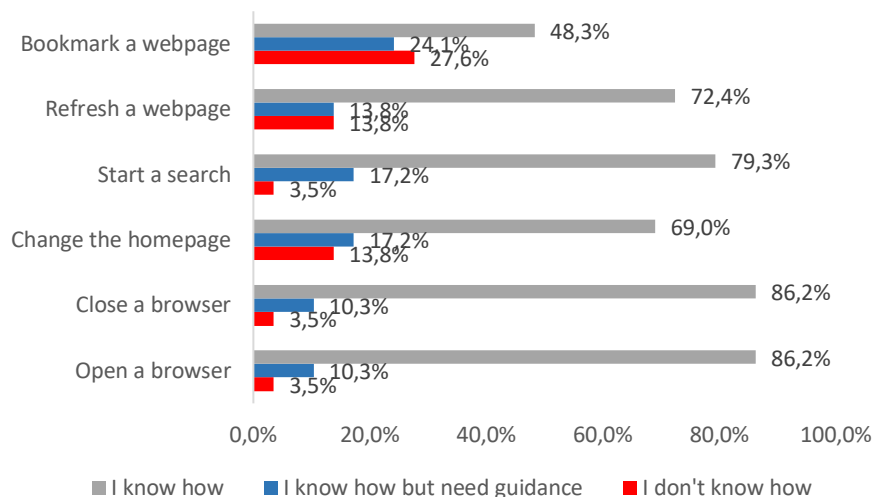
### **6.2.2 Internet browsing**

The Internet Society (2017, n.p.) describes access to the internet as “a doorway to a wealth of information, knowledge and educational resources, increasing opportunities for learning in and beyond the classroom”. The availability of the internet, in combination with authoring tools that are supported by the internet, allows for the creation of interactive educational resources in suitable formats for the required delivery mode. Most of the content included in the modules of the PGDipNE requires the availability of internet access to do research, download content, or to perform searches for prescribed readings or articles.

Students must not only be able to browse the internet, but also understand how to refine their searches if they are looking for specific resources pertaining to each of the modules. Hence, the basic functions of internet browsing need to be understood. The basic functions that are important

for this programme are shown in Figure 6.4, with the associated response to each of these functions. A bookmark is a saved shortcut to a specific webpage. The bookmark stores the title, link and icon of the webpage allowing for quick and easy access (TechTerms Computer Dictionary, 2019).

According to the responses, 51.7 per cent of the participants would need guidance or did not know how to create a bookmark. For a programme like the PGDipNE, the appropriate use of the internet for accessing articles, prescribed readings, and other resources, and being able to create a reference list for assignments, are important. According to Schutte (2018) most of the students require training to do proper referencing, or to create an internet reference bookmark for future reference.



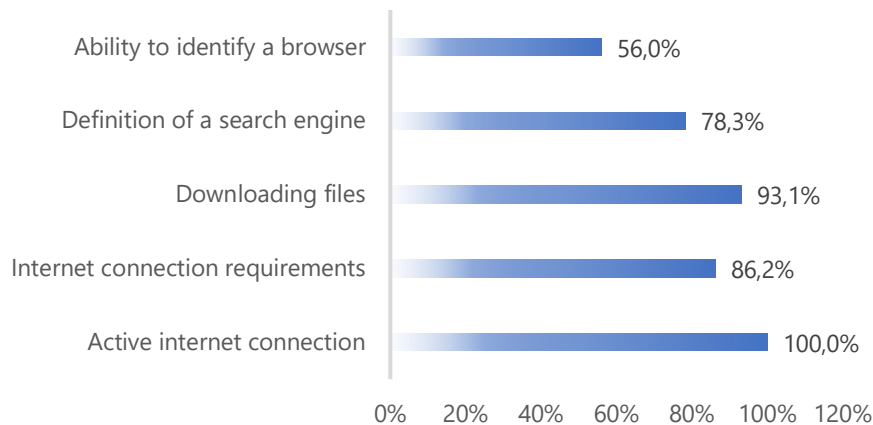
**Figure 6.4 Understanding of Internet browsing basic functions**

A home page is an entry point of a website (TechTerms Computer Dictionary, 2019). The importance of the homepage item relates to the design of the study guides and how the information for some of the modules is published. The links to the articles or readings are static web addresses and the students themselves must do the navigation. From the responses it transpired that 31 per cent of the respondents required guidance or did not know how to change the homepage of a browser. Yet, the PGDipNE is heavily dependent on the students' ability to find the appropriate resources.

The responses to the matrix, which are summarised in Figure 6.5, were validated with the addition of subsequent questions. For verification of the answers provided by the respondents in the matrix questions were included on their ability to identify a browser, to download files, to understand what a search engine is, as well as the requirements for an active internet connection and the meaning of an active internet connection

Some internet browsers are associated with specific operating systems. An operating system is the software that communicates with the device and allows other programmes to run (Christensson, 2016). The identification of the browser in the setting of the University is important, because the

library services, HR systems and students' resources only work with specific internet browsers. The services will only display accurately if the associated internet browser is used. Based on the responses, one can conclude that 44 per cent of the students would only use the internet browser that they are most familiar with. The installation of other specific browsers would require technical support. The IT support function is a distributed function across the University. This not only complicates communication but impedes the integration of resources used by students



**Figure 6.5 Verification of general knowledge of internet browsing**

The downloading of files is closely connected to the ability to bookmark a specific webpage that could be used as a reference in an assignment. The responses indicated that 93.1 per cent of the participants understand the concept. Comparing this to the less than 50 per cent of the participants (Figure 6.4) who indicated that they were able to bookmark a webpage, explains why the lecturer (Schutte, 2018) highlighted, during the interviews, that students made mistakes with referencing in their assignments.

A search engine creates indexes or large databases of web sites that locate relevant sites if a search term or phrase is entered by a user (TechTerms Computer Dictionary, 2019). The library services also use search engines for educational resources. Using the correct search engine not only provides access to the largest number of the most appropriate resources, but also ensures that the best resources for academic purposes are included. Most of the participants were familiar with what a search engine is used for, but not with the use of Boolean search to improve their results. According to Beal (2020), a Boolean search is defined as a type of search allowing users to combine keywords with operators to further produce more relevant results.

Access to SUNLearn or other services on the University website requires an active internet connection. The results, as shown in Figure 6.5, indicate that 86.2 per cent of the participants understood the prerequisites of an active internet connection. The complexity is related to the security configuration when working from various locations (between home, work and university, for



example) and understanding the requirements to connect to the network to be able to access the internet. Accessing their learning resources from anywhere, and especially if they need to connect to the broadcast sessions, requires students to understand the security and internet protocols at the various locations.

Internet connections must preferably be secure to safeguard students from falling prey to cybersecurity threats. When troubleshooting computer related issues, a logical process needs to be followed. Many complexities lie in the infrastructure and software configurations that access different directories and if a logical process is not followed, resolving the issue could be difficult for students. From the discussions with the students and the programme administrator, it became clear that the students did not always use the correct terminology when they reported problems or requested assistance; this complicated assistance and required someone to guide the student to the appropriate division to provide the required assistance.

### **6.2.3 Software applications**

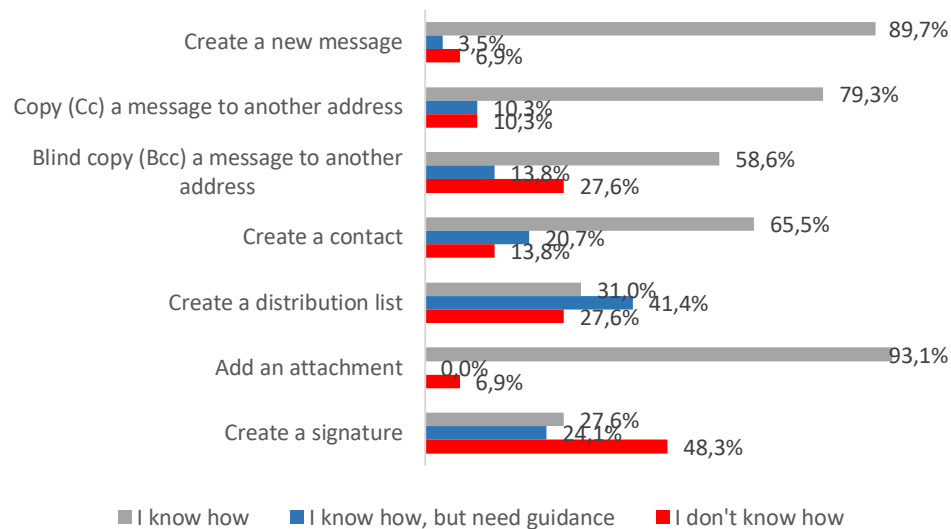
Stellenbosch University has a Microsoft Enrolment for Education Solution in place that offers students the Windows and Microsoft Office suite for free for the duration of their studies. Students are also able to purchase the software at a fraction of the commercial prices. The Microsoft Office suite is part of the standard software profile of the University and is supported by the Information Technology Division. Questions on the basic functions of each of the applications used by the Department of Nursing (email, Word, Excel and PowerPoint) were included as part of the questionnaire.

#### **6.2.3.1 Using email as a communication tool**

Microsoft Outlook is a personal information manager that is part of the Microsoft Office suite that is most often used as an email application, but also includes a calendar, task manager, contact manager, note taking, journal and web browsing functions (Microsoft Outlook, 2019). Email is the preferred method of communication for most of the lecturers in the PGDipNE programme. The staff complement of this programme includes part-time lecturers who only have access to their email for limited periods of time. Notifications from SUNLearn are sent as emails to the email address that was defined as the default address by each student. The students have an option to change their default email address on their SUNLearn profile. Seeing that email is such an important communication tool, questions on basic functions of email were asked, configured in a matrix format with a three-point Likert scale.

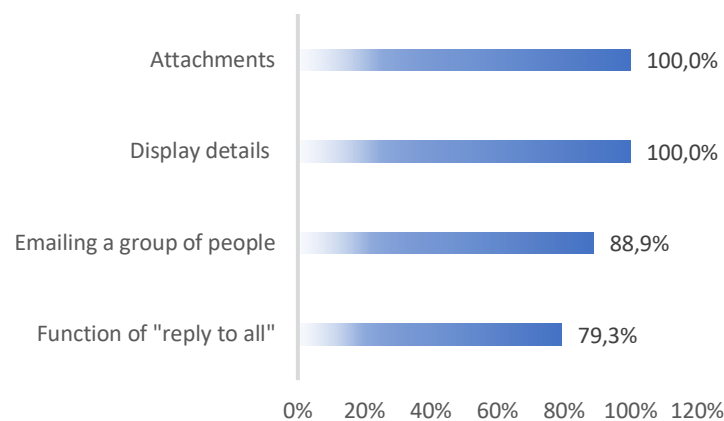
The basic functions included creating a new message, copying a message to another address, blind copying a message to another address, creating a contact, creating a distribution list, adding attachments, and creating a signature. These functions were included as part of the needs analysis

to determine if this application should be included in the design of the interventions. Figure 6.6 provides a summary of the results of the items on basic functions of email.



**Figure 6.6 Understanding of basic email functions**

Most of the respondents were comfortable with most email functions. The results indicate, however, that 13.8 per cent of the respondents had no knowledge of how to create a contact, and 27.6 per cent of the respondents would struggle creating a distribution list. The accuracy of responses from some of the matrix type questions was verified by adding a branched question. The verified responses are summarised in Figure 6.7.

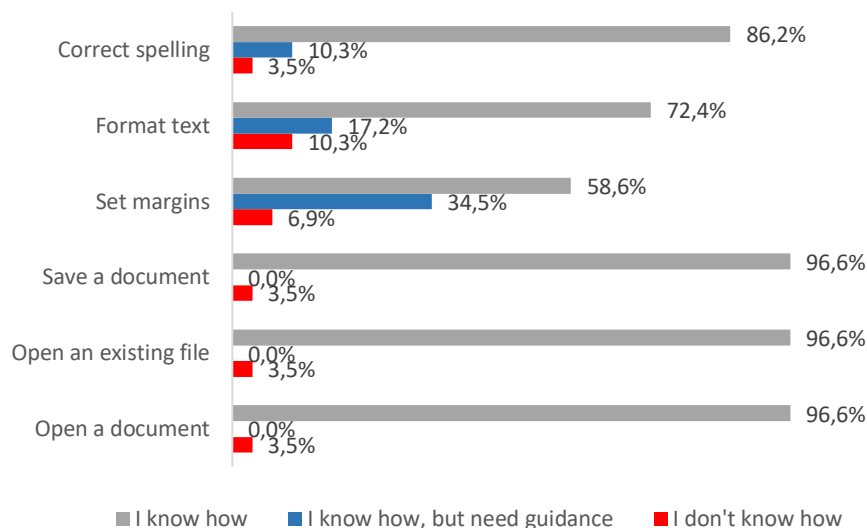


**Figure 6.7 Verification of understanding of basic email functions**

An overall knowledge of the basic email functions is adequate for the PGDipNE. The responses indicate that 79.3 per cent of the participants were not only aware of but knew how to use the "reply to all" function. Significantly more (88.9 per cent) of the responses indicate that the participants were aware of the fact that the application has a function to create a distribution list but did not know how to use the function for the creation of a distribution list.

### 6.2.3.2 Using MS word to create documents

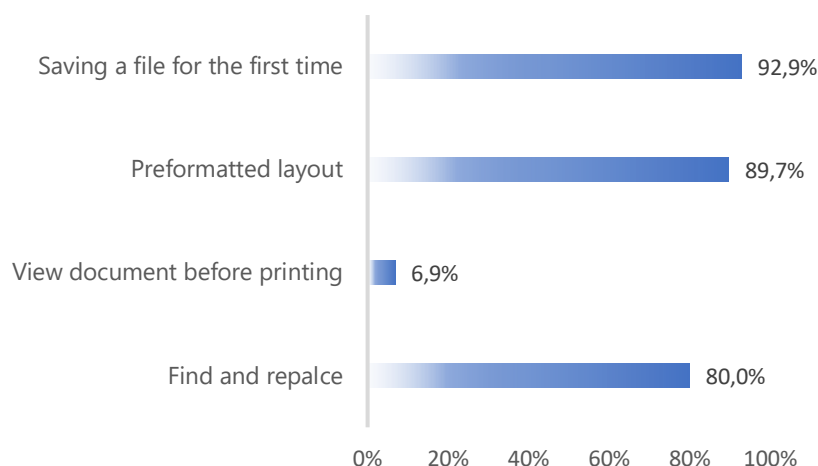
Microsoft Word is a word processing application used for creating and editing documents. Students must be able to create a new document, edit existing documents, save documents, format the text, set the margins, and check the spelling of their documents. These are the functions they require to create their assignments. The functions were summarised in a matrix type question with a three-point Likert scale. The responses are shown in Figure 6.8, demonstrating that most of the participants were familiar with the basic functions of MS Word.



**Figure 6.8 Understanding of MS Word basic functions**

The results infer a fair understanding of the basic Microsoft Word functions, but the correct application of the functions was not evident in the quality of the assignments submitted by students. The general instructions that were provided regarding styling and format for assignments were not adhered to, and students were not able to create the required templates for their assignment layouts. There was a general disconnect between the guidelines provided and how to apply these guidelines in the Word application. The responses on some of the basic functions in Figure 6.8 were tested to verify the accuracy of the responses.

The validated responses are shown in Figure 6.9. From the results it is clear that 92.9 per cent of the participants understood that a file must be given a name for identification when it is saved for the first time. This compares well with the 82.8 per cent of the participants who indicated that they could save a file in the Computer Basics section. Yet, the experience was that students would struggle finding the file to either work on it again or when they needed to upload the file as one of their SUNLearn assignments.



**Figure 6.9 Verification of understanding of MS Word basic functions**

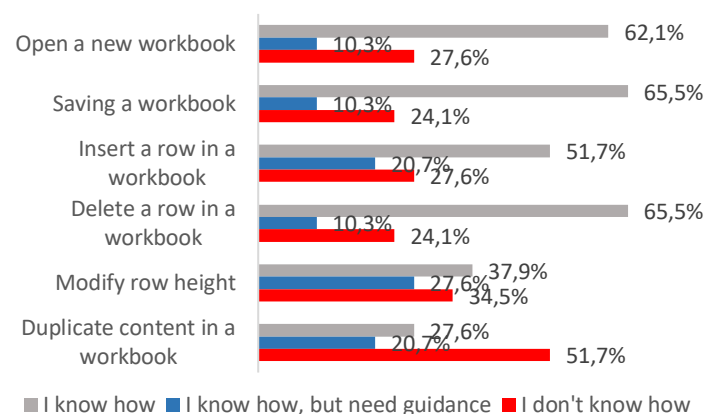
An MS Word template is a Word document that includes specific formatting with regard to font styles, headers, footers, headings and custom dictionaries (Microsoft Word, 2019). The students were aware of the definition of the function, as indicated by the 89.7 per cent of the responses, but failed to understand how to use the function.

An outline is a draft version of a document with specific formatting, enabling the creator of the document to focus on the structure of the document (Microsoft Word, 2019). The outline functions allow the reformatting of a document with the correct formatting if a printer amends the layout of a document. The style and formatting of the page layout are displayed on screen before printing the final document. The students' responses to the question related to the outline function indicate that only 6.9 per cent of the participants were able to accurately identify the function. The general conclusion based on the results was that the students had either not used the function, or that they were not aware of the fact that they could outline the structure of a preformatted document.

The find and replace function helps one find formats, styling, spacing or words in a document that can be replaced or removed (Microsoft Word, 2019). This is a useful function for a lengthy document. Figure 6.9 shows that 80 per cent of the respondents were aware of the find and replace feature. The benefits in terms of the formatting of a document must be explored to assist the students with large Word documents, but more importantly, using the advanced feature of the function to avoid mistakes in the formatting or replacing an incorrect phrase or word.

### 6.2.3.3 Using MS Excel to create a workbook

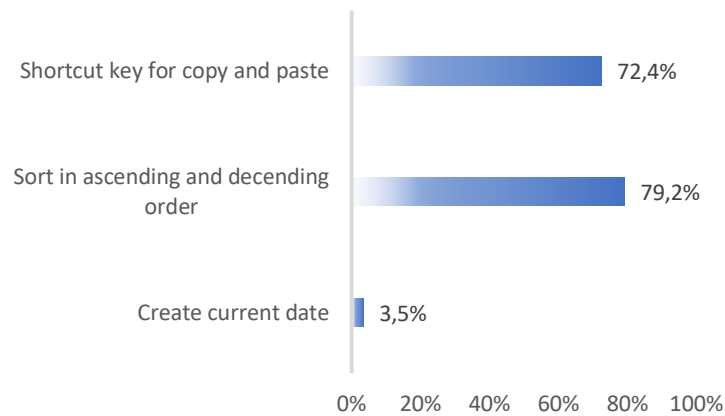
Microsoft Excel is a spreadsheet application used to create grids of texts, numbers or formulas. The application can also be used to perform calculations and to draw graphs and charts. Questions on the basic functions of Excel were constructed in a matrix format with a three-point Likert scale. The basic functions included opening a workbook, saving a workbook, inserting or deleting a row, modification of a row height and duplicating the content in a workbook. From the results, as shown in Figure 6.10, it is clear that in all six areas more than 25 per cent of the respondents were unable to perform the basic Excel functions, whereas less than half of the respondents could modify row height or duplicate content in a workbook.



**Figure 6.10 Understanding of MS Excel basic functions**

Microsoft Excel is a very powerful application depending on what specific functionalities are required. Excel functions range from very simple to very complicated functions that require expertise in programming or database analysis. Shortcut keys that increase productivity and increase efficiency in compiling data is a disregarded function in Excel. Shortcut keys assist with navigation within a spreadsheet, filling in formulas or grouping data (CFI Education, 2019).

The sorting of data in Excel is one component of the software. The real power of the software is the ability to analyse the data. The sorting of data function as shown in ascending or descending order is a powerful function that could help identify key issues or important elements in data. The responses indicate that 79.3 per cent of the respondents were aware of the fact that Excel has such a feature. This however does not infer that this group of students would be able to use the advanced capability of the function.



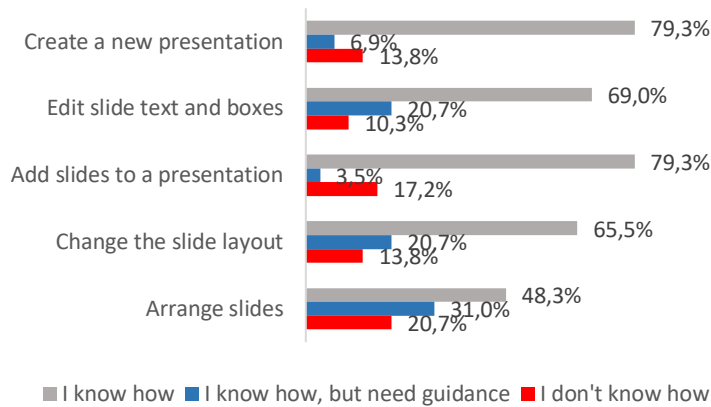
**Figure 6.11 Verification of understanding of basic MS Excel functions**

Three functions, as shown in Figure 6.11, were added to test the participants' understanding of specific functions in Excel. The copy and paste function is an elementary function in Excel. The combination for the shortcut key is confusing, as shown in Figure 6.11, indicating that 72.4 per cent of the respondents selected the incorrect answer. Shortcut keys help to avoid unnecessary mistakes and assist with the consistency of equations, grouping of data, formatting, etc. Excel can also be used for the statistical analysis of data.

#### **6.2.3.4 Using PowerPoint to create presentations**

Microsoft PowerPoint is an effective presentation application. The application gives the user all the features and functionality to create a professional presentation. The application has the artificial intelligence to combine text, graphics, audio and video and to provide slide layout designs to match the content (Microsoft PowerPoint, 2019). For students transitioning from a clinical to a non-clinical programme to become nurse educators, PowerPoint provides an easy-to-use interface to create interactive content for any online programme. The effective and efficient use of this application would increase the visual impact of the content and produce more engaging presentations.

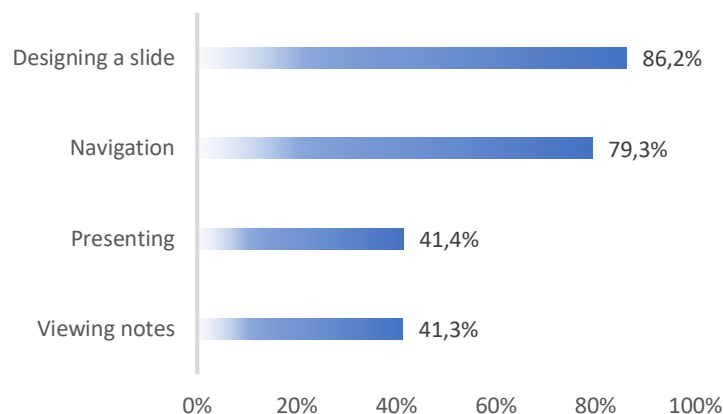
Questions on the basic functions of PowerPoint were framed in a matrix type question with a three-point Likert scale. The basic functions that were included for the need's analysis included creating a presentation, editing slides, text and boxes, adding slides to a presentation, changing the slide layout and arranging slides. Figure 6.12 is a visual representation of the respondents' ability to use the application.



**Figure 6.12 Understanding of MS PowerPoint basic functions**

The responses on the basic functions of changing the slide layout and arranging slides indicate that the proportion of respondents who would require assistance, or who would have a problem performing the functions, were 34.5 per cent and 51.7 per cent respectively. The ability to arrange the slides and decide on the layout of the slides relates to the logical organisation of the content and learning how to construct the logical flow of content to keep the audience's attention.

The additional basic PowerPoint functions that were included as part of the needs analysis are shown as a collective in Figure 6.13. The participants were enrolled to qualify as nurse educators. This leads to the supposition that they would need these skills in their professional capacity to be able to create engaging content for their students. A structured training course categorized into different skills levels would be an attribute that could benefit their career paths. More importantly, as students, the visual presentation of the content could help them make the connection between the various principles and theories.



**Figure 6.13 Verification of understanding of basic MS PowerPoint functions**

Figure 6.13 is an illustration of some of the basic functions that these students must understand and be able to apply as educators who would have to design course material for students. PowerPoint as an application has many undiscovered capabilities that could improve the design of the content, specifically for a programme that is delivered in a combination of block contact and online delivery. From the responses it is clear that 86.2 per cent of the participants understood the combination of the different types of content that could be added when designing a slide. However, potential to use the application for digital storytelling and to create engaging content, lies in the hands of the individual designing the course content and his/her appetite to unlock the potential of technology for a learning environment.

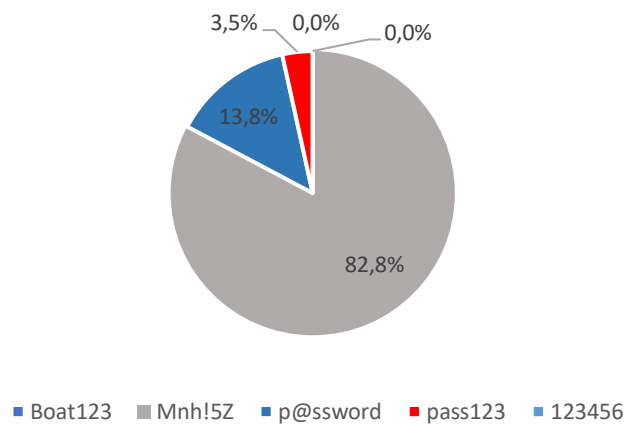
The notes pane, for viewing of your notes during a presentation as a function in PowerPoint, has the potential to help students gain the confidence needed when they have to stand in front of an audience to do a presentation. The correct use of the notes pane adds an advanced level of professionalism to a presentation. From the responses it is clear that only 41.3 per cent of the participants knew about the function but did not necessarily understand how to use the function. The additional features, as part of the application while you are presenting, provide students with techniques to control the flow of the presentation.

#### **6.2.4 Security and safety**

The cybersecurity ecosystem is complex. As information systems are increasingly integrated, security measures to protect data are becoming an essential part of technology deployment. Students connect to the university network from public networks. A public network is defined as a type of network to which anyone, including the general public, has access and through it can connect to other networks or the internet (Technopedia, 2018). Therefore, students must understand how to protect themselves by using secure passwords and recognising cyber threats.

This section of the need analysis included multiple choice questions to test the students' general knowledge and awareness of cybersecurity. Questions on the ability to identify a secure password, security of public networks, malware and phishing were included. Passwords are the most common way an intruder tries to gain unauthorised access. Within this context an item on the ability to identify a secure password was included. From the responses, 82.8 per cent of the participants correctly recognised the attributes of a secure password, as shown in Figure 6.14.

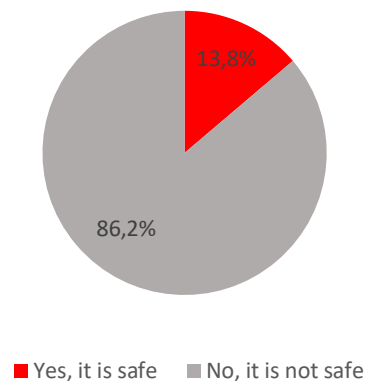




**Figure 6.14 Identification of the attributes of a secure password**

The reality at Stellenbosch University is that most students never change their generic passwords. Students tend to share their passwords without understanding the consequence of their actions or the possible repercussions it could have for the university. More importantly, the lecturers involved with this programme discovered that students either completed the quizzes in groups or shared their passwords to have fellow students complete the quiz on their behalf (Lourens, 2019).

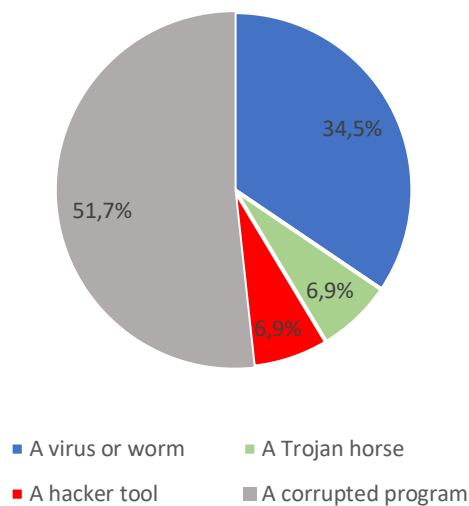
The responses about public network access, as illustrated in Figure 6.15, indicate that 86.2 per cent respondents understood that the use of a public network is not secure. These students needed to be even more vigilant about their connectivity options, because in their context they have multiple possible connections that could be exposed.



**Figure 6.15 Are public networks safe to use?**

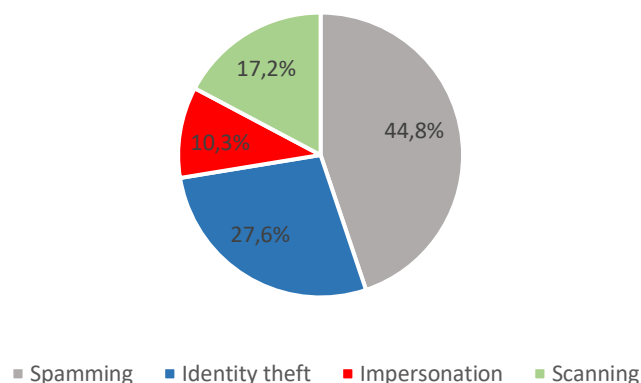
Students are obliged to do research to complete their assignments. It is therefore important that students should be aware of malware, phishing and any other cybersecurity threats that they may encounter. Malicious software, more commonly known as malware, is software designed to cause harm to a personal computer or network (TechNet, 2009). Malware has a malicious intent and causes damage after it has been 'implanted'. Malware can be in the form of an executable code, for

example, when students download software or drivers on their computers, malware can be embedded in that software or other active content (United States Computer Emergency Readiness Team, 2014). From the responses, as shown in Figure 6.16, only 6.9 per cent of the participants were able to correctly identify what malware was, leaving the majority of the students vulnerable to cybersecurity attacks.



**Figure 6.16 Identification of malware**

The reality of the cyber landscape is that it is becoming more sophisticated and very difficult to distinguish cybersecurity attacks. The university is bombarded with phishing attempts. Phishing is a cybercrime in which a target or targets are contacted by email, telephone or text message by someone posing as a legitimate institution to lure individuals into providing sensitive data such as personal identifiable information, banking or credit card details and passwords (KnowBe4, 2019).

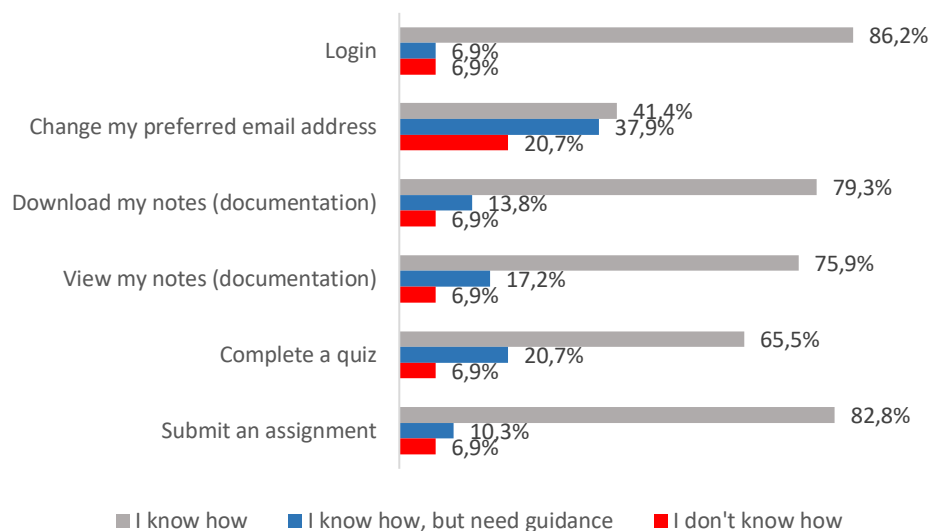


**Figure 6.17 Identification of phishing**

From the responses in Figure 6.17, only 10.3 per cent of the participants identified phishing as a form of impersonation. The students' tendency to use the same passwords across various software platforms and to share passwords, creates risks that require additional safety precautions.

### 6.2.5 Learning Management System – SUNLearn

The SUNLearn basic functions that were included as part of the needs analysis included logging in, changing the preferred email address, downloading notes, viewing notes, completing a quiz and submitting an assignment. These basic functions were outlined in a matrix type question with a three-point Likert scale. At first glance the responses led one to draw the conclusion that there are a few problems with SUNLearn, as shown in Figure 6.18.



**Figure 6.18 Understanding of SUNLearn basic functions**

The current use of SUNLearn by the lecturers and students, namely the design of lesson plans and formatting of the learning guides, would have been appropriate if the mode of delivery of this programme was purely face-to-face, on-campus delivery. However, for a blended learning environment with limited contact sessions, it was concerning that 58.6 per cent of the participants either needed guidance (37.9 per cent) or did not know (20.7 per cent) how to change their preferred email addresses on SUNLearn. Communication via email is in most cases the default medium that the lecturers use; hence, relevant information about the programme, deadlines or notifications is sent via email. Knowing how to change their preferred email address was therefore crucial for students to remain updated on important programme information.

Students log in to access their learning resources on SUNLearn. According to the responses, 86.2 per cent of the respondents did not need help to log in. Upon further investigation, I discovered that 45 of the 84 students (53.7 per cent of the registered students) had never logged in, or their

passwords had expired (Wanza, 2018). This information was collected on the 1<sup>st</sup> of October 2018. More importantly, when comparing the detailed analysis of activity logs, showing the interaction of the students with the published information pertaining to modules of the programme and the responses in Figure 6.18, it becomes clear that the responses were inconsistent with the student behaviour as demonstrated by enquiries to the programme administrator and the actual usage of SUNLearn.

These inconsistencies were not only evident in the last section of the needs analysis. The inconsistencies in, for example, the computer basics section revealed the gaps in the students' understanding of the interrelated functions of the software applications. For remote support to add value to the students, some assistance would be needed to guide the process. If there are gaps in the understanding of basic computer functions, assisting the student remotely would be very difficult. To address the inconsistencies in the results and to add richness to the needs analysis, the survey was followed by a focus group discussion to investigate some of the issues in more depth.

### **6.3 FOCUS GROUP DISCUSSION RESULTS**

The purpose of the discussion was to gain insight into the experiences of the adult learners with the SUNLearn platform, and to understand the expectations of the targeted student population when using an online platform for learning. In addition, I wanted to investigate the role of technology from their perspective and gain a clearer understanding of the inconsistencies in the needs analysis.

The focus group discussion was arranged with the students during one of their on-campus workshop sessions. The opportunity presented itself to observe the students' interaction with the lecturers facilitating the workshops. During this time, I, as the researcher, was part of the "messiness of the real-world practice" (Barab & Squire 2004:3), and I could witness the shift in the changing landscape of nursing education (Viljoen, 2018) in which traditional teaching methods and strategies were challenged. Furthermore, I could begin to understand the andragogical assumptions about adult learning (iSpring Solutions Blog, 2016; Zmeyov 1998:106), of which the following were highlighted:

- the learning of an adult is largely determined by his/her life context
- the adult learning process is characterised by the leading role of the learner
- the learner and teacher (lecturer) co-operate in all stages of learning.

The following transpired in support of each of the above assumptions. One of the students found herself attending a compulsory workshop while her mother was critically ill in hospital. For her, the regular updates she received about her mother's condition were more important than being present to understand the content in preparation for the upcoming examinations (learning determined by context - assumption 1). The attendance of the workshops is compulsory within a fixed program schedule. The programme schedule was interrupted by another student who was struggling with the

Didactics module and requested the lecturer to shift the focus of the workshop to clarify concepts in the Didactics module (leading role of the student – assumption 2). The change in the programme for the day was negotiated with the students. The lecturer approached the students and asked what would work for them (cooperation in all stages – assumption 3).

The lack of cooperation between students and the facilitators of the workshop was obvious. The Didactics lecturer acted as the facilitator for the workshop and had difficulty switching between the roles of lecturer and workshop facilitator. It was interesting to observe how the students interacted with the facilitators. The one facilitator had a connection with the students because she understood their expectations, but more than that, she had a keen understanding of “the art and science of helping adults learn” (Knowles, 1980:43). On the other hand, the other facilitator was the subject matter expert in his field (Didactics) but he could not connect with the students. The students struggled with his traditional teaching methods which did not meet their expectations of the educational environment, expressed as follows: “The lecturer is not only teaching, but the student also gives input, so they can learn together”; in this case it did not happen. It was evident that there was a disconnect between the facilitators in their understanding and application of the underlying principles of adult learning. The lecturer was so focused on working through the content that he ignored the context in the education setting, and this hampered an effective connection with the students.

These circumstances provided an opportunity to start the group discussion with the students. The purpose of the discussion was explained to the entire group and their consent for the data collection was sought. There were 36 participants who signed the consent form. With the permission of the participants, the focus group discussion was recorded with a digital voice recorder and the recording was transcribed for analysis. The focus group discussions were facilitated with a set of guiding questions (Addendum G). The focus group results are presented in terms of the observations prior to the group discussions, the general discussion with the entire group, the content analysis, and findings of the smaller groups.

### **6.3.1 Group discussion**

I used the context of the educational setting and what had transpired in the classroom to start the discussion with the students and to build rapport with the group. The students asked if they could first ask me a few questions to get to know me. They asked about my experience as a student, my experience as an employee and, more importantly, my experience in the field of technology. So, the group discussion started from a place of trust with someone who shared their experiences as a student, and a place of interest to understand their needs.

From the place of interest, I wanted to understand the students’ reasons for applying for the PGDipNE. The students chose the PGDipNE because it was advertised as a blended learning

programme and delivered in a combination of block contact and online delivery. The combination of block contact and online delivery mode gave them the flexibility they needed to work while striving to obtain another qualification to advance their careers, or while they were between careers. In terms of their understanding of what a blended learning programme was, one student commented that “it is when you are learning or when learning takes place using means to different methods and also various assessments and also different ways of interactions, so with contact sessions, us going to class, us viewing on the screens, so just different ways of learning and being assessed, ways to be taught as well”. Another participant added that “it is digital, a media method of attending class or lectures and also using traditional method of teaching which is like for example being in class here and involves a facilitator and student involvement”. After this comment, I asked the student to elaborate on her understanding about “student involvement”. The student offered a very interesting response, when she said that literature uses the term ‘student as a co-creator’, “so the lecturer is not only the teacher, but the student also gives input, so you have the opportunity to learn together but the current environment has no room for students giving opinions about the content”.

This comment triggered the question about the current format of the content and the ease of use of SUNLearn. The question evoked a small uproar in the classroom and the students unequivocally agreed that they found the navigation of SUNLearn complicated. A participant commented that “in all honesty, it takes months to work through everything that is just dumped on SUNLearn. You browse from one module to the next and you are lost. From the one module to the next it feels like I have enrolled for a different programme because there is no structure, and we don’t have months to understand how to use SUNLearn”. In relation to this response, another student added: “the content is not user friendly and no guidance is given or provided to understand all the resources that are available to us. We are supplied with study guides but the information in the study guide and what you see on SUNLearn creates more confusion because you are not sure if the one resource is more important than the other”. This led to a question about their awareness of the mobile application for SUNLearn, which elicited comments about the use of the mobile application if the content is not designed to fit a mobile application. In addition, one participant added that “if our guides were published using SUNLearn, the content would be more accessible. It would contribute to better scheduling and felt like you are more in control of your studies”. The majority of the group asked what the use of SUNLearn was if there was no correlation between the information or content on SUNLearn and the study guides, because for them SUNLearn was for notifications, uploading of assignments and completing quizzes, but not for managing their learning environment.

The responses to the question about computer literacy for the learning environment revealed that the participants understood computer literacy as follows: “basically it means being aware of the terminology used on the computer or the internet for downloading or uploading but comes down to different terminology”. Another participant commented that “computer literacy is being able to use a

medium like the computer appropriately, being able to use what there is and make use of it, like Microsoft Excel for example". The comment that struck me most was: "failing to see how technology is applied in the programme when you need a training manual just for orientation and that the ease of use could not be compared with that of social media that adds convenience above all else".

At this stage of the discussion, the conversations with the students were so lively that there was no need for prompting, but it was difficult to give every individual in the group an opportunity to be heard. Within the conditions of the focus group discussion and with the permission of the group, I decided to divide the large group into smaller groups of 3-4 participants per group. This resulted in 10 small groups. In each of the small groups, a volunteer was chosen as a scribe. I had prepared a set of questions for small group discussion as a contingency (Addendum H). This offered the students the opportunity to raise their concerns in a safe environment with one another, but also led to more expressive descriptions of their experiences. These expressive descriptions led to the technicians who provided technical support to the students and attended the focus group discussion, starting to draw graphical illustrations when the group members found it difficult to express themselves. The small group storylines were transcribed and analysed, using content analysis with the aid of ATLAS.ti. The process used to analyse the data and the small group findings are discussed in the following section.

### **6.3.2 Small group findings**

The study was initiated based on the perception of some of the lecturers and the programme coordinator that the students who enrolled struggled with the use of technology. It was therefore important to understand the students' perceptions and to investigate if there were gaps in their digital literacy skills, and, depending on the results, to determine actions to improve their digital literacy skills.

Lankshear (1999) identifies three dimensions of digital literacy, namely operational, cultural and critical (section 2.5.2 in Chapter 2). The operational dimension involves the ability to read and write in context with clear instructions as part of routine tasks. The cultural dimension involves relating the text and information to real-life practices. The critical dimension involves the ability to use literacy in combination with innovation, transformation, improvement and adding value to social practices (Lankshear, 1999). Therefore, the small group discussions were centred around the participants' understanding, expectations and explanation of the role of technology in various contexts. The context in which these students found themselves was a social context, namely when interacting with lecturers, peers, friends, colleagues and family, as a fellow student in the same academic programme and as a professional in a workplace. Firstly, the process of content analysis will be discussed to provide insight into how I arrived at the thematic results.

### 6.3.2.1 Content analysis

Content analysis involves coding, categorising, comparing and drawing theoretical conclusions from text. Saldaña (2016:23) defines a code in a qualitative inquiry as “most often a word or short phrase that symbolically assigns a summative, salient, essence-capturing and/or evocative attribute for a portion of language-based or visual data”. According to Hatch (2002) the data can be coded in various patterns, as shown in Table 6.1.

**Table 6.1 Coding patterns**

Type of pattern	Description
Similarity	Things happen the same way
Difference	They happen in predictable different ways
Frequency	They happen seldom or often
Sequence	They happen in a certain order
Correspondence	They happen in relation to other activities or events
Causation	One appears to cause another

**Source: Hatch, 2002:155**

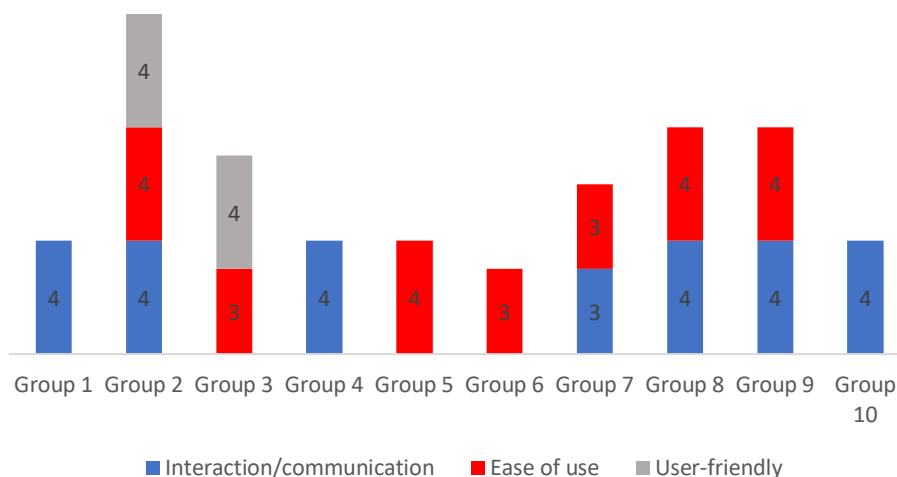
The text-based qualitative data from the group discussions was first manually prepared, for me to familiarise myself with the content and to investigate if any coding patterns, as explained in Table 6.1, had transpired. Some of the coding patterns were more apparent than others. For example, frequency in terms of the lack of technology integration was evident. The other frequent coding pattern was causation relating to the lack of standardisation in the programme, resulting in students struggling to navigate SUNLearn. The computer assisted qualitative data analysis software, ATLAS.ti, was used to separate the data into short phrases with line spacing when the idea, topic or concept changed (Saldaña, 2016). A concept, according to Saldaña (2016: 138), is “a word or short phrase that symbolizes a suggested meaning broader than a single item or action – a bigger picture beyond the tangible and apparent”. This method is concerned about the “suggested meaning” in the data and circumvents the detail and nuances of other coding methods (Saldaña, 2016). The findings of the smaller group discussions are discussed in relation to the themes that emerged which either came up in terms of frequency, correspondence or similarity.

### 6.3.2.2 Thematic results of the small group discussions

The small group discussions were very vibrant. The students were eager to discuss the role of technology in the various facets of their lives. The responses to the question about the role of technology in their social context revealed how comfortable the participants were using technology, but more importantly, they revealed the encompassing role of technology in their lives. The one group summarised the role of technology, i.e., the use of their mobile devices, as follows: “there are four areas easily manageable that is enabled through technology using our mobile devices namely



communication, entertainment, knowledge and finances. We can stay in contact with our friends, family, and colleagues. We are kept in the loop with the latest news developments and we can manage our internet banking”. From the discussion of this question, the following themes emerged: interaction/communication, ease of use, and user friendly, as shown in Figure 6.19. The number in each of the respective bars in Figure 6.19, are in relation to the number of times a comment was made about a particular theme.

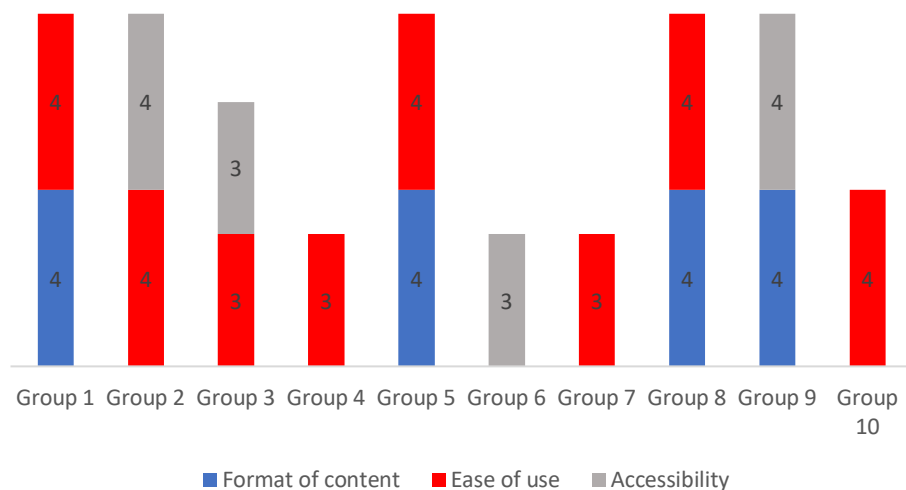


**Figure 6.19 Role of technology in a social context**

From the participants’ responses it was clear that the role of technology cannot be overestimated. This was also acknowledged by another group, stating that “we use technology in everyday life. Social media is user friendly. The sharing of information is so much friendlier than most IT platforms”. This sentiment was shared by another group who added that “it is a form of communication with family, friends, fellow students with the availability of multiple applications that are compatible with mobile devices. All social apps are user friendly, easy to use with no unnecessary instructions or guide needed on how to use the apps because it is intuitive”.

The groups shared similar experiences that frequently appeared in the transcripts of most of the groups. Interaction and communication were critical for most of the groups and one group elaborated on “the ability to have an online session with peers and a lecturer or lecturers, interaction with other students and able to chat with a lecturer regarding problems or engagement”. There were also responses about how social media is “vital to stay abreast of new developments, platform for communication to share ideas or information, individual or professional development more than an eLearning platform could”. The role of technology in the form of social media apps demonstrated to these students how seamless communication could be, as they have integrated social apps holistically into their social context.

Whereas the discussions revealed successful adoption of technology in the social context, the participants painted an uncertain picture about the role of technology on their academic journey. The responses highlighted the possibilities, challenges and experiences. The patterns that emerged from the analysis showed that the students considered the format of the content for a blended learning environment as important, and the ease of use of the learning platform and the accessibility of the learning platform as essential, as shown in Figure 6.20. The number in each of the respective bars in Figure 6.20, are in relation to the number of times a comment was made about a particular theme.



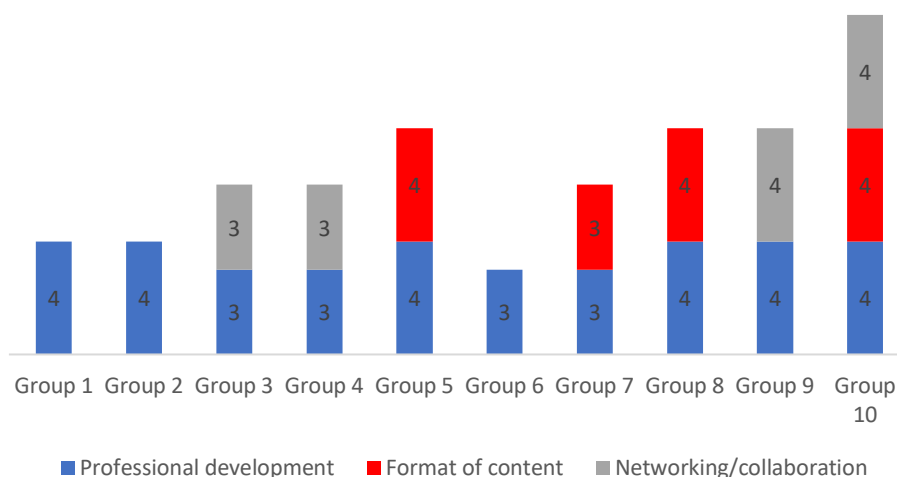
**Figure 6.20 Role of technology in the academic programme**

The responses of one group drew attention to the possibilities of “easy access to download learning resources, be able to use the information as a guide, be able to use the information to complete research or integrate the use of Wikipedia”. Other groups’ responses focused on the “speed and simplicity, convenience and economical” role of technology. The role of technology in education was also compared with social media apps, and one group was positive about “group activities via social platforms, emailing as a form of communication, skype discussions but the front page of SUNLearn is far too cluttered with information, no clear guidance but currently too many columns and have one page that gives an overview and guidance with soft colours”.

Another group shared the following: “unaware of a technology platform available for this programme that can improve our studies. No computer literacy training for students (especially older students who are not tech savvy). If the only way of connecting to students are through the use of technology, it can be very costly and if student have no way of connecting to SUNLearn, access is a problem. Capture data electronically but in a convenient way for the student, less paperwork but the content must be in the correct format”. This view was also shared by another group who articulated that “the

podcasts on SUNLearn are too lengthy to download and not accommodating for distant learners. Poor infrastructure makes access to resources very difficult”.

The groups also shared significant insights about the role of technology with regard to their career opportunities. The groups unanimously agreed that technology was important for their professional development, as was format of content and networking/collaboration, as shown in Figure 6.21. The number in each of the respective bars in Figure 6.21, are in relation to the number of times a comment was made about a particular theme



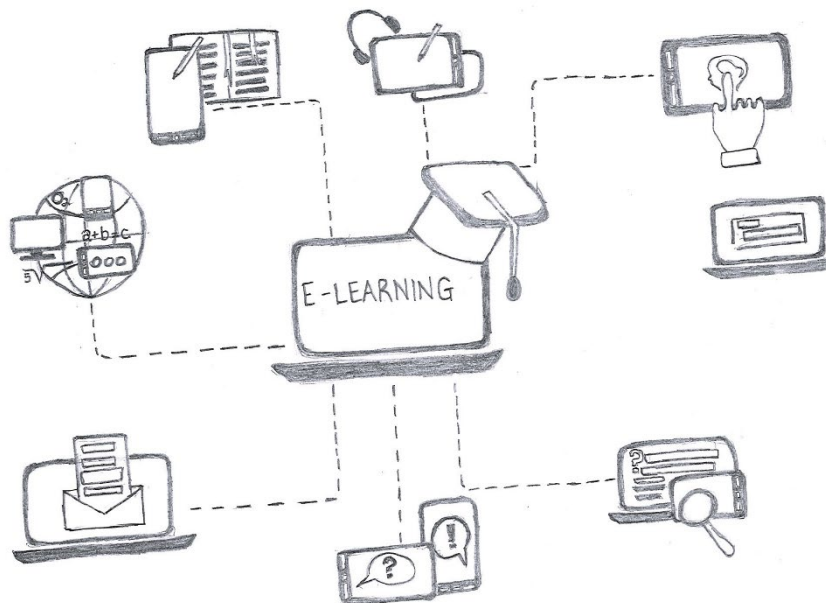
**Figure 6.21 Role of technology for professional development**

In responding to the role of technology in professional development, students’ understanding of the format of the content took on a different meaning. In this context, the students perceived themselves as lecturers preparing the content and learning about the importance of the format of content based on their own experiences. This conclusion is reflected in the response of one of the groups stating that “we are unaware of any specific limits of technology if applied and used appropriately proven by how social media apps are developed and used. As a nurse educator, presentation skills become critical to draw in your audience, the ability to collect, disseminate the data needed as an educator”. In addition, another group added that technology can be used as a starting point for self-directed learning, but it is important to understand the skills you require in your field of study”. The sensitivity about the changing environment and the changing role of technology was evident in a response stating that “computer-mediated education programmes should have interaction with the community for job opportunities or skills required for industry”. The rest of the insights that the students shared with their graphical illustrations are discussed in the next section.

### 6.3.2.3 Findings from the graphical illustrations

As mentioned, the discussion with this group was very vibrant and the passion of the students needed to be captured to really portray the voice of the participants. Two of my colleagues who are technical support staff in the IT Division joined the group discussions to listen to the students' experiences. My colleagues, the technicians, understood the complexities because they work in the support environment. The atmosphere in the room motivated them to start drawing. They wanted to convey the strong messages that the students shared through graphical illustrations. As they moved between the groups finishing off the graphical illustrations, it became apparent how appreciative the participants were with this way of capturing their perspectives. The essence of the message was captured to tell the story of their experiences at the University, their expectations of the role of technology and their challenges as students.

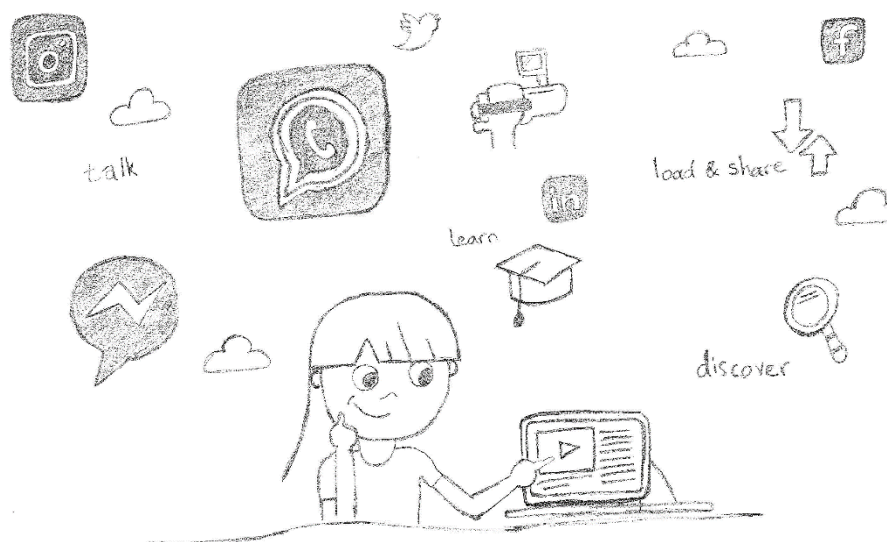
Group 1 described the role of technology as an essential part of their social context and their expectations of eLearning, as shown in Figure 6.22. This group acknowledged that poor infrastructure could be an obstacle for eLearning but pointed out that the content must be designed to fit the delivery mode of the programme.



**Figure 6.22 Group 1 - eLearning as an integral part of students' context**

These students wanted to be able to connect and to have access to their study materials irrespective of distance or lack of infrastructure. They wanted an academic programme that accommodated adult learners. These students shifted the focus from the poor infrastructure to the innovation and potential of technology if the content was designed in line with the delivery mode of the programme.

The blended learning approach and the prerequisite of computer literacy were compared to the participants' experience with social media and how social media applications complemented their lifestyles. Some of the responses reflected the importance of technology for “individual and professional development”, and also technology as a “form of communication and sharing of ideas or information”. The importance of technology for this group related to the possibilities of new developments and being able to stay abreast, and to technology being seamlessly integrated.

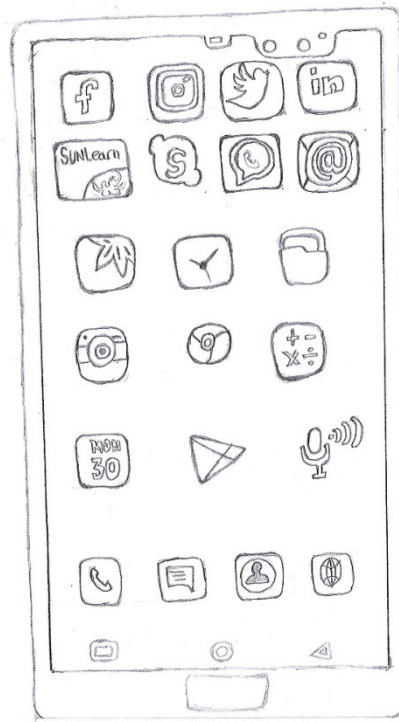


**Figure 6.23 Group 2 - Social media and technology – lessons learned from a social context**

The participants in Group 2 highlighted that technology had been successfully adopted with the availability of social media applications. These applications improved interaction and the same principles should be applied for eLearning, as shown in Figure 6.23. These perspectives were also shared by many of the other groups when they were talking about the importance of technology to stay “connect(ed) with family and friends”. The ability of these learners to easily learn how to use a mobile application without training support was underscored by remarks like “no unnecessary instruction guides to follow on how to use apps”. The way that they used technology on their mobile devices reflected an integration of technology in their daily lives, as stated by one of the participants: “use of technology in everyday life, making the sharing of information much more user friendly”. The students expressed a desire to be able to engage with lecturers or to have small group activities to be able to learn from each other.

Participants in Group 3 felt that the SUNLearn platform should assist with their learning and the prescribed computer literacy training should be a complementary course for students who are not computer literate. Students following a combination of block contact and online delivery mode should still be able to access the online resources in spite of poor connections. Access to the learning resources through the mobile app, as shown in Figure 6.24, should be possible, but they were now

inaccessible because the course was not designed for mobile devices. The group noted that they were aware of the fact that there was a mobile app for SUNLearn, but due to the format of the programme they could not use the SUNLearn mobile app. For most of the groups, distance was irrelevant because of the rapid advancements in technology.



**Figure 6.24 Group 3 - eLearning improves the mobility of students**

Advancements in technology were mentioned by most of the groups, but the participants also highlighted the incorrect use of technology and a lack of understanding of the competencies required in their specific fields and the workplace. The participants were of the opinion that the possibilities of technology are endless, as shown in Figure 6.25, but they were unsure about how technology could be integrated to improve their chances for better career opportunities.



**Figure 6.25 Group 4 - accessibility and staying connected**

One of the students in Group 5 sketched a scenario as illustrated in Figure 6.26: “my mobile phone has given me the ability to connect with peers. I can send instant messages, do video calls and even voice notes. So, in a sense, I am phone literate. The flexibility that I have with social media, if I start my journey as a student, how I connect should also be easy because that is the life of IT that should come alive with SUNLearn”.



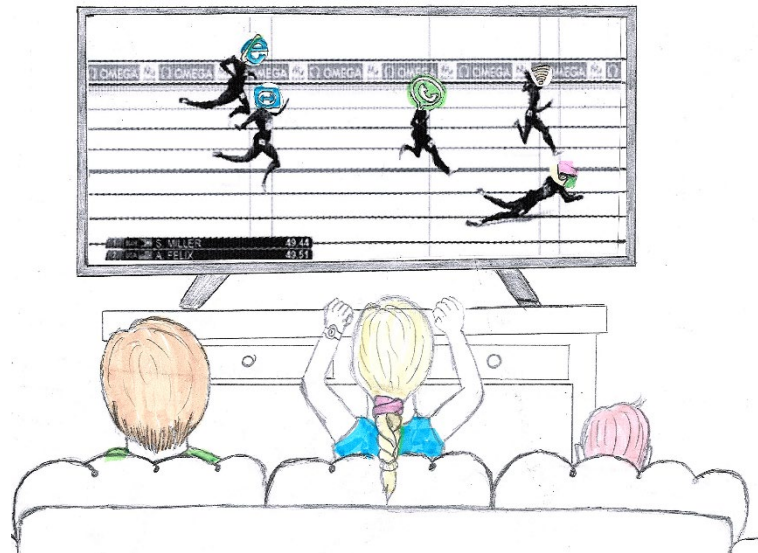
**Figure 6.26 Group 5 - From student - to graduate - to employability**

The student went on to say: “As I journey, what I have acquired must enable me to find a suitable job with the skills I need. This however is not our experience. SUNLearn, the study guides, interaction with the lecturers, administrators are like talking to people working for different companies because nobody is on the same page”.

The students described their experience as being spectators of eLearning in a programme promoting blended learning, while others were racing ahead with a learning platform that is easily accessible



and improves the user experience, as shown in Figure 6.27. The responses of the group were summarised as “the use of technology is encouraged but while everything is connected, Wi-Fi is limited to the workshops, the only IT computer mediated education is PowerPoint presentations failing to demonstrate how we can use technology to enhance our professional development”.

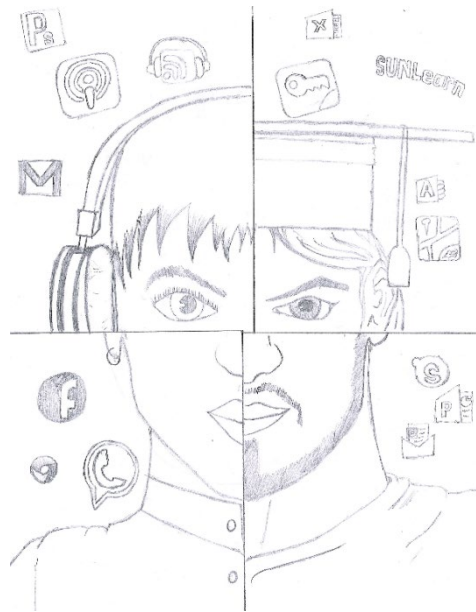


**Figure 6.27 Group 6 - as a spectator of my academic journey**

The professional development of the participants was a very sensitive issue. As I engaged with some of the individuals about the topic, I discovered that some had enrolled at Stellenbosch University because they believed that getting a qualification from an institution like Stellenbosch University would improve their chances not only for job shadowing, but also increase their opportunities to be head-hunted because they have acquired a qualification from a very prestigious institution. They shared their reasons for transitioning from a clinical to a non-clinical programme; some felt that their careers had stagnated, and others wanted to make their families proud. Other participants drew attention to the lack of standardisation within the health profession and emphasised that they needed to ensure that their qualification would not be questioned.

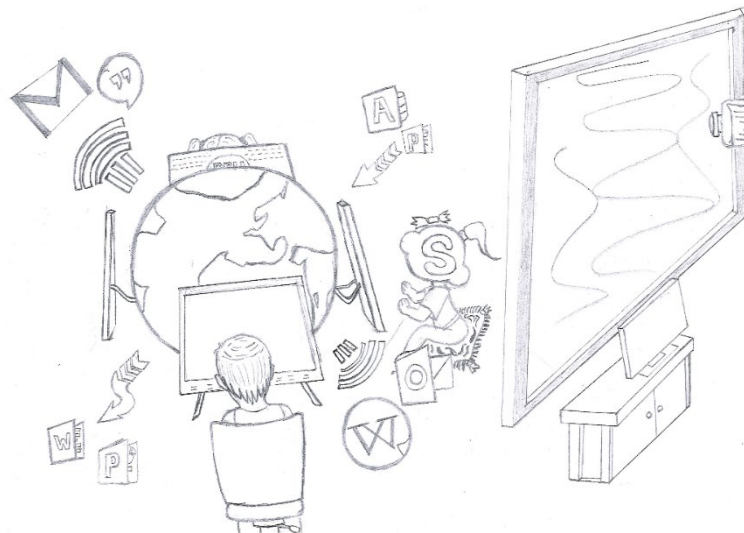
The gaps in their prior qualifications resulted from inconsistencies of providers following their own educational practices. Nevertheless, the participants felt strongly that, irrespective of socio-economic background, each of them had a right to education (as shown in Figure 6.28). Group 7 believed that the availability of technology and the eLearning platform creates opportunities to achieve success. The students challenged the use of traditional teaching methods, because the integration and implementation of educational technologies unlock new opportunities.





**Figure 6.28 Group 7 -Equity in education**

The opportunities of technologies, described by Group 8 as “limitless”, are illustrated in Figure 6.29. These students realised that the appropriate use of technology in teaching and learning has the potential to drive change and development in educational settings. A summation of the illustration as described by the critical dimension of Lankshear (1999:5), is the ability to “use literacies in combination with innovation, transformation, improvement and adding value to social practices”.



**Figure 6.29 Group 8 - Unlocking the potential of technology**



Even though they were conscious that poor infrastructure has an impact on connectivity, they believed that applying the appropriate educational technologies and the creation of content suitable for areas with poor infrastructure could overcome this challenge. Their experience of a programme with a blended learning approach left them wanting, because they felt it did not adequately accommodate adult learners. The implications of the need analysis are discussed in the following section.

## **6.4 IMPLICATIONS OF THE NEEDS ANALYSIS**

The aim of this study was to identify the challenges adult learners experience with the use of technology in a blended learning and to investigate ways in which technology can be used to improve the digital literacy of adult learners in a blended learning environment. The needs analysis shed light on the practices that were not conducive for a blended learning environment, especially not for adult learners. The adult learners preferred the availability of the learning resources in an easy to access format that is accessible irrespective of poor infrastructure. The accessibility and connectivity requirement altered the scope of the project to review how SUNLearn could be enhanced to be more student centric. The findings of the needs analysis confirmed that the main challenge of the study was not the digital literacy of the adult learners but rather that the poor learning design process without consideration for the target group. Furthermore, the course structure and content was not suitable for a blended learning approach.

To address the main challenge, I developed design principles as a set of procedures and conditions for successful adoption of technology to improve the educational environment for the adult learners. As part of the process, I discussed the implications of the decisions taken as part of the design process with the programme coordinator(s), and then transformed them into a procedural guideline to address the challenges of the adult learners (Plomp, 2013:22). This was combined with and validated by personal experiences, observations in the educational environment of the practices of the group of lecturers, and crossed referenced with the literature review in Chapter 2, the assumptions of adult learning in section 3.3 and the theoretical framework in section 3.4.

To address the main challenge, the scope of the intervention was extended to include the redesign of the current modules, the design of a standardised template for the integration for the modules of the PGDipNE, the development of a new digital literacy module, and the design of a prototype that illustrates how multimedia principles (see section 2.7.1) can be embedded as part of the process to improve technology adoption. The digital literacy course was customised to integrate into the PGDipNE in a format that can evolve and adapt to tailor for the need of alignment with the enhanced features of the various applications. The prototype served as an illustration of how to incorporate the multimedia principles into the design of the content to assist in closing the gaps by enhancing the learning experience of the target audience to make learning more effective (Pappas, 2016). The

adoption of educational technologies must be selected by taking into account the target audience, and understanding the processes within the learning ecosystem to successfully address the barriers for adult learners. In addition, the educational setting was redesigned to incorporate “design thinking approaches to course content and engaging activities...(and) to develop content in multiple modalities to ensure access for all students” (Alexander, et al., 2019: 15). This requires lecturers to apply their knowledge about the role and use of technology in their course modules to define, defend and develop the function of technology (Laurillard, 2012).

## 6.5 CONCLUSION

This chapter concentrated on the findings of the needs analysis as part of the informed exploration phase. The findings of the needs analysis highlighted how the adoption of social media applications, as part of the students’ lifestyles, opened the door for limitless possibilities of how technology can be adopted for the learning and professional development of students. The participants’ insight into the role of technology (if applied correctly for self-directed learning as part of a blended learning approach to accommodate adult learners who selected the programme because of the delivery mode) with regard to expectations, challenges and possibilities, was surprising and informative. It became clear that the role of technology should be shaped in alignment with the social context of the participants. The lessons learned from using social media apps needed to be applied to their social interactions as students, and in turn applied to their professional development for possible career advancements. As I journeyed with the participants through the discussions, specific patterns emerged.

In the context of social media, the patterns of the role of technology that emerged were interaction/communication, ease of use and user friendliness. As we moved into their academic journey, the patterns of the role of technology progressed to format of content, ease of use and accessibility. The patterns that were visible in terms of the important role of technology in professional development reflected the format of the content and networking. The role of technology becomes more prominent depending on the context of the student. As these students transition from student to qualified nurse educator, they will be responsible for content creation and therefore it is imperative for them to acquire the skills to develop content that would assist students in their learning process.

In the next chapter, the implications of the findings are discussed in relation to the inadequate learning design process with insufficient consideration for the target group. The series of interventions were designed using the framework for information technology management (people – process – technology, section 2.3) in a systematic process of design. The systematic process took into account the usage-centred design (people focus attention on the importance of user needs), the factors within the environment that could be barriers or influence the changes (process includes the

goals that should be taken into consideration to drive change) and instructional design traditions (technology involves educating people to capitalise on the true value of a technology investment). The usage-centred design is illustrated in the discussion of the course structure and content that considered the adult learners needs and expectations. Furthermore, the instructional design traditions are illustrated in the discussion of the digital literacy course and the Didactics exemplar.

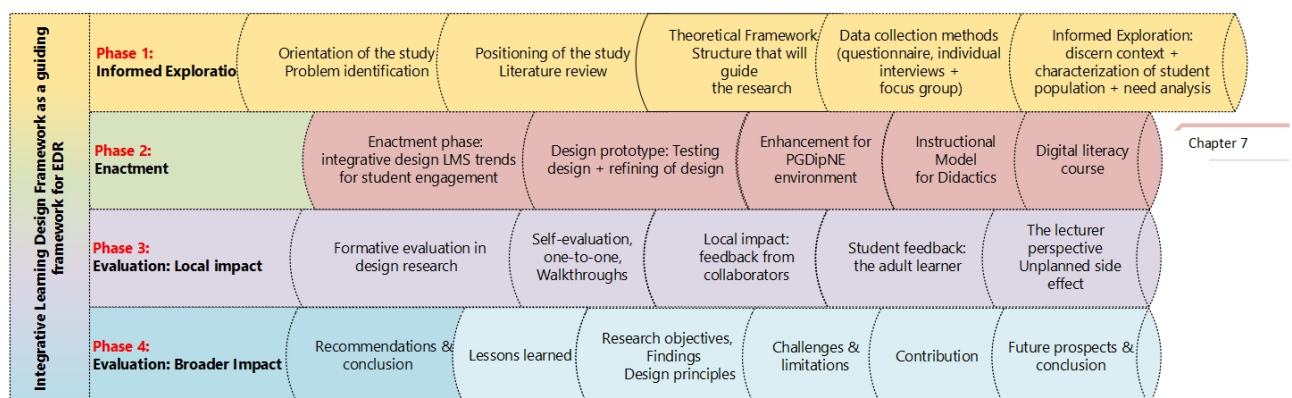
## CHAPTER 7

### ENACTMENT PHASE: INTEGRATIVE DESIGN

#### 7.1 INTRODUCTION

In the previous chapter, the findings of the needs analysis and the implications of these findings shed light on areas of improvement that required attention before addressing the enhancement of the digital literacy of adult learners in the targeted postgraduate programme. These areas of improvement consequently broadened the scope of the research project. This manifestation is referred to as the “notion of evolutionary planning” (McKenney, et al., 2006). Evolutionary planning is a “sound planning framework that is responsive to the fields of data and experiences, at acceptable moments during the course of a study” (McKenney, et al., 2006: 84).

In response to the interrelated challenges in the PGDipNE environment highlighted by the needs analysis, the design framework was extended to include the design of four interventions. Firstly, a procedural guide for the course structure with design principles in support of the characteristics, needs and expectations of the adult learners was developed. Secondly, a generic template for the course content to assist the lecturers with the redesign of their modules was drawn up. The template demonstrates how the study units and study activities can be integrated into each module. Thirdly, an exemplar of the Didactics module was designed, using the multimedia principles to demonstrate the practical implementation of the theory because Didactics has “a dualistic nature – knowing (theory) and practice (doing)” (Hugo, 2019:6). This module has a specific focus on the information and communication technologies that students could apply when they, as nurse educators, design content for students. Lastly, a digital literacy course was designed in a shareable content reference model. The above-mentioned design activities correspond with Phase 2: Enactment of the Integrative Learning Design Framework (ILDF), as shown in Figure 7.1.



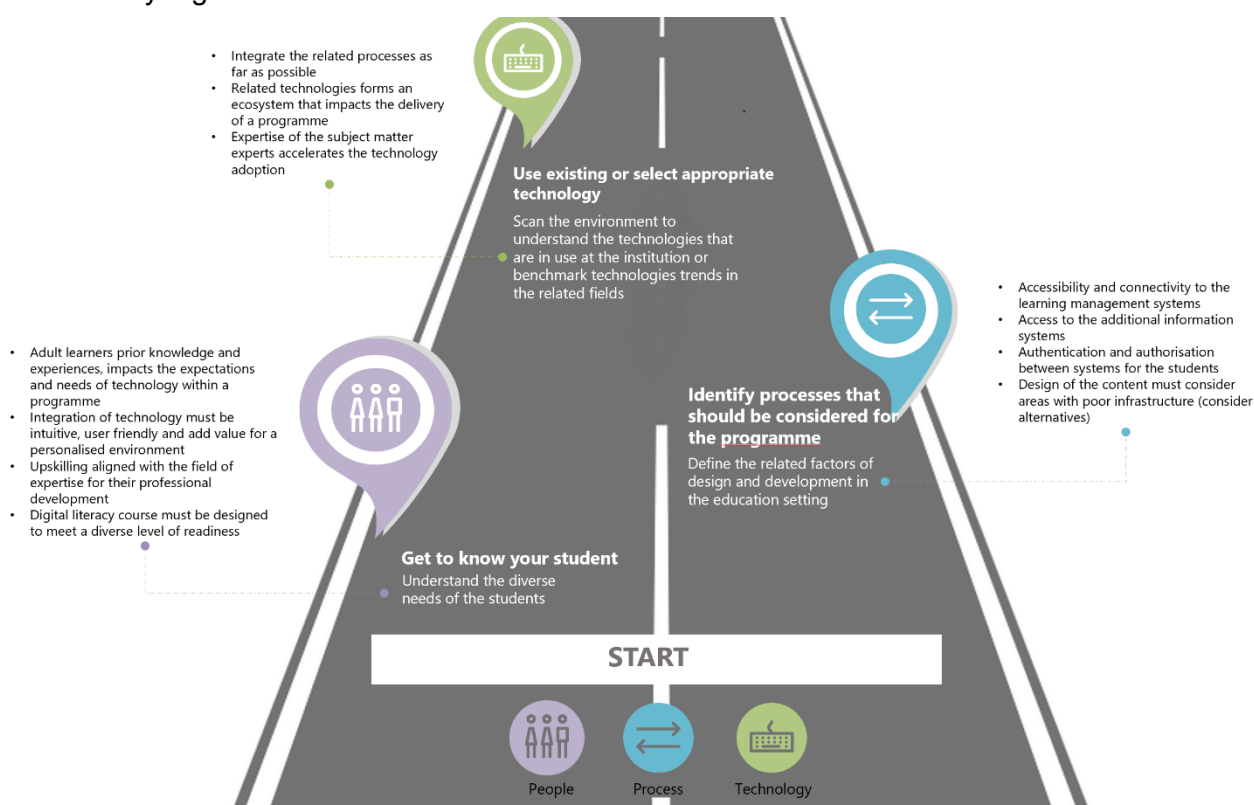
**Figure 7.1 Phase 2: Enactment of the ILDF**

**Source: Adapted from Bannan, 2010, n.p.**

In this section, a closer look is taken at the systematic process of design by discussing usage-centred design (Constantine & Lockwood, 2001), instructional design traditions (Dick & Carey, 1990), the enhancement of the PGDipNE for SUNLearn with a student-centric focus, PGDipNE course structure and content, Didactics prototype and the digital literacy course.

## 7.2 INTEGRATIVE LEARNING DESIGN FRAMEWORK – SYSTEMATIC PROCESS FOR DESIGN

The Integrative Learning Design Framework (ILDF), as the guiding framework for this educational design research (EDR) project, draws from instructional design traditions (Dick & Carey, 1990), product design and development (Ulrich & Eppinger, 2000), usage-centred design (Constantine & Lockwood, 2001) and diffusion of innovation (Rogers, 1995) as an integrated systematic process. Within the design of each of the four interventions, the procedural guideline based on the people – process - technology (PPT) framework for information technology management was used, as illustrated by Figure 7.2.



**Figure 7.2 People Process Technology framework guiding the design**

The PPT framework required me to first consider who will enrol for the programme, how will they gain access to the programme, and from where the students will need access. This consideration pays attention to the importance of the students' needs (section 2.3). Technology should add value to the individual (in this case the students), and the students, their needs and expectations should be predominant in terms of how the programme and learning process is designed (Magowan, 2020).



Furthermore, the processes in the programme should be reproducible (Magowan, 2020) and the steps involved should achieve a result (section 2.3).

In the context of the PGDipNE, the adoption of a blended learning approach required consideration of the processes involved to provide the students access to the course and content. The changes to the course structure and content should have been aligned with the rest of the information systems in the ecosystem to provide students with access to all the necessary systems. The adapted processes within the PGDipNE should have ensured that the processes in the educational environment paid attention to the characteristics of their target audience.

The adoption of technology (section 2.3) specifies the causal relationship (as shown in Figure 7.2) between the system design features, perceived usefulness, perceived ease of use, attitude towards using the system and the system behaviour (Davis, 1993). Attitude toward using, on the other hand, is a function of two beliefs, perceived usefulness and perceived ease of use (Davis, 1993). System design features directly influence perceived usefulness and perceived ease of use but has an indirect effect on attitude toward using (Davis, 1993: 475).

Firstly, with due consideration to the people aspect of the system design features, a closer look is taken at usage-centred design (Constantine & Lockwood, 2001) that was used to unpack what the student needs to accomplish (section 7.2.1). Secondly, the instructional design traditions (Dick & Carey, 1990) were used as guide to build the process for the digital literacy course (section 7.3.4) and, with the multimedia principles embedded in the digital media as instructional scaffolds, the Didactics exemplar was redesigned (section 7.3.3) to improve its effectiveness. The next section briefly introduces the usage-centred design (Constantine & Lockwood, 2001) process (section 7.2.1) and instructional design traditions (Dick & Carey, 1990) in section 7.2.2.

### **7.2.1 Usage-centred design**

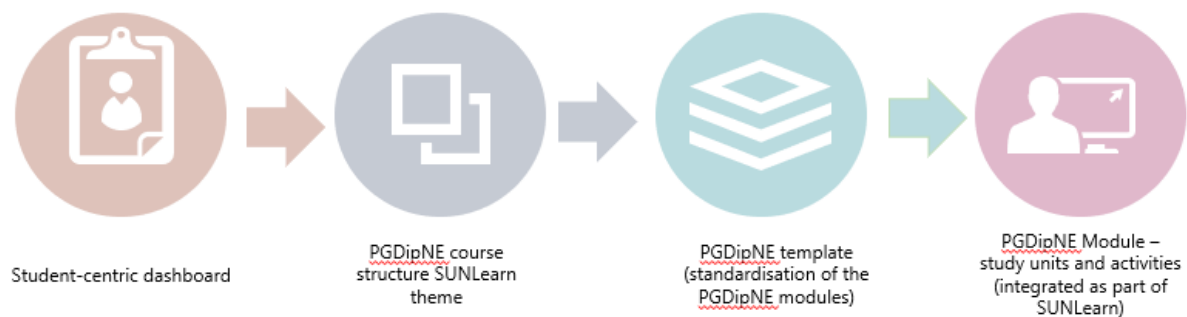
Usage-centred design (Constantine & Lockwood, 2001) is a streamlined, systematic process driven by using “abstract models to design the smallest, simplest systems that fully and directly support all the tasks users (students) need to accomplish” (Constantine & Lockwood, 2001:3). The abstract model of the design includes a role model, a task model and a content model.

- *Role model*: This is about how the student interacts with the system, considering what the student needs access to and what role the student must have. The role, as a student at the University, is representative of the type of relationship the individual has with SU and determines access types to the systems.
- *Task model*: This embodies a construction of the functions the student must be able to accomplish.
- *Content model*: This model relates to the organisation of the content to support the functions



or tasks together in the graphical user interface that the student will interact with.

The usage-centred design (Constantine & Lockwood, 2001) process has been used to design the abstract model for the student-centric enhancements of SUNLearn for the PGDipNE, as shown in Figure 7.3. As the target group are adult learners, the role model was designed based on the adult learning assumptions for the learning environment and also the notion that Jarvis (2012) introduced of the whole person in a social context to understand how the student would interact within the environment.

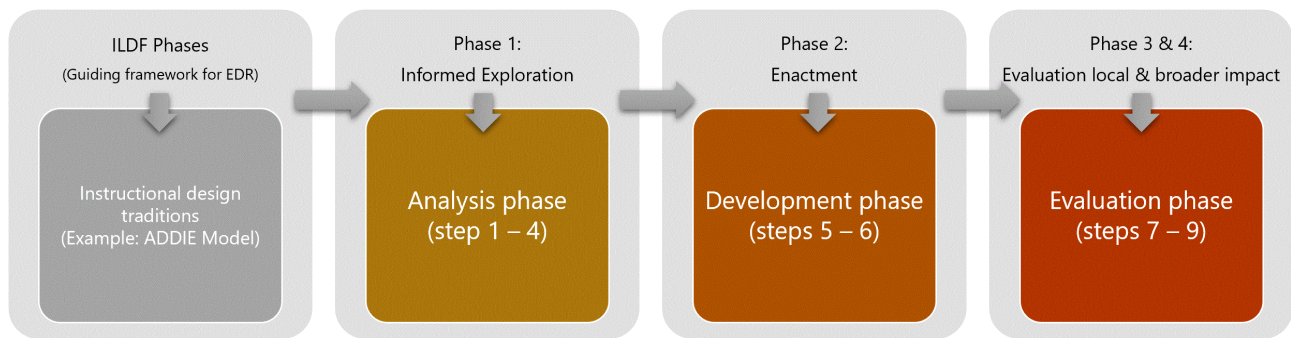


**Figure 7.3 PGDipNE abstract model for SUNLearn**

The task model was derived from the students' expectations (ease of access, format of the content and accessibility - Figure 6.20 in Chapter 6) of the learning environment and was designed accordingly. The content model was a combination of the students' roles and the tasks the students would need to perform, improving their experience of and interaction with PGDipNE as part of the SUNLearn ecosystem.

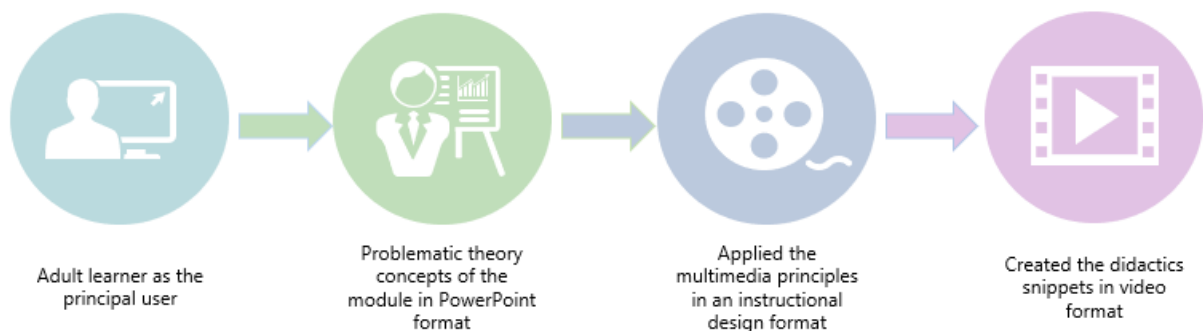
### 7.2.2 Instructional design traditions

The Dick and Carey (1990) model of instructional design includes nine interconnected steps with feedback loops. The steps incorporate procedures and techniques used for effective instruction by instructional designers (Dick & Carey, 1990). The sequential steps of the model, as summarised by Gustafson and Branch (2002), are: (1) assess needs to help to identify learning goals; (2) conduct instructional analysis and analyse learners and context; (3) write performance objectives; (4) develop an assessment instrument; (5) develop instructional strategies; (6) develop and select instructional material; (7) design and conduct formative evaluation; (8) revise instruction based on formative evaluation, and (9) design and conduct summative evaluation. The high-level phases of the model can be summarised as the analysis phase (steps 1-4), development phase (steps 5-6) and the evaluation phase (steps 7-9). The phases coincide with ILDF as the guiding framework for EDR as shown in Figure 7.4.



**Figure 7.4 ILDF in comparison to instructional design traditions**

The instructional design traditions (Dick & Carey, 1990) were used to inform the design of the scaffolds for the Didactics module. The Didactics module is a core module that most students struggle with and the module offers the opportunity to practically demonstrate how the multimedia principles could be applied in the creation of instructional design content for a blended learning environment. With the assistance of the Didactics lecturer, problem areas were identified, and a traditional PowerPoint presentation was used to design the scaffolds (Figure 7.5).

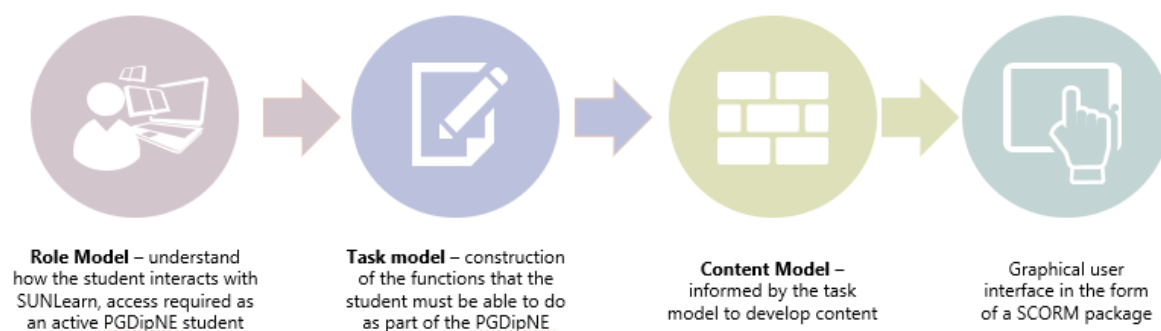


**Figure 7.5 Didactics exemplar**

The traditional PowerPoint presentation was redesigned using the multimedia principles for instructional design (section 2.81. and section 7.3.3). In this section, the theory behind the principles is explained with a definition of each principle, how the principle must be applied when designing instructional design content and examples of how the multimedia principles were applied in the digital media instructional snippet for the Didactics module.

Usage-centred design (Constantine & Lockwood, 2001) processes and instructional design traditions (Dick & Carey, 1990), procedures and techniques informed the design of the abstract model (Figure 7.6) for the development of customised, new digital literacy course in the form of a SCORM package. The digital literacy course (section 7.3.4) is explained in terms of the adult learning

principles, the learning paths of the theoretical framework and the skills the students acquire when the course is deployed.



**Figure 7.6 Digital literacy course (usage-centred design)**

The digital literacy course has been designed to enhance the digital literacy of the adult learners, but also to ensure that the students have ample resources that are aligned with the content they require to complete assignments. The course is discussed in section 7.3.4. Each of the mentioned elements in Figure 7.2, Figure 7.3, Figure 7.5 and Figure 7.6 was designed to increase the utilisation of technologies in the PGDipNE, to improve the student experience of the blended learning environment and to enhance the digital literacy of the targeted student population. In the following section, the focus is firstly on the enhancements of SUNLearn for the PGDipNE.

### 7.3 PGDIPNE ENHANCEMENTS FOR SUNLEARN

The design of the intervention was subject to a few non-negotiables. The University has an LMS that is currently in use and therefore the technology-based intervention had to be compatible with the current version of SUNLearn, and the enhancements had to be integrated into SUNLearn with the implementation on the programme level of PGDipNE. In addition to compatibility, the technology-based intervention had to be (1) device agnostic, (2) cost-effective, (3) sustainable, and (4) easily configured. Complex configurations could not be afforded as the programming language expertise to change, adapt or improve features of the SUNLearn platform is a scarce resource within the IT Division. The development work for the SUNLearn platform is usually outsourced to a third party or limited to the selection of a bespoke solution to the SUNLearn platform.

The reason for the enhancements being device agnostic relates to the diverse array of privately owned student devices, and allowing adult learners to use the devices that are accessible to them. Device agnostic refers to the design being compatible across devices. The cost efficiency and sustainability factors are related to the development cost. Moodle is a free and open source LMS (Moodle, 2019). The development and enhancement of Moodle is supported by a global community of users, developers, educators and administrators. The Moodle open-source project keeps abreast

with the latest technology trends, and therefore a logical approach was to review the latest developments in theme enhancement with a key focus on improving the student experience.

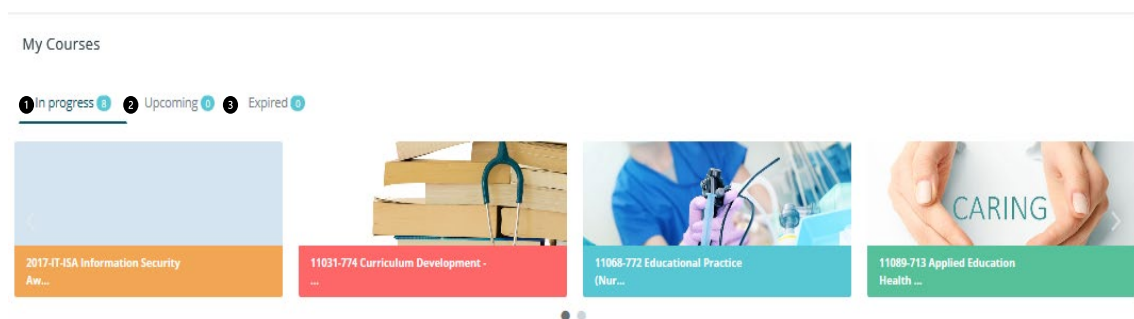
A theme can be used to change the look and feel of an LMS (Moodle, 2019). Furthermore, a theme applied within SUNLearn is designed to be device agnostic (Moodle, 2019). The Moodle theme was benchmarked based on the current version of SUNLearn, the mentioned requirements, the significant feature of the theme, the additional features of the theme and the feedback from the system administrators that provide the back-end support for SUNLearn.

The significant features of the theme included the course format, ability to configure the enhancement with the current version of SUNLearn, the ability to create a focused dashboard with all the relevant information for the students and the ability to provide a graphical illustration of statistics with regard to the number of activities, quizzes, etc. The additional features included visual functionality, user friendliness, ease of use or convenience, tracking progress and improving student engagement. The next section illuminates the enhancements of the SUNLearn theme for the PGDipNE.

### 7.3.1 Procedural guide for PGDipNE course structure

The informed exploration phase highlighted the navigation of SUNLearn as problematic for the adult learners of the targeted programme. For the education setting the expectations of the learners were ease of use, consistent format of the content and accessibility. To improve the student experience, the graphical user interface (GUI) of SUNLearn thus needed to be enhanced, based on the students' expectations of a blended learning environment. This was achieved by applying a Moodle theme to SUNLearn for the PGDipNE to present the learning content in an interactive, easy to use manner.

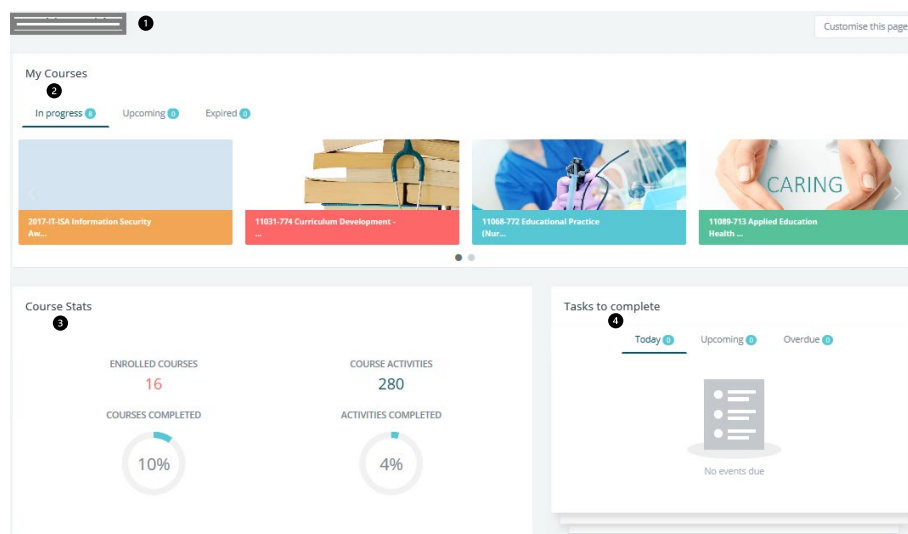
A Moodle theme can be applied at the site level (SUNLearn as an LMS), per category (in this case Nursing) or per course level (in this case the PGDipNE). This enhancement simplifies interaction with SUNLearn for students with an overview of all the modules at one glance, as shown in Figure 7.7.



**Figure 7.7 PGDipNE personalised dashboard**

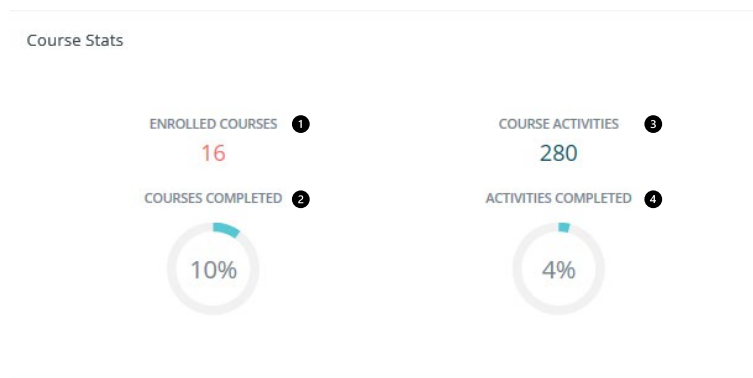
The personalised dashboard, with the student's name in the top left corner (1), is organised into My Courses (2), Course Stats (3) and Tasks to complete (4). For all the features to function properly, there is an expectation that the lecturer will fill in the start and end date of the module. This will allow the student to track the progress of the module. The dates are useful to distinguish between semester and year modules of the PGDipNE.

The My Course Overview block displays the list of modules that students are registered for with a live progress indicator. The live progress indicator gives the students a visual of the status of the modules. The in progress (1) indicator displays the modules that the student is busy with, the upcoming (2) indicator shows the module(s) that the student is about to start with, and the expired (3) indicator shows the module(s) the student has finished, as shown in Figure 7.8



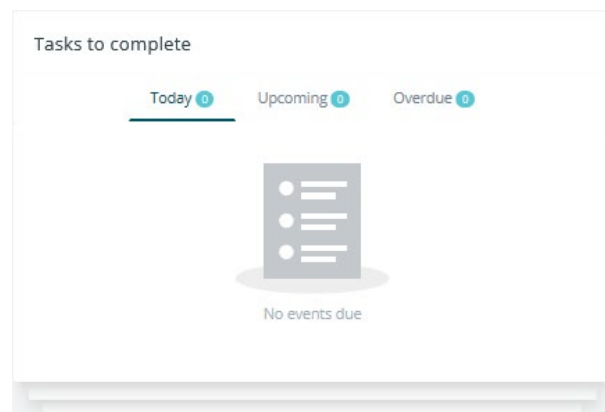
**Figure 7.8 PGDipNE course overview**

The course stats block (Figure 7.9) provides the students with a summary of the number of modules they are enrolled for; (1) shows the students the number of modules that they have been registered for as part of the PGDipNE, and the number of module activities across each of the modules or enrolled courses; (2) provides the student with a percentage complete indicator to monitor their progress in the programme for the duration of the programme and possible planning if they fall behind. The course activities (3) are a visual indicator of the cumulative number of activities (quizzes, assignments, etc.) across the programme. The activities completed (4) provides the students with a percentage of all activities across the programme that have been completed.



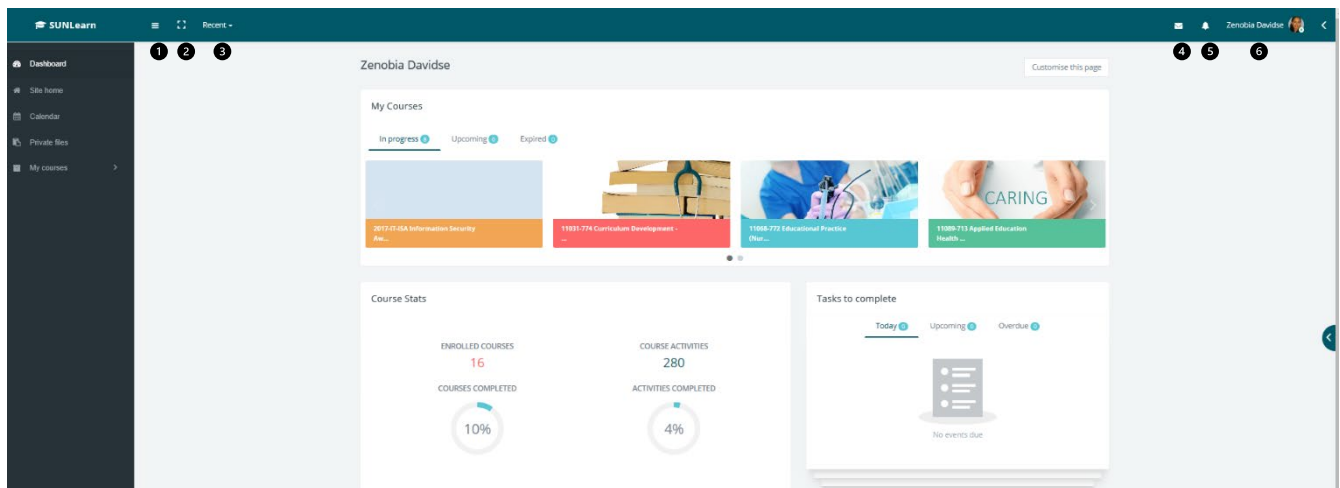
**Figure 7.9 PGDipNE Module statistics**

The tasks to complete block, as shown in Figure 7.10, affords students a visual indicator of upcoming, overdue or current assignments, tasks, activities, etc. This gives students the ability to plan and manage their activities across the programme. With the added calendar functionality, the students can synchronise their tasks to their preferred calendars and, by doing so, will get notifications on any device they are using as a primary device.



**Figure 7.10 PGDipNE activity reminder**

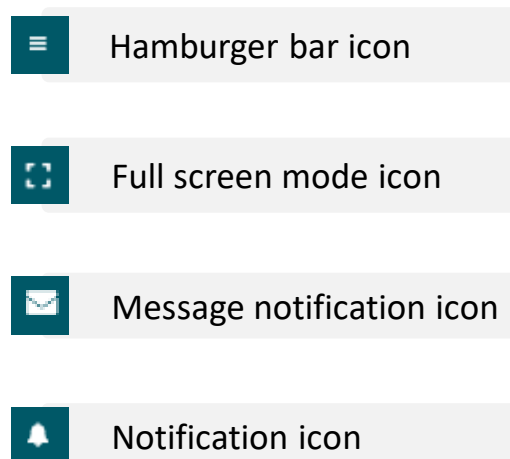
The SUNLearn toolbar houses icons that students are familiar with when using social media applications. The SUNLearn toolbar includes the hamburger bar icon (1), full screen mode icon (2), recent course icon (3), message notification icon (4), notification icon (5) and the profile icon (6), as shown in Figure 7.11.



**Figure 7.11 PGDipNE toolbar**

Each of the icons on the toolbar has a unique function. Every icon with its associated description is listed in Figure 7.12:

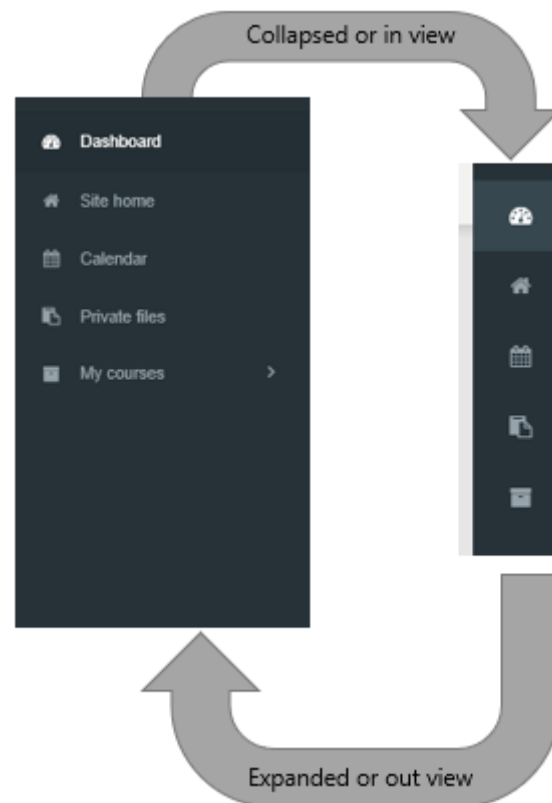
- Hamburger bar icon - controls the display of the sidebar. This allows the student to slide the sidebar in or out.
- Full screen mode icon - allows the student to create a distraction free mode displaying only the content that is relevant to her/him.
- Messages icon - provides a student with an area to send messages to the lecturer or fellow students. They can add individuals as contacts to their profile.
- Notification icon - provides the student with one area for all notifications. These include notifications about assignments, tasks or any other student activity with a configured notification.



**Figure 7.12 PGDipNE toolbar icons**

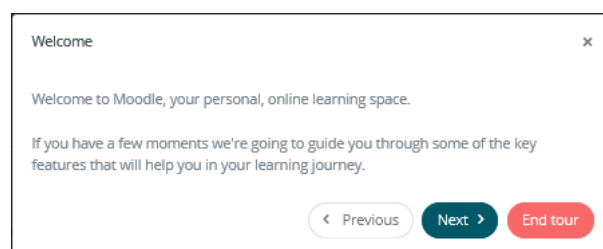


The sidebar can either be expanded or collapsed, as shown in Figure 7.13. The decision on how the screen space is used is that of the student. The screen size, depending on the type of device a student is using, is one requirement that is addressed by the responsiveness of the theme, and the layout is adapted in relation to the screen size of the device the student is using.



**Figure 7.13 SUNLearn Sidebar (PGDipNE)**

For a student who is newly introduced to SUNLearn, the configuration offers a virtual tour, as shown in Figure 7.14, to guide the student through the features that will help her/him with the navigation of the SUNLearn platform for the programme.



**Figure 7.14 PGDipNE Virtual tour**

These changes offer distraction free learning, creating a dedicated, focused area for the learning content (Edwiser, 2019). The features enable the students to take responsibility to configure the



interface to their own liking, which relates to the self-concept adult learning principle (adults need to be responsible for their own decisions on education) and applies to the blended learning environment by providing an interface with minimal intrusive instruction and maximum guidance and support (iSpring Solutions Blog, 2016).

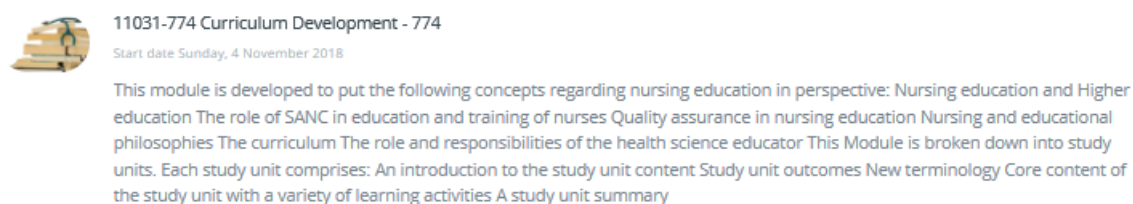
This interface also creates an environment where networking with others can contribute to their academic success or to their career development (iSpring Solutions Blog, 2016), because it allows the students to update their profile page, add contacts they wish to engage with or add lecturers to consult about learning content. The course contact block offers students various means of communication with lecturers, the programme administrator and the programme coordinator, but more importantly, it indicates the recent activity of either the lecturer or another person of interest. This means that the students will have a visual indicator if the lecturer or person of interest is available or active on SUNLearn. The responsibility becomes that of the students to involve the lecturer in planning and evaluation of their progress by using the channels provided through SUNLearn.

In addition to all the mentioned enhancements, the calendar feature was also added to create a digital version of the broadcast schedule, examination schedule, assignment due dates and quizzes. Students would now be able to export their personalised schedules associated with their programme and not all the dates of the Department of Nursing and Midwifery. This provides students with the flexibility and responsibility to create a personalised planning schedule aligned with their personal calendars and the PGDipNE schedule.

### **7.3.2 PGDipNE template for course content**

Students in the PGDipNE received a study guide for each of the modules that they were enrolled for, as well as a general information guide that provided (or duplicated) information about the programme. These guides contained the study units with the activities, reflections, assignment information, due dates and additional reading resources. The purpose of the self-study activities was practical application, but the lecturers were unable to track or monitor the students' understanding and could only intervene if a student reached out, fell behind or failed an examination. There was no standardised design for the seven modules and in the absence of a coherent design for the programme, students found the navigation between the modules frustrating and confusing. The structure and layout of each of the seven modules followed a different format that did not create a seamless interface for the students. The lesson plans for each of the modules were different. Some started with a welcome, others with announcements, others started with instructions and a folder of files that can be downloaded and others provided no context about the module, study units or what resources the document folder contained.

This was the “messiness of the real-world practice, with context being a core part of the story” (Barab & Squire, 2004:3) that was used as a foundational building block for the redesign of the PGDipNE modules. The need to know as motivation assumption emphasises that adults need to know the reason for learning and that, as a person matures, motivation to learn comes from intrinsic factors (Knowles, 1980). This assumption has been provided for in the educational setting by publishing a clear purpose for every module on SUNLearn, as shown in Figure 7.15. The purpose explains the focus of the module for students to understand what the module is about and how nurse educators can apply the new knowledge in their careers. The adult learner must be able to understand how the new knowledge could be applied in the workplace (iSpring Solutions Blog, 2016).



**Figure 7.15 Purpose of each module (example)**

The standardisation of the structure and layout of the modules for PGDipNE addresses the andragogical assumptions as applied to a blended environment (iSpring Solutions Blog, 2016), namely:

1. Need to know (adults need to know the reason for learning) was addressed by publishing a clear focus and purpose of each module.
2. Self-concept (adults need to be responsible for their decisions on education, involvement in planning and evaluation of their instruction) was addressed by adding to each module the learning resources and articles, references and self-study activities that the students are able to use to discover the information for themselves.
3. Orientation (as adults acquire knowledge, they want to apply it immediately in problem solving) was addressed by the introduction of reflection activities requiring students to use examples from their own settings to focus their attention on issues/problems they could connect with.

Each of the modules was designed with an introduction, announcements that are relevant to the specific module, the resources for the module and the study units for the module, as shown in Figure 7.16. After selecting a module from the “My Course” block, the name of the module appears in the top corner of the sidebar (1). The details pertaining to the module are displayed at the top of the

page and include 'enrolled students' (2), 'students completed' (3), 'in progress' (4) and 'yet to start' (5).

**Figure 7.16 PGDipNE modules integrated (SUNLearn)**

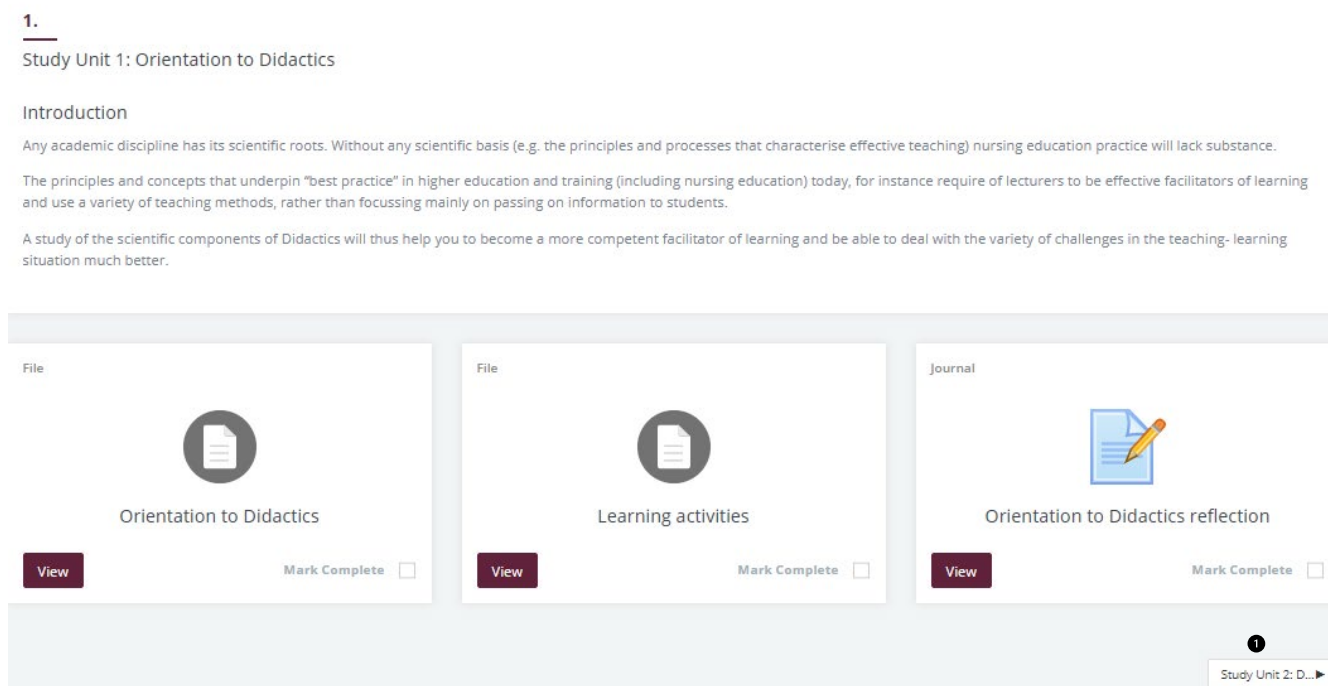
These statistics provide the lecturer with visual indicators about the progress students are making with the module, and each student can track her/his own progress in relation to fellow students. The number of study units is displayed in the sidebar (6 in Figure 7.16). The study units are named in alignment with the content of the unit. A brief introduction has been added as an orientation. The name of the study unit appears as a heading (1), as shown in Figure 7.17. The resources (2) appear as files and the number of activities (3) as well as the type of activity - in this example a journal - are also shown.

**Figure 7.17 Overview of study units (integrated)**

Furthermore, if the student clicks on the "View" button at the bottom of each of the study units (4 in Figure 7.17), the full content of the study unit is expanded showing the reading(s), online resources,

learning activities or reflection in the form of a journal, as shown in Figure 7.17. The content of each module was created as online content and published in SUNLearn, giving students the ability to complete their activities online and flexibility to work at their own pace.

The students can view online, read online and complete the activities online. Each of the activities can be marked as complete, giving a visual about the student's progress and percentage completion for the activities and module. The students navigate from one study unit to the next by clicking the indicator (1) in Figure 7.18, bottom right-hand corner to alternate between the study units.



**Figure 7.18 Study unit integrated with introduction, resources & activities**

In the following section the focus is shifted to the discussion of the design of the Didactics scaffolds drawn from the instructional design traditions (Dick & Carey, 1990).

### 7.3.3 Didactics exemplar

The Didactics module plays a dual role in the training of nurse educators. On the one hand the students learn about the theory of didactics, and on the other hand they should get sufficient opportunity for practical work to develop their expertise (Hugo, 2019). This makes an important contribution to the competences developed by the nurse educators. Having completed the module, according to Hugo (2019), the students must have the competence to:

- explain the difference and inter-relatedness between effective and efficient teaching
- discuss the key principles and strategies of effective teaching and apply it to the nursing education environment

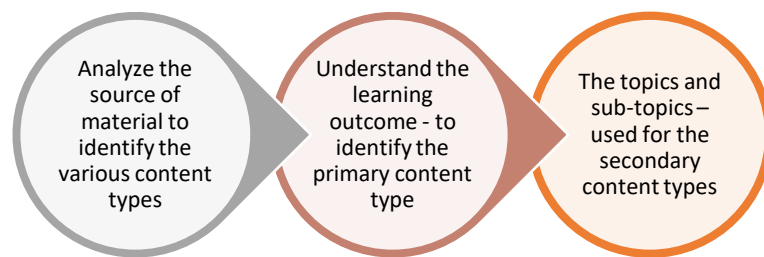
- choose and apply suitable approaches, methods, media and technologies within nursing education
- develop and apply a variety of instructional techniques and skills in nursing education practice
- relate new knowledge and skills regarding teaching and learning to the professional development of nursing educators.

To develop and apply a variety of instructional techniques for the students, the Didactics scaffolds were designed as a practical example of how to use the multimedia principles in the creation of instructional content for a blended learning environment. The interventions focused on key concepts, embedded into a series of instructional design videos to close the knowledge gaps of the students. As referred to in Chapter 2, Chapter 4 and Chapter 5, these knowledge gaps resulted as a lack of standardisation in attaining a nursing qualification that played a role in the education of the nursing workforce (DoH, 2019). The next section elaborates on the principles of multimedia learning for the design of instructional design content for an educational environment for adult learners.

The above-mentioned multimedia principles were applied to the instructional design scaffolds for the Didactics module. The scaffolds covered theoretical concepts included in the Didactics module (Addendum I), such as the professional teaching framework; the teaching and learning situation; the role of health sciences teachers; the quality viewpoint; markers of quality; competence and competencies; instructional design; aim, objective and outcomes; outcomes-based teaching and learning; teaching styles and trainer types; teaching methods, roles related to teaching; educational technology, media and ICT selection; ICT user skills; instructional techniques, designing self-directed learning; assessment and evaluation; assessment types and moderation. There are twenty interactions in a digital media container format (mp4) storing video, images, and text. The full duration of the Didactics scaffolds is 120 minutes. The student is able to use the scaffolds as revision before an examination. Firstly, I explain how the theory of multimedia learning was applied.

#### **7.3.3.1 Multimedia learning theory in the context of the Didactics module**

The theory of multimedia learning was applied in the design of the Didactics scaffolds by paying attention to the three cognitive processes that occur during knowledge construction (section 2.8). The process that was followed to apply the foundation of the multimedia theory within the study, is shown in Figure 7.19.



**Figure 7.19 Multimedia learning theory process**

Each part of the PowerPoint presentation was discussed with the lecturer - as the subject matter expert of Didactics - to understand the context. This was followed up with the identification of the primary content type and visual types to support the learning objectives. Csernyanszky (2019), as an instructional designer, then redesigned the PowerPoint presentation to build the 'relationship' between the visual type and the content type. This was done to assist the student in the construction of a mental model that links the visuals with the content. We then added narration for further explanation of the specific Didactics concepts. The application of the theory, with examples, is discussed in the next section.

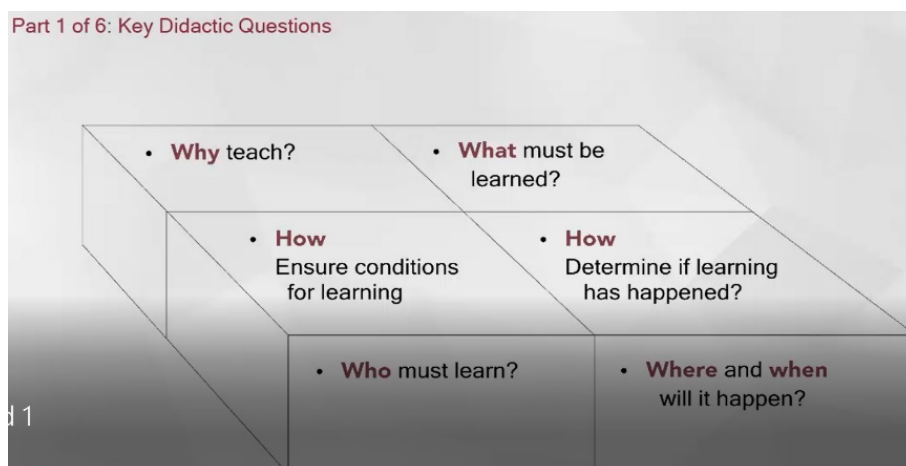
### **7.3.3.2 Digital media for Didactics - scaffolds**

The digital media container format of the Didactics scaffolds is a series of theory concepts. The first video in the series of scaffolds provides the student with an introduction to the module, making the connection with PGDipNE, announcing who the lecturer is with contact details, as well as approximate time estimation of the whole series - as shown in Figure 7.20. This approach to the design and changing of the introduction to the content of the module applies most of the andragogical assumptions of adult learning, but also considers the delivery approach of the programme. The personalisation principle has been applied to the series of the scaffolds by using the voice of the lecturer in a conversational style, replicating her/his style during the contact sessions or broadcast sessions.



**Figure 7.20 Introducing the Didactics scaffold series**

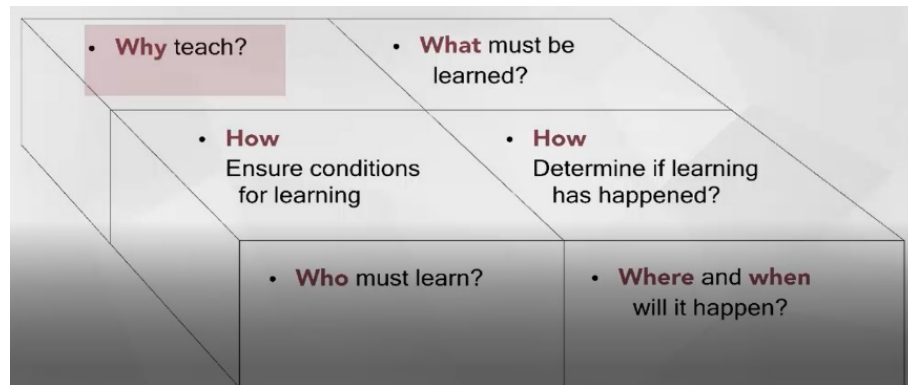
In the following section the multimedia principles are demonstrated as they were applied to the scaffolds for the Didactics module. Each one of the scaffolds is numbered and named in accordance with the key concepts, for example: “In this section, you will revise ‘Professional Teaching Framework’”, to focus the attention of the student. This is followed by stipulating which topics will be covered in the snippet to provide the student with a clear focus. The snippet can be controlled by adding additional features like skipping back, moving forward, pausing the video, switching off the audio narration, or removing the subtitles. In addition to all the added features the relevant topic is highlighted, as the video progresses, with the number of parts that the topic entails, as shown in Figure 7.21.



**Figure 7.21 Coherence principle applied**



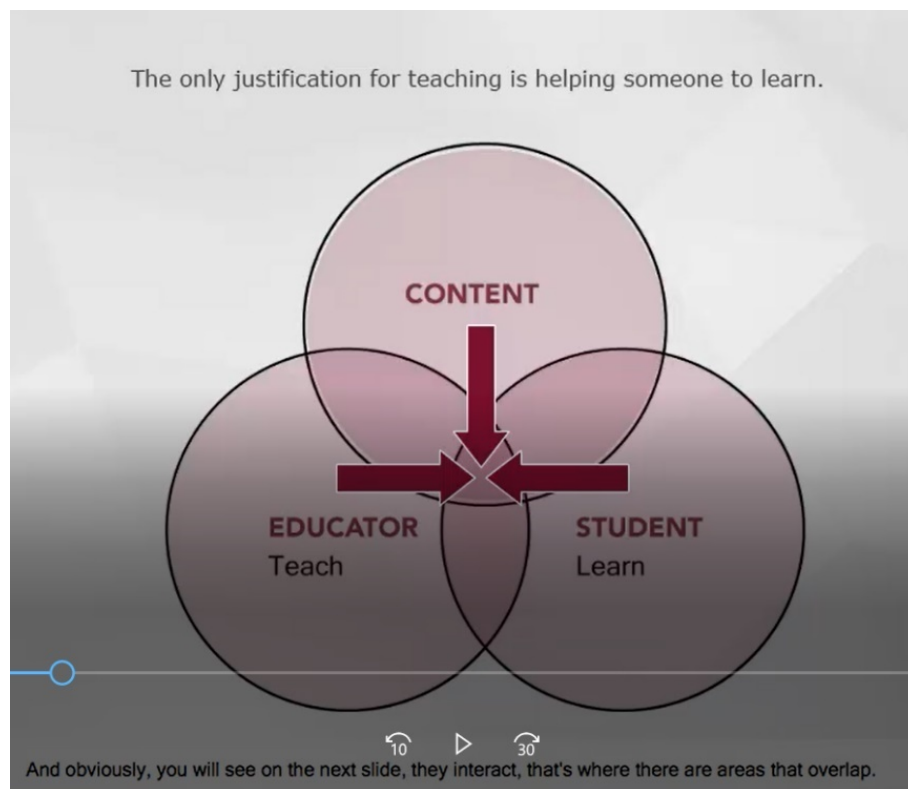
The six parts of the key Didactic questions are illustrated by means of a mental model, with the associated questions in each block. This is a practical example of how the coherence principle was applied. The mental model also assisted the student to start building new knowledge for the creation of a learning path, as explained in Jarvis's theoretical framework. The next section of the snippet incorporated the modality principle, as shown in Figure 7.22, by presenting the words to explain the six key Didactic questions as audio narration.



**Figure 7.22 Modality principle applied**

Each of the key concepts of the scaffolds was designed to keep the audio aligned (contiguity principle). In addition, the extraneous processing was reduced to help the students concentrate on the critical information (redundancy principle), the difficult concepts were simplified by introducing mental models so that students could make sense of the information (coherence principle) and the series was designed to afford students the ability to control the pace of the lesson (segmenting principle). The pretraining principle was applied to the start of each of the scaffolds in the series. Furthermore, to help the students focus, prompts were added and as the lesson progressed the animation built the concepts by adding depth to the colour and adding arrows - as shown in Figure 7.23.





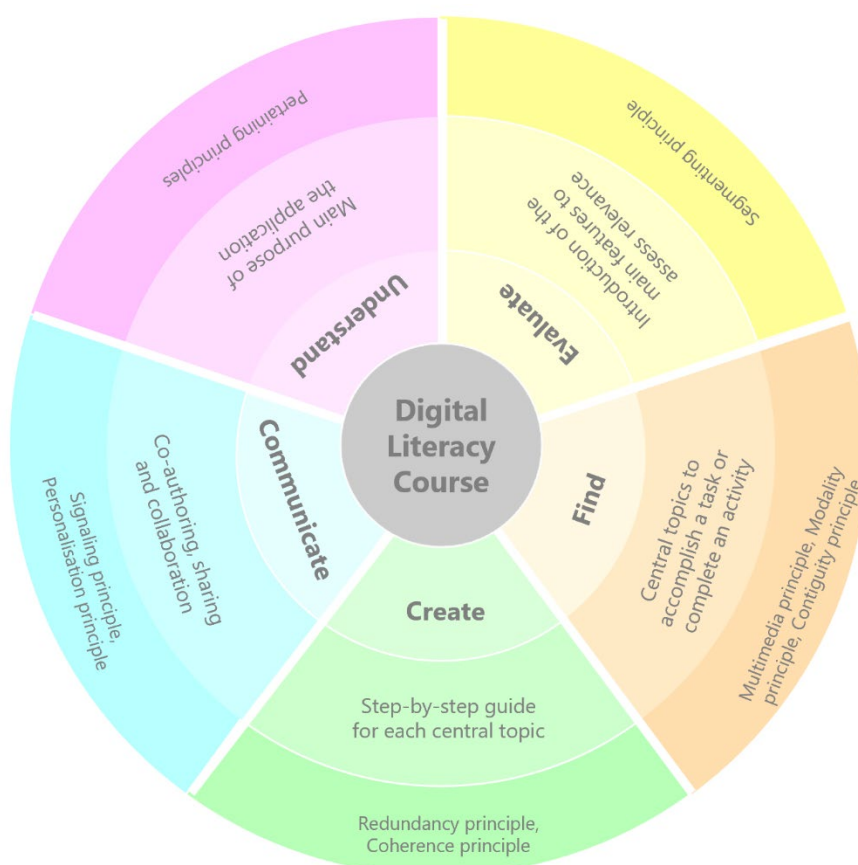
**Figure 7.23 Segmenting principle applied**

The series reviews and builds on the key concepts for novice students to help them make sense of theory. One of the core competencies a nurse educator should possess is a “sound understanding of contemporary educational theories, principles and models underlying the design of curricula and the value of adult learning” (WHO, 2016: 11). Instructional design of the multimedia scaffolds is used as a model for the nurse educator.

In the next section, the rationale for the selection of the SCORM package is explained, the digital literacy course for the targeted programme is introduced and how the design integrates the reflective learning path is illuminated.

### **7.3.4 DIGITAL LITERACY COURSE**

The digital literacy course has been designed to enhance the digital literacy of the adult learners of the targeted programme (Addendum J). The purpose of the customised digital literacy course for PGDipNE was to ensure that students benefit from the understanding of a wide range of applications (MS Word, MS Excel and MS PowerPoint) that was integrated as part of the PGDipNE. By integrating the different functions of each of the applications, the students were given the opportunity to explore, apply their knowledge and use the application to complete some of their study activities. The design was standardised across the applications, constructed around the definition of digital literacy and applying the multimedia principles as shown in Figure 7.24.



**Figure 7.24 Design guidelines for digital literacy course**

MS Word is a word processing application used for the creation and editing of documents. MS Excel is a spreadsheet application used for calculations, graphing tools, creating tables or charts. MS PPT is a presentation application that allows the user to use slides to tell a story and add narrations, transitions or recordings. The main objective of the newly designed digital literacy course was (1) to provide students with the necessary electronic resources and required support, (2) to develop the ability to collaborate with each other by using for example the co-authoring feature of the different applications, (3) to provide them with the built-in functionality to organise their content and use a feature like the design ideas of PPT, teaching them how to construct their information into a coherent presentation, (4) to provide them with a means to design professional reports and (5) to develop their ability to use the application and share information.

The PPT digital literacy course is discussed as an exemplar to illustrate how the multimedia principles were applied and how the reflective learning paths of Jarvis's experiential learning theory have been integrated. Before doing this, the rationale for the selection of SCORM will first be argued.

#### **7.3.4.1 Shareable Content Object Reference Model (SCORM)**

Shareable Content Object Reference Model (SCORM) standardises the way in which training or course content can be created and how it is deployed in a learning management system (LMS)

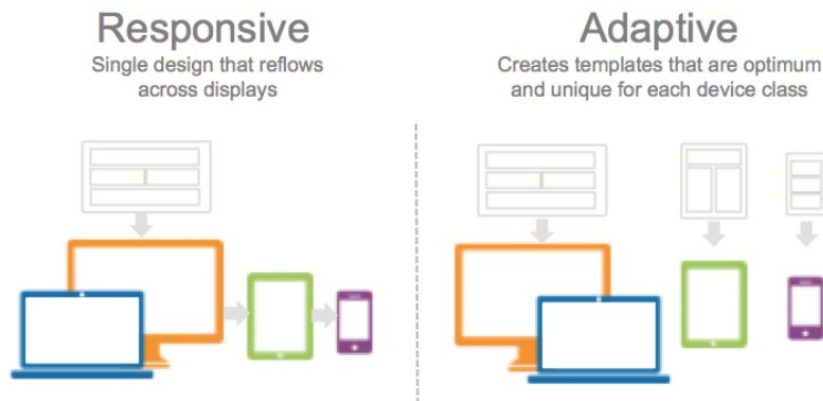
(Quigley, 2018). SCORM, as a standard, offers the benefits of interoperability, adaptability, reusability, efficiency and durability. According to Valuy (2016) these benefits entail the following:

- Interoperability allows for simple and convenient migration of course content that has already been created, irrespective of the platform it was built for, suggesting that SCORM compliant courses can be implemented on another platform.
- Adaptability allows for easy configuration of the course content according to the detailed requirements of a programme.
- Reusability is one of the key benefits of this standard as it allows the created content to be reused under different conditions.
- Efficiency affords system administrators with technical specifications to enhance course development, saving time and costs for a tailor-made course.
- Durability allows for convenience and simplification to suit new technologies without additional cost.

The benefits of the standard addressed the concern about scarce resources and limited skills of the IT Division, while also giving the lecturer the ability to modify the course if the content needs to be updated. SCORM provides lecturers with flexibility and the opportunity to reuse course content should the need arise. The digital literacy course was designed using an authoring tool which is briefly explained in the following section.

#### **7.3.4.2 Authoring tool**

The Gomo authoring tool was used to design the digital literacy courses. Gomo is a collaborative, cloud-based responsive eLearning authoring tool allowing users to create beautiful multi-device learning (Gomo Learning, 2019). The content produced was both responsive and adaptive to ensure that the available screen space is used in an optimal way and the quality of the learning experience is maintained (Gomo Learning, 2019). Responsive content is about changing the position of the content once the size of the screen has been detected. The ability to design content in a responsive manner means that the content responds to the size of any screen to optimize the experience for the student. The content is described as fluid and flexible (Gomo Learning, 2019).



**Figure 7.25 Responsive versus adaptive design**

**Source: Gomo Learning (2019)**

Adaptive content is how the behaviour of the content will be altered based on the type of device and the available screen size. Adaptive content is less flexible and fluid, but the content adjusts to the screen size and selects the most appropriate detected layout for the screen of the devices (Gomo Learning, 2019). The comparison between responsive and adaptive is shown in Figure 7.25. This was an important consideration for the design of the SCORM packages, because the students enrolled in the PGDipNE use an array of devices and the design needed to be device agnostic.

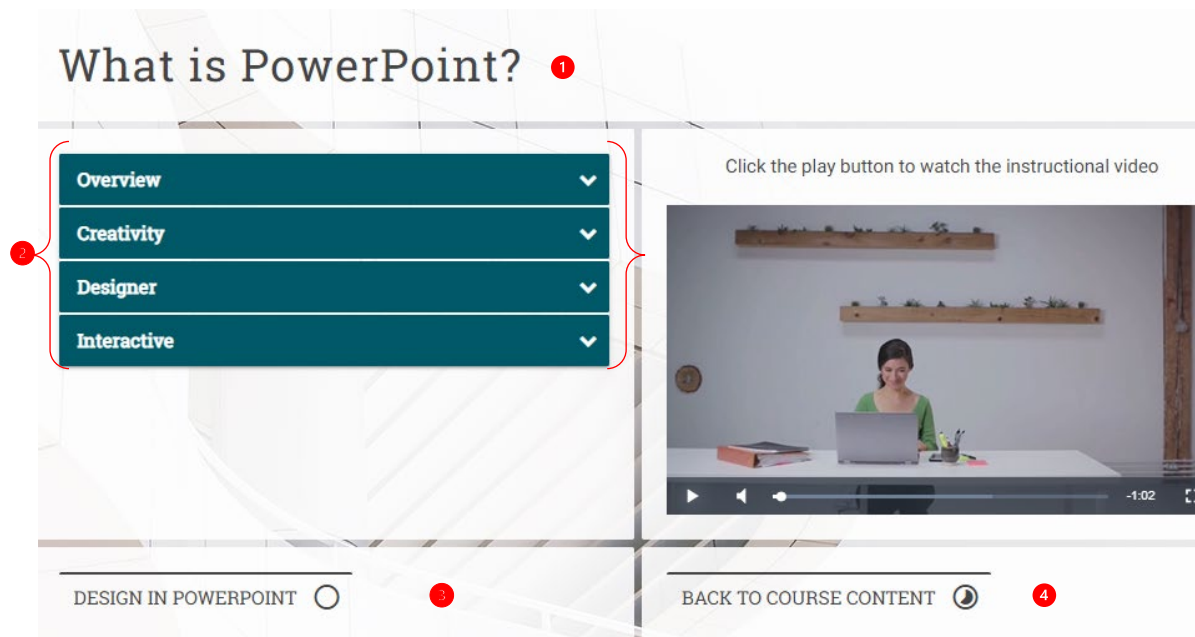
#### **7.3.4.3 MS PPT as a digital literacy intervention**

The potential learning experience is modelled by referring to the different reflective learning paths of Jarvis's model (Chapter 3.4), namely the contemplation path, the reflective practice path and the experiential learning path (Chapter 3.4.3).

- The contemplation path is described as “when one considers an experience and makes an intellectual decision about it” (Dyke, 2017: 5). The learning process starts with an individual who goes through an experience/situation, reasoning and reflection occur, the events are evaluated, the new knowledge, skill or emotions are memorised and the individual is changed and more experienced after the chain of events.
- The reflective practice learning process happens when an individual reflects “on and in action” (Dyke, 2017: 5). The reflective practice learning process starts with an individual who goes through an experience/situation, a reasoning or reflection on the event occurs, the individual practices or experiments and memorises, and is changed and more experienced because of the reflective practice of the events.
- The experiential reflective learning path, according to Jarvis, is described as “the way in

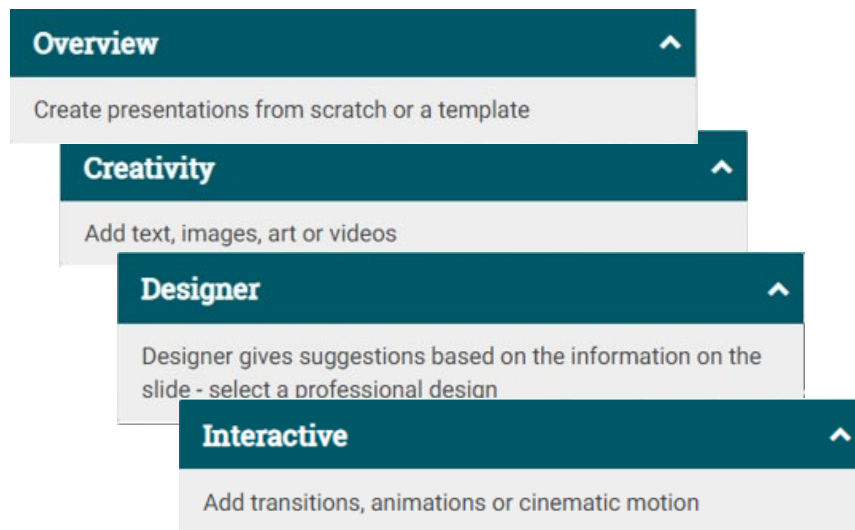
which pragmatic knowledge may be learned” (Bhat, 2004). The learning process starts with an individual who goes through an experience/situation, memorises the event(s), the individual practices or experiments, engages in reasoning and reflection, evaluates the event, goes back to memorisation of the event(s) and is changed and more experienced.

Each course starts with an introduction (1) explaining what the application is about, pretraining topics (2) about the key features of the application, an option to skip to the next topic (3), an option to go back to the course content (4) and an instructional design video (5) as illustrated in Figure 7.26.



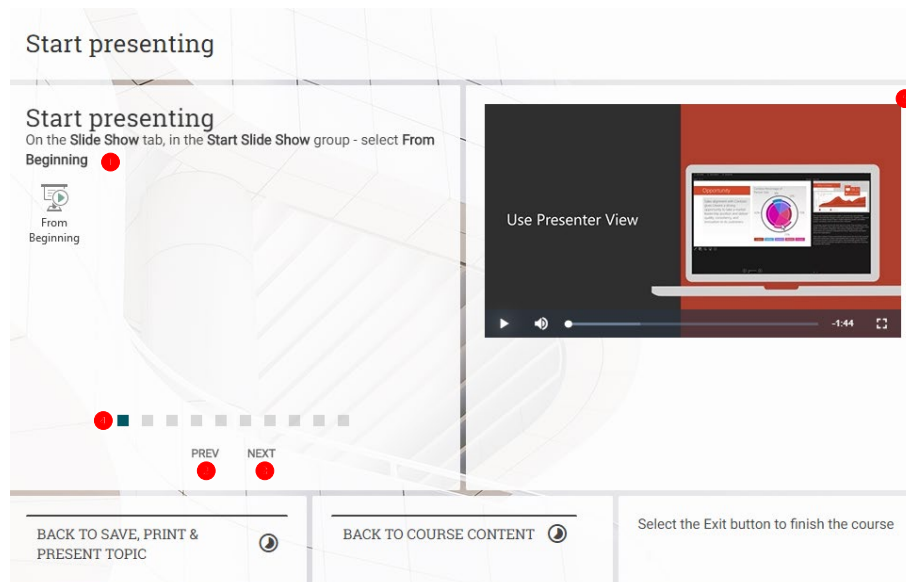
**Figure 7.26 Introduction of the PPT course (pretraining principle applied)**

The introduction represents the event (experience/situation). The reasoning and reflection occur when the student interacts with the content. On the left-hand side of the screen, the text-based illustration introduces the key topics and when clicking on the topic, further information is displayed, providing the student with a pretraining topic as shown in Figure 7.27.



**Figure 7.27 Pretraining topics**

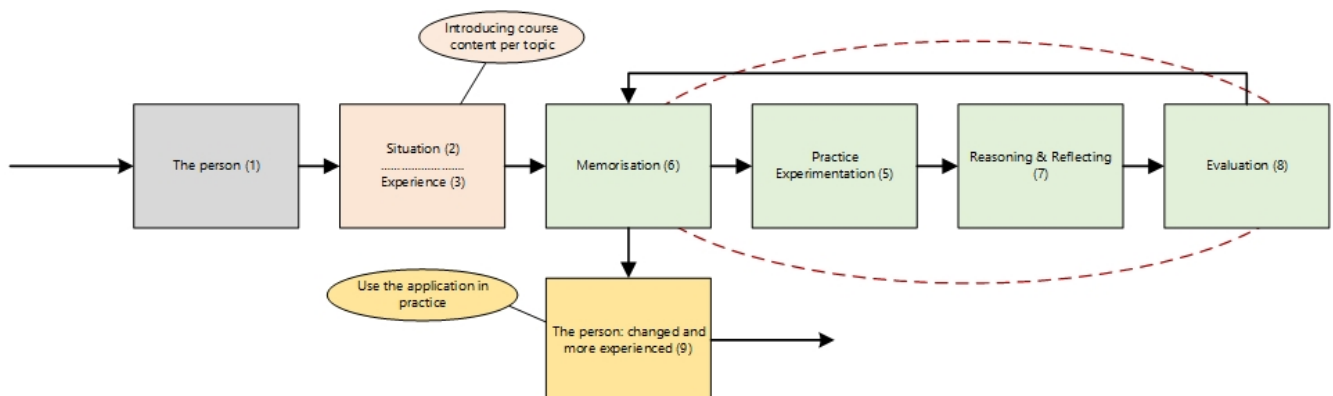
This helps the student evaluate the information and to decide if the topic would be of interest to explore. The information is strengthened by adding the instructional design video to help create a mental model of the information (memorising). The contemplation path is used as an entry point for the reflection path, as shown in Figure 7.28. The interaction was created to elicit a response from the student after a decision has been taken about what action the student would like to perform. The signalling principle (1 in Figure 7.28), reflected in the menu ribbon of the application, focuses the student's attention on the text s/he should engage with in the application as part of the practice or experimentation during the reflection path. This helps the student create a mental model, strengthens memorisation and enhances the ability to recall prior knowledge.



**Figure 7.28 Signalling principle in the reflective path**

Figure 7.28 further illustrates that the previous (2) and next (3) buttons give control to the student. The process indicator (4) provides the student with a visual indicator about the number of steps that are involved with the specific topic. The student can go back and forth between the steps, pause the instructional design video (5) and open the PPT application to engage with course content and to practise the action as explained. The signalling principle applied in the course is reflected in the menu ribbon of the application.

Figure 7.29 explains the steps that the student takes to create a reflective path. The student selects the topic from the menu (1), and the event (situation/experience) is triggered when the student clicks on the left or right side of the screen. The memorisation (6), practice (5), reason/reflecting (7) and evaluation is a step-by-step process that is triggered depending on the actions of the student and was applied to the digital literacy course by creating a step-by-step interaction that the student triggers when s/he is ready to move on to the next step or after practising the action. A number of multimedia principles were applied to this topic, namely the redundancy principle by removing all the unnecessary text or images; the coherence principle by combining the graphics and the text; the contiguity principle for the corresponding text and images; the modality principle by directing students to a separate screen with the instructional design video; segmenting by using a main topic with sub-topics; and the signalling principle by highlighting important key words and guiding the text with arrows.

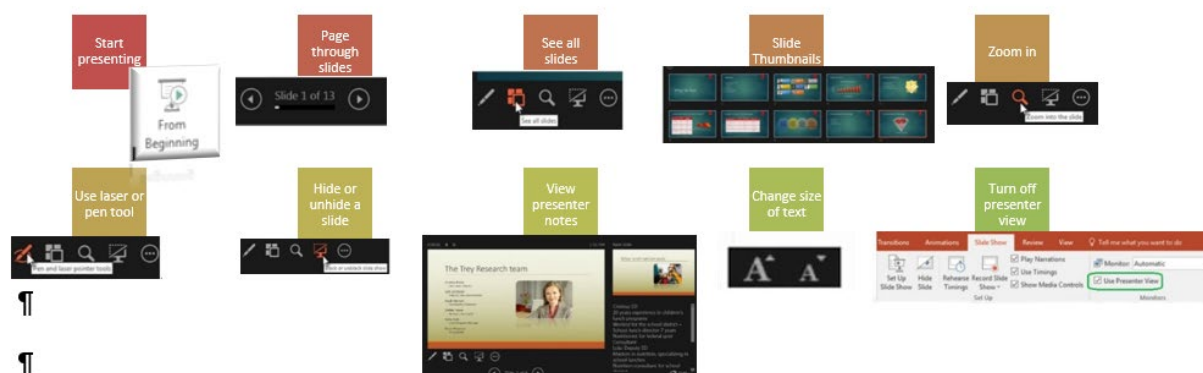


**Figure 7.29 Reflective path: feedback loop with triggers**

The experimental reflective path was designed by using content the students must engage with as part of the programme and as a qualified nurse educator. As a nurse educator the student becomes the educator responsible for education and by providing these students with relevant examples that they can use, and opportunities to reflect on previous experiences, the core competencies nurse educators require are reinforced. PPT has artificial intelligence to combine text, graphics, audio and video and provides design ideas to match the content (Microsoft PowerPoint, 2019). PPT has an easy to use interface to create interactive content that will improve the visual impact of the content and produce more engaging presentations.



Students can use the co-authoring feature to work in smaller groups to improve the planning of content or to share with a lecturer for possible coaching opportunities. The example from the digital literacy course, as shown in Figure 7.30, illustrates how to break down a concept into chunks, and the pauses introduced with the next and previous buttons give students the ability to control the pace and to experiment with the feature in the application as they are moving from topic to topic.



**Figure 7.30 Graphical user interface (reflective path)**

The pretraining principle was used for all the digital literacy courses to assist students in understanding the core features of the applications. The segmenting principles were applied to the main topics by adding sub-topics to the training material. The flexibility in the design gives students the ability to pace their learning and create a mental model that would assist with the learning. The course was designed so that even when the student starts experimenting with the application, s/he is able to use the course content to reinforce the concepts.

## 7.4 CONCLUSION

This chapter outlined how the “messiness of the real-world practice, with being a core part of the story” (Barab & Squire, 2004:3) has influenced the EDR. The objective of enhancing the digital literacy of adult learning in a blended learning environment was subject to additional enhancements. Importantly, the chapter explained how the profile of the adult learner shaped the design of an educational environment. The educational environment in the context of rapid technological advancements, and increasing the utilisation of technology within a programme that adopted a blended learning approach, necessitate various subject matter experts from different fields to collaborate for the creation of an environment favourable for adult learners. This is one of the consequences of the changing dynamics of HE landscapes and the diversity of the student profile with distinct needs.

Furthermore, the technology enhancement of the targeted programme with the application of the multimedia principles and the reflective paths of Jarvis’s model of experiential learning, demonstrated how the integration of technology could influence adult learning in an educational



setting. The intervention originated in support of the adult learner, but for EDR to be successful, the programme coordinator and lecturers will have to drive the utilisation of technologies in the environment. Further technology enhancements in the PGDipNE should be driven by faculty, otherwise the adoption would be slow or even non-existent.

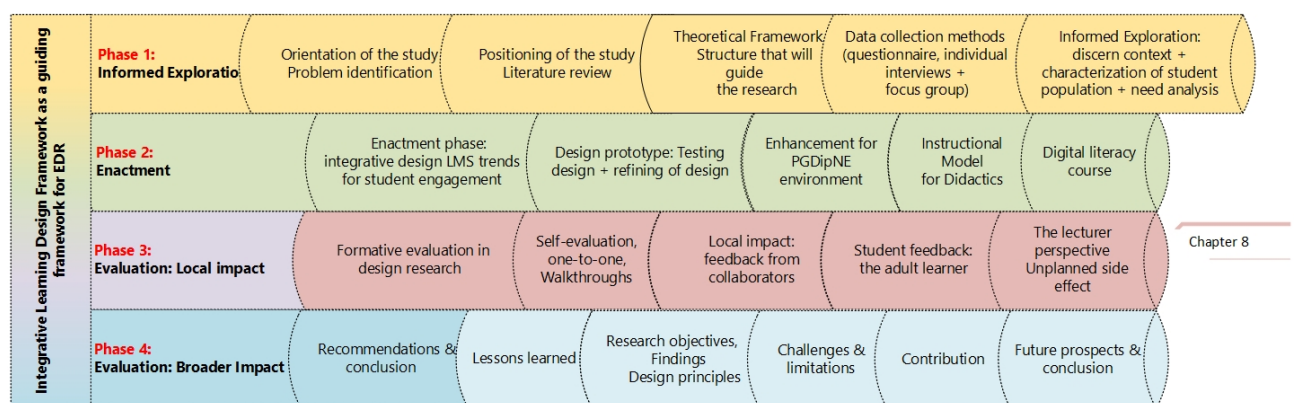
The enrichment of the targeted programme was mainly driven from the students' expectations of a blended learning environment and their personal experience with technology application leading to their understanding that technology has no limitations. The design was student-centered and attempted to accommodate adult learners with different needs because of the social context and their embracing of learning opportunities accessible to them. The next chapter elaborates on the evaluation of the design and the feedback from students and staff.

## CHAPTER 8

### EVALUATION OF THE INTERVENTION

#### 8.1 INTRODUCTION

In the previous chapter, I argued that the dependent variables (SUNLearn theme for PGDipNE in section 7.3.1 and the PGDipNE structure in section 7.3.2) heavily impacted the design of the series of technology-based interventions. In this chapter, the focus is turned to how the collaboration with the stakeholders influenced the technology-based design and how these stakeholders responded to the intervention. This chapter relates to Phase 3 (Evaluation: Local Impact) of the ILDF, as shown in Figure 8.1. With the prototype in place, this phase incorporated formative evaluation. The iterative nature of this phase informed the design and led to refinement and redesign efforts until the design was finalised. The goal of the evaluation: local impact is to determine how well the design satisfies the requirements of the targeted programme, i.e. the PGDipNE.



**Figure 8.1 ILDF: Positioning of Phase 3**

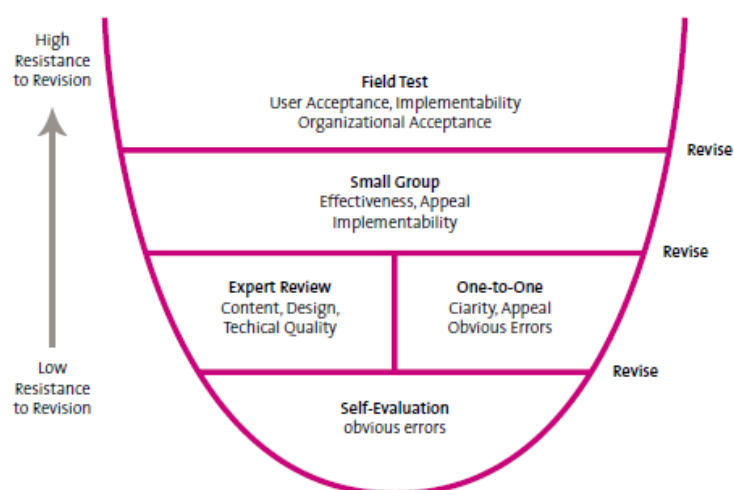
**Source: Adapted from Bannan, 2010, n.p.**

In designing the intervention, the needs and desires of these adults became evident during the informed exploration phase, especially their expectations of the use of technology in a blended learning environment. When designing an intervention, the context and the activity of the design process add value to the initial design, because real-world educational settings inform the design (Bannan, 2010).

The formative evaluation of the technology-based design was strengthened by two further stages of testing, known as alpha and beta testing (McKenney & Reeves, 2012), as mentioned in Chapter 3. In the following section, attention is paid to formative evaluation in educational design research (EDR) and how this was applied to the study.

## 8.2 FORMATIVE EVALUATION IN DESIGN RESEARCH

In the context of EDR, formative evaluation is defined as “a systematically performed activity aiming at quality improvement of a prototypical intervention” (Nieveen & Folmer, 2013:158). Formative evaluation has various layers as the intervention develops from the one phase to the next. Tessmer (1993) describes these layers, as shown in Figure 8.2, from more informal in the early stages (self-evaluation, one-to-one evaluation/walk-through) to small group evaluation aimed at testing the practicality and effectiveness, and then to field testing that relates to broader implementation.



**Figure 8.2 Various layers of formative evaluation**

**Source: Tessmer (1993)**

The early stages of the formative evaluation, from self-evaluation that started in Phase 2 with the refining of the design and the iterative design cycles, up to small group testing, overlapped with Phase 3 (Evaluation: local impact) of the ILDF. The formative evaluation was done in sequence and included a self-evaluation, one-to-one walk-throughs and small group evaluation. The small group evaluation was done with both lecturers and students. In the following section the quality criteria that apply to EDR interventions are discussed in the context of the study, followed by an explanation of each layer of formative evaluation that was applied to the design of the intervention.

### 8.2.1 Criteria and layers of formative evaluation for EDR interventions

According to Nieveen and Folmer (2013:160) relevancy, consistency, practicality and effectiveness are four of the quality criteria for the design of an educational intervention that can be applied to a wide array of educational interventions. Each of the criteria is defined with an indication of what has been done in each phase of the ILDF, as shown in Table 8.1.

**Table 8.1 Evaluation criteria related to ILDF phases**

<b>Phase</b>	<b>Criteria</b>	<b>Short description of the activities</b>
Phase 1: Informed Exploration	Relevancy: there is a need for the intervention	Needs analysis, problem identification, characterisation of audience in the targeted programme, review of literature
Phase 2: Enactment	Consistency: the intervention is logically designed	Benchmarking of themes, design prototype that was tested and revised based on the formative evaluation
Phase 3: Evaluation: Local impact	Practicality: the intervention is either expected or usable in the setting for which it has been designed	Walk-throughs and testing of the intervention with the targeted student group and lecturers (evaluate whether targeted group can work with the intervention)
Phase 4: Evaluation: Broader Impact	Effectiveness: using the intervention is expected to result in desired outcomes	Strategy for diffusion (willingness to adopt the intervention as part of targeted programme or extend to the clinical programmes)

**Source: Adapted from Plomp, 2010:26**

#### **8.2.1.1 Self-evaluation**

The relevancy criterion was confirmed by Phase 1: Informed Exploration. The consistency criterion, as explained in Chapter 7, was met by the incorporation of technical features (both significant and additional features - see Table 8.2) that were aligned with the requirements of SUNLearn, the needs of the adult learners and the maintenance and support from the SUNLearn system administrator.

**Table 8.2 Technical features addressed**

<b>Significant features</b>	<b>Additional features</b>
Multiple customisation options	User friendly
Multiple course formats (programme in the context of the University)	Visually functional
Graphical statistics for quizzes	Convenience for systems administrators, lecturers, etc.
Drag and drop customisation of the configuration of the dashboards	Tracking the course progress
	Tracking student performance

**Source: Edwiser, 2019**

The SUNLearn theme was applied at the programme level (PGDipNE) and tested by the system administrators. The test performed by the system administrators included seamless integration, configurability, maintainability, ease of installation and granularity of deployment (Meder, 2018). Further testing included the responsiveness and adaptiveness of the theme for PGDipNE. In addition to the technical testing, self-evaluation was done to eliminate obvious errors. This part of the intervention was further strengthened by alpha testing that was part of the related fields, software engineering and product design that ILDF as an integrative process makes provision for (Bannan, 2010).

#### a) Self-evaluation results

The self-evaluation involved testing of the technical aspects of SUNLearn for the PGDipNE and to ensure that the operational components would not influence SUNLearn in the production environment. The self-evaluation instrument was designed based on the requirements (section 7.3) and in alignment with the technical features of the Moodle theme. Following on the self-evaluation, the results were verified by a technical evaluation done by the system administrator and the system support specialist. The same instrument guided the technical evaluation performed by the system administrator and the system support specialist. The results of the qualitative feedback data of the technical evaluation are shown in Table 8.3.

The general feedback from the technical perspective was that the granular deployment (1) created the flexibility to provide the PGDipNE with a seamless, neat and effortless navigation for the environment. The enhancement was easy to install, easy to maintain, sustainable and cost effective. The cost effectiveness included the elements of receiving regular updates not only for the theme, but also whether the current version of Moodle was upgraded. Furthermore, being able to deploy the enhancements of a test development and production environment without requiring programming expertise, is an advantage. The maintenance and support were added value to ensure that the University could enter into a suitable service level agreement. The system support specialist described the testing and installation as effortless, even across multiple environments (Meder, 2018). The programme layout (2) was changed to the card layout to accommodate the structure of the programme as well as the modules. The consistency of the content was evaluated for different devices to verify the adaptiveness and responsiveness of the design and to confirm that the design met the device agnostic requirement (Table 8.3, number 3). The students used an array of devices to access SUNLearn, therefore the intervention was designed to work across multiple devices (referred to as a device agnostic design).

**Table 8.3 Technical evaluation feedback**

<b>Feature</b>	<b>Attribute</b>	<b>Feedback</b>
<b>Multiple customisation options</b>	Designing of templates to improve productivity	Easily configurable -design can be fully customised – drag and drop functionality, visually functional, user friendly, convenient
	Ability to upload logo, corporate ID for each faculty	Theme can be deployed granularly – site, category, course or even up to student level <sup>①</sup>
	Collapsible sidebar	Sidebars to the left and right with notification tray at the top – giving the student control over what is displayed
<b>Graphical stats</b>	Course progress tracking	Brilliant feature for the student and the lecturer – lecturer must add the start and end date of the module
	Student performance tracking	Progress bar for all activities that are uploaded Visual indicators for the lecturer and student
<b>Multiple course formats</b>	List format	Displays the course in a collapsible list Format can display thumbnails of course
	Card format <sup>②</sup>	Course is presented in sections and activities – stacked like cards Student can keep track of all activities across the programme
<b>Device agnostic</b>	Functionality seamless across multiple devices <sup>③</sup>	Tested the theme across smartphones, tablets, desktops and laptops – no issues; design extremely responsive Testing was extended to the mobile application without any further configurations or settings that needed to be adjusted
<b>Source: Meder, 2018; Loubser, 2018</b>		

The device agnostic tests were conducted with a diverse array of devices and confirmed that the intervention was compatible with multiple devices. The evaluation was extended to test the compatibility with the SUNLearn mobile application. The responsiveness and adaptability were seamless.

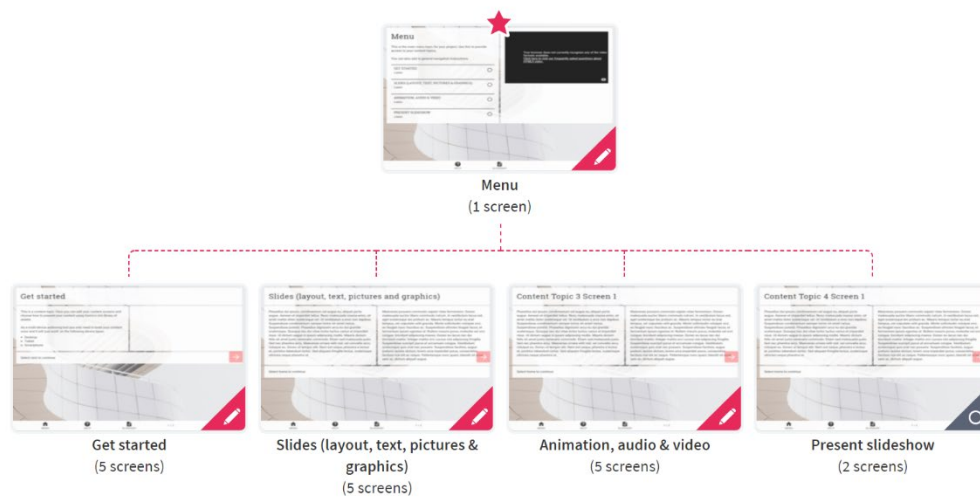
Following the self-evaluation, additional changes were required to the course contact block and journal activity. The course contact block displays a list of users for the module, methods of

communicating with the users and activity status (Moodle, 2019). The activity status is a visual means of knowing when the user was last active in the module on SUNLearn. The users of the module were configured to include the programme coordinator, programme administrator and lecturer. The journal activity allowed the lecturer to create reflections for each study unit per module. The students were able to edit and refine their reflections online and to mark the activity as complete.

The next phase of the self-evaluation was the alpha testing. Alpha testing relates to the early assessment of design ideas (McKenney & Reeves, 2012:137). As part of the alpha testing stage, the detailed design specifications were verified in terms of functionality. The goal of the test was to collect data to check the soundness and feasibility of the design. The soundness was tested by considering the requirements underpinning the design (McKenney & Reeves, 2012), as discussed in Chapter 7 (compatible with the current version of SUNLearn, device agnostic, cost effective, sustainable and easily configured). Apart from these requirements, the intervention also had to address the expectations of the students (accessibility, format of the course, ease of use).

The digital literacy course was further evaluated in terms of the digital media videos for each topic to test browser compatibility and accessibility to the students. Some of the students only had access to limited bandwidth and low speed internet, hence consideration was given to appropriate design features and adjustments to accommodate them. To provide the best user (student) experience and maintain the quality of the content, the digital literacy course was responsive and adaptive to ensure that the course could be published across multiple devices.

The instrument for the self-evaluation of the digital literacy course was derived from the basic functions of each application (Word – section 6.2.3.2, Excel – section 6.2.3.3 and PowerPoint – section 6.2.3.4). For the discussion, the iterative cycles of the PowerPoint course are illustrated to demonstrate the task model for each cycle as a progression of how the changes were accomplished. The basic functions (section 6.2.3.4) were used as the criteria for the evaluation and design of the task model. After the design of the task model for cycle 1, as shown in Figure 8.3, the task model was discussed with the programme coordinator who proposed that the task model be elaborated to include more functions for the students. This model was then refined as part of cycle 2 - as shown in Figure 8.4.



**Figure 8.3 PPT Cycle 1**

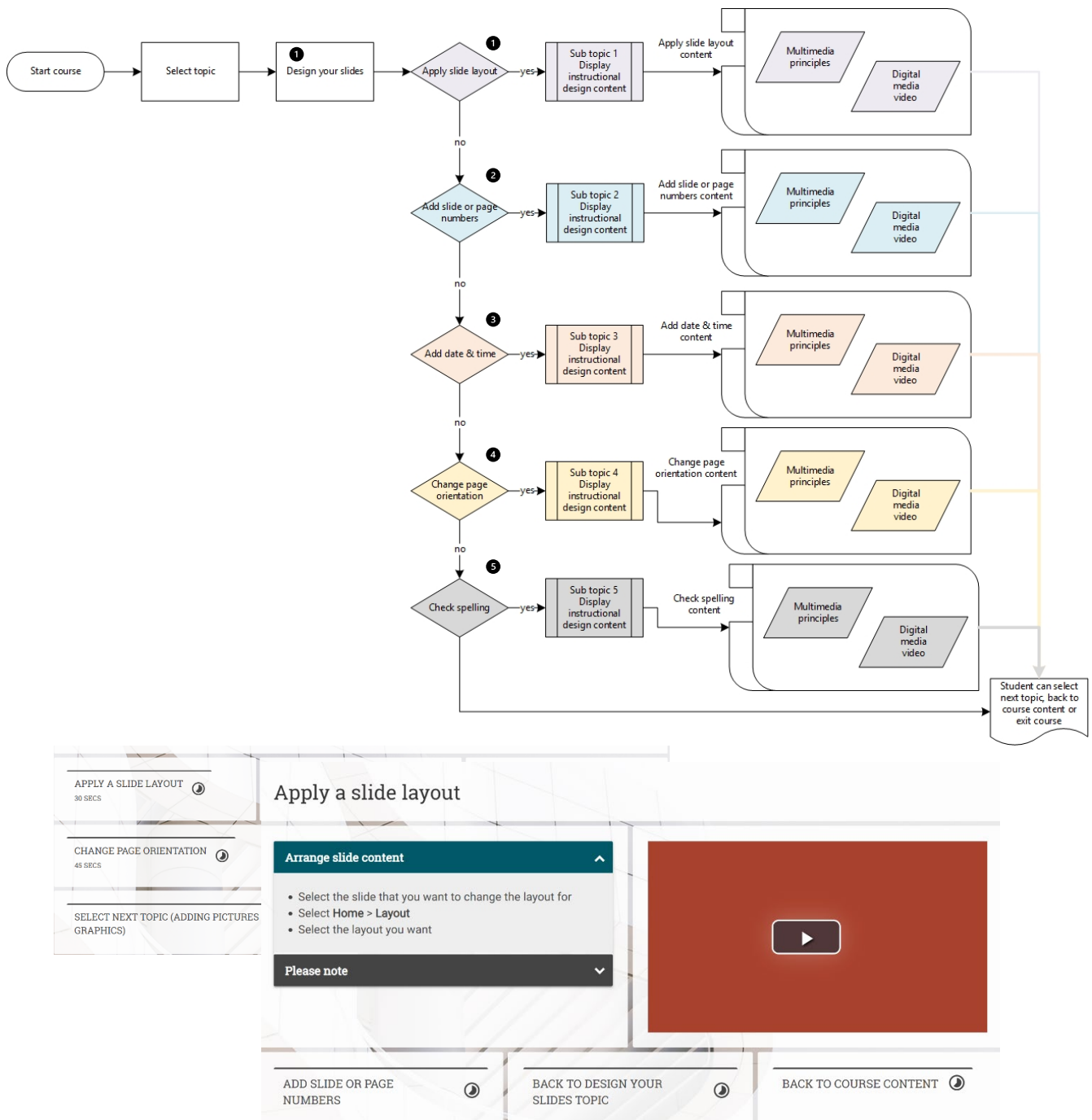


**Figure 8.4 PPT Cycle 2**

The content model was tested by verifying each of the required tasks as outlined in Addendum J. This was followed by switching from the main topic, then back and forth between the topics, going back to the course content or exiting the course. The transition from topic to topic is illustrated in Figure 8.5. To illustrate how the self-evaluation was done for the main topic and each of the associated subtopics, the process flow is shown in Figure 8.5. Each process flow was tested



following a step-by-step systematic process. The selection of the main topic (1) displays the subtopics as content that was informed by the task model. In this example, subtopics 1 – 5 are displayed.



**Figure 8.5 Process flow of the content model and associated GUI (PPT – Design your slides)**

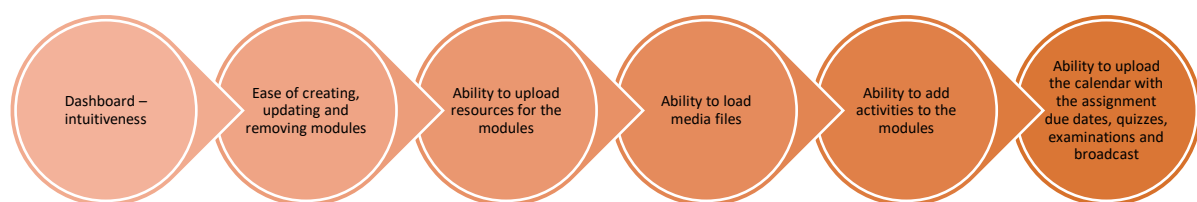
The student had the option to go back to the course content page from any screen, or to go back to the main topic or to a subtopic. The verification was completed as part of the alpha testing stage. The process flow was also used as the instrument for the evaluation. The high definition training videos were compressed to maintain the quality of the video but to accommodate low speed internet

connections. From cycle 1 to cycle 2, an introduction was added for each application to assist the students to understand what the application was all about. The course content topics were changed to a more conversational style.

The self-evaluation was completed by testing the adaptiveness and responsiveness of the digital literacy course across multiple devices and the SUNLearn mobile application. This was followed by a one-to-one evaluation with the programme coordinator in the form of a personal interview.

#### 8.2.1.2 One-to-one evaluation

After the self-evaluation, the programme coordinator was brought on board to evaluate the consistency criterion. The consistency quality criterion answered the question whether the technology-based intervention was designed logically for the programme. This was done in a one-to-one walk-through of the system in the test environment in the form of a user acceptance test, consisting of the elements as shown in Figure 8.6. The rationale for the personal interview was to allow the programme coordinator to express herself, and ask questions about the digital literacy course, interventions for the PGDipNE and the programme structure. The verbal feedback was recorded with a digital recorder and transcribed. This resulted in additional refinements to the study activities including, inter alia, reflections that had to be reviewed to ascertain whether the students understood the content.



**Figure 8.6 User acceptance test for PGDipNE theme**

The programme coordinator found the overall layout and structure well organised. The categorisation of the user acceptance test was logical and followed a natural progression to understand the navigation of the programme. The standardisation of the modules fit the layout and design of the study guides and the lecturers could easily add or remove content. The intuitiveness of the dashboard created a detailed, student centered area. To upload resources for the modules, to load media files, to add activities to the modules and to upload the calendar with the assignment due dates, quizzes, examinations and broadcasts was straightforward. The programme coordinator did, however, raise a concern about understanding what activity or resources would fit a particular module.

During the testing and refinement of the technology-based intervention, the programme coordinator resigned and the intervention had to be evaluated by her predecessor as acting programme

coordinator. When the new programme coordinator was appointed, the acting programme coordinator handed over to her and, in collaboration with the researcher, explained the research project and the design of the intervention. The walk-through was done with the previous programme coordinator who had years of experience with the current practices, was familiar with the shortcomings of the programme and had her own ideas on what improvements were required. On the other hand, the incumbent taking over gave an outsider perspective that led to new insights and slight refinements in the design to standardise the layout of the programme for SUNLearn. Lourens (2019) wanted the calendar integrated for each of the programmes to allow the PGDIpNE to be recognised as a brand for adult learners, and more importantly, to be more accommodating for the students to export the calendar to a preferred email address. After the evaluation had been completed by the programme coordinator, the evaluation continued with the lecturers in the form of a small group evaluation.

### **8.2.1.3 Small group walk-through**

The evaluation by the lecturers was done using the same user acceptance criteria (Figure 8.5), because the programme coordinator found the user acceptance test procedure beneficial in terms of giving the lecturers guidance to structure their modules. The small group walk-through was first conducted with the five lecturers of the core modules (section 5.2.1). The second walk-through was done with a group of ten lecturers. The lecturers were overall impressed with the structure, layout and resources, but were concerned that they would not be able to update the resources as required. The programme administrators found all the elements of the user acceptance test helpful, as this also helped them to better understand how to assist the students. The evaluation also included, and was strengthened by, beta testing (second stage) that was part of the related fields, software engineering and the product design that ILDF was built from as an integrative process (Bannan, 2010).

Beta testing was conducted as a functional intervention with a focus on its use in context (McKenney & Reeves, 2012:138). Beta testing explores local viability and institutionalisation. Local viability relates to how the intervention persists in the immediate context (McKenney & Reeves, 2012:138), while institutionalisation explores the possibilities for how the intervention could be disseminated as a future endeavour. The digital literacy course was designed in a standard (SCORM) that could be institutionalised. However, the digital literacy course would have to be adapted to fit the learning outcomes of each academic programme. This aligns with the practicality quality criterion that refers to expected or usable factors in the educational setting for which the intervention was designed.

Apart from the practicality quality criterion, user-friendliness (or rather ease of use) also featured as a requirement. These design requirements were incorporated by creating a dedicated, focused

dashboard that was visually functional, easy to use and included a progress bar for all course activities.

The feasibility of the design considered the material, financial, emotional and human resource costs that were associated with the design (McKenney & Reeves, 2012). For the research study, the human resources were limited to the collaborators. The material and financial components of the design were controlled, because the researcher had access to the authoring tool and development environment to complete the research and the design. An authoring tool enables the creation of learning content using text, media and interactions in an effective and efficient manner, reducing development time and enhancing the ability to use the created content in various formats (Hassey, 2018).

The digital literacy course (MS PPT part of the full course - Addendum K) in the form of the SCORM package supported the sustainability requirement, but also enabled the lecturers to easily maintain the content of the digital literacy course.

The following section sheds light on the feedback from the collaborators (students and lecturers). The feedback from the students was collected by means of a questionnaire, using Microsoft Forms, and a focus group discussion.

### **8.3 LOCAL IMPACT: FEEDBACK FROM THE COLLABORATORS**

The programme coordinator invited me to another contact session with the students. The students had been exposed to the existing PGDipNE SUNLearn environment, and also had had the opportunity to engage with the enhancements in a test environment (in research, 'laboratory' is usually the term used for these research conditions).

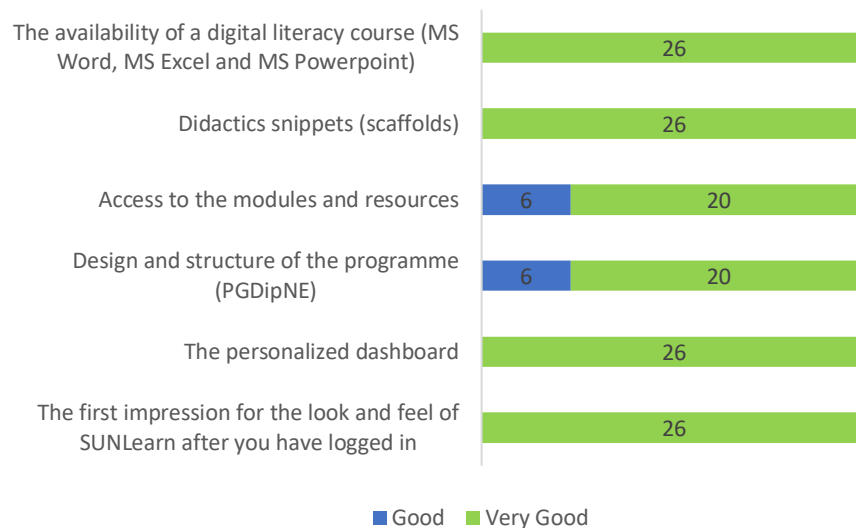
#### **8.3.1 Student feedback: the adult learners as the users**

The following section will firstly focus on the results of the survey and then on the feedback from the focus group discussion. The feedback was collected with the permission of the students. The focus group discussion was not recorded because the students were not comfortable having their feedback recorded, but they agreed to submit their written feedback in either an individual email or handwritten note. Most of the students handed me their notes when the discussion concluded.

##### **8.3.1.1 Evaluation questionnaire**

The needs analysis questionnaire included a concluding question to ask the students if they would be willing to participate in the evaluation (section 6.2). Those who agreed, provided their contact details and were contacted for the evaluation. The sample size of students who agreed to participate in the evaluation was 26. The students provided feedback on various elements of the intervention, as shown in Figure 8.7. The questionnaire (Addendum L) consisted of six items, each with a five-point Likert scale. The rating scale ranged from very poor (1), poor (2), neutral (3), good (4) to very

good (5). The questionnaire items covered the first impression after a successful login, the personalised dashboard, design and structure of the programme, access to the modules and resources, Didactics scaffolds and the availability of a digital literacy course. The results of the survey are given in Figure 8.7



**Figure 8.7 Results of student evaluation survey**

For four of the six areas that required enhancement, namely the look and feel of SUNLearn for the PGDipNE, the personalised dashboard, the Didactics scaffolds and the availability of a digital literacy course for the programme, the students agreed that the enhancements were very good. As far as the design and structure of the programme (PGDipNE) and access to the modules and resources were concerned, six of the 26 students responded with ‘good’, while the remaining 20 students responded with ‘very good’.

The focus group discussion concentrated on the same areas as those covered by the questionnaire to limit the scope of the evaluation. The next section sheds light on the feedback received during the focus group discussion.

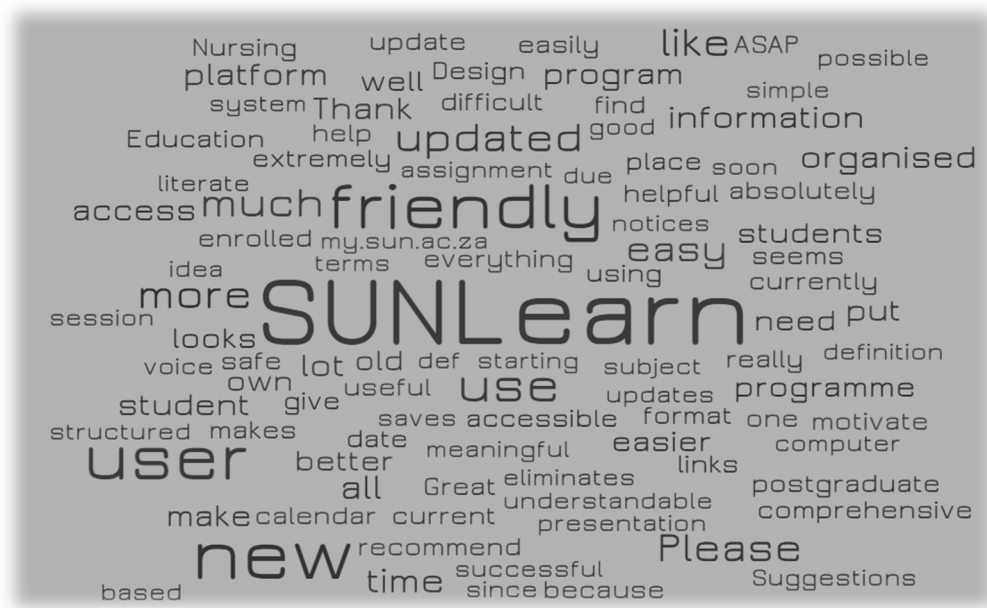
### **8.3.1.2 Focus group discussion**

As the focus group discussion with the students commenced, one of the first questions they had was when they could start using the “new SUNLearn”. The anxiousness of the students who could not log in, who had forgotten their passwords or who had problems with their devices was obvious. The students’ names and personal information, as well as any reference to the researcher, system administrator or technicians, were removed from the general comments.

To recap, in section 6.3.2 the students’ expectations of the role of technology in a social context and of an academic programme were elicited. In a social context the students expected technology to be

user friendly, easy to use and to facilitate interaction/communication. In terms of an academic programme, the students' expectations centred around format of the content, ease of use and accessibility.

The comparison between the students' expectations in a social versus an academic context demonstrated the parallels between the findings and the expectations of the students. The students' experience with the use of technology indicated that they were comfortable using technology. Their expectation was to find technological functionalities in an educational setting similar to those in a social media context. With the assistance of a word cloud, the qualitative data is represented visually, as shown in Figure 8.8.



**Figure 8.8 Word cloud of the evaluation (students' feedback)**

The students' feedback was analysed to determine if the intervention met their expectations in relation to the theme of an academic programme. The results of the analysis are presented according to the students' expectations as highlighted above.

- **Format of content:** from the feedback words that can be associated with the format of the content were: organised, very informative, detailed, great aids and support per subject, good benefit for students, understandable, extremely useful, very streamlined and holistic. That suggests that the expectation was met. During the group discussion one student explained: “This is like giving cookies to hungry children and tell them not to eat it”. Another openly asked: “Are you a nurse? It is as if you are inside our minds and knew exactly what we needed but more, that it is as if you understand that we are not only students, but mothers, grandmothers, breadwinners or just trying to advance our careers. I could just hug you.”
- **Ease of use:** that this expectation was met, can be derived from comments like “the

customized SUNLearn is the best platform where all subjects and activity can easily be accessed and refined...I would suggest it should be out in place". There was also a number of students who made reference to the saving of time, allowing them to focus when studying. Another one mentioned having "trouble with SUNLearn", and that the interaction with the intervention led to concluding that "using this new platform is a much better option."

- **Accessibility:** that this expectation had been met, was confirmed by a statement like: "New SUNLearn format: this is a very easy to use and organized format that will be very helpful to postgraduate students here and abroad with all this information we will better understand the program and put our minds at ease with all this information overload". The accessibility aspect was further substantiated by comments like "optimally accessible to students" and "information easily accessible".

The collaborative nature of EDR creates opportunities for open and relaxed discussions between the designer/researcher and participants/collaborators. Further comments of the students are given in terms of meeting the literacy requirements, user friendliness, wanting the design implemented as soon as possible and the structure.

The students agreed that the technology-based intervention was user friendly, well-structured and very helpful in terms of **meeting the literacy requirements** of the students. One of the participants said:

"All the information in the new SUNLearn is organised which makes it user friendly even for someone who is not so computer literate".

Most of the comments about the design focused on the **user friendliness**, as illustrated by the following comments:

"I honestly love the new SUNLearn. It is visually much more user friendly and more comprehensive, user friendly for every level of IT user".

"It is user friendly. I feel like a fossil and this makes it so much easier. The old one is too busy. I do not have all the time to download everything".

"It is easier to use and clearly shows where all the information I need (is) in one place. It is timesaving and eliminates a lot of stress".

The students' comments extended to "please to **have the design implemented as soon as possible**":

"As a postgraduate student I would like to motivate that our SUNLearn may be updated to the new version as that will be more beneficial to us. The new version is more organised and



understandable as there are voice recorders with definitions of the work. It is user friendly and saves a lot of time and will also give us reminders for due dates of exams and assignments”.

The needs analysis highlighted the **structure** as one of the burning issues, and many of the students’ responses also focused on the structure. The participants commented that:

“Unanimously, the group is in favour of the new design. The design is excellent and based on well-thought out planning to make everything user friendly and sufficient access. Easy access!!!”.

“Very user/student friendly, optimally accessible to students, very streamlined – absolutely well-structured, easy and meaningful to use, definitely recommend for especially older not so technically inclined student”.

“The new design is very easy to use and organised format that will be very helpful to postgraduate students both here and abroad with all this information we will better understand the programme and put our minds at ease with all the information overload”.

Most of the participants agreed that they struggled with SUNLearn, and one student commented:

“The current SUNLearn dashboard is outdated and not very user friendly. The new design is organised, very informative, user friendly and extremely helpful. It would be of great help if the updated version of SUNLearn could be put into use as soon as possible”.

Another participant added:

“The customized SUNLearn is the best platform where all the subjects and activities can be easily accessed and refined. It is a well detailed system”.

From the participants’ responses it was clear that the new design met their requirements, but that the intervention also had unplanned side effects such as exacerbating the students’ dissatisfaction with the ‘old SUNLearn’ and highlighting their impatience with the implementation of the ‘new SUNLearn’. The following section focuses on the feedback from the lecturers which was collected in a focus group discussion. The group discussion was recorded with the permission of the lecturers and transcribed.

### **8.3.2 Unplanned side effects: feedback from the lecturer perspective**

Regular feedback on progress with the design of the technology-based intervention was provided to the lecturers throughout the study. The initial feedback took the form of an interview with the programme coordinator and a focus group discussion with the lecturers and programme administrators of PGDipNE. The first feedback was provided after the needs analysis (Phase 1: informed exploration), followed by a session with the programme coordinator about the initial design and prototype of the changes to the PGDipNE SUNLearn. The initial task model and content model



of the digital literacy course were reviewed by the programme coordinator, followed by a refinement session that included the lecturers.

After the completion of the design, the lecturers were invited for a detailed walk-through. The initial response of the lecturers was disbelief. Some lecturers also, like the students, referred to the intervention as the 'new SUNLearn', and I had to remind them that it was the same learning management system (LMS) which had simply been enhanced to meet their specific requirements. With the first walk-through, one module was selected to review, discuss and refine the design, but most lecturers requested that their modules should also be selected as part of the small group evaluation with the students.

The feedback from the lecturers was very positive. For example, Van der Merwe (2018) who was the chairperson of the Research Development and Support of the Faculty of Medicine and Health Sciences at that stage said: "When you came to ask permission to do the research, I could envision what you explained but I never expected this and our students would truly benefit from this". Most of the lecturers agreed that the digital literacy course and the student-centered enhancements would be beneficial to their students.

The responses about the digital literacy course led to a discussion of the possibilities of additional readiness assessments and supplementary content on how to create a table of content (Schutte, 2018).

Lourens (2019), the programme coordinator, was keen to have the intervention implemented as soon as possible, but with any technology-based design the testing must be done in phases. More importantly, in the Nursing and Midwifery Department, lecturers are responsible for modules in both clinical and non-clinical programmes, and the configuration for modules in the clinical programme that are related to the PGDipNE required further discussion. The study was focused on the enhancement of the PGDipNE, and the adoption of the prototype for the entire Nursing and Midwifery Department had further implications that required additional training for the programme administrator and lecturers. Concerns were raised by some of the lecturers about their own readiness to utilise technologies effectively as part of their blended learning strategy. A blended learning course for staff had been offered, but the acquired knowledge could not be applied (Crowley, 2018). Most of the lecturers had not received any training in designing a Moodle course and they were not sure how to use the features in SUNLearn like activities, resources, etc. (Crowley 2018).

SUNLearn runs on the learning platform Moodle, an open-source project that releases major updates every six months and minor updates every two months. A major update is one that consists of application and feature enhancements (Moodle, 2020). The impact on activities, as a result of these updates, requires regular communication to the SUNLearn community, but often the updates, especially the enhancement of activities, are not communicated. This poses a problem for the

lecturers who do not have the necessary technical skills to perform an end-to-end system test. The lecturers were concerned about the complexity of the technology landscape and the variety of related dependencies to create learning content that matches the delivery mode (Young, 2018). For the lecturers, the rapid advancements in technology necessitate keeping abreast with the latest technology trends, not only for learning and teaching but also for the health profession and HE in general. Most of the lecturers agreed that the department would require a dedicated resource to assist the lecturers with content development (Crowley, 2018, Fürst, 2018).

The dilemma that the lecturers highlighted is echoed by Adams Becker, et al. (2018:34), stating that “educators are increasingly expected to employ a variety of technology-based tools” based on pedagogical considerations. The authors argue that as technology-enabled approaches gain momentum, institutions will have to rethink the primary responsibilities of educators (Adams Becker, et al., 2018). The reality is that it is not only the role of the educators that requires rethinking, but also the external factors that are shaping and changing the dynamics of higher education institutions (HEIs), driven by the implications of societal changes and the knowledge economy (Adams Becker, et al., 2018). These factors are demanding that lecturers acquire higher levels of technological expertise in order to attract, teach and retain students who have embraced the use of mobile applications in their daily lives and hence expect more use of technology in their academic offerings (Adams Becker, et al., 2018).

In parallel with the technological expertise, there is an increasing demand for digital learning experience and instructional design expertise (Alexander, et al., 2019), shifting the responsibility for course development to teams of specialised designers instead of training lecturers to use technology. According to Alexander, et al., (2019), course content development should include design-thinking approaches, engaging activities and applying universal design development in multiple modalities. As phenomena like globalisation, democratisation and massification of higher education (HE) and emerging technologies are altering the HE playing field, the core activities of HEIs should be investing in the recruitment and development of lecturers who will be able to design course content fitting the digital learning environment and serving the needs of a diverse student population (Alexander, et al., 2019). The biggest challenge was the lecturers’ readiness to change the format of the content.

## **8.4 CONCLUSION**

This chapter highlighted the feedback of the students, lecturers, programme coordinator and programme administrators in answering the aim of the study (section 1.7). More importantly, the feedback from the evaluation was validated, namely that the students’ expectations were addressed and that they felt as comfortable with the enhancement in the educational environment as with social media. Conducting the research in the real-world setting with participants in the role of collaborators

added an interesting dynamic to the research project. The dynamics of the collaborative nature brought depth to the discussion, because the collaborators journeyed with one another as the design was refined and finalised.

The next chapter draws the study to a conclusion by presenting the findings and design principles for future endeavours. It commences by recapping the focus of each chapter.

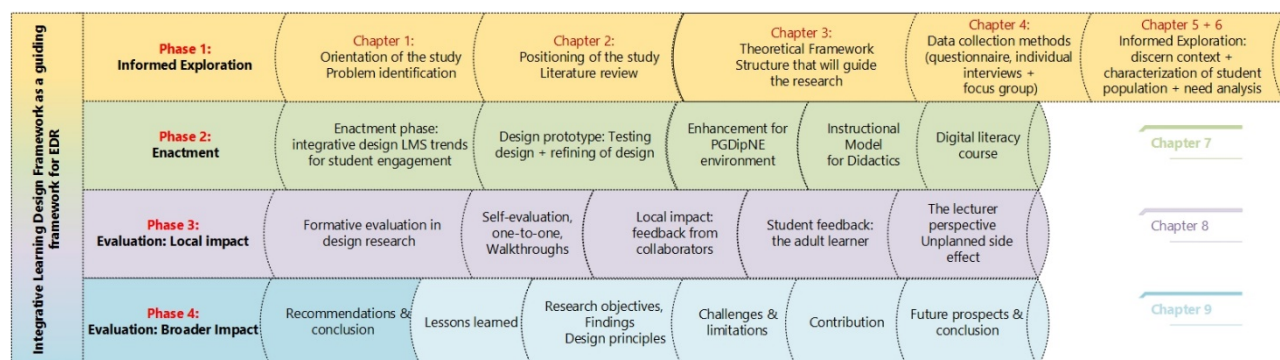
## CHAPTER 9

### CONCLUSIONS AND RECOMMENDATIONS

#### 9.1 INTRODUCTION AND OVERVIEW OF THE STUDY

The scope of this research study was confined to the context of the targeted programme, the Postgraduate Diploma in Nursing Education (PGDipNE) in the Faculty of Medicine and Health Sciences of Stellenbosch University. The departure point was the needs of adult learners pursuing lifelong learning opportunities. Other research criteria that shaped the study included the adoption of a blended learning approach for the programme, and the students' limited exposure to information and communication technology (ICT) in a learning environment. These factors contributed to refining the research aim, which was to investigate how technology could be used to improve the digital literacy of adult learners in a blended learning environment through education design research (EDR).

The topicality and importance of this study was unexpectedly highlighted by the COVID-19 pandemic and its effect on educational institutions. Higher education institutions (HEIs) across the world found themselves almost overnight having to move to online learning. Many institutions, lecturers and students were unprepared for using technology in new ways, often with negative consequences for student learning. The study is graphically illustrated in Figure 9.1.



**Figure 9.1 Learning by design: enhancing the digital literacy of adult learners in a blended learning environment**

**Source: Adapted from Bannan, 2010, n.p**

The orientation of the study in Chapter 1 gave prominence to phenomena shaking the foundation of HEIs. In this chapter, I presented the problem statement and purpose of the study and argued for the use of Education Design Research (EDR) as the most appropriate methodology to address the research problem and to fulfil the purpose of the study. The integrative learning design framework (ILDF) as the guiding framework and blueprint of the study was also introduced in this chapter.

Chapter 2 positioned the research study and was aligned with one of the components of Phase 1 of the ILDF, namely informed exploration, which took the form of a literature review. This chapter highlighted change trends from a global and local perspective, and especially underscored how the HE landscape is being shaped by these trends. The focus of the literature review then turned to the technology trends in HE, more particularly core educational technologies. The importance of digital literacy for the effective use of ICT, and for skills development for the knowledge economy and the Fourth Industrial Revolution, was pointed out.

The significance of the research population being adult learners provided the rationale for Chapter 3, in which I introduced adult learning foundations, andragogy, and the theoretical framework that would guide the design, development and evaluation of a series of technology-based interventions for adult learners in a blended learning environment.

Chapter 4 argued for placing this study in a pragmatic paradigm and elaborated on the research methodology and design. A focal point of this chapter was a brief introduction to EDR and the ILDF process model. The four phases (Phase 1: informed exploration, Phase 2: enactment, Phase 3: evaluation local impact and Phase 4: evaluation broader impact) and what each phase involves, were explained. In this chapter I also introduced the research population and the data collection methods.

In Chapter 5 I presented a deep dive into the nursing profession which was reviewed in terms of global shortages, curriculum development and continued professional learning. I then narrowed my focus to the structure, content and current practices of the postgraduate diploma in nursing education (PGDipNE), as the research context. Both Chapters 5 and 6 covered Phase 1, namely the informed exploration phase of the ILDF. Chapter 6 dug down even deeper by means of a needs analysis and introduced the self-assessment of the adult learners as key participants of the study. Importantly, the needs assessment clarified the expectations of the adult learners of a blended learning environment and their perceptions of the possibilities of information and communication technology (ICT) to serve their needs.

Chapter 7 (Phase 2: Enactment) explained how the adult learners' expectations had influenced the design of a series of technology-based interventions that included improvements to the educational setting for the specific programme (PGDipNE), as well as enhancements to develop the adult learners' digital literacy in a blended learning environment. Chapter 8 covered Phase 3 of the ILDF (Evaluation: local impact) by presenting the formative evaluation process and the feedback received from both students and lecturers.

Finally, Chapter 9 represents Phase 4 of the ILDF, namely Evaluation: broader impact, and presents the lessons learned in terms of the findings and the design principles that could be applicable for

adult learners in a broader blended learning context. This chapter also highlights the challenges and limitations of the study, the contribution of the study, as well as future prospects.

## **9.2 LESSONS LEARNED IN CONTEXT OF OUTCOMES**

The collaborative nature of EDR introduced depth and richness to the research process. The unfolding procedure of each phase potentially influenced the next phase, but the unpredictability and 'messiness' of the real-life context required constant renegotiation of the process, matching the positioning of the study from a pragmatist point of view (section 4.2).

The exponential growth in technology development and adoption not only introduces volatility relating to the delivery modes of HEIs, but more importantly, requires HEIs to take responsibility for the development of the digital citizenship (section 2.5.2) of their graduates. HEIs must prepare the students for careers that are not yet defined or are still unknown, with a skillset that is still evolving in conjunction with the new technologies and information systems. With the exponential evolution of technology in the HE environment, institutions will have to understand the changing needs of their student population to be able to design and adapt academic offerings that will serve those needs. This will be an ongoing process as new technologies, new information systems and new skills are required for the 4IR (section 2.4). One of the findings of this study revealed that the adult learners' experience with technology in a social context (social media) was used as a benchmark for how technology should be used in a blended learning environment. The adult learners crossed the boundaries between social interactions, lifelong learning opportunities and professional development with the expectation that the implementation of technology will be seamless and continuous, irrespective of where technology is used.

For adult learners technology should be easy to use, user-friendly, accessible, and should enable interaction, communication and sharing of information, while serving as a means of keeping abreast with the latest news. In relation to the study, these students failed to see how the technology that was integrated in the educational environment offered the same level of ease and empowerment as they were experiencing with social media applications. This refuted the initial assumption that these students struggled with the use of ICT. Their expectations were that technology could be used as a starting point for self-directed learning, but that the curriculum and teaching strategy must be updated to match the skills requirements of the nursing education field. This supported the assumption that the social context in which the learner functions is important, according to Jarvis's theory of experiential learning (section 3.4). The students argued that there is no limitation to how technology can be used if it is applied appropriately (section 6.3.2.3), but for this to happen the role of technology must be defined and developed by the lecturers (section 1.3).

The situated context of this study demonstrated that academic offerings are required that address the systemic faultlines in the SA educational system restricting equal access to quality education,

leading to different levels of academic readiness for the development of digital literacies (section 2.5.2). Therefore, academic support for diverse levels of digital literacies (design principle 1 in Figure 9.2) should be designed, allowing adult learners to facilitate their own learning and have equal access to resources to support their academic journey. Research further indicates that HEIs are questioning their traditional practices and are adapting to meet the students where they are to become more student-centric institutions (section 2.3). A student-centric institution focuses the value proposition to create student services that support the entire life cycle of the student (section 2.3). According to research the three pillars of student experience are attaining academic and career goals, equity and access, and best practices in technology-enabled teaching and learning (section 2.2.1 and section 2.3). These pillars resonate with the feedback from the adult learners that an academic programme should complement their career prospects, be relevant to the field of study, and technology should be aligned with the skills required in the specific field (design principle 2 and 3, Figure 9.2).

The technology enablement of teaching and learning drew attention to HEIs' learning and teaching strategies, while the preferences of the lecturers, on the other side of the spectrum, were overshadowed by the impact of the pandemic, requiring HEIs to shift to learning systems online. The lecturers were overwhelmed by the fast changing pace of technology and anxious about all the educational technologies shaping the HE education landscape (section 2.4.1). These lecturers had to cope with a changing curriculum for nursing education (section 5.2) and investigating strategies to improve student retention (section 5.4.2), while not understanding how to effectively and efficiently use SUNLearn (section 6.4) for a blended learning approach. In the midst of it all, adding to the complexity, was the volatility in the environment with staff turnover in critical positions, such as the programme coordinator who had to drive the development of the curriculum for PGDipNE and provide strategic direction. The shortages in the health profession together with outdated curricula highlighted interdependencies between educational and health systems. Closer collaboration between HEIs and the health profession could provide potential solutions and delivery models (adoption of technologies) to optimally develop the core competencies of health workers (design principle 4 in Figure 9.2).

Many lecturers placed the adoption of technology on the back burner, due to being overwhelmed by their numerous responsibilities and/or being accustomed to their (traditional) way of teaching. Regardless of whether the technology-based intervention added value to their existing practices, the lecturers' reactions ranged from being in awe of the possibilities of technology to being anxious about how much more they had to learn (section 8.2.1.3). The role of technology was further demonstrated by using the multimedia principles in designing instructional design content for the Didactics module that can be used as a model for the nurse educator. Designing an academic programme in conjunction with the delivery mode determines the format of the content for the learning management



system (section 2.3.2) which in turn leads to understanding the visual and content types that support learning (section 2.7). The visual and content types led into the introduction of the multimedia principles for instructional design and how the multimedia principles must be applied to support effective learning (section 2.7). The addition of animation, video, images and voice-overs gives students the ability to control their preferences.

For EDR and interventions like these to be successful amongst academic staff, the culture of the environment must change. This does not necessarily imply that the lecturers of the targeted programme alone are responsible for the culture change. EDR affords the opportunity for shared expertise of stakeholders from various fields to make contributions to clear up the 'messiness' of the real-world setting (section 4.3). These circumstances created unique opportunities to innovate and jointly exploit the possibilities of technology development in the design of academic programmes (section 2.3). This would enable interdisciplinary collaboration to keep pace with technology advancement, drawing on the strength of the collective. In the following section the research objectives are recapped, and aligned with the outcomes in the context of the study and the associated design principles, linked and motivated to the research or theory.

### 9.3 RESEARCH OBJECTIVES, OUTCOMES AND DESIGN PRINCIPLES

The research objectives outlined for this study are recapped with an indication of how each objective was addressed from the departure point of the student as the principal user (section 3.3). In recommending these design principles, I do not claim that they are exhaustive, but rather propose them as a guide to bridge the gap between educational theory and practice (Chapter 7) for adult learners to accelerate technology adoption. The gap can be bridged by embarking on endeavours like EDR to leverage the collaboration with research participants to transform academic programmes, and to change how the university operates as an institution, creating an institutional culture driven by innovation and learning and accelerating the adoption of technology by drawing from the strength and expertise of the collective.

As the study evolved, it became apparent that the principles applied to this study could be elevated to an abstract level in order to generalise the principles for a series of interventions for adult learners by taking into account the interrelated dependencies in an educational setting, as illustrated in Table 9.1.

**Table 9.1 Research objectives, outcomes and design principles**

<b>Research objective 1</b>	To <b>determine</b> the level of digital literacy required in the blended learning environment of the PGDipNE
<b>Recap</b>	With the evolution of technologies, digital literacy is also continually mutating. Initially attention was focused on the computer literacy of adult learners in terms of their varying levels of knowledge and skills to use computers and related technologies (section 1.2). The knowledge economy, however, requires the



ability to use ICT to find, understand, evaluate, create, and communicate digital information (section 1.2). And now, at the dawn of the 4IR, digital fluency is required, in other words, being able to leverage digital tools and platforms to communicate critically, design creatively, make informed decisions and solve wicked problems while anticipating new ones (section 2.6). In this process the three dimensions of digital literacy need to be observed, namely:

- Operational dimension is concerned with developing performance in linguistics systems, procedures, tools and techniques involved in making and interpreting text.
- Example: ability to read and write in the academic context. This is a skill that the students had mastered as part of their prior clinical training.
- Cultural dimensions build on the operational dimension to enhance the students' ability to participate in the discourse of the social world.
- Example: ability to relate text and information to real-life practices. These students studying to become nurse educators must combine their clinical experience and academic expertise (what they are being taught in this programme) to educate future nurse educators (section 2.3). This dimension teaches these students to participate not only in the nursing discourse, but also in the discourses around technology enhanced teaching and learning.
- Critical dimension involves the transformation and active reproduction of existing literacy practices, developing the ability to evaluate, critique and redesign a resource through mediation of these practices.
- Example: the ability to use literacies in combination with innovation, transformation, improvement and adding value to social practices. The students should eventually in their future positions as nurse educators have the ability to transform digital literacy practices and redesign digital resources.

## Outcome

The three dimensions of digital literacy competencies empower the students to apply and use ICT in the context of the blended learning environment but also to further develop their digital literacy competencies in their careers. This will promote the continual improvement and transformation of not only nursing education but also create an awareness that nursing education exists in an ecosystem that is influenced by learning and teaching strategies, technology developments and the 4IR.

## DESIGN PRINCIPLE 1

### *Design for diverse levels of digital literacy*

## Motivation

The findings revealed that the adult learners were comfortable using technology for social media purposes, which refuted the initial assumption that the students were struggling with technology.

The students' expectation was that elements of what they experienced in the context of social media would be incorporated in a blended learning environment. Social media added value in terms of being user friendly, convenient, simple and keeping them connected, and provided a way in which they could integrate their everyday activities to accommodate their context as adult learners.

Students' level of readiness should inform the selection of technologies and how

<b>Theoretical foundation</b>	the course content should be designed. This would reduce the turnaround time from design to implementation. The learning design process in HEIs should be aligned with the growing needs of students in parallel with the exponential growth in technology development that consequently impacts the skills required to support these technologies.
<b>Substantiation from literature</b>	Cognitivism (creation of learning environments that allow and encourage the student to make connections with previously learned material – prior knowledge, use of relevant examples) (section 3.2.2). Digital literacy transcends gaining isolated technological skills to generating a deeper understanding of the digital environment, enabling intuitive adaptation to new contexts and co-creation of content with others (section 2.6).
<b>Research objective 2</b>	To <b>investigate</b> how the gaps in the digital literacy dimensions can be addressed to enhance the digital literacy skills of the adult learners in the blended learning environment.
<b>Recap</b>	Computer literacy was a prerequisite for admission into the programme; however, transformation in the health professions and the core competencies required from nurse educators indicate that the focus should rather be on developing the digital literacy skills of these students.
<b>Outcome</b>	A customised digital literacy course was designed that was integrated into the PGDipNE to add value to the adult learner learning experience. The format of the course allows convenient migration of course content that transcends concerns about the LMS platform. In addition, the configuration could be easily amended, the content can be reused under different conditions, increasing the likelihood of transferability. Also, the course can be tailor-made and allows for the integration of new technologies.
<b>DESIGN PRINCIPLE 2</b>	<b><i>Design in a personalised way</i></b>
<b>Motivation</b>	The people, process, technology framework for information technology management draws the attention to the importance of the three equal parts (section 2.4), and the andragogical model places the emphasis on the adult learners' work experience, given the vocational nature of their course (section 2.6.2). The andragogical model recognises the lack of homogeneity among learners and learning situations, that the learning process is a multifaceted activity and that the model can be leveraged as a starting point to create learner-centred approaches.  Ultimately technology is selected to support learning and the student experience through an understanding of the learners' context, prior experiences, their professional development needs, learning objectives, motivation and resources (section 2.4 and section 2.6.2).
<b>Theoretical foundation</b>	The andragogical model identifies six principles: (1) need to know: adults need to know why they are learning a topic before learning commences; (2) learners' self-concept: adults need to be responsible for their decisions on education, (3) role of learners' experiences: adults use experiences as the basis of learning activities, (4) readiness to learn: adults are more interested in learning if there is an immediate relevance to work, (5) orientation to learning: adult learning in problem-centred rather than content orientated and (6) motivation to learn: adults' most potent motivators are intrinsic.

	In the light of the unique teaching and learning methods for adult learners and their changing educational needs, three additional assumptions of andragogy were noted, namely (1) the learning of adult is largely determined by his/her life context, (2) the adult learning process is characterised by the learning role of the learner himself/herself and (3) the learner and teacher co-operate in all stages of learning.
<b>Substantiation from literature</b>	The technology trends in higher education indicate that learning experiences should be supported by a learning design framework that directs the choices about what, when, where and how we teach. The process of integrating technology into education should aim at better teaching/learning experiences that result in higher learning outcomes that consider the student lifecycle (section 2.3 and 2.3.1). The design should provide flexibility and include applications that students are familiar with and clear individual paths for student choices (section 2.3.2).
<b>Research objective 3</b>	To <b>improve</b> the effectiveness of the utilisation of educational technologies in the specific academic programme.
<b>Recap</b>	<p>Poor learning design of the programme was one of the contributing factors to student underperformance that was evident in the review of the practices of the PGDipNE. A blended learning approach was adopted without changing the course structure or content. The lecturers were driven by their own personal teaching philosophies (Table 5.2), and little interaction with the students led to inaccurate assumptions about the adult learners' level of readiness to engage with technology. The students' expectations were not met which underlined the gap in the course design in terms of the structure and content.</p> <p>The PGDipNE adopted a blended learning approach, but this did not infer technology adoption. Even after moving to a blended learning approach, existing practices continued and the students struggled with connectivity, navigating from one module to the next and not being able to download their resources.</p> <p>The PGDipNE course structure was redesigned to integrate with SUNLearn by applying a SUNLearn theme with a personalised, student centric dashboard. The PGDipNE modules were integrated by designing a standardised template for each module that could accelerate the redesign of the content by the lecturers. The changes to the PGDipNE also included the integration of study units and activities that bear resemblance to social media apps like creating a contact, being able to see the status (last activities) of the lecturers/peers, etc.</p>
<b>Outcome</b>	Creating a personalised learning environment for each student on the LMS made a huge difference to the student experience. Applying multimedia principles to design digital media in the form of video with animation, voice overs, text and images demonstrated how the effective use of technology could enhance the students' interaction and engagements. Also, for Didactics, the instructional design of the multimedia scaffolds can be used as an exemplar for future module development or improvement.
<b>DESIGN PRINCIPLE 3</b>	<b><i>Design context specific activities</i></b>
<b>Motivation</b>	The needs and expectations of the adult learners stem from their prior experiences, therefore, it was important to hear what the adult learners had to

<b>Theoretical foundation</b>	<p>say about their prior knowledge and experience in their field of expertise when they entered the program. The adult learners expected the integration of technology to be intuitive, user friendly, engaging, and adding value to the context the students found themselves in; this was achieved by creating a personalised learning environment for each student. In addition, it transpired that the adult learners expected that the educational environment would complement their professional development.</p>
<b>Substantiation from literature</b>	<p>Jarvis's Model of Experiential Learning – learning takes place in a social context in which the learner functions (section 3.4).</p> <p>Findings from the literature demonstrate that the development of lifelong digital learners include explicit exploration of academic and professional practice in digital environments, time and opportunity for academic and support staff to explore changing modes of scholarship and professionalism, recognition of learners' existing knowledge practices as resources for learning, and collaborative exploration of a variety of educational approaches (section 2.5.2).</p>
<b>Research objective 4</b>	<p>To <b>evaluate</b> if the acquisition of digital literacies, as part of the PGDipNE, changed the learning experience.</p>
<b>Recap</b>	<p>Formative evaluation and testing the design against the criteria of relevance, consistency, practicality and effectiveness was done (Chapter 8 – Table 8.1).</p>
<b>Outcome</b>	<p>The effective utilisation of educational technologies and having access to a digital literacy course improved the learning experience of the adult learners. This was ascertained through the student evaluation and feedback (section 8.3.1).</p>
<b>DESIGN PRINCIPLE 4</b>	<p><b><i>Design to build an ecosystem of partnerships</i></b></p>
<b>Motivation</b>	<p>With a plethora of technologies that are rapidly changing the way we operate, a support structure should be put in place to journey with lecturers and to gradually introduce technology that will complement their teaching styles. By understanding the lecturers' environment through observation, collaborating with them and supporting them with what they find daunting, the researcher/designer enters into a partnership that will not only enhance the learning experience for the students but allows the lecturers to invite a 'stranger' into their space, building on one another's strengths to create an ecosystem based on trust and rapport. This means not only highlighting what technology could offer, but also putting it into practice.</p>
<b>Theoretical foundation</b>	<p>Andragogy – the lack of uniformity among students and learning situation illustrated that the learning transaction is a multidimensional activity (section 3.3).</p>
<b>Substantiation from literature</b>	<p>The ecosystem with the diverse expertise across an institution could bring about a more intricate and robust understanding of more inclusive teaching for improving student experiences. The research has shown that the adoption and implementation of emerging technology, embraced by faculty who wants to create a student-centred learning environment in HEIs, elevates the instructional design and user experience design (section 2.5).</p>

This research study exemplified the characteristics that set EDR apart from other forms of research (Chapter 4). The complex real-life problems emphasised in this study were: (1) the rapid advancements in technology do not automatically infer effective adoption in the blended learning environment; (2) strategic initiatives of the University to penetrate new knowledge markets did not necessarily result in changing the academic programme to meet the needs of the new market; (3) aligning the programme with the Higher Education Qualifications Framework resulted in changes to the nursing qualification (section 5.3), and (4) the global health profession is being criticised for the lack of curriculum development (section 5.2). Furthermore, demonstrating the utilisation of technology to enhance the learning environment was welcomed by the students, but created uncertainty for the lecturers because instructional design is a time-consuming process (Table 5.6). EDR enabled me to not only address several of the practical problems that were identified above, but through the research process I could also identify four design principles that could be applied in any blended learning environment for adult learners.

The same characteristics that make EDR attractive also intensify the complexity, e.g., the possibility of unknown variables and the elements that seem unrelated (Chapter 2), but which have a direct influence on the success or failure of an intervention. In the following section, the challenges and the limitations of the study are highlighted.

#### **9.4 CHALLENGES AND LIMITATIONS OF THE STUDY**

The research study presented various challenges. One of these was the lack of alignment of standard operating procedures between the internal departments (Information Governance, Division of Research Development, etc.), adding unexpected delays to research timelines. The iterative cycles that are used as input for the design of an intervention depend on collaboration between role players to test or evaluate parts of the intervention as progress is made through the testing stages, but a lack of understanding of the education design research (EDR) process created delays or resulted in having to retest a cycle/cycles.

For EDR, the university environment with its rather rigid structures and processes creates barriers, making it very challenging to conduct research in the situated context of the educational setting. A series of technology-based interventions often requires duplicating an environment because testing cannot be done in a production environment. The duplicated environment may not accurately replicate or simulate the problems students or lecturers experience in the production environment. Also, the identity and access management of information systems at the university allow limited authorisation and authentication to users, which further complicates giving users access to a development environment.

Within the educational setting, the blended learning programme was primarily focused on adult learners, but some of the lecturers adopted a generic learning and teaching style that was not

conducive for the delivery mode or the non-traditional students. The adult learners' limited exposure to technology was perceived by the lecturers as the reason why students struggled with the blended learning environment. However, the findings showed that the learners were comfortable with technology in a social context but expected a blended learning environment to mimic similar affordances of technology. From the students' perspective, and based on their experience, they did not see any limitations to information and communication technology (ICT) but found the implementation of ICT in their educational setting 'unnatural' and 'unfriendly'.

Furthermore, they failed to see how the implementation of technology in the course format could support their learning and interaction with their peers and lecturers. From the PGDipNE side, the educational setting and technology development should have been driven by the lecturers' understanding of what technology has to offer, but lecturers do not necessarily know how to combine the various technologies to build a learning management ecosystem that is compatible with the delivery mode.

## **9.5 CONTRIBUTIONS OF THE STUDY**

The outputs of this EDR study are both knowledge and products (Herrington & Reeves, 2011). The differentiating knowledge claim of this study takes the form of design principles to support researchers/curriculum developers in their task to create an educational environment for adult learners and are outlined in section 9.3. To guide and inform future development and implementation decisions to accelerate technology adoption, the design principles contain indicative and practical knowledge (McKenny & Reeves, 2012). This study engendered a set of design principles that could enhance the learning experience of adult learners in a blended learning environment by considering who the programme was designed for, as well as the collaborative creation of knowledge through the involvement of different subject matter experts to accelerate the technology integration into the environment.

The design principles are based on a combination of the findings of the research, the writings of theorists (the integrative systematic approach of ILDF – section 7.2) and the contributions of the subject matter experts (Herrington & Reeves, 2011). In this manner, the set of design principles can facilitate partnerships and knowledge building to create pockets across HEIs to accelerate technology adoption and implementation leading to improved learning and teaching processes. Furthermore, in the age of exponential growth in technology developments, research like this cumulatively adds knowledge and understanding about how educational technologies can play a profound and valuable role in learning and teaching. In the light of how the COVID pandemic impacted HEIs' operations, the design principles can guide the design and development of similar interventions with the possibility of improving upon the proposed principles, or adding to them.

The collaborative nature of EDR demonstrated that if the expertise from various fields and academic backgrounds has a shared understanding about the issues within an environment, the contribution from each role-player could work towards creating a student-centric learning environment. As a strategic initiative of the University to attract students from new knowledge markets (section 1.1) has been embarked upon, an interdisciplinary teaching and learning bionetwork will assist in increasing the institutional adoption rate of educational technologies. A bionetwork is the formation of a collective of roles with a common interest, like for example fostering student success or retention and working together to create educational environments that will serve the needs of diverse groups of students (Brown *et al.*, 2020:23). This could give the University the advantage of attracting and serving students not only from new knowledge markets, but also position it as an institution that, through innovation, has found plausible channels to create equal, life-long opportunities for a broader population of students.

The design of a series of interventions in EDR is the primary output of this study. The series of interventions designed to address the digital literacy of adult learners included (1) a technical guideline for a course structure when designing a technology-based intervention for an educational environment for adult learners based on the people process technology framework of information technology management, (2) a generic template for the course content to assist lecturers with the redesign of their modules, (3) a customised digital literacy course in a shareable content reference model as part of the PGDipNE but which could also be used as a stand-alone course and (4) an exemplar in the Didactics module using the multimedia principles. A digital literacy course such as this intervention, or courses that are based on design principles, have “solid foundation in theory and practice” (Herrington & Reeves, 2011:599). The gap in the body of knowledge I wanted to address was to discover how digital technologies could be applied and incorporated in teaching and learning processes to add value for adult learners. This gap was bridged through understanding the social context in which these students were functioning, and more critically understanding the multiple dependent variables that might impact technology adoption and addressing the complexities of the related issues within the educational setting. The foundation of Jarvis’s experiential learning theory as the theoretical framework for the study not only guided the research with reliance on a formal theory (section 3.1), but also the interpretation to gain more knowledge and deeper understanding about this occurrence. In return, the reliance on a formal theory added to the trustworthiness of the study. By nature, EDR aims to be practically relevant (Plomp, 2010:22). Finally, responding to the primary research questions (section 1.3), I conclude that the conceptualised design principles in this study are feasible and succeeded (section 8.3.1) in enhancing the student experience by adding the required resources to facilitate the digital literacy of the adult learners. The relevance of the research has been underlined by the current COVID-19 pandemic. Research shows that HEIs must simplify



practices, develop sustainable approaches to technology investment, and do things differently through innovation (section 2.3).

The entire research study is graphically illustrated in Figure 9.2, highlighting the research question, positioning of the study, the research approach with phases, research objectives, the findings, design principles and contribution.



**Figure 9.2 Overview of the study**



## 9.6 FUTURE PROSPECTS

The success of EDR, especially for further exploration and adoption in the environment, depends on the willingness of the academics to adopt technologies. However, the rapid pace and advancements often happen before the knowledge of technology can move from awareness to full exploitation (section 1.2). As this development of the intervention progressed, Microsoft, as a global software developer, used its knowledge of the emerging trends to fill a gap with the introduction of Microsoft 365 learning pathways.

The Microsoft 365 learning pathways is an on-demand, configurable training tool that allows an institution to create training paths suitable for any environment. The central repository from the Microsoft online catalogue guarantees that the content is relevant and up to date (Microsoft, 2020). This type of initiative provides educational institutions with the ability to stay abreast of the latest trends and ensures that content is updated continually. Additionally, Microsoft understands the higher education trends, ensuring that the content will be related to the latest developments in the education sector. The digital literacy course that was designed for the targeted programme can now be redesigned in alignment with the needs of an academic offering, and this could be explored within the context of SU.

In line with the latest developments on the emerging technologies and practices front, the University should consider creating learning and teaching ecosystems with a diversity of expertise, extended to instructional designers and technologists to become involved with content development for hybrid learning. Lecturers who are not at ease with technology can be assisted with either an instructional designer or a technologist, depending on the learning and teaching approach. Each stakeholder in this ecosystem then contributes from their field of expertise to the benefit of the students.

## 9.7 CONCLUSION

This research project started with a desire to improve the digital literacy of adult learners. Contextualising the study as part of the journey, and taking cognisance of all the factors, resulted in the systematically unfolding of the complexities. However, ultimately all the factors must be seen as part of the ecosystem to address the needs of a diverse student population. The adult learners, craving to pursue lifelong learning opportunities, found themselves in the middle of an ecosystem consisting of a call for transformation of HE, the implementation of institutional strategies, the transformation of the health profession with an urgency to train more health workers as a result of the needs of the society, and a new Higher Education Qualifications Sub-Framework.

In addition, traditional teaching and learning strategies were challenged because of the interconnectedness brought about by globalisation. The rapid advancements in technology are always challenging the rate of change in HEIs, but irrespective of the drivers of change, the needs

of the students must ultimately remain at the centre of it all. The study was contextualised for a targeted academic programme with a strong focus on adult learners re-entering higher education. The impact of the pandemic on HEIs has heightened the importance and relevance of this research on educational technologies to add value to the learning experience of learners, as well as the importance of HEIs being able to transform their learning systems.

## LIST OF REFERENCES

- AACN (American Association of Colleges of Nursing). 2019. *Fact sheet: Nursing Faculty Shortage*. [online] Available: <https://www.aacnnursing.org/Portals/42/News/Factsheets/Faculty-Shortage-Factsheet.pdf?ver=2019-04-02-160735-400> [Accessed: 19 April 2019].
- Adams Becker, S., Brown, M., Dahlstrom, E., Davis, A., DePaul, K., Diaz, V. & Pomerantz, J. 2018. *NMC Horizon Report: 2018 Higher Education Edition*. Louisville, CO: EDUCAUSE.
- Adams Becker, S., Cummins, M., Davis, A., Freeman, A., Hall Giesinger, C. & Ananthanarayanan, V. 2017. *NMC Horizon Report: 2017 Higher Education Edition*. Austin, Texas: The New Media Consortium.
- Alexander, B., Ashford-Rowe, K., Barajas-Murphy, N., Dobbin, G., Knott, J., McCormack, M., Pomerantz, J., Seilhamer, R. & Weber, N. 2019. *EDUCAUSE Horizon Report: 2019 Higher Education Edition*. Louisville, CO: EDUCAUSE.
- Ally, M. 2004. Foundations of Educational Theory for Online Learning, in T Anderson (ed). *Theory and Practice of Online Learning*. AU Press \, Athabasca University. 15–34.
- American Library Association. 2011. What is digital literacy? [online] Available: <http://www.dla101.org/wp-content/uploads/2015/07/what-is-digilit-2.pdf> [Accessed: 23 May 2017].
- Anderson, T. & Shattuck, J. 2012. Design-based research: A decade of progress in education research? *Educational Researcher*, 41(1): 16-25. DOI: <https://doi.org/10.3102/0013189X11428813>.
- Bada, S.O. 2015. Constructivism Learning Theory: A Paradigm for Teaching and Learning. *Journal of Research & Method in Education*, 5(6): 66-70.
- Baker, J. 2017. *Updating the Next Generation Digital Learning Environment for Better Student Learning Outcomes*. [online] Available: <https://er.educause.edu/articles/2017/7/updating-the-next-generation-digital-learning-environment-for-better-student-learning-outcomes> [Accessed: 30 July 2020].
- Bakker, A. & Van Eerde, H.A.A. (in press). 2013. An introduction to design-based research with an example from statistics education in A. Bikner-Ahsbahs, C. Knipping and N. Presmegd (eds.), *Doing qualitative research: methodology and methods in mathematics education*. New York: Springer.
- Bandura, A. & Walters, R.H. 1963. *Social learning and personality development*. Holt Rinehart and Winston: New York.

- Bandura, A. 1973. *Aggression: A Social Learning Analysis*. Englewood Cliffs, NJ: Prentice-Hall.
- Bandura, A. 1976. Effecting Change Through Participant Modeling in J.D. Krumboltz & C.E. Thoresen (eds). *Counseling Methods*. New York: Holt, Rinehart & Winston.
- Bandura, A. 1977. *Social Learning Theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Bandura, A. 1986. *Social Foundations of Thought and Action: A Social Cognitive Theory*. Englewood Cliffs, N.J: Prentice-Hall.
- Bannan, B. 2010. The Integrative Learning Design Framework: An illustration Example from the Domain of Instructional Technology in T. Plomp & N. Nieveen (eds). *An introduction to educational design research: Proceedings of the seminar conducted at the East China Normal University, Shanghai*. Enschede, The Netherlands: SLO – The Netherlands Institute for Curriculum Development. 53-72.
- Bannan, B. 2013. Formative evaluation in educational design research, in T. Plomp & N. Nieveen (eds). *Educational design research – part A: An introduction*. Enschede, the Netherlands: SLO. 114 -133.
- Bannan-Ritland, B. 2003. The role of design in research. The integrative learning design framework. *Educational Researcher*, 32 (1): 21–24.
- Barab, S. & Squire, K. 2004. Design-based research: Putting a stake in the ground. *The Journal of Learning Sciences*, 13 (1): 1–14.
- Barber, M., Donnelly, K. & Rizvi, S. 2013. *An avalanche is coming: Higher education and the revolution ahead*. [online] Available: [http://med.stanford.edu/smili/support/FINAL%20Avalanche%20Paper%20110313%20\(2\).pdf](http://med.stanford.edu/smili/support/FINAL%20Avalanche%20Paper%20110313%20(2).pdf) [Accessed: 17 May 2017].
- Barkley, E. 2009. *Student Engagement Techniques: a handbook for college faculty*. New York: Jossey Bass.
- Beal, V. 2020. *Boolean Search*. [online] Available: [https://www.webopedia.com/TERM/B/Boolean\\_search.html](https://www.webopedia.com/TERM/B/Boolean_search.html) [Accessed: 31 March 2020]
- Beard, C. & Wilson, J. 2013. *Experiential Learning: A handbook for education, training and coaching*. 3<sup>rd</sup> edition. London: Kogan Page.
- Beauvais, A.M, Stewart, J.G, De Nisco, S. & Beauvais, J.E. 2014. Factors related to academic success among nursing students: a descriptive correlational research study. *Nurse Education Today*, 34(6): 918-923.

- Belyh, A. 2020. The 10 skills you need to thrive in the Fourth Industrial revolution. [online] Available <https://www.cleverism.com/10-skills-to-thrive-in-the-fourth-industrial-revolution/> [Accessed 6 February 2021].
- Bennett-Goleman, T. 2001. *Emotional Alchemy: How the mind can heal the heart*. New York: Three Rivers Press.
- Bhat, V. 2004. *Experiential Learning: A handout for teacher educators*. [online] Available: [https://wikieducator.org/images/b/b5/EXPERIENTIAL\\_LEARNING.pdf](https://wikieducator.org/images/b/b5/EXPERIENTIAL_LEARNING.pdf) [Accessed: 22 January 2019].
- Biesta, G. 2010. Pragmatism and the philosophical foundations of mixed methods research in A. Tashakkori & C. Teddlie (eds). *Handbook of mixed methods research for the social and behavioral sciences*. Thousand Oaks, CA: SAGE Publications. 95-118.
- Blaauw, D., Ditlopo, P. & Rispel, L.C. 2014. Nursing education reform in South Africa – lessons learnt from a policy analysis study. *Global Health Action*, 7:1. DOI: <https://dx.doi.org/10.3402%2Fgha.v7.26401>.
- Blackmore, J., Hardcastle, L., Bamblett, E. & Owens, J. 2003. *Effective use of information and communication technology (ICT) to enhance learning for disadvantaged school students*. Melbourne: Deakin Centre for Education and Change, Institute of Disability Studies, Deakin University and Institute of Koorie Education.
- Bless, C. & Higson-Smith, C. 2000. *Fundamentals of social research methods. An African perspective*. 3<sup>rd</sup> edition. Cape Town: Juta.
- Blessinger, P. 2015a. *Lifelong education as an equaliser*. [online] Available: <https://www.universityworldnews.com/post.php?story=20150803125916265> [Accessed: 21 July 2019].
- Blessinger, P. 2015b. *Lifelong learning as a human right*. [online] Available: <https://www.universityworldnews.com/post.php?story=20150303150758108> [Accessed: 20 July 2019].
- Blessinger, P. 2015c. *Why global higher education must be democratised*. [online] Available: <https://www.universityworldnews.com/post.php?story=2015090815175230> [Accessed: 20 July 2019].
- Blondy, L. C. 2007. Evaluation and application of andragogical assumptions to the adult online learning environment. *Journal of Interactive Online Learning*, 6(2): 116–130.
- Breier, M., Wildschut, A. & Mgqolozana, T. 2009. *Nursing in a new era: the profession and education of nurses in South Africa*. Cape Town: HSRC Press.

- British Council. 2014. *Can Higher Education solve Africa's job crisis? Understanding graduate employability in Sub-Saharan Africa. Going Global 2014*. [online] Available: [https://www.britishcouncil.org/sites/default/files/graduate\\_employability\\_in\\_ssa\\_final-web.pdf](https://www.britishcouncil.org/sites/default/files/graduate_employability_in_ssa_final-web.pdf) [Accessed: 23 July 2019].
- Brown, A. L. 1992. Design experiments: Theoretical and methodological challenges in creating complex interventions in classroom settings. *The Journal of The Learning Sciences*, 2(2): 141–178.
- Brown, K. 2015. *Theorizing learning process: An experiential, constructivist approach to young people's learning about global poverty and development*. [online] Available: <https://files.eric.ed.gov/fulltext/EJ1167834.pdf> [Accessed: 23 September 2020].
- Brown, M., McCormack, M. Reeves, J., Christopher Brook, D., Grajek, S., Alexander, B., Bali, M., Bulger, S., Dark, S., Engelbert, N., Gannon, K., Gauthier, A., Gibson, D., Gibson, R., Lundin, B., Veletsianos, G. & Weber, N. 2020. *EDUCAUSE Horizon Report, Teaching and Learning Edition*. Louisville, CO: EDUCAUSE.
- Bruce, C., Klopper, H. & Mellish, J.M. 2011. *Teaching and learning the practice of nursing*. Cape Town: Heinemann.
- Bruner, J.S. 1961. The act of discovery. *Harvard Educational Review*, 31(1): 21-32.
- Bryson, C. & Hand, L. 2007. The role of engagement in inspiring teaching and learning. *Innovations in Education and Teaching International*, 44(4): 349-362.
- Bui, S. 2020 Top Educational Technology Trends in 2020/2021. [online] Available <https://elearningindustry.com/top-educational-technology-trends-2020-2021> [Accessed 6 February 2021].
- Burnard, P. 1989. *Teaching interpersonal skills: A handbook of experiential learning for health professionals*. London: Chapman and Hall.
- Burnett, C. 2011. Pre-Service teachers' digital literacy practices: Exploring contingency in identity and digital literacy in and out of educational contexts. *Language and Education*, 25(5): 433-499.
- Caffarella, R. S. 2002. *Planning programmes for adult learners: A practical guide for educators, trainers, and staff developers*. 2<sup>nd</sup> edition. San Francisco: Jossey-Bass.
- CFI Education. 2019. *Excel Shortcuts overview – Guide to using shortcuts in Excel*. [online] Available: <https://corporatefinanceinstitute.com/resources/excel/study/benefits-of-excel-shortcuts/> [Accessed: 25 June 2019].

- Chatlani, S. 2018. *8 Global trends impacting higher ed.* [online] Available: <https://www.educationdive.com/news/8-global-trends-impacting-higher-ed/515272/> [Accessed: 25 March 2019].
- CHE (Council of Higher Education). 2016. South African higher education reviewed. Two decades of democracy. Pretoria: CHE.
- CHE (Council on Higher Education). 2017. *VitalStats Public Higher Education.* (online) (online) Available: [https://www.policysa.com/images/VitalStats\\_Public%20Higher%20Education%202017.pdf](https://www.policysa.com/images/VitalStats_Public%20Higher%20Education%202017.pdf). [Accessed: 2 November 2020]
- Choudaha, R. 2021. The fourth wave of international student mobility. [online] Available <https://www.universityworldnews.com/post.php?story=20210111083621946> [Accessed 6 February 2021].
- Choy, S. 2002. *Nontraditional. Undergraduates. (NCES 2002 -012).* Washington, DC: US Department of Education, National Center for Education Statistics.
- Christensen, L.S. & Simmons, L.E. 2019. *The Scope of Practice for Academic Nurse Educators and Academic Clinical Nurse Educators.* 3<sup>rd</sup> edition. Philadelphia: National League for Nursing & Wolters Kluwer.
- Christensson, Per. 2016. *Operating System Definition.* [online] Available: [https://techterms.com/definition/operating\\_system](https://techterms.com/definition/operating_system) [Accessed 31 March 2020].
- Citrix. 2019. *What is load balancing?* [online] Available: <https://www.citrix.com/glossary/load-balancing.html> [Accessed: 15 December 2019].
- Clark, R.C. & Mayer, R.E. 2011. *E-learning and the Science of Instruction: Proven guidelines for consumers and designers of multimedia learning.* 2<sup>nd</sup> edition. San Francisco, CA: Pfeiffer.
- Clark, R.K. 2017. *Instructional Technology/Ruth Clark.* [online] Available: [https://en.wikibooks.org/wiki/Instructional\\_Technology/Ruth\\_Clark](https://en.wikibooks.org/wiki/Instructional_Technology/Ruth_Clark) [Accessed: 1 July 2019].
- Clark, R.K. 2018. Learning Theories: Cognitivism. *Radiologic Technology*, 90(2): 176-179.
- Cohen, L., Manion, L. & Morrison, K. 2007. *Research Methods in Education.* 6<sup>th</sup> edition. London: Routledge.
- Cohen, L.M. 1999. *Section III – Philosophical perspectives in Education.* [online] Available: <https://oregonstate.edu/instruct/ed416/PP4.html> [Accessed: 22 April 2019].
- Collins, A. 1990. *Toward a Design Science of Education. Technical Report No. 1.* [online] Available: <https://eric.ed.gov/?id=ED326179> [Accessed: 29 October 2020].



- Collins, A. 1992. Toward a design science of education, in E. Scanlon & T. O'Shea (eds). *New directions in educational technology*. New York: Springer. 15-22.
- Collins, A. 1993. *Design issues for learning environments*. [online] Available: <https://files.eric.ed.gov/fulltext/ED357733.pdf>. [Accessed: 30 October 2020].
- Collins, A. 1999. The changing infrastructure of education research, in E.C. Lagemann & L. S. Shulman (eds). *Issues in education research: Problems and possibilities*. San Francisco: Jossey-Bass Publishers. 289–298.
- Computer Literacy. 2020. Definition of computer literacy. [online] Available [https://en.wikipedia.org/wiki/Computer\\_literacy](https://en.wikipedia.org/wiki/Computer_literacy) [Accessed 12 February 2021].
- Constantine, L. & Lockwood, L. 2001. Structure and Style in Use cases for User Interfaces, in M. van Harmelan (ed). *Object Modeling and User Interface Design*. Boston: Addison-Wesley. 1-15.
- Cremers, P.H.M., Wals, A.E.J., Wesselink, R. & Mulder, M. 2016. Design principles for hybrid learning configurations at the interface between school and workplace. *Learning Environ Res*, 19: 309-334.
- Creswell, J.W. 2009. *Research design: Qualitative, quantitative and mixed methods approaches*. 3<sup>rd</sup> edition. Thousand Oaks, CA: SAGE.
- Cross, K.P. 1981. *Adults as Learners: Increasing participation and facilitating learning*. San Francisco: Jossey-Bass.
- Crowley T. & Young, C. 2017. Personal interviews (conducted on 9 May 2017).
- Crowley, T. 2017. Personal interview (conducted on 11 May 2017).
- Crowley, T. 2018. Adoption of blended learning approach (email).
- Csernyanszky, E. 2019. Personal interview (conducted on 1 August 2018, 6 August 2018, 4 September 2018).
- Culatta, R. 2020. *Social Learning Theory (Albert Bandura)*. [online] Available: <https://www.instructionaldesign.org/theories/social-learning/> [Accessed: 24 January 2020].
- Cultivating Digital Literacy. 2018. *Adobe report: Cultivating digital literacy – how colleges and universities can teach skills for success in the age of automation and digital transformation*. [online] Available: [https://landing.adobe.com/dam/uploads/2018/na/CCE\\_CultivatingDigitalLiteracy.pdf](https://landing.adobe.com/dam/uploads/2018/na/CCE_CultivatingDigitalLiteracy.pdf) [Accessed: 5 15 December 2019].



- Dani, V. 2019. 8 Trends in Education Technology that will have a major impact. [online] Available [8 Trends in Education Technology That Will Have A Major Impact \(kitaboo.com\)](#) [Accessed 6 February 2021].
- David, L. 2014. *Stage theory of cognitive development (Piaget)*. [online] Available: <https://www.learning-theories.com/piagets-stage-theory-of-cognitive-development.html> [Accessed: 12 August 2020].
- Davis, F.D. 1993. User acceptance of Information Technology: system characteristics, user perceptions and behavioural impacts. *International Journal of Man-Machine Studies*, 38: 475–487.
- Davis, G. & Norman. M. 2016. *Principles of multimedia learning*. [online] Available: <https://ctl.wiley.com/principles-of-multimedia-learning/> [Accessed: 5 July 2020].
- DBRC (Design-Based Research Collective). 2003. Design-based research: An emerging paradigm for educational inquiry. *Educational Researcher* 32(1): 5–8.
- DeBell, A. 2020. *How to use Mayer's 12 Principles of Multimedia*. [online] Available: <https://waterbearlearning.com/mayers-principles-multimedia-learning/> [Accessed: 5 July 2020].
- Dewey, J. 1929. *The quest for certainty*. New York: Minton.
- Dewey, J. 1938. *Experience and education*. New York: Macmillan.
- 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*. [Online] Available: <http://www.dhet.gov.za/SiteAssets/Latest%20News/White%20paper%20for%20post-school%20education%20and%20training.pdf> [Accessed: 19 May 2017].
- Dick, W. & Carey, L. 1990. *The Systematic Design of Instruction*. 3<sup>rd</sup> edition. New York: Harper Collins.
- Dickey, M.D. 2005. Engaging by design: How engagement strategies in popular computer and video games can inform instructional design. *Educational Technology Research and Development*, 53: 67-83.
- DoH (Department of Health). 2008. *Nursing strategy for South Africa 2008*. Pretoria: Department of Health.
- DoH (Department of Health). 2019. National policy on Nursing Education and Training. Gazette issue 42380 [online] Available:

[https://www.gov.za/sites/default/files/gcis\\_document/201904/42380gon544.pdf](https://www.gov.za/sites/default/files/gcis_document/201904/42380gon544.pdf) [Accessed: 6 February 2021].

Dyke, M. 2017. Paradoxes of a Long Life Learning: an Exploration of Peter Jarvis's Contribution to Experiential Learning Theory. *International Journal of Lifelong Education*, 36(1-2): 23-34.

Edirisingha, P. 2012. *Interpretivism and positivism (Ontological and Epistemological perspectives)*. [online] Available: <https://prabash78.wordpress.com/2012/03/14/interpretivism-and-positivism-ontological-and-epistemological-perspectives/> [Accessed: 24 August 2019].

Edwiser. 2019. *The most beautiful and responsive theme is here*. [online] Available: <https://edwiser.org/remui/> [Accessed: 10 December 2019].

Eisenhart, M. 1991. *Conceptual frameworks for research circa 1991: Ideas from a cultural anthropologist; implications for mathematics education researchers*. Proceedings of the Thirteenth Annual Meeting North American Chapter of the International Group for the Psychology of Mathematics Education, Blacksburg, Virginia, USA.

Elias, J. L. & Merriam, S. B. 1995. *Philosophical foundations of adult education*. Huntington, N.Y.: R.E. Krieger Pub. Co.

Ellis, R.K. 2009. Field Guide to Learning Management Systems. ASTD Learning Circuit. [online] Available: [https://web.archive.org/web/20140824102458/http://www.astd.org/~media/Files/Publications/LMS\\_fieldguide\\_20091](https://web.archive.org/web/20140824102458/http://www.astd.org/~media/Files/Publications/LMS_fieldguide_20091) [Accessed: 24 August 2019]

Ertmer, P.A. & Newby, T.J. 1995. Behaviorism, cognitivism, constructivism: Comparing critical features from an instructional design perspective. *Performance improvement quarterly*, 6(4): 50-72.

Ertmer, P.A. & Newby, T.J. 2013. Behaviorism, cognitivism, constructivism: Comparing critical features from an instructional design perspective. *Performance Improvement Quarterly*, 26(2): 43–71.

ezTalks. 2020. *What is remote support?* [online] Available: <https://www.eztalks.com/video-conference/what-is-remote-support.html> [Accessed: 15 December 2019].

Faasen, M. 2018. The implementation of the learning management system at the Department of Nursing and Midwifery [email].

Fasokun, T. O., Katahoire, A. & Oduaran, A. B. 2005. *African Perspectives on learning: The psychology of adult learning in Africa*. Cape Town: Pearson.

Fawaz, M.A., Hamdan-Mansour, A.M. & Tassi, A. 2018. Challenges facing nursing education in the advanced healthcare. *International Journal of Africa Nursing Science* 9: 105–110.

- File Explorer. 2019. Wikipedia: File Explorer. [online] Available: [https://en.wikipedia.org/wiki/File\\_Explorer](https://en.wikipedia.org/wiki/File_Explorer) (Accessed 15 January 2020)
- Fortuin, Z. & van Wyhe, M. 2019. Graphical illustrations of group discussions.
- Frenk, J., Chen, L., Bhutta, Z.A., Cohen, J., Crisp, N., Evans, T., Fineberg, H., Garcia, P., Ke, Y., Kelley, P., Kistnasamy, B., Meleis, A., Naylor, D., Pablos-Mendez, A., Reddy, S., Scrimshaw, S., Sepulveda, J., Serwadda, D. and Zurayk, H. 2010. Health professionals for a new century: Transforming education to strengthen health systems in an interdependent world. *The Lancet Commission*. 376(9756): 1923-1958.
- Friel, G. 2019. *Social Learning Theory Review*. [online] Available: <http://www.gerardfriel.com/instructional-design/social-learning-theory/> [Accessed: 1 May 2019].
- Fry, H., Ketteridge, S. & Marshall, S. 2009. Understanding student learning, in H. Fry, S. Ketteridge & S. Marshall (eds). *A Handbook for Teaching and Learning in Higher Education: Enhancing Academic Practice*. London: Routledge.
- Fürst, L. & Hugo, J. 2018. Personal interviews (conducted on 17 April 2018).
- Fürst, L. & Lourens, G. 2018. Personal interviews (conducted on 27 June 2018).
- Fürst, L. & Terblanche, L.M. 2018. PGDipNE Study guides, information and design [email].
- Fürst, L. 2017. Personal interviews (conducted on 9 May 2017, 6 July 2017, 7 September 2017, 6 October 2017, 20 October 2017, 13 December 2017).
- Fürst, L. 2018. Personal interviews (conducted on 17 April 2018, 27 June 2018)
- Fürst, L., Hugo, J. & Schutte, L. 2018. Workshops and feedback from the students [email].
- G-Cube. 2017. *Introduction to Learning Management Systems*. [online] Available: <http://www.gc-solutions.net/resources/articles/introduction-to-learning-management-systems.html> [Accessed: 17 May 2017].
- Gentner, D. 2003. Why we're so smart, in D. Gentner & S. Goldin-Meadow (eds). *Language in mind*. Cambridge, MA: MIT Press. 195–235.
- Gergen, K.J. 1995. Social Construction on the Educational Process, in L.P. Steffe & J. Gale (eds). *Constructivism in Education*. Hillside, N.J.: Lawrence Erlbaum Associates. 17–39.
- Geyer, N. 2016. A universal truth: Are we heading for no health care? (Legal and Ethical Column). *Professional Nursing Today, MedPharm*, 20(4): 23–26.

- Giri, K., Frankel, N., Tulenko, K., Puckett, A., Bailey, R. & Ross, H. 2012. *Keeping up to date: continuing professional development for health workers in developing countries*. [online] Available: <https://www.capacityplus.org/technical-brief-6/> [Accessed: 11 August 2019].
- Globalization. 2019. Wikipedia: Globalization. [online] Available: <https://en.wikipedia.org/wiki/Globalization> (Accessed: 20 July 2019).
- Gomo Learning. 2019. *Gomo – Beautiful multi-device learning. Anywhere*. [online] Available: <https://www.gomolearning.com/> [Accessed: 5 July 2020].
- Gotarkar, R. 2017. *Top 10 Moodle Jargon to Make your life easy*. [online] Available: <https://edwiser.org/blog/top-10-moodle-jargons-to-make-your-life-easy/> [Accessed: 10 July 2020].
- Govender, T. 2013. *The education gap – practical solutions to key barriers*. [online] Available: <http://www.universityworldnews.com/article.php?story=20130419125136707> [Accessed: 22 January 2017].
- Grajek, S. & Reinitz, B. 2019. “Getting Ready for Digital Transformation: Change Your Culture, Workforce, and Technology”, EDUCAUSE Review, [online] Available <https://er.educause.edu/articles/2019/7/getting-ready-for-digital-transformation-change-your-culture-workforce-and-technology> [Accessed 6 February 2021].
- Grajek, S., Alander, I., Anderson, D.L., Anne, K.M., Bermann, S., Chester, T.M., Cirullo, G., Coats, B., Cresswell, M.K., Davis, R.F., Davray, N., Feehan, P.J., Harris, DP., Kelly, K., Lindstrom, C.H., Liss, D., Mancini, J., McCarty, S., Mitchell, C.J., Pitter, G., Rampp, C., Rozgonyi, J & Seidl, D. 2020a. Top IT Issues, 2021: Emerging from the Pandemic. [online] Available <https://er.educause.edu/articles/2020/11/top-it-issues-2021-emerging-from-the-pandemic> [Accessed 6 February 2021].
- Grajek, S., Al-idrissi, T., Aractingi, E., Bawa, O., Campbell, K., Canniff, J.F., Chu, H.Y., Hancock, M., Heslop, J., Hubbs, C., Lakhavani, F., Marasinghe, M., Miller, S., Perez, E., Pillay, S., Pomales, A., Rhea, K.K., Scanlon, T., Schaefer, B., Stadler, B., Weil, D. & Wilhauk, P. 2020. Top 10 IT Issues, 2020b: The Drive to Digital Transformation Begins. [online] Available: <https://er.educause.edu/articles/2020/1/top-10-it-issues-2020-the-drive-to-digital-transformation-begins> [Accessed: 6 February 2020].
- Grajek, S., Askren, M., Bazile, R., Berman, M., Campwell, J., Carmean, C., Clark, T., Cooper, J., Currier, C., Early, L., Gill, C., Gower, M., Hartman, J., Lavagnino, M.B., Miragliotta, J., Morales, C., Nixon, A., Raghu, G., Slezak, J., Spencer, E., Washington, C., Wilson, W and Yu, E. 2019. *The top 10 IT Issues 2019*. [online] Available: <https://er.educause.edu/>

</media/files/articles/2019/1/er19sr1w.pdf?la=en&hash=4F7D6169A8F288F24BC7A75167AF83D040A4288B> [Accessed: 8 August 2019].

- Grant, C. & Osanloo, A. 2014. Understanding, selecting, and integrating a theoretical framework in dissertation research: creating the blueprint for your “house”. *Administrative Issues Journal: Connecting Education, Practice and Research*, 4(2): 12 – 26.
- Griffith, L. 2017. *International Trends in Higher Education 2016 – 17*. University of Oxford. [online] Available: [http://www.ox.ac.uk/sites/files/oxford/trends%20in%20globalisation\\_WEB.pdf](http://www.ox.ac.uk/sites/files/oxford/trends%20in%20globalisation_WEB.pdf) [Accessed: 11 March 2019].
- Grusec, J. 1992. Social Learning Theory and development psychology: The legacies of Robert Sears and Albert Bandura. *Developmental Psychology*, 28(5): 776–786.
- Guba, E. 1990. *The Paradigm dialog*. Newbury Park, CA: SAGE Publications.
- Gustafson, K. L. & Branch, R. M. 2002. *Survey of Instructional Development Models*. 4<sup>th</sup> edition. New York: Clearinghouse of Instructional Technology, Syracuse University.
- Halo (Halo Business Intelligence). 2014. *People Process Technology: the golden triangle explained*. [online] Available: <https://halobi.com/blog/people-process-technology-the-golden-triangle-explained/> [Accessed: 8 August 2019].
- Halstead, J. 2018. *NLN Core Competencies for Nurse Educators: A Decade of Influence*. Philadelphia, PA: Lippincott Williams & Wilkens.
- Hassey, K. 2018. *What is an Authoring Tool?* [online] Available: <https://blog.gutenberg-technology.com/en/authoring-tools> [Accessed: 22 June 2020].
- Hatch, J.A. 2002. *Doing qualitative research in education settings*. Albany: State University of New York Press.
- Herrington, J. & Reeves, T.C. 2011. Using design principles to improve pedagogical practice and promote student engagement. In *International Conference on Innovation, Practice and Research in the Use of Educational Technologies in Tertiary Education*. 594–601.
- Herrington, J., McKenney, S., Reeves, T.C. & Oliver, R. 2007. Design-based research and doctoral students: Guidelines for preparing a dissertation proposal, in C. Montgomerie & J. Seale (eds). *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunication 2007*. 4089–4097.
- Herzing University. 2019. *What is a Nurse Educator?* [online] Available: <https://www.herzing.edu/blog/what-nurse-educator> [Accessed: 11 August 2019].
- Hillier, Y. 2002. *Reflective teaching in further and adult education*. London: A&C Black.

- HoloniQ. 2019. 10 charts that explain the Global Education Technology Market. [online] Available: <https://www.holoniq.com/edtech/10-charts-that-explain-the-global-education-technology-market/> [Accessed: 2 November 2020].
- Holton, E. F., Swanson, R. A. & Naquin, S. 2001. Andragogy in practice: Clarifying the andragogical model of adult learning. *Performance Improvement Quarterly*. 14(1): 118-143.
- Hooks, B. 1994. *Teaching to transgress: Education as the practice of freedom*. New York: Routledge.
- Hughes, J. & Robertson, L. 2013. The power of digital literacy to transform and shape teacher identities. In H.H. Yang & S. Wang (eds). *Cases on online learning communities and beyond*. Hershey, PA: Information Science Reference. 68-87.
- Hugo, J. 2018. Personal interview (conducted on 27 June 2018).
- Hugo, J. 2019 Didactics Study guide – updated [email].
- India Today. 2019. *Over 80% Indian engineers are unemployable, lack new age technology skills*. [online] Available: <https://www.indiatoday.in/education-today/news/story/over-80-indian-engineers-are-unemployable-lack-new-age-technology-skills-report-1483222-2019-03-21> [Accessed: 23 September 2020].
- Institute of Medicine. 2011. *The future of nursing: leading change, advancing health*. Washington, DC: The National Academies Press.
- Internet Society. 2017. *Internet Access and Education: Key considerations for policy makers*. [online] Available: <https://www.internetsociety.org/resources/doc/2017/internet-access-and-education/> [Accessed: 15 January 2020].
- iSpring Solutions Blog. 2016. *What does Malcom Knowles know about adult learning theory?* [online] Available: <https://www.ispringsolutions.com/blog/what-does-malcolm-knowles-know-about-adult-learning-theory> [Accessed: 25 April 2019].
- Jarvis, P. 1987. *Adult learning in the Social Context*. London: Croom Helm.
- Jarvis, P. 2004. *Adult and continuing education: theory and practice*. London: Routledge Falmer.
- Jarvis, P. 2005. The Existential Nature of Human Learning: Toward a Philosophical Understanding of Learning. *Adult Education Research Conference*. [online] Available: <https://newprairiepress.org/aerc/2005/papers/45>. [Accessed: 9 September 2020].
- Jarvis, P. 2006. *Towards a comprehensive theory of human learning: lifelong learning and the learning society*. London: Routledge.



- Jarvis, P. 2009. Learning to become a person in Society: Learning to be me, in K. Illeris (ed). *Contemporary theories of learning: Learning theorists in their own words*. New York: Routledge.
- Jarvis, P. 2012. Learning from everyday life. HSSRP 1(1): 1-20. [online] Available: <http://hssrp.uaic.ro/continut/1.pdf> [Accessed: 13 September 2017].
- Johnson, L., Adams Becker, S. Estrada, V. & Freeman, A. 2014. *NMC Horizon Report: 2014 Higher Education Edition*. Austin, Texas: The New Media Consortium.
- Johnson, L., Adams Becker, S. Estrada, V. & Freeman, A. 2015. *NMC Horizon Report: 2015 Higher Education Edition*. Austin, Texas: The New Media Consortium.
- Johnson, L., Adams Becker, S., Estrada, V. & Freeman, A. 2016. *NMC Horizon Report 2016 Higher Education Edition*. Austin, Texas: The New Media Consortium.
- Johnson, M. 2008. Persona, identity and competence: issues of control in teaching and learning with personal technology. *International Journal of Learning Technology*, 3: 388-403.
- Johnson, R. B. & Onwuegbuzie, A. J. 2004. Mixed Methods Research: A Research Paradigm Whose Time Has Come. *Educational Researcher*, 33(7): 14–26.
- Jordan, P. 2019. *Department of Nursing and Midwifery. Stellenbosch University*. [online] Available: <http://www.sun.ac.za/english/faculty/healthsciences/Nursing/Pages/Nursing.aspx> [Accessed: 9 September 2020].
- Kalb, K.A. 2008. Core Competencies of Nurse Educators: Inspiring Excellence in Nurse Educator Practice. *Nursing Education Perspective*, 29(4): 217-219.
- Kampen, M. 2019. How to promote 21<sup>st</sup> Century Skills in your school. [online] Available <https://www.prodigygame.com/main-en/blog/21st-century-skills> [Accessed 12 February 2021].
- Kanuka, H. 2011. Understanding E-Learning Technologies through Philosophies-in-Practice, in T. Anderson & F. Elloumi (eds). *Theory and Practice of online learning*. Edmonton: AU Press. 91-118.
- Karodia, Y. 2019. #Biztrends2019: Top 11 trends in South African education. [online] Available: <https://www.bizcommunity.com/Article/196/722/185945.html> [Accessed: 25 July 2019].
- Kasworm, C. E. 2008. Emotional challenges of adult learners in higher education. *New Directions for Adult and Continuing Education*, (120): 27-34.

- Keating, A., Gardiner, C. & Rudd, P. 2009. E-access, e-maturity, e-safety: A learner survey. [online] Available ([PDF](#)) [E-access, E-maturity, E-safety:A Learner Survey \(researchgate.net\)](#) [Accessed 7 February 2021].
- Keating, S. B. 2015. *Curriculum development and evaluation in nursing*. New York: Springer Publishing Company.
- Kelly, A.E. 2003. Theme issues: The Role of Design in Educational Research. *Educational Researcher*, 32(1): 3–4.
- Kelly, J. 2012. *Learning theories*. [online] Available: <https://thepeakperformancecenter.com/educational-learning/learning/theories/> [Accessed: 18 August 2019].
- Kember, D. 2007. *Reconsidering open and distance learning in the developing world*: London: Routledge. DOI: <https://doi.org/10.4324/9780203966549>
- Kempthorne, D. 2018. Personal interview (conducted on 27 June 2018).
- Kistner, J. 2019. A brief history about the adoption of a Learning Management System at Stellenbosch University [email].
- Kistner, L. 2020. PGDipNE Statistics from SUN-i. Stellenbosch University [email].
- Kleinhans, F. 2018. Programme administration, feedback on interaction with students and type of enquiries [email].
- KnowBe4. (2019). *What is phishing?* [online] Available: <http://www.phishing.org/what-is-phishing> [Accessed: 15 January 2019].
- Knowles, M. S., Holton, E. F. & Swanson, R. A. 2015. *The adult learner: the definitive classic in adult education and human resource development*. 8<sup>th</sup> edition. Abingdon: Routledge.
- Knowles, M.S. 1980. *The modern practice of adult education: from andragogy to pedagogy*. New York: Follett.
- Kolb, A. Y. & Kolb, D. A. 2009. Experiential learning theory: a dynamic, holistic approach to management learning, education and development, in S.J. Armstrong & C.V. Fukami (eds). *The SAGE handbook of management learning, education and development*. London: SAGE Publication Ltd. DOI: <http://dx.doi.org/10.4135/9780857021038.n3>. 42-68.
- Kolb, D. 1984. *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs, NJ: Prentice Hall.
- Kramer, L. 2014. *The role, development, expansion and importance of open education resources: An HETL interview with Larry Kramer*. [online] Available: <https://www.hetl.org/the-role->



[development-expansion-and-importance-of-open-education-resources-an-hetl-interview-with-larry-kramer/](#) [Accessed: 18 May 2017].

Kuhn, T.S. 1962. *The structure of scientific revolutions*. Chicago: University of Chicago Press.

Kumar, S. 2018. *8 Top eLearning Trends for 2019*. [online] Available: <https://elearningindustry.com/elearning-trends-for-2019-8-top> [Accessed: 8 August 2019].

Kurt, S. 2015. Educational Technology: An Overview. [online] Available: [Educational Technology: An Overview - Educational Technology](#) [Accessed 7 February 2021].

Lane, S.H. & Kohlenberg, E. 2010. The future of baccalaureate degrees for nurses. *Nursing Forum*, 45(4): 218 -227.

Lankshear, C. 1999. Digital rhetorics: Literacies and technologies in classrooms - current practices and future directions. *Queensland Journal of Educational Research*, 15(1): 141-148.

Lankshear, C., Snyder, I. & Green, B. 2000 *Teachers and Techno-Literacy – Managing Literacy, Technology and Learning in Schools*. St Leonards, NSW: Allen and Unwin.

Laurillard, D. 2012. *Teaching as a Design Science: Building Pedagogical patterns for learning and technology*. London: Routledge.

Lewis, L. H. & Williams, C. J. 1994. Experiential learning: Past and present, in L. Jackson & R. S. Caffarella (eds). *Experiential learning: A new approach*. San Francisco: Jossey-Bass. 5-16.

Lim, C.P. & Khine, M.S. 2006. Managing teachers' barriers to ICT integration in Singapore schools. *Journals of Technology and Teacher Education*, 14(1): 97-125.

Lippincott Nursing Education Blog. 2017. Nursing education Blog. Wolters Kluwer. Available[Online]: [http://nursingeducation.lww.com/blog.entry.html/2017/01/07/dire\\_nursing\\_shortag-NoCQ.html](http://nursingeducation.lww.com/blog.entry.html/2017/01/07/dire_nursing_shortag-NoCQ.html). Accessed: 10 December 2019

Littlejohn, A., Beetheam, H. & McGill, L. 2012. Learning at the digital frontier: a review of digital literacies in theory and practice. *Journal of Computer Assisted Learning*, 28: 547-556.

Loubser, J. 2018. SUNLearn system administrator – testing [email].

Lourens, G. 2019. Personal interview (conducted on 15 April 2019).

Luckin, R., Clark, W., Logan, K., Oliver, M. & Mee, A. 2009. Do Web 2.0 tools really open the door to learning? Practices, perceptions and profiles of 11 – 16 years olds learners. *Learning, Media and Technology*, 34: 87-104.

- MacGregor, K. 2014. *Higher Education in the 20<sup>th</sup> year of democracy*. [online] Available: <https://www.universityworldnews.com/post.php?story=20140425131554856> [Accessed: 23 July 2019].
- Magowan, K. 2020. People, Process, Technology (and partners): An Introduction. [online] Available <https://www.bmc.com/blogs/people-process-technology/> [Accessed 16 February 2021].
- Martin, M and Furiv, U. 2020. COVID-19 tests the resilience of higher education. [online] Available <https://www.universityworldnews.com/post.php?story=20201211130427131> [Accessed 6 February 2021].
- Masango, TE. 2014. A qualitative study on attrition of student nurses in Kwazulu-Natal College of Nursing: Principals' perspectives. *African Journal for Physical Activity and Health Sciences*, 20(2): 721-731.
- Maslow, A.H. 1970. *Motivation and Personality*. New York: Harper and Row.
- Mayer, R. & Moreno, R.E. 1999. Cognitive principles of multimedia learning: The role of modality and contiguity. *Journal of Educational Psychology*, 91(2): 358-368.
- Mayer, R.E. & Fiorella, L. 2014. Principles for reducing extraneous processing in multimedia learning: Coherence, signaling, redundancy, spatial contiguity, and temporal contiguity principles, in R.E. Mayer (ed). *The Cambridge handbook of multimedia learning*. New York: Cambridge University Press. 279-315.
- Mayer, R.E. & Stull, A.T. 2007. Learning by doing versus learning by viewing: Three experimental comparisons of learner-generated versus author-provided graphic organizers. *Journal of Educational Psychology*, 99(4): 808-820.
- Mayer, R.E. 2009. *Multimedia learning*. New York: Cambridge University Press.
- Mbizule, C.L. 2017. *The digital divide in South African's higher education sector: why public internet access is important in the context of tertiary education*. [online] Available: <https://www.inonafrica.com/2017/08/07/digital-divide-south-africas-higher-education-sector-public-internet-access-important-context-tertiary-education/> [Accessed: 5 June 2019].
- McGinnis, D. 2020. What is the fourth industrial revolution? [online] Available <https://www.salesforce.com/blog/what-is-the-fourth-industrial-revolution-4ir/> [Accessed 8 February 2021].
- McGrath, V. 2009. Reviewing the evidence on how adult students learn: An examination of Knowles' model of andragogy. *The Irish Journal of Adult and Community Education*, 99-110.

- McKenney, S. & Reeves, T.C. 2012. *Conducting educational design research*. London: Routledge.
- McKenney, S. & Van den Akker, J. 2005. Computer-based support for curriculum designers: A case of developmental research. *Educational Technology Research and Development*, 53(2): 41–66.
- McKenney, S., Nieveen, N. & Van den Akker, J. 2006. Design Research from the curriculum perspective, in J. Van Den Akker; K. Gravemeijer; S.E. McKenney & N. Nieveen (eds). *Educational Design Research*. London: Routledge, 67-90.
- McLeod, G. 2003. Learning Theory and Instructional Design. *Learning Matters*, 2(1):35-43.
- McLeod, S. 2020. *Maslow's Hierarchy of needs*. [online] Available: <https://www.simplypsychology.org/maslow.html> [Accessed: 12 August 2020].
- McLoughlin, C. & Oliver, R. 2000. Designing learning environments for cultural inclusivity: A case study of indigenous online learning at tertiary level. *Australian Journal of Educational Technology*, 16(1): 58-72.
- Meder, C. 2018. Testing of digital literacy course, Moodle theme for PGDipNE [testing].
- Mekwa, J. 2000. Transformation in nursing education (Chapter 13). *South African Health Review*, 2000(1): 271-283.
- Merriam, S.B. & Caffarella, R.S. 1999. *Learning in Adulthood. A Comprehensive Guide*. 2<sup>nd</sup> edition. California: Jossey-Bass Inc.
- Merriam, S.B., Caffarella, R.S. & Baumgartner, L.M. 2007. *Learning in adulthood: A comprehensive guide*. 3<sup>rd</sup> edition. San Francisco: Jossey-Bass.
- Mertens, D.M. 2010. *Research and evaluation in education and psychology: integrating diversity with quantitative, qualitative and mixed methods*. Thousand Oaks, CA: SAGE Publications.
- Meyer, S. & Van Niekerk, S. 2008. *Nurse Educator in Practice*. Cape Town: Juta.
- Microsoft Outlook. 2019. *Wikipedia: Microsoft Outlook*. [online] Available: [https://en.wikipedia.org/wiki/Microsoft\\_Outlook](https://en.wikipedia.org/wiki/Microsoft_Outlook) (Accessed: 31 March 2020).
- Microsoft PowerPoint. 2019. *PowerPoint help & training*. [online] Available: <https://support.microsoft.com/en-za/powerpoint> [Accessed: 15 December 2018]
- Microsoft Word. 2019. *Word help center*. [online] Available: <https://support.office.com/en-za/word> [Accessed: 15 December 2018].
- Microsoft. 2019. *What is cloud computing?* [online] Available: <https://azure.microsoft.com/en-us/overview/what-is-cloud-computing/>. [Accessed: 8 August 2019].

- Microsoft. 2020. *Microsoft 365 learning pathways*. [online] Available: <https://docs.microsoft.com/en-us/office365/customlearning/> [Accessed: 30 July 2020].
- Moodle. 2019. *What is Moodle?* [online] Available: <https://moodle.org/>. [Accessed: 10 December 2019].
- Moodle. 2020. *Releases*. [online] Available: <https://docs.moodle.org/dev/Releases> [Accessed: 15 July 2020].
- Moore, M. 2019. What is the 4.0? Everything you need to know. [online] Available: <https://www.techradar.com/news/what-is-industry-40-everything-you-need-to-know> [Accessed 3 March 2021].
- Morena, R. & Ortegado-Layne, L. 2008. Do classroom exemplars promote the application of principles in teacher education? A comparison of videos, animations, and narratives. *Educational Technology Research and Development*, 56(4): 449-465.
- Mulaudzi, F.M., Daniels, F.M., Direko, K.K. & Uys, L. 2012. The current status of the education and training of nurse educators in South Africa. *Trends in Nursing*, 1(1). Doi: <https://doi.org/10.14804/1-1-26>.
- Newman, D. 1990. Opportunities for research on the organizational impact of school computers. *Educational Researcher*, 19(3): 8-13.
- Newman, J., Khalbous, S. & Van't Land H. 2020. Higher Education in key to building back better post-COVID. [online] Available <https://www.universityworldnews.com/post.php?story=2020103009344768> [Accessed 25 January 2021].
- Nieveen, N. & Folmer, E. 2010. Formative evaluation in educational design research, in T. Plomp & N. Nieveen (eds). *Educational design research – part A: An introduction*. Enschede, the Netherlands: SLO. 103-124..
- Nieveen, N. & Folmer, E. 2013. Formative evaluation in educational design research, in T. Plomp and N. Nieveen (eds). *Educational design research – part A: An introduction*. Enschede, the Netherlands: SLO. 152- 169.
- Nieveen, N. 1999. Prototyping to reach product quality, in J. Van Den Akker; R.M. Branch; K. Gustafson; N. Nieveen, & T. Plomp (eds). *Design approaches and tools in education and training*. Dordrecht: Kluwer Academic Publishers. 125–136.
- Nurse Practitioner Schools. (2019). *What is a Nurse Educator?* [online] Available: <https://www.nursepractitionerschools.com/faq/what-is-a-nurse-educator/> [Accessed: 11 August 2019]

- OECD (Organisation for Economic Cooperation and Development). 2012. *Equity and Quality in Education: Supporting Disadvantaged Students and Schools*. Paris: OECD Publishing. DOI: <https://doi.org/10.1787/9789264130852-en>.
- OECD (Organisation for Economic Cooperation and Development). 2015. *Factbook 2015–2016: Economic, Environmental and Social Statistics Ratio of Nurses to Physicians: 2013 or Latest Available Year*. Paris: OECD Publishing. DOI: <https://dx.doi.org/10.1787/factbook-2015-graph199-en>.
- OECD (Organisation for Economic Cooperation and Development). 2016. *Health at a Glance: Asia/Pacific: Measuring Progress towards Universal Health Coverage*. Paris: OECD Publishing. DOI: [https://doi.org/10.1787/health\\_glance\\_ap-2016-en](https://doi.org/10.1787/health_glance_ap-2016-en).
- OECD (Organisation for Economic Cooperation and Development). 2017a. *Health at a Glance: Chapter 8 Health Workforce*, 148–165. Paris: OECD Publishing. DOI: [https://dx.doi.org/10.1787/health\\_glance-2017-en](https://dx.doi.org/10.1787/health_glance-2017-en).
- OECD (Organisation for Economic Cooperation and Development). 2017b. *Report on benchmarking higher education systems performance: conceptual framework*. Paris: OECD Publishing. [online] Available: <https://www.oecd.org/education/skills-beyond-school/Benchmarking%20Report.pdf> [Accessed: 30 July 2020].
- OECD (Organisation for Economic Cooperation and Development). 2018. *Health at A Glance: Europe 2018 State of Health in the EU Cycle*. Paris/Brussels: OECD Publishing/European Union. DOI: [https://doi.org/10.1787/health\\_glance\\_eur-2018-en](https://doi.org/10.1787/health_glance_eur-2018-en).
- Oliver, R. 2000. When teaching meets learning: Design principles and strategies for Web-based learning environments that support knowledge construction in R. Sims, M. O'Reilly & S. Sawkins (eds.) *Learning to choose. Choosing to learn. Proceedings of the Australian Society for Computers in Learning in Tertiary Education 2000 conference*, Southern Cross University, Coffs Harbour, Australia. 17-28.
- Pappas, C. 2016. *The top 8 benefits of using a Learning Management System*. [online] Available: <https://elearningindustry.com/top-8-benefits-of-using-learning-management-systems> [Accessed: 27 March 2019].
- Patel, S. 2015. *The research paradigm – methodology, epistemology and ontology – explained in simple language*. [online] Available: <http://salmapatel.co.uk/academia/the-research-paradigm-methodology-epistemology-and-ontology-explained-in-simple-language/> [Accessed: 24 August 2019].

- Pavlov, I. 1927. Conditioned reflexes: an investigation of the physiological activity of the cerebral cortex. *Classics in the History of Psychology*. [online] Available: <http://psychclassics.yorku.ca/Pavlov/> [Accessed: 13 September 2020].
- Phillips, D.C. 1995. The good, the bad and the ugly: The many faces of constructivism. *Education Researcher*, 24(7): 5-12.
- Phillips, D.C. 2000. *Constructivism in education*. Chicago: National Society for the Study of Education.
- Piaget, J. 1980. The psychogenesis of knowledge and its epistemological significance, in M. Piattelli-Palmarini (ed). *Language and Learning: The Debate between Jean Piaget and Noam Chomsky*. Cambridge, MA: Harvard University Press. 1-23.
- Plomp, T. 2010. Educational Design Research: An Introduction, in T. Plomp & N. Nieveen (eds). *An introduction to educational design research: Proceedings of the seminar conducted at the East China Normal University, Shanghai*. Enschede, The Netherlands: SLO – The Netherlands Institute for Curriculum Development. 9–35.
- Plomp, T. 2013. Formative evaluation in educational design research, in T. Plomp & N. Nieveen (eds). *Educational design research – part A: An introduction*. Enschede, the Netherlands: SLO. 10-51.
- Prinsloo, M. & Sasman, F. 2015. Literacy and language teaching and learning with interactive whiteboards in early schooling. *TESOL Quarterly*, 49(3): 533-544.
- Pritchard A. 2009. *Ways of learning: Learning Theories for the Classroom*. 2<sup>nd</sup> edition. New York: Routledge.
- Pritchard A. 2014. Cognitive, constructivist learning, in *Ways of Learning – Learning Theories and Learning Styles in the Classroom*. 3<sup>rd</sup> edition. New York, NY: Routledge. 18-37.
- Quigley, E. 2018. *What is SCORM? A simple guide for those new to eLearning*. [online] Available: <https://www.learnupon.com/blog/what-is-scorm/> [Accessed: 29 May 2020].
- Reeves, T.C. 2006. Design research from the technology perspective, in J. Van Den Akker; K. Gravemeijer; S. McKenney & N. Nieveen (eds). *Educational Design Research*. London: Routledge. 86–109.
- Reeves, T.C., Herrington, J. & Oliver, R. 2005. Design research: A socially responsible approach to instructional technology research in higher education. *Journal of Computing in Higher Education*, 16(2): 97-116.
- Richardson, V. 2003. Constructivist Pedagogy. *Teachers College Record*, 105 (9): 1623–1640.



- Rogers, E. M. 1983. *Diffusion of innovations*. New York: Free Press.
- Rogers, E. M. 1995. *Diffusion of Innovations*. New York: Free Press.
- Saldaña, J. 2016. *The Coding Manual for Qualitative Researchers*. Los Angeles: SAGE Publications.
- Salson, A. 2018. A world tour to understand “how to teach 21<sup>st</sup> century skills?” [online] Available <https://whatifspirit.com/en/howtoteach21stcenturyskills-education/> [Accessed 8 February 2021].
- Sambell, K. 2011. *Rethinking Feedback in Higher Education: An assessment for learning perspective*. The Higher Education Academy. [online] Available: <https://www.plymouth.ac.uk/uploads/production/document/path/2/2729/RethinkingFeedbackInHigherEducation.pdf> [Accessed: 30 July 2020].
- SANC (South African Nursing Council). 2014. *Competencies for a nurse educator*. [online] Available: <http://www.sanc.co.za/pdf/Competencies/SANC%20Competencies-Nurse%20Educator%202014-07.pdf> [Accessed: 11 August 2019].
- Saunders, M., Lewis, P. & Thornhill, A. 2009. *Research methods for business students*. 5<sup>th</sup> edition. London: Prentice Hall.
- Schreyer Institute of Teaching Excellence. 2007. *Adult learners in Higher Education*. [online] Available: <https://www.schreyerinstitute.psu.edu/pdf/AdultLearners.pdf> [Accessed: 13 September 2017].
- Schunk, D. H. 1991. *Learning theories: An educational perspective*. New York: Macmillan.
- Schutte, L. 2018. SWOT analysis (email).
- Scotland, J. 2012. Exploring the philosophical underpinnings of research: Relating ontology and epistemology to the methodology and methods of the scientific, interpretive, and critical research paradigms. *English Language Teaching*, 5(9): 9–16.
- Scott, P. 1995. *The Meaning of Mass Higher Education*. Buckingham: Open University Press.
- Shannon-Baker, P. 2016. Making Paradigms Meaningful in Mixed Methods Research. *Journal of Mixed Methods Research*, 10(4): 319–334.
- Sharma, A. 2015. *Discovering Learning Management Systems: Basic Functions and Benefits*. [online] Available: <https://elearningindustry.com/discovering-learning-management-systems-basic-functions-benefits> [Accessed: 27 March 2019].
- Sharpe, R. 2010. Conceptualizing Difference in Learners' Experiences of E-Learning: A review of Contextual Models: Reports of the Higher Education Academy Learner Difference (HEALD)

Synthesis Projects. [online] Available <https://www.advance-he.ac.uk/knowledge-hub/conceptualizing-differences-learners-experiences-e-learning-review-contextual-models> [Accessed 6 February 2021].

Siemens, G., Gašević, D., & Dawson, S. (2015). Preparing for the Digital University: a review of the history and current state of distance, blended, and online learning. [online] Available Pg. 62. Athabasca University. Retrieved from <http://linkresearchlab.org/PreparingDigitalUniversity.pdf> [Accessed 15 December 2019].

Skinner, B. F. 1971. *Beyond Freedom and Dignity*. New York: Knopf.

Skinner, B. F. 1974. *About behaviorism*. New York: Knopf.

Skinner, B.F. 2011. *About behaviorism*. New York: Vintage.

Smart Sparrow. 2018. What is Learning Design?. Keep learners at the center of the design process. [online] Available <https://www.smartsparrow.com/what-is-learning-design/> [Accessed 6 February 2021].

South African Government. 2013. *National Development Plan 2030*. [online] Available: <http://www.gov.za/sites/www.gov.za/files/Executive%20Summary-NDP%202030%20-%20Our%20future%20-%20make%20it%20work.pdf>. [Accessed: 24 January 2017].

Sparrow, J. 2018. Digital Fluency: Big, Bold Problems. [online] Available <https://er.educause.edu/articles/2018/3/digital-fluency-preparing-students-to-create-big-bold-problems> [Accessed: 12 February 2021].

Spires, H.A & Bartlett, M.E. 2012. Digital Literacies and Learning Designing a Path Forward. Friday Institute White Paper Series. [online] Available <https://www.fi.ncsu.edu/wp-content/uploads/media/media/2013/05/digital-literacies-and-learning.pdf> [Accessed: 12 February 2021].

Spires, H.A., Medlock Paul, C. & Kerkhoff, S.N. 2017. Digital Literacy for the 21<sup>st</sup> Century. Encyclopaedia of Information [online] Available [https://www.researchgate.net/publication/318508429\\_Digital\\_Literacy\\_for\\_the\\_21st\\_Century](https://www.researchgate.net/publication/318508429_Digital_Literacy_for_the_21st_Century) [Accessed 7 February 2021].

Stauffer, B. 2020. *What are the 4 C's of 21<sup>st</sup> Century Skills?* [online] Available: <https://www.aeseducation.com/blog/four-cs-21st-century-skills> [Accessed 5 July 2020].

Stellenbosch University. 2013. *Institutional Intent and Strategy 2013 – 2018*. [online] Available: [http://www.sun.ac.za/english/Documents/Strategic\\_docs/IP%20english%20website.pdf](http://www.sun.ac.za/english/Documents/Strategic_docs/IP%20english%20website.pdf) [Accessed: 8 July 2017].



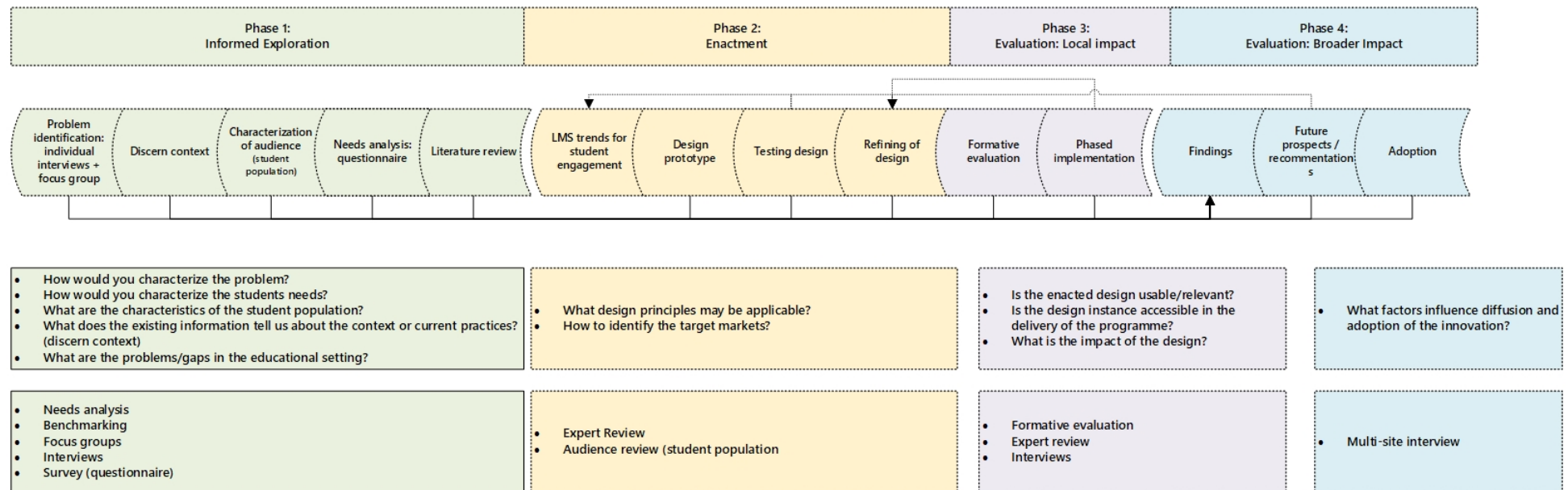
- SU & saMRC (Stellenbosch University and the South African Medical Research Council). (2020). *International year of the nurse and midwife*. [online] Available: <http://www.sun.ac.za/english/faculty/healthsciences/Nursing/Documents/Year-of-the-nurse-and-midwifery-brochure.pdf>. [Accessed: 29 August 2020]
- Tashakkori, A. & Teddlie, C. 1998. *Mixed Methodology Combining Qualitative and Quantitative Approaches*. Thousand Oaks, CA: SAGE.
- Tashakkori, A. & Teddlie, C. 2003. *Handbook of Mixed Methods in Social and Behavioural Research*. Thousand Oaks, CA: SAGE.
- Tech Terms Computer Dictionary. 2019. *Bookmark*. [online] Available: <https://techterms.com/definition/bookmark> [Accessed: 24 June 2019].
- TechNet. 2009. *Defining Malware: FAQ*. [online] Available: <https://www.techopedia.com/definition/26424/public-network> [Accessed: 25 June 2019]
- Technopedia. 2018. *Public network*. [online] Available: <https://www.techopedia.com/definition/26424/public-network> [Accessed: 25 June 2019].
- Teddlie, C. & Yu, F. 2007. Mixed Methods Sampling: A typology with Examples. *Journal of Mixed Methods Research*, 1(1): 77–100.
- Telematic Programme. 2019. *Prospective Postgraduate Students: Telematic Programmes*. Stellenbosch University. [online] Available: <https://www0.sun.ac.za/pgstudies/telematic-programmes.html> [Accessed: 10 December 2019].
- Tennant, M. & Pogson, P. 1995. *Learning and change in the adult years: a development perspective*. San Francisco, CA: Jossey-Bass.
- Tessmer, M. 1993. *Planning and conducting formative evaluations*. London: Kogan Page.
- Thompson, A. D., Simonson, M. R. & Hargrave, C. P. 1992. *Educational technology: A review of the research*. Education Books. DOI: [https://lib.dr.iastate.edu/edu\\_books/6](https://lib.dr.iastate.edu/edu_books/6).
- Thorndike, E. L. 1913. *Educational psychology: The psychology of learning*. New York: Teachers College Press.
- Trilling, B. & Fadel, C. 2009. *21<sup>st</sup> Century Skills: Learning for Life in our times*. San Francisco: Jossey-Bass.
- Turvey, K. & Pachler, N. 2019. Design principles for fostering pedagogical provenance through research in technology supported learning. *Computers & Education*, 146: 1-14.
- Ulrich, K. & Eppinger, S. 2000. *Product Design and Development*. Boston: Irwin McGraw-Hill.

- United States Computer Emergency Readiness Team. 2014. *An Undirected Attack Against Critical Infrastructure*. [online] Available: [https://us-cert.cisa.gov/sites/default/files/recommended\\_practices/CaseStudy-002.pdf](https://us-cert.cisa.gov/sites/default/files/recommended_practices/CaseStudy-002.pdf) [Accessed: 25 June 2019].
- Valuy, S. 2016. *Building eLearning Software: Why choose the SCORM standard?* [online] Available: <https://elearningindustry.com/elearning-software-scorm-standard> [Accessed: 30 May 2020].
- Van Den Akker, J. 1999. Principles and methods of development research, in J. Van Den Akker; R. Branch; K. Gustafson; N. Nieveen & T. Plomp (eds). *International handbook of science education*. Dordrecht: Kluwer Academic Publishers. 1-14.
- Van Den Akker, J., Gravemeijer, K., McKenney, S. & Nieveen, N. 2006. *Educational Design research*. London: Routledge.
- Van den Heever, M. 2018. Personal interview (conducted on 17 April 2018).
- Van der Merwe, A. 2018. Granted permission for the research study (email).
- Ventimiglia, P & Pullman, G. 2016. From written to digital: The new literacy. [online] Available: <https://er.educause.edu/-/media/files/articles/2016/3/erm1623.pdf> [Accessed 12 February 2021].
- Viljoen, D. 2018. *Higher education – a vast and changing future landscape*. [online] Available: <https://www.fin24.com/Finweek/Featured/higher-education-a-vast-and-changing-future-landscape-20180228> [Accessed: 22 July 2019].
- Von Glasersfeld, E. 2013. *Radical Constructivism*. Hoboken: Taylor and Francis.
- Vygotsky, L. 1962. *Thought and language*. Cambridge, MA: MIT Press.
- Wabisabi Learning. 2020. 5 Digital Literacy Skills students can benefit from. [online] Available <https://wabisabilearning.com/blogs/technology-integration/5-digital-literacy-skills> [Accessed 6 February 2021].
- Wang, F. & Hannafin, M.J. 2005. Design-based research and technology-enhanced learning environments. *Educational Technology Research and Development*. 53(4):5–23.
- Wanza, M. 2018. PGDipNE student login and access [email].
- Watson, J. B. 1913. Psychology as the behaviourist views it. *Psychological Review*, 20(2):158-177.
- Weimer, L. 2017. *10 Trends changing global higher education*. [online] Available: <https://www.eaie.org/blog/10-trends-changing-global-higher-education.html> [Accessed: 26 March 2019].

- WHO (World Health Organization). 1988. *Nurses education in the Eastern Mediterranean region. Guidelines on future directions*. Alexandria: World Health Organization Europe. DOI: <https://apps.who.int/iris/handle/10665/119600>.
- WHO (World Health Organization). 2000. *Nurses and midwives for health. WHO European strategy for nursing and midwifery education*. Copenhagen: World Health Organization Europe. DOI: <https://apps.who.int/iris/handle/10665/107689>.
- WHO (World Health Organization). 2013. *Transforming and scaling up health professional' education and training: WHO Education Guidelines 2013*. [online] Available: [https://www.who.int/hrh/resources/transf\\_scaling\\_hpet/en/](https://www.who.int/hrh/resources/transf_scaling_hpet/en/) [Accessed: 11 August 2019].
- WHO (World Health Organization). 2019. *Nursing and midwifery – WHO Global Strategic Direction for strengthening Nursing and Midwifery 2016- 2020*. [online] Available: [https://www.who.int/hrh/nursing\\_midwifery/nursing-midwifery/en/](https://www.who.int/hrh/nursing_midwifery/nursing-midwifery/en/) [Accessed: 19 April 2019].
- WHO (World Health Organization). 2020. *State of the World's Nursing 2020 investing in education, job and leadership*. (online) Available: <https://apps.who.int/iris/bitstream/handle/10665/331673/9789240003293-eng.pdf> [Accessed: 29 August 2020].
- Winn, W. 1990. Some implications of cognitive theory for instructional design. *Instructional Science*, 19: 53-69.
- Winne, P. H. 1985. Cognitive processing in the classroom, in T. Husen & T.N. Postlethwaite (eds). *The International Encyclopaedia of Education: Research and studies*. Oxford, U.K.: Pergamon Press. 795-808.
- Wolters Kluwer. 2017. *Dire Nursing Shortage How will it Affect Patient Care*. [online] Available: <https://www.wolterskluwer.com/en/expert-insights/dire-nursing-shortage-how-will-it-affect-patient-care> [Accessed: 10 December 2019]
- Wolters Kluwer. 2019. *Taking the leap to concept-based learning*. [online] Available: <http://concepts.nursingeducationuccess.com/why-concept-based-learning/> [Accessed: 19 April 2019].
- World Economic Forum. 2017. *The skills needed in the 21<sup>st</sup> century*. [online] Available: <https://widgets.weforum.org/nve-2015/chapter1.html> [Accessed 15 December 2019].
- Yilmaz, K. 2008. Constructivism: Its theoretical underpinnings, variations, and implications for classroom instruction. *Educational Horizons*, 86(3): 161-172.

- Youde, A. 2018. Andragogy in blended learning contexts: effective tutoring of adult learners studying part-time, vocationally relevant degrees at a distance. *International Journal of Lifelong Education*, 37 (2): 255-272.
- Young, C. 2018. Principles of Advanced Nursing Practices study guide [email].
- Young, S. F. 2008. Theoretical frameworks and models of learning: tools for developing conceptions of teaching and learning. *International Journal for Academic Development*, 13(1): 41-49.
- Zmeyov, S. I. 1998. Andragogy: Origins, Development and Trends. *International Review of Education*, 44(1): 103-108.

## ADDENDUM A: DETAILED INTEGRATIVE LEARNING DESIGN FRAMEWORK (ILDF)



Source: Adapted from Bannan, 2010: 54

## ADDENDUM B: HUMANIORA RESEARCH AND ETHICS COMMITTEE OF STELLENBOSCH UNIVERSITY



### NOTICE OF APPROVAL

REC Humanities New Application Form

22 March 2018

Project number: 1555

Project Title: Learning by design: enhancing the digital literacy of adult learners in a blended learning environment

Dear Mrs. Zenobia Davids

Your REC Humanities New Application Form submitted on 14 March 2018 was reviewed and approved by the REC: Humanities.

Please note the following for your approved submission:

#### **Ethics approval period:**

Protocol approval date (Humanities)	Protocol expiration date (Humanities)
22 March 2018	21 March 2021

#### **GENERAL COMMENTS:**

Please take note of the General Investigator Responsibilities attached to this letter. You may commence with your research after complying fully with these guidelines.

**If the researcher deviates in any way from the proposal approved by the REC: Humanities, the researcher must notify the REC of these changes.**

Please use your SU project number (1555) on any documents or correspondence with the REC concerning your project.

Please note that the REC has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

#### **FOR CONTINUATION OF PROJECTS AFTER REC APPROVAL PERIOD**

Please note that a progress report should be submitted to the Research Ethics Committee: Humanities before the approval period has expired if a continuation of ethics approval is required. The Committee will then consider the continuation of the project for a further year (if necessary).

#### **Included Documents:**

Document Type	File Name	Date	Version
Research Protocol/Proposal	PhD proposal	11/09/2017	8
Proof of permission	Institutional Permission Standard Agreement IRPSD 695	24/11/2017	1
Informed Consent Form	SU HUMANITIES Consent template electronic survey	14/03/2018	2
Informed Consent Form	SU HUMANITIES Consent template Written Focus group	14/03/2018	1
Deafult	Final letter to PGDipNE students 2018	28/09/2018	2
Data collection tool	Readiness assessment questionnaire	16/11/2018	2
Data collection tool	Focus group discussion	16/11/2018	1

If you have any questions or need further help, please contact the REC office at [cgraham@sun.ac.za](mailto:cgraham@sun.ac.za).

Sincerely,

Clarissa Graham



## Investigator Responsibilities

### Protection of Human Research Participants

Some of the general responsibilities investigators have when conducting research involving human participants are listed below:

**1. Conducting the Research.** You are responsible for making sure that the research is conducted according to the REC approved research protocol. You are also responsible for the actions of all your co-investigators and research staff involved with this research. You must also ensure that the research is conducted within the standards of your field of research.

**2. Participant Enrollment.** You may not recruit or enroll participants prior to the REC approval date or after the expiration date of REC approval. All recruitment materials for any form of media must be approved by the REC prior to their use.

**3. Informed Consent.** You are responsible for obtaining and documenting effective informed consent using **only** the REC-approved consent documents/process, and for ensuring that no human participants are involved in research prior to obtaining their informed consent. Please give all participants copies of the signed informed consent documents. Keep the originals in your secured research files for at least five (5) years.

**4. Continuing Review.** The REC must review and approve all REC-approved research proposals at intervals appropriate to the degree of risk but not less than once per year. There is **no grace period**. Prior to the date on which the REC approval of the research expires, it is **your responsibility to submit the progress report in a timely fashion to ensure a lapse in REC approval does not occur**. If REC approval of your research lapses, you must stop new participant enrollment, and contact the REC office immediately.

**5. Amendments and Changes.** If you wish to amend or change any aspect of your research (such as research design, interventions or procedures, participant population, informed consent document, instruments, surveys or recruiting material), you must submit the amendment to the REC for review using the current Amendment Form. You **may not initiate** any amendments or changes to your research without first obtaining written REC review and approval. The **only exception** is when it is necessary to eliminate apparent immediate hazards to participants and the REC should be immediately informed of this necessity.

**6. Adverse or Unanticipated Events.** Any serious adverse events, participant complaints, and all unanticipated problems that involve risks to participants or others, as well as any research related injuries, occurring at this institution or at other performance sites must be reported to Malene Fouche within **five (5) days** of discovery of the incident. You must also report any instances of serious or continuing problems, or non-compliance with the REC's requirements for protecting human research participants. The only exception to this policy is that the death of a research participant must be reported in accordance with the Stellenbosch University Research Ethics Committee Standard Operating Procedures. All reportable events should be submitted to the REC using the Serious Adverse Event Report Form.

**7. Research Record Keeping.** You must keep the following research related records, at a minimum, in a secure location for a minimum of five years: the REC approved research proposal and all amendments; all informed consent documents; recruiting materials; continuing review reports; adverse or unanticipated events; and all correspondence from the REC

**8. Provision of Counselling or emergency support.** When a dedicated counsellor or psychologist provides support to a participant without prior REC review and approval, to the extent permitted by law, such activities will not be recognised as research nor the data used in support of research. Such cases should be indicated in the progress report or final report.

**9. Final reports.** When you have completed (no further participant enrollment, interactions or interventions) or stopped work on your research, you must submit a Final Report to the REC.

**10. On-Site Evaluations, Inspections, or Audits.** If you are notified that your research will be reviewed or audited by the sponsor or any other external agency or any internal group, you must inform the REC immediately of the impending audit/evaluation.

REC Coordinator: Research Ethics Committee: Human Research (Humanities)

*National Health Research Ethics Committee (NHREC) registration number: REC-050411-032.*

*The Research Ethics Committee: Humanities complies with the SA National Health Act No.61 2003 as it pertains to health research. In addition, this committee abides by the ethical norms and principles for research established by the Declaration of Helsinki (2013) and the Department of Health Guidelines for Ethical Research: Principles Structures and Processes (2<sup>nd</sup> Ed.) 2015. Annually a number of projects may be selected randomly for an external audit.*



## ADDENDUM C: INSTITUTIONAL PERMISSION



UNIVERSITEIT • STELLENBOSCH • UNIVERSITY  
jou kennisvenoot • your knowledge partner

### INSTITUTIONAL PERMISSION:

#### AGREEMENT ON USE OF PERSONAL INFORMATION IN RESEARCH

**Name of Researcher:** Zenobia Davidse

**Name of Research Project:** Learning by design: enhancing the digital literacy of adult learners in a blended learning environment

**Service Desk ID:** IRPSD 695

**Date of Issue:** 24 November 2017

You have received institutional permission to proceed with this project as stipulated in the institutional permission application and within the conditions set out in this agreement.

1 WHAT THIS AGREEMENT IS ABOUT	
What is POPI?	<p>1.1 POPI is the Protection of Personal Information Act 4 of 2013.</p> <p>1.2 POPI regulates the entire information life cycle from collection, through use and storage and even the destruction of personal information.</p>
Why is this important to us?	<p>1.3 Even though POPI is important, it is not the primary motivation for this agreement. The privacy of our students and employees are important to us. We want to ensure that no research project poses any risks to their privacy.</p> <p>1.4 However, you are required to familiarise yourself with, and comply with POPI in its entirety.</p>
What is considered to be personal information?	<p>1.5 'Personal information' means information relating to an identifiable, living, individual or company, including, but not limited to:</p> <p>1.5.1 information relating to the race, gender, sex, pregnancy, marital status, national, ethnic or social origin, colour, sexual orientation, age, physical or mental health, well-being, disability, religion, conscience, belief, culture, language and birth of the person;</p> <p>1.5.2 information relating to the education or the medical, financial, criminal or employment history of the person;</p>

1  
Institutional Permission Standard Agreement: 13 March 2017 V1

	<p>1.5.3 any identifying number, symbol, e-mail address, physical address, telephone number, location information, online identifier or other particular assignment to the person;</p> <p>1.5.4 the biometric information of the person;</p> <p>1.5.5 the personal opinions, views or preferences of the person;</p> <p>1.5.6 correspondence sent by the person that is implicitly or explicitly of a private or confidential nature or further correspondence that would reveal the contents of the original correspondence;</p> <p>1.5.7 the views or opinions of another individual about the person; and</p> <p>1.5.8 the name of the person if it appears with other personal information relating to the person or if the disclosure of the name itself would reveal information about the person.</p>
Some personal information is more sensitive.	<p>1.6 Some personal information is considered to be sensitive either because:</p> <p>1.6.1 POPI has classified it as sensitive;</p> <p>1.6.2 if the information is disclosed it can be used to defraud someone; or</p> <p>1.6.3 the disclosure of the information will be embarrassing for the research subject.</p> <p>1.7 The following personal information is considered particularly sensitive:</p> <p>1.7.1 Religious or philosophical beliefs;</p> <p>1.7.2 race or ethnic origin;</p> <p>1.7.3 trade union membership;</p> <p>1.7.4 political persuasion;</p> <p>1.7.5 health and health related documentation such as medical scheme documentation;</p> <p>1.7.6 sex life;</p> <p>1.7.7 biometric information;</p> <p>1.7.8 criminal behaviour;</p> <p>1.7.9 personal information of children under the age of 18;</p> <p>1.7.10 financial information such as banking details, details relating to financial</p>

	products such as insurance, pension funds or other investments.
	1.8 You may make use of this type of information, but must take extra care to ensure that you comply with the rest of the rules in this document.
<b>2 COMMITMENT TO ETHICAL AND LEGAL RESEARCH PRACTICES</b>	
You must commit to the use of ethical and legal research practices.	2.1 You must obtain ethical clearance before commencing with this study. 2.2 You commit to only employing ethical and legal research practices.
You must protect the privacy of your research subjects.	2.3 You undertake to protect the privacy of the research subjects throughout the project.
<b>3 RESEARCH SUBJECT PARTICIPATION</b>	
Personal information of identifiable research subjects must not be used without their consent.	3.1 Unless you have obtained a specific exemption for your research project, consent must be obtained in writing from the research subject, before their personal information is gathered.
Research subjects must be able to withdraw from the research project.	3.2 Research subjects must always be able to withdraw from the research project (without any negative consequences) and to insist that you destroy their personal information.
Consent must be specific and informed.	3.3 Unless you have obtained a specific exemption for your research project, the consent must be specific and informed. Before giving consent, the research subject must be informed in writing of:  3.3.1 The purpose of the research, 3.3.2 what personal information about them will be collected (particularly sensitive personal information), 3.3.3 how the personal information will be collected (if not directly from them), 3.3.4 the specific purposes for which the personal information will be used, 3.3.5 what participation will entail (i.e. what the research subject will have to do), 3.3.6 whether the supply of the personal information is voluntary or mandatory for purposes of the research project,

	<p>3.3.7 who the personal information will be shared with,</p> <p>3.3.8 how the personal information will be published,</p> <p>3.3.9 the risks to participation (if any),</p> <p>3.3.10 their rights to access, correct or object to the use of their personal information,</p> <p>3.3.11 their right to withdraw from the research project, and</p> <p>3.3.12 how these rights can be exercised.</p>
Consent must be voluntary.	3.4 Participation in the research project must always be voluntary. You must never pressure or coerce research subjects into participating and persons who choose not to participate must not be penalised.
Using the personal information of children?	<p>3.5 A child is anybody under the age of 18.</p> <p>3.6 Unless you have obtained a specific exemption in writing for your research project, you must obtain</p> <p>3.6.1 the consent of the child's parent or guardian, and</p> <p>3.6.2 if the child is over the age of 7, the assent of the child, before collecting the child's information.</p>
Research subjects have a right to access.	3.7 Research subjects have the right to access their personal information, obtain confirmation of what information is in your possession and who had access to the information. It is strongly recommended that you keep detailed records of access to the information.
Research subjects have a right to object.	<p>3.8 Research subjects have the right to object to the use of their personal information.</p> <p>3.9 Once they have objected, you are not permitted to use the personal information until the dispute has been resolved.</p>
<b>4 COLLECTING PERSONAL INFORMATION</b>	
Only collect what is necessary.	4.1 You must not collect unnecessary or irrelevant personal information from research subjects.
Only collect accurate personal information.	4.2 You have an obligation to ensure that the personal information you collect is accurate. Particularly when you are collecting it from a source other than the

	<p>research subject.</p> <p>4.3 If you have any reason to doubt the quality of the personal information you must verify or validate the personal information before you use it.</p>
<b>5 USING PERSONAL INFORMATION</b>	
Only use the personal information for the purpose for which you collected it.	<p>5.1 Only use the personal information for the purpose for which you collected it.</p> <p>5.2 If your research project requires you to use the personal information for a materially different purpose than the one communicated to the research subject, you must inform the research subjects and Stellenbosch University of this and give participants the option to withdraw from the research project.</p>
Be careful when you share personal information.	<p>5.3 Never share personal information with third parties without making sure that they will also follow these rules.</p> <p>5.4 Always conclude a non-disclosure agreement with the third parties.</p> <p>5.5 Ensure that you transfer the personal information securely.</p>
Personal information must be anonymous whenever possible.	<p>5.6 If the research subject's identity is not relevant for the aims of the research project, the personal information must not be identifiable. In other words, the personal information must be anonymous (de-identified).</p>
Pseudonyms must be used whenever possible.	<p>5.7 If the research subject's identity is relevant for the aims of the research project or is required to co-ordinate, for example, interviews, names and other identifiers such as ID or student numbers must be collected and stored separately from the rest of the research data and research publications. In other words, only you must be able to identify the research subject.</p>
Publication of research	<p>5.8 The identity of your research subjects should not be revealed in any publication.</p> <p>5.9 In the event that your research project requires that the identity of your research subjects must be revealed, you must apply for an exemption from this rule.</p>
<b>6 SECURING PERSONAL INFORMATION</b>	
You are responsible for the confidentiality and security of the personal information	<p>6.1 Information must always be handled in the strictest confidence.</p> <p>6.2 You must ensure the integrity and security of the information in your possession or under your control by taking appropriate and reasonable technical and</p>

	<p>organisational measures to prevent:</p> <p>6.2.1 Loss of, damage to or unauthorised destruction of information; and</p> <p>6.2.2 unlawful access to or processing of information.</p> <p>6.3 This means that you must take reasonable measures to:</p> <p>6.3.1 Identify all reasonably foreseeable internal and external risks to personal information in your possession or under your control;</p> <p>6.3.2 establish and maintain appropriate safeguards against the risks identified;</p> <p>6.3.3 regularly verify that the safeguards are effectively implemented; and</p> <p>6.3.4 ensure that the safeguards are continually updated in response to new risks or deficiencies in previously implemented safeguards.</p>
Sensitive personal information requires extra care.	6.4 You will be expected to implement additional controls in order to secure sensitive personal information.
Are you sending any personal information overseas?	<p>6.5 If you are sending personal information overseas, you have to make sure that:</p> <p>6.5.1 The information will be protected by the laws of that country;</p> <p>6.5.2 the company or institution to who you are sending have agreed to keep the information confidential, secure and to not use it for any other purpose; or</p> <p>6.5.3 get the specific and informed consent of the research subject to send the information to a country which does not have data protection laws.</p>
Be careful when you use cloud storage.	<p>6.6 Be careful when storing personal information in a cloud. Many clouds are hosted on servers outside of South Africa in countries that do not protect personal information to the same extent as South Africa. The primary example of this is the United States.</p> <p>6.7 It is strongly recommended that you use hosting companies who house their servers in South Africa.</p> <p>6.8 If this is not possible, you must ensure that the hosting company agrees to protect the personal information to the same extent as South Africa.</p>
<b>7 RETENTION AND DESTRUCTION OF PERSONAL INFORMATION</b>	
You are not entitled to retain personal information when	7.1 Personal information must not be retained beyond the purpose of the research project, unless you have a legal or other justification for retaining the information.

6

Institutional Permission Standard Agreement: 13 March 2017 V1



you no longer need it for the purposes of the research project.	
If personal information is retained, you must make sure it remains confidential.	<p>7.2 If you do need to retain the personal information, you must assess whether:</p> <p>7.2.1 The records can be de-identified; and/or whether</p> <p>7.2.2 you have to keep all the personal information.</p> <p>7.3 You must ensure that the personal information which you retain remains confidential, secure and is only used for the purposes for which it was collected.</p>
<b>8 INFORMATION BREACH PROCEDURE</b>	
In the event of an information breach you must notify us immediately.	<p>8.1 If there are reasonable grounds to believe that the personal information in your possession or under your control has been accessed by any unauthorised person or has been disclosed, you must notify us immediately.</p> <p>8.2 We will notify the research subjects in order to enable them to take measures to contain the impact of the breach.</p>
This is the procedure you must follow.	<p>8.3 You must follow the following procedure:</p> <p>8.3.1 Contact the Division for Institutional Research and Planning at 021 808 9385 and <a href="mailto:permission@sun.ac.za">permission@sun.ac.za</a>;</p> <p>8.3.2 you will then be required to complete the information breach report form which is attached as Annexure A.</p> <p>8.4 You are required to inform us of a information breach within 24 hours. Ensure that you have access to the required information.</p>
<b>9 MONITORING</b>	
You may be audited.	<p>9.1 We reserve the right to audit your research practices to assess whether you are complying with this agreement.</p> <p>9.2 You are required to give your full co-operation during the auditing process.</p> <p>9.3 We may also request to review:</p> <p>9.3.1 Forms (or other information gathering methods) and notifications to research subjects, as referred to in clause 3;</p>

	<p>9.3.2 non-disclosure agreements with third parties with whom the personal information is being shared, as referred to in clause 5.4;</p> <p>9.3.3 agreements with foreign companies or institutes with whom the personal information is being shared, as referred to in clause 6.5.</p>
<b>10 CHANGES TO RESEARCH</b>	
You need to notify us if any aspect of your collection or use of personal information changes.	<p>10.1 You must notify us in writing if any aspect of your collection or use of personal information changes (e.g. such as your research methodology, recruitment strategy or the purpose for which you use the research).</p> <p>10.2 We may review and require amendments to the proposed changes to ensure compliance with this agreement.</p> <p>10.3 The notification must be sent to <a href="mailto:permission@sun.ac.za">permission@sun.ac.za</a>.</p>
<b>11 CONSEQUENCES OF BREACH</b>	
What are the consequences of breaching this agreement?	<p>11.1 If you do not comply with this agreement, we may take disciplinary action or report such a breach to your home institute.</p> <p>11.2 You may be found guilty of research misconduct and may be censured in accordance with Stellenbosch University or your home institute's disciplinary code.</p>
You may have to compensate us in the event of any legal action.	<p>11.3 Non-compliance with this agreement could also lead to claims against Stellenbosch University in terms of POPI and/or other laws.</p> <p>11.4 Unless you are employed by or studying at Stellenbosch University, you indemnify Stellenbosch University against any claims (including all legal fees) from research subjects or any regulatory authority which are the result of your research project. You may also be held liable for the harm to our reputation should there be an information breach as a result of your non-compliance with this agreement.</p>
<b>12 CONTACT US</b>	
Please contact us if you have any questions.	Should you have any questions relating to this agreement you should contact <a href="mailto:permission@sun.ac.za">permission@sun.ac.za</a> .



## ADDENDUM D: ELECTRONIC CONSENT



UNIVERSITEIT • STELLENBOSCH • UNIVERSITY  
jou kennisvennoot • your knowledge partner

### CONSENT TO PARTICIPATE IN RESEARCH

Dear Fellow Student

My name is Zenobia Davidse, a student at the Faculty of Education at Stellenbosch University, and I would like to invite you to take part in a survey, the results of which will contribute to a research project to complete my PhD Higher education.

Please take some time to read the information presented here, which will explain the details of this project. Your participation is entirely voluntary, and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

The purpose of this study is to understand how technology can be used in a blended learning environment to improve the computer literacy skills of students. This refers to the skills students require to access their learning resources and use the learning management system (SUNLearn) to complete their assignments or work through the course material.

The questionnaire will take approximately 15 minutes to complete and will contain a combination of questions covering your access to a computer, using internet and common programs like email, word and excel. This is just to understand how you use these technology tools.

The study is voluntary and if you chose to participate, your participation will be kept confidential. If you decide to participate and then change your mind, you may stop at any time.

#### **RIGHTS OF RESEARCH PARTICIPANTS:**

You have the right to decline answering any questions and you can exit the survey at any time without giving a reason. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research participant, contact Mrs Maléne Fouché [[mfouché@sun.ac.za](mailto:mfouché@sun.ac.za); 021 808 4622] at the Division for Research Development.

Your information and responses to the survey will be encrypted with a password which limits access to the information and additional multifactor authentication limited to my access only. Any information you provide will be kept confidential and no personal identifiers will be included or used outside of this research project.

If you have any questions or concerns about the research, please feel free to contact the researcher Zenobia Davidse via email: [nobi@sun.ac.za](mailto:nobi@sun.ac.za) and/or the Supervisor, Prof Magda Fourie-Malherbe via email [mfourie@sun.ac.za](mailto:mfourie@sun.ac.za).

A copy of the consent will be available from your lecturer or alternatively you can print a copy of the text by using the print function.

I confirm that I have read and understood the information provided for the current study.	YES	NO
	<input type="checkbox"/>	<input type="checkbox"/>
I agree to take part in this survey.	YES	NO

Electronic consent template. REC: Humanities (Stellenbosch University) 2017

## ADDENDUM E: WRITTEN CONSENT



UNIVERSITEIT • STELLENBOSCH • UNIVERSITY  
jou kennisvennoot • your knowledge partner

### STELLENBOSCH UNIVERSITY CONSENT TO PARTICIPATE IN RESEARCH

---

Dear Fellow Student

My name is Zenobia Davidse and I am a student in the Faculty of Education at Stellenbosch University. I would like to invite you to participate in a research project entitled: *Learning by design: enhancing the digital literacy of adult learners in a blended learning environment*.

Please take some time to read the information presented here, which will explain the details of this project, and contact me if you require further explanation or clarification of any aspect of the study. Also, your participation is **entirely voluntary** and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

The purpose of this study is to understand how technology can be used in a blended learning environment to improve the computer literacy skills of students. This refers to the skills you require to access your learning resources and use the learning management system (SUNLearn) to complete your assignments or work through the course material. I am interested in your valuable opinion and perspectives about the use of technology in a blended learning environment, with limited contact sessions, by conducting a focus group discussion(s). You have limited contact sessions; therefore, your inputs would really be of great value. The information, contribution or opinion will be used to compliment your learning resource. An invitation will be sent for the focus group discussion(s) of approximately 45 minutes, should you give your consent, and will be scheduled after the workshop of the 4<sup>th</sup> of August 2018.

As part of the protocol for the focus group discussion, please do not share any personal or sensitive information with the group. I would like your permission to record the focus group discussion(s). The recording will be stored electronically with a password. Access to the recording is limited to myself with additional security of a one-time password that is sent to my cell phone. You may refuse to answer any questions or withdraw from the group discussion at any time without any negative consequences. The audio recording will be transcribed and completely confidential, no names or personal identifiers will be added or associated with any participant. The signed consent form will be locked in a cabinet in the personal possession of the researcher.

If you have any questions or concerns about the research, please feel free to contact me, Zenobia Davidse via email: [nobi@sun.ac.za](mailto:nobi@sun.ac.za) or my supervisor, Prof Magda Fourie-Malherbe ([mfourie@sun.ac.za](mailto:mfourie@sun.ac.za)).

**RIGHTS OF RESEARCH PARTICIPANTS:** You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research participant, contact Ms Maléne Fouché [[mfouche@sun.ac.za](mailto:mfouche@sun.ac.za); 021 808 4622] at the Division for Research Development. You have the right to receive a copy of the Information and Consent form.

**If you are willing to participate in this study, please sign the attached Declaration of Consent and hand it to me or place it in the available box.**

Alternative written consent template. REC: Humanities (Stellenbosch University) 2017

**DECLARATION BY PARTICIPANT**

By signing below, I ..... agree to take part in a research study entitled *Learning by design: enhancing the digital literacy of adult learners in a blended learning environment*, conducted by Zenobia Davidse.

I declare that:

- I have read the attached information leaflet and it is written in a language with which I am fluent and comfortable.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- I may be asked to leave the study before it has finished, if the researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.
- All issues related to privacy and the confidentiality and use of the information I provide have been explained to my satisfaction.

Signed on .....

.....

**Signature of participant**

**SIGNATURE OF INVESTIGATOR**

I declare that I explained the information given in this document to \_\_\_\_\_ [*name of the participant*] [*He/she*] was encouraged and given ample time to ask me any questions. This conversation was conducted in English.

\_\_\_\_\_  
**Signature of Investigator**

\_\_\_\_\_  
**Date**

Alternative written consent template. REC: Humanities (Stellenbosch University) 2017

## ADDENDUM F: SELF-ASSESSMENT QUESTIONNAIRE



### Computer basic – using a computer:

1. Do you own a device (computer or laptop)?
  - a. Yes
  - b. No
2. If no, do you have access to a device (computer or laptop)?
  - a. Yes
  - b. No
3. How would you rate your computer skill level (using a computer)?
  - a. Novice – new to the use of a computer
  - b. Beginner – you are starting to explore
  - c. Familiar – you have basic knowledge but would like to learn more
  - d. Proficient – you are comfortable using a computer for basic tasks
  - e. Expert – you are able to perform more advance tasks
4. Would you be able to identify the version of the operating system (for example Windows) on your device?
  - a. Yes
    - i. If yes, what version of Windows are you using?
      1. Windows 7
      2. Windows 8
      3. Windows 10
  - b. No
    - i. If no, what operating systems are you using?
      1. Other, specify
5. Which program do you use to manage folders and files?
  - a. Windows accessories
  - b. Windows Explorer
  - c. Microsoft Word
  - d. Windows Control panel
6. You need to save your work on your computer or the computer that you are using, are you able to create a folder within a folder?
  - a. No
  - b. Depends on the folder size
  - c. Yes
  - d. Depends on the name

Self-assessment

7. You have a document in a PDF format, which of the following would you use to read the document?
- OneNote
  - Internet
  - Microsoft Word
  - Evernote
  - Adobe Acrobat

### Internet Browsing:

Using the internet	Rate your skill		
	I know how	I know how, but need guidance	I do not know how
Open a browser			
Close a browser			
Change a home page			
Start a search			
Refresh a web page			
Bookmark a web page			

- 1) What is listed in the image?



- Applications
  - Operating Systems
  - Browsers
  - Internet Service Provider
- 2) What does downloading from the internet mean?
- Lowering your game level
  - Retrieving files from the internet
  - Viewing web pages on the internet
  - Surfing the internet
- 3) What is a search engine?
- A website you can click on hundreds of categorized web addresses
  - A program that monitors your surfing behaviour on the internet
  - A website where you can type in the key words and search for them in millions of web pages
  - A program that allows you to download multiple images
- 4) If you have an active internet connection, it means you are
- Outline
  - Offline
  - Online
  - Standby

Self-assessment

## Using email as a communication tool

Using email	Rate your skill		
	I know how	I know how but need guidance	I do not know how
Create a new message			
Copy (Cc) a message to another address			
Blind copy (Bcc) a message to another address			
Create a contact			
Create a distribution list			
Add an attachment			
Create a signature			

- 1) The "reply to all" email function means that you
  - a) This function is not possible
  - b) Generate a reply message to all the recipients of the message
  - c) Send a reply message to every entry in your address book
  - d) generate a reply message only to the sender of the message
  
- 2) What is an effective and efficient way to send the same email message to a group of people?
  - a) Use the Bcc field
  - b) Create a distribution list
  - c) Send a message over and over
  - d) List every person's email address in the "To" field
  
- 3) You would like each of the emails you send to display your name and other details automatically at the end of the message. Which feature helps you to do this?
  - a) Footers
  - b) Frames
  - c) Signatures
  - d) Tables
  
- 4) You want to send your written assignment using Microsoft word that you have saved to your lecturer. The best way to do this is...
  - a) Retype the assignment into an email
  - b) Copy and past the assignment into an email
  - c) Print a hard copy of the assignment and deliver it to the lecture
  - d) Send the saved file as an attachment to an email

---

Self-assessment

## Using Microsoft Word to create documents

Using Microsoft Word	Rate your skill		
	I know how	I know how, but need guidance	I do not know how
Open a document			
Open an existing document			
Save a document			
Set margins			
Format text			
Correct spelling			

- 1) What happens when a file is saved for the first time?
    - a) A copy is automatically printed
    - b) Give it a name to identity it
    - c) The file does not require a name
    - d) A name is given only when it is printed
  
  - 2) A preformatted layout of text, content and graphics is a...
    - a) Wizard
    - b) Letter
    - c) Thumbnail
    - d) Template.
  
  - 3) What page view can you use to see what your document will look like when printed?
    - a) Draft view
    - b) Reading view
    - c) Outline view
    - d) Print view
  
  - 4) A quick way to change all the instances of the word **nursing** with the word **treatment** is to use what feature?
    - a) Properties
    - b) Find and replace
    - c) Thesaurus
    - d) Document information
- 

Self-assessment



## Using Microsoft Excel to create a workbook

Using Microsoft Excel	Rate your skill		
	I know how	I know how, but need guidance	I do not know how
Open a new workbook			
Saving a workbook			
Insert row in a workbook			
Delete a row in a workbook			
Modify row height			
Duplicate content within a workbook			

- 1) You press the shortcut key to copy and paste, in what order must this be done?
  - a) Ctrl + x and then ctrl + v
  - b) Ctrl + c and then ctrl + p
  - c) Ctrl + c and then ctrl + z
  - d) Ctrl + z and then ctrl + y
  
- 2) What function would you use to sort in ascending or descending order?
  - a) Format painter
  - b) Merge & center
  - c) Sort & filter
  - d) Find & Select
  
- 3) What is the formula to create current date and time?
  - a) =Data(now)
  - b) =Day(now)
  - c) =Now()
  - d) =(Date)

Self-assessment



**Using PowerPoint to create a presentation**

Using Microsoft Excel	Rate your skill		
	I know how	I know how, but need guidance	I do not know how
Create a new presentation			
Edit a slide text or boxes			
Add slides to a presentation			
Change the slide layout			
Arrange slides			

1. What can you insert on a slide?
  - a. Text
  - b. Pictures
  - c. Organization Charts
  - d. All of the above
  
2. During a slide show, pressing the ESC key...
  - a. Displays the last slide
  - b. Displays slide 1
  - c. Ends the slide show
  - d. Displays the previous slide
  
3. Which key do you press to go into Slide Show view and always start on the first slide?
  - a. ESC
  - b. F5
  - c. F7
  - d. F9
  
4. The notes pane at the bottom of the PowerPoint window is the only place you can type and work with notes.
  - a. True
  - b. False

---

Self-assessment

### Security:

1. Which of the following password are the most secure?
  - a. Boat123
  - b. Mnh!5Z
  - c. p@ssword
  - d. pass123
  - e. 123456
  
2. If a public wireless network (internet café or airport) requires a password to access, it is generally safe to use that network for sensitive activities such as online banking?
  - a. Yes, it is safe
  - b. No, it is not safe
  
3. What is "malware"?
  - a. A virus or worm
  - b. A trojan horse
  - c. A hacker tool
  - d. A corrupted program
  
4. Phishing is a form of...
  - a. Spamming
  - b. Identity theft
  - c. Impersonation
  - d. Scanning

### SUNLearn (Learning management system)

Using SUNLearn	I know how	I know how, but need guidance	I do not know how
Login			
Changing my preferred email address			
Download my notes (documentation)			
View my notes (documentation)			
Complete a quiz			
Submit an assignment			

### General:

1. Would you be willing to assist with the testing of the enhancements?
  - a. Yes
  - b. No
2. Thank you, would you please provide your email address

Self-assessment

## ADDENDUM G: FOCUS GROUP DISCUSSION



### Focus-Group-Discussions¶

#### ▪ 1. → Background¶

Thank-you-for-agreeing-to-participate-in-the-group-discussion. We are interested to hear your valuable opinion and thoughts around the use of technology in a blended learning environment. The purpose of the study is to understand how technology can be used in a blended learning environment to improve literacy skills of students. This refers to the skills you require to access your learning resources, use the learning management platform SUNLearn (complete assignments and upload assignments) and using applications and university systems. The discussion also includes sharing your ideas for improving the program and what you consider important for your journey.¶

The information, contribution or opinion you provide will be taken into consideration for the curriculum design and complimenting the learning resources on SUNLearn to assist you on and during your study journey. I would like your permission to record the focus group discussion. The information is confidential, no names or personal identifiers will be added to the captured data. A copy of the recording will be stored and encrypted with the additional security of a one-time password.¶

You may refuse to answer any questions or withdraw from the group discussion at any time. The information you give is completely confidential and will not be associate with any participant.¶

¶

### Questions¶

1. → This is your first contact session, what has been your experience with the course content up to this point? -- *Use these for stimulating the conversation*¶
2. → The PGDIPNE is advertised as a blended learning programme, what is blended learning?¶
  - i. → You mentioned student involvement, literature uses the term "student as a co-creator", what is your understanding of the concept? (additional question based on the responses)¶
  - b. → What other elements would you like to see in the program?¶
  - c. → What is good about this blended learning approach?¶
  - d. → What is negative about this blended learning approach?¶
3. → Computer literacy is a prerequisite for this program. What do you understand when you hear computer literacy?¶
4. → What is SUNLearn?¶
  - a. → How do you access SUNLearn?¶
  - b. → You have successfully logged into SUNLearn, to what learning resources do you have access?¶
  - c. → Would you share the process you follow to access the modules?¶
5. → The SUNLearn mobile app:¶
  - a. → Are you aware there is a mobile application?¶
    - i. → How would you explain the format of the content? (additional question based on the responses)¶

## ADDENDUM H:

### FOCUS GROUP DISCUSSION – SMALL GROUPS



---

#### Guiding questions for the small group discussions

---

1. In your experience with the PGDipNE, what is the role of technology in a blended learning environment?
  2. Technology has changed the way we interact with each other and the way we work, how would you describe the role of technology in the following areas:
    - a. Your day-to-day use of technology
    - b. For you as a student
    - c. For those who are working
    - d. For those starting a career
    - e. In nursing
-

## ADDENDUM I: DIDACTICS SCAFFOLDS

Welcome to DIDACTICS 773  
This module is part of the programme:

**Postgraduate Diploma in Nursing Education (PGDipNE)**

Your lecturer and facilitator:  
Dr Jhega (Jhega DSI, MEd, DEd, PhD)

1 Professional teaching framework.mp4  
The full intersection takes approx 120 minutes to complete



Post-graduate Diploma in Nursing Education / DIDACTICS 773  
In this section, you will revise:  
**Scaffold #2 The Teaching-Learning Situation**

Topics include:

- 1 The Didactic teaching-learning triad
- 2 Key components
- 3 Related Disciplines
- 4 Relationships between teaching and learning

2 The teaching-learning situation.mp4  
Estimated time: 10:00

Post-graduate Diploma in Nursing Education / DIDACTICS 773  
In this section, you will revise:  
**Scaffold #3 Roles of Health Sciences Teachers**

Topics include:

- 1 The 6 areas of teaching activity
- 2 The 12 Roles related to key areas of activity

3 Role of health sciences teachers.mp4  
Estimated time: 10:00

Post-graduate Diploma in Nursing Education / DIDACTICS 773  
In this section, you will revise:  
**Scaffold #4 The Quality Viewpoint**

Topics include:

- 1 The Didactic teaching-learning triad
- 2 Key components
- 3 Related Disciplines
- 4 Relationships between teaching and learning

4 The quality viewpoint.mp4  
Estimated time: 10:00

I have already indicated the importance of thinking about quality, and also in terms of ensuring your teaching is of high quality.

Post-graduate Diploma in Nursing Education / DIDACTICS 773  
In this section, you will revise:  
**Scaffold #5 Markers of Quality**

Topics include:

- 1 What quality is
- 2 Quality markers in higher education
- 3 Linking quality criteria and standards
- 4 Effectiveness-efficiency dualism
- 5 Guidelines for effective teaching

5 Markers of quality.mp4  
Estimated time: 10:00

Post-graduate Diploma in Nursing Education / DIDACTICS 773  
In this section, you will revise:  
**Scaffold #6 Competence and Competencies**

Topics include:

- 1 Difference in meaning
- 2 Types of competencies
- 3 Didactic aspects of nurse competencies (SANC)
- 4 Novice-expert continuum (Benner 2013)

6 Competence and competencies.mp4  
Estimated time: 10:00

Post-graduate Diploma in Nursing Education / DIDACTICS 773  
In this section, you will revise:  
**Scaffold #7 Instructional Design**

Topics include:

- 1 Instructional design is...
- 2 Instructional design system
- 3 Planning according to the ADDIE framework
- 4 The Everyday Logic model
- 5 The Lock Frame

7 Instructional design.mp4  
Estimated time: 10:00

One of the key aspects of Didactics and, obviously in curriculum development, and in education practice, is Instructional design.

Post-graduate Diploma in Nursing Education / DIDACTICS 773  
In this section, you will revise:  
**Scaffold #8 Aim, objectives, outcomes**

Topics include:

- 1 What's the difference
- 2 Behavioural outcomes

8 Aim objective and outcome.mp4  
Estimated time: 10:00

Post-graduate Diploma in Nursing Education / DIDACTICS 773

In this section, you will revise:

**Scaffold #9 Outcomes-based teaching and learning**

Topics include:

- 1 Outcomes-based curriculum development
- 2 Outcomes drive processes

9 Outcomes based teaching and learning.mp4

---

Post-graduate Diploma in Nursing Education / DIDACTICS 773

In this section, you will revise:

**Scaffold #11 Teaching Methods**

Topics include:

- 1 Classification
- 2 Many options

11 Teaching methods.mp4

---

Post-graduate Diploma in Nursing Education / DIDACTICS 773

In this section, you will revise:

**Scaffold #13 Educational Technology**

Topics include:

- 1 Beyond computers
- 2 Gillet's definition
- 3 Traditional approach
- 4 New approach
- 5 Scope of ICT Applications
- 6 Blended learning - merging two worlds

13 Educational technology.mp4

---

Post-graduate Diploma in Nursing Education / DIDACTICS 773

In this section, you will revise:

**Scaffold #15 ICT User skills**

Topics include:

- 1 Educational technology dimensions
- 2 ICT/Media skills

15 ICT user skills.mp4

---

Post-graduate Diploma in Nursing Education / DIDACTICS 773

In this section, you will revise:

**Scaffold #17 Designing self-directed learning materials**

Topics include:

- 1 Mediocrity, Quality, Excellence
- 2 Types of study guides
- 3 Functions of study guides

17 Designing self-directed learning materials.mp4

---

Post-graduate Diploma in Nursing Education / DIDACTICS 773

In this section, you will revise:

**Scaffold #19 Assessment types**

Topics include:

- 1 Assessment types ... Appropriate mix
- 2 Different purposes different times
- 3 Appropriate methods and tools

19 Assessment Types.mp4

Post-graduate Diploma in Nursing Education / DIDACTICS 773

In this section, you will revise:

**Scaffold #10 Teaching styles and trainer types**

Topics include:

- 1 Teaching styles
- 2 Comparing strengths and limitations

10 Teaching styles and trainer types.mp4

---

Post-graduate Diploma in Nursing Education / DIDACTICS 773

In this section, you will revise:

**Scaffold #12 Roles related to teaching**

Topics include:

- 1 Roles related to teaching practice
- 2 Comparing teacher-controlled with student-centred methods
- 3 Instruction-learning continuum

12 Roles related to teaching.mp4

---

Post-graduate Diploma in Nursing Education / DIDACTICS 773

In this section, you will revise:

**Scaffold #14 Media / ICT Selection**

Topics include:

- 1 Choose wisely
- 2 Factors and variables
- 3 ASSURE procedure

14 Media ICT Selection.mp4

---

Post-graduate Diploma in Nursing Education / DIDACTICS 773

In this section, you will revise:

**Scaffold #16 Instructional techniques**

Topics include:

- 1 Techniques in teaching and learning
- 2 Techniques demonstrate competence
- 3 Cutting across all areas

16 Instructional techniques.mp4

---

Post-graduate Diploma in Nursing Education / DIDACTICS 773

In this section, you will revise:

**Scaffold #18 Assessment and Evaluation**

Topics include:

- 1 Shifting trends
- 2 Quality assessment is ...
- 3 Credible assessment is ...
- 4 Outcomes-based assessment systems

18 Assessment and evaluation.mp4

---

Post-graduate Diploma in Nursing Education / DIDACTICS 773

In this section, you will revise:

**Scaffold #20 Moderation**

Topics include:

- 1 The purpose of Moderation
- 2 Different purposes, different times
- 3 Rules of Evidence

20 Moderation.mp4

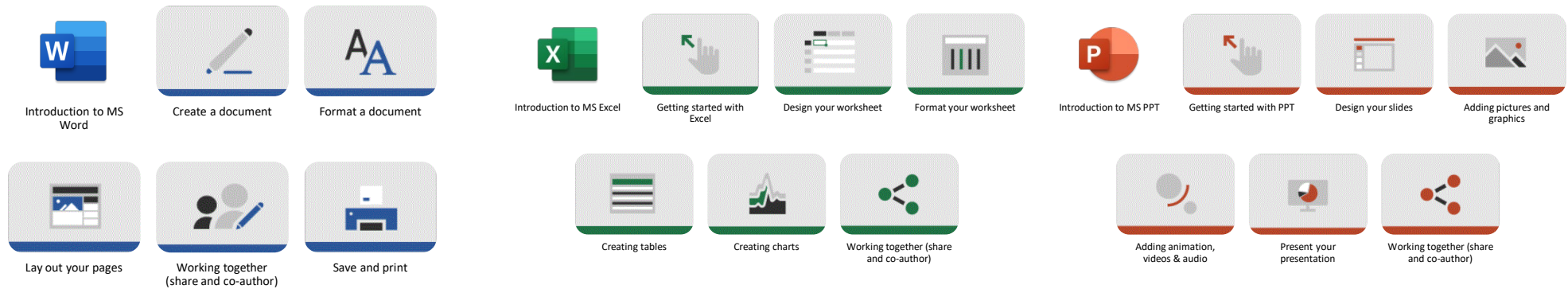
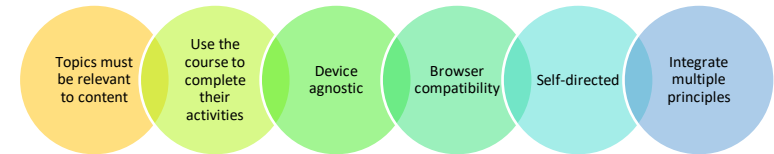
## ADDENDUM J:

### DIGITAL LITERACY COURSE: REQUIREMENTS AND CONTENT

Introduction – integrated the pretraining principle providing the students with a quick overview of the main features.

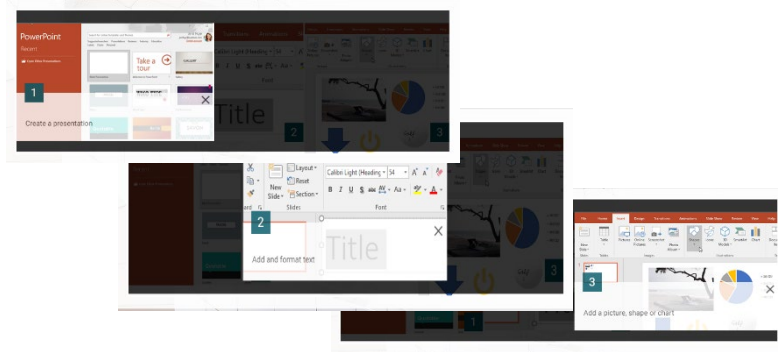
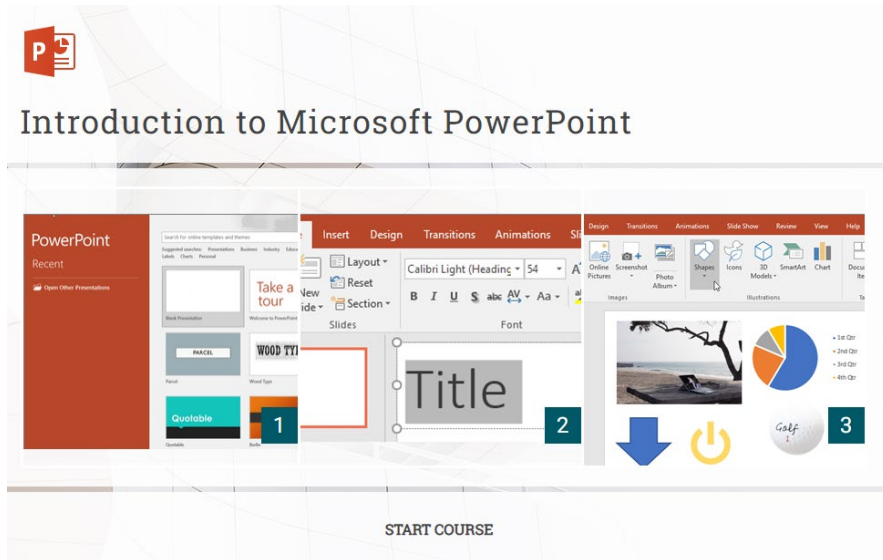
The course then gives the students a menu with all the main topics – topics can be selected by the student to focus on the tasks the student needs to master.

Each topic provides the student with step-by-step instructions, an instructional video and ability to practice the skill in the application.





## ADDENDUM K: MICROSOFT POWERPOINT DIGITAL LITERACY COURSE



Course Content		
The course has been divided into different topics. Select a topic or browse the course.		
OVERVIEW ABOUT POWERPOINT 2 MINS	<input checked="" type="radio"/>	1
GETTING STARTED WITH POWERPOINT 4 MINS	<input type="radio"/>	2
DESIGN YOUR SLIDES 2 MINS 15 SECS	<input type="radio"/>	3
ADDING PICTURES & GRAPHICS 4 MINS	<input type="radio"/>	4
ADDING ANIMATION, VIDEOS OR AUDIO 5 MINS	<input type="radio"/>	5
SAVE, PRINT & PRESENT 5 MINS	<input type="radio"/>	6
<p>This topic is a general overview about Microsoft PowerPoint - quick introduction to some of features that you can apply in the creation of your presentation.</p> <p>Learn more about creating a presentation; adding or formatting text; slides (adding, rearranging, duplicating or deleting); choosing the right views</p> <p>Learn more about slide layouts; adding slide numbers, page numbers or date &amp; time; changing the page orientation, check the spelling in your presentation</p> <p>Learn more about inserting a pictures, backgrounds, charts or graphs; creating &amp; formatting tables; creating, merging or grouping objects</p> <p>Learn more about how you can make your presentation come alive by animating text or objects; adding, changing or removing transitions; inserting videos; adding or deleting audio</p> <p>Learn more more using the controls in presenter view by adding speaker notes; controlling your presentation from start to finish; saving or printing your presentation</p>		

Microsoft PowerPoint overview		
1	WHAT IS POWERPOINT? 1 MIN	<input type="radio"/>
2	DESIGN IN POWERPOINT 1 MIN	<input type="radio"/>
SELECT NEXT TOPIC (GETTING STARTED WITH POWERPOINT)		<input type="radio"/>
		BACK TO COURSE CONTENT <input type="radio"/>



## What is PowerPoint?

1 1

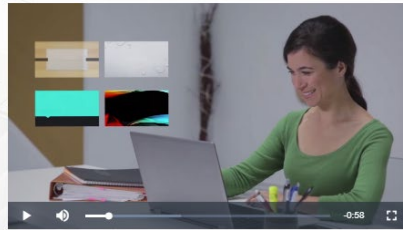
### Overview

### Creativity

### Designer

### Interactive

Click the play button to watch the instructional video



DESIGN IN POWERPOINT

BACK TO COURSE CONTENT

### Overview

Create presentations from scratch or a template

### Creativity

### Creativity

Add text, images, art or videos

### Designer

### Designer

### Designer

Designer gives suggestions based on the information on the slide - select a professional design

### Interactive

### Interactive

### Interactive

Add transitions, animations or cinematic motion

## Design in PowerPoint

1 2

### Use PowerPoint designer

PowerPoint Designer (Office 365) lets you create designer slides in two steps: just add image and then select a design

1. Select **Insert > Picture**, browse for the picture you want and select **Insert** (*The **Design Ideas** pane opens and offers several design options*)
2. Select the design option you like



PREV NEXT

PREVIOUS TOPIC

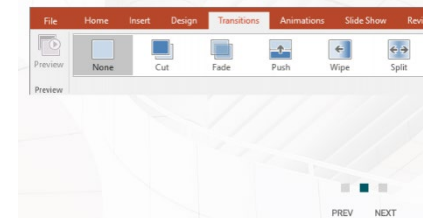
GETTING STARTED WITH  
POWERPOINT TOPIC

BACK TO COURSE CONTENT

### Transitions

To add special effect, to transition from one slide to another:

1. Select the slide you want to add a transition to
2. On the **Transitions** tab, select the effect you want
3. Select **Effect Options** to change how the transition happens: **From Right**, **From Left**
4. To undo a transition, select **None**

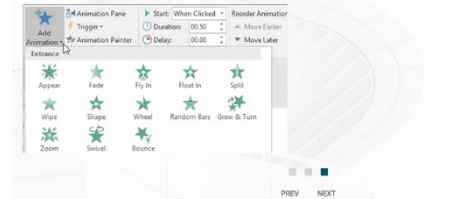


PREV NEXT

### Animations

To animate text or objects on a slide:

1. Select the text or object you want to animate
2. On the **Animations** tab, select **Add Animation** and the select the animation you want from the drop-down
3. For **Start**, select **When Clicked** or **With Previous** or **After Previous**



PREV NEXT

## Getting started with PowerPoint 2

1

**CREATE A PRESENTATION**  
1 MIN 10 SECS

2

**ADD AND FORMAT TEXT**  
1 MIN 20 SECS

3

**ADD, REARRANGE, DUPLICATE & DELETE SLIDE**  
1 MIN

4

**CHOOSE THE RIGHT VIEW FOR THE TASK**  
1 MIN 20 SECS

SELECT NEXT TOPIC (DESIGN YOUR SLIDES) 2


BACK TO COURSE CONTENT 2

## Create a presentation 2 1

**Create a blank presentation** 2

**Create a presentation from a theme** 2

Click the play button to watch the instructional video



STARTED 2 BACK TO COURSE CONTENT 2

**Create a blank presentation** 2

1. Open PowerPoint  
2. Select one of the Blank Presentation

**Create a presentation from a theme** 2

1. Select **File > New**  
2. To create a presentation in that theme: double-click a theme

## Add and format text 2 2

Click the play button to watch the instructional video

**Add text** 2

**Format text** 2

**Format options** 2

**Add and format text**

Click the play button to watch the instructional video

1:18

ADD, REARRANGE, DUPLICATE & DELETE SLIDE 2

BACK TO GETTING STARTED TOPICS 2

BACK TO COURSE CONTENT 2

**Add text** 2

1. Select a text placeholder or box  
2. Type in the text you want

**Format text** 2

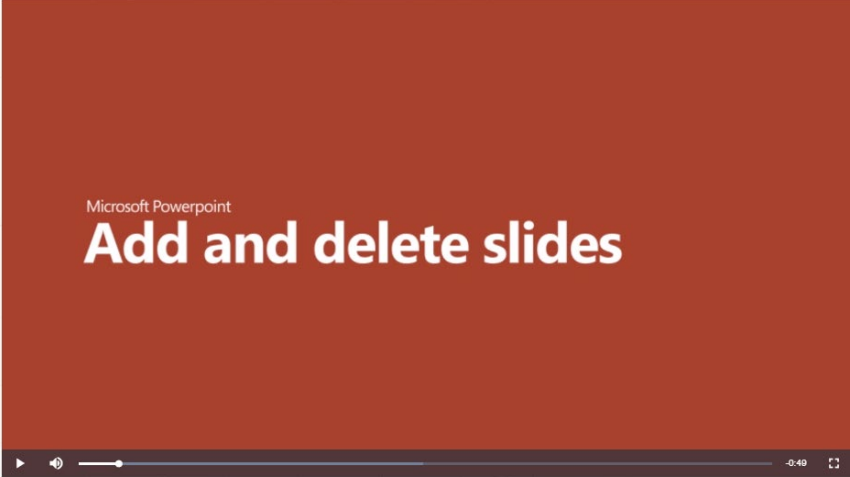
**Format options** 2

When you select text or choose a format, hover over a menu option to see a live preview in your slide

**Format options** 2

- **Font Color** - selecting a font color for your text
- **Numbering or Bullets** - to create a list format
- **Add or Remove Columns** - to add or remove columns in your text
- **Text Direction** - to change the direction of your text
- **Align Text** - to connect the text to the top, middle or bottom of the bounding box

## Add, rearrange, duplicate & delete slide 2 3



Microsoft Powerpoint

# Add and delete slides

▶ 🔊 ⏮ ⏭ ⏪ ⏩ ⏹ -0:40

- Add slides
- Delete slides
- Duplicate a slide
- Rearrange the order of slides

**Add slides**

1. Select the slide you want your new slides to follow
2. Select **Home > New Slide**
3. Select a layout
4. Select the text box and type

**Delete slides**

**Delete slides**

- For a single slide:
  - right click and select **Delete Slide**
- For multiple slides:
  - hold **Ctrl** and select the slides, then right-click and select **Delete Slide**
- For a sequence of slides:
  - hold **Shift** and select sequence, then right-click and select **Delete Slide**

**Duplicate a slide**

**Duplicate a slide**

- In the thumbnail pane on the left
  - Right click the slide thumbnail that you want to duplicate
  - Click **Duplicate Slide** (the duplicate is inserted directly after the original)

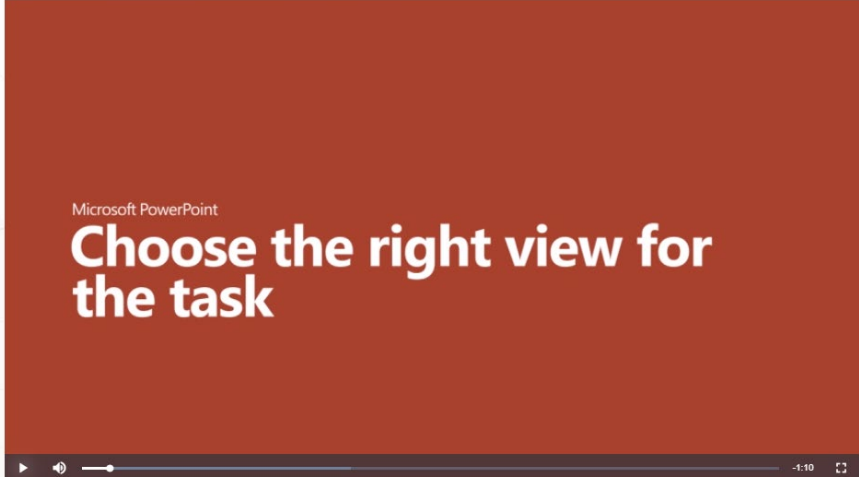
**Rearrange the order of slides**

**Rearrange the order of slides**

- In the pane on the left
  - Click the thumbnail of the slide that you want to move
  - Then drag it to the new location
- For multiple slides:
  - Press and hold **Ctrl** and in the pane on the left, click each slide that you want to move
  - Release the **Ctrl** key and then drag the selected slides as a group to the new location

TARTED ⌚ BACK TO COURSE CONTENT ⌚

## Choose the right view for the task 2 4



Microsoft PowerPoint

# Choose the right view for the task

▶ 🔊 ⏮ ⏭ ⏪ ⏩ ⏹ -1:10

### Normal view

- Select **View > Normal** or
- select **Normal** from the task bar at the bottom of the screen

### Slide sorter view

- Select **View > Slide Sorter** or
- Select **Slide Sorter** from the task bar at the bottom of the screen
- To reorganize your slides, drag a slide to a new location

### Notes Page view

- Select **View > Notes Page** or
- Select **Notes** the task bar at the bottom of the screen

### Slide Show view

- Select **Slide Show** from the task bar at the bottom of the screen

DESIGN YOU

⏮ ⏭ ⏪ ⏩ ⏹ PREV NEXT

## Design your slides 3

1

2

3

4

5

APPLY A SLIDE LAYOUT  
30 SECS

ADD SLIDE NUMBERS & PAGE NUMBERS

ADD DATE & TIME

CHANGE PAGE ORIENTATION  
45 SECS

CHECK THE SPELLING IN YOUR PRESENTATION  
1 MIN 40 SECS

SELECT NEXT TOPIC (ADDING PICTURES & GRAPHICS)

BACK TO COURSE CONTENT

## Apply a slide layout 3 1

Arrange slide content

Please note

Click the play button to watch the instructional video

Microsoft PowerPoint

Apply or change a slide layout

0:26

Arrange slide content

- Select the slide that you want to change the layout for
- Select **Home > Layout**
- Select the layout you want

Please note

Please note

OUR

BACK TO COURSE CONTENT

The layouts contains placeholders for text, videos, pictures, charts, shapes, clip art, a background and more.

The layout also contain the formatting for those objects like theme colors, fonts and effects.

## Add slide or page numbers 3 2

### On the View tab

In the **Presentation Views** group, click **Normal**

### On the left of the screen

In the pane that contains the slide thumbnails:

- click the first slide thumbnail in your presentation

### On the Insert tab

in the **Text** group, click **Header and Footer**

### In the Header and Footer

Do one of the following:

- For slide numbers: click **Slide** tab and then select **Slide number** check box
- For page numbers to notes: click the **Notes and Handouts** tab, then select the **Page number** check box

ADD DATE & TIME

Header and Footer

Slide - Notes and Handouts

Include on slide

Date and time

Generate automatically

18/10/2016

Language

English (South Africa)

Calendar type

Gregorian

Slide number

Page number

Don't show on title slide

PREV

NEXT

### Apply to all

Select **Apply to All**,

- If you want to add page numbers to all of the slides or notes pages in your presentation

## Add date & time to your slides 3 3

- On the view tab
- On the left of your screen
- On the Insert tab
- In the Header and Footer box
- Select Date and time check box

CHANGE PAGE ORIENTATION ☐ BACK TO DESIGN YOUR SLIDES TOPIC ☐ BACK TO COURSE CONTENT ☐

**On the view tab**  
In the Presentation Views group, click Normal

**On the left of your screen**  
In the pane that contains the slide thumbnails:  
• Click the first slide thumbnail in your presentation

**On the Insert tab**  
In the Header and Footer box:  
Select Date and time check box

**On the Insert tab**  
In the Header and Footer box:  
Select Date and time check box

**In the Header and Footer box**  
Do one of the following:  
• If you want the date and time to reflect the *current date and time each time* you open or print the presentation: Click **Update automatically** and then select the date and time format.  
• If you want to set the date and time to a specific date, click **Fixed** and in the **Fixed** box, type in the date you want.

## Change page orientation 3 4

Click the play button to watch the instructional video

**Design tab**  
Select the **Design** tab:

File Home Insert Design Transitions Share

Slide Size Format Background Customize

**Slide size**  
Near the right end:  
• Select **Slide size** and then click **Custom Slide size**

CHECK TH YOUR PRE:

Standard (4:3)  
Widescreen (16:9)  
Custom Slide Size...

**Orientation**  
In the **Slide size** dialog box, select **Portrait**

**Slide Size**

Slides sized for: Custom  
Width: 13.333 in  
Height: 17.778 in  
Number slides from: 1

Orientation  
Slides: ☒ Portrait ☐ Landscape  
Notes, Handouts & Outline: ☐ Portrait ☐ Landscape

**In the next dialog box**  
You can select one of the following:  
• **Maximize** to take full advantage of the available space  
• Select **Ensure Fit** to make sure that your content fits on the vertical page

PREV NEXT



## Check the spelling in your presentation 3 5

Click the play button to watch the instructional video

Check spelling in PowerPoint

**Fix spelling as you work** ▼

**Check entire presentation** ▼

**Other options** ▼

Right-click on a word with a red squiggly line underneath  
Select the correct spelling from the list of suggestions

You can also:

- **Ignore All** - ignores the error and removes the red squiggly line
- **Add to Dictionary** - adds the spelling to the dictionary so that spelling will not show an error in the future

**Check entire presentation** ▲

1. Select **Review > Spelling**

2. In the **Spelling** pane, select the correct spelling from the suggestions

3. Select **Change** to fix the error or **Change All** if it appears more than once in the document

**Other options** ▲

You can also:

- **Ignore** - ignores the error and remove the red squiggly line
- **Ignore All** - ignores all the errors and removes the red squiggly line in the presentation
- **Add** - adds the spelling to the dictionary

ADDING PICTURES & GRAPHICS TOPIC

BACK TO DESIGN YOUR SLIDES TOPIC

BACK TO COURSE CONTENT

## Adding pictures & graphics 4

**1** INSERT A PICTURE  
1 MIN 15 SECS

**2** INSERT A BACKGROUND  
2 MINS

**3** INSERT CHARTS & GRAPHS

**4** CREATE & FORMAT A TABLE  
1 MIN

**5** CREATE, MERGE OR GROUP OBJECTS  
50 SECS

SELECT NEXT TOPIC (ADDING ANIMATION, VIDEOS OR AUDIO)

BACK TO COURSE CONTENT

## Insert a picture 4 1

### Insert a picture from your computer on your slide

Click where you want to insert the picture on the slide

- On the **Insert** tab, in the **Images** group, click **Pictures**
- In the dialog box that opens, browse to the picture that you want to insert, click the picture and then click **Insert**

HOME **INSERT** DESIGN TRANSI

Table **Pictures** Online Screenshot Photo

Tables Pictures Images Album

PREV NEXT

### Insert a picture from the web on your slide

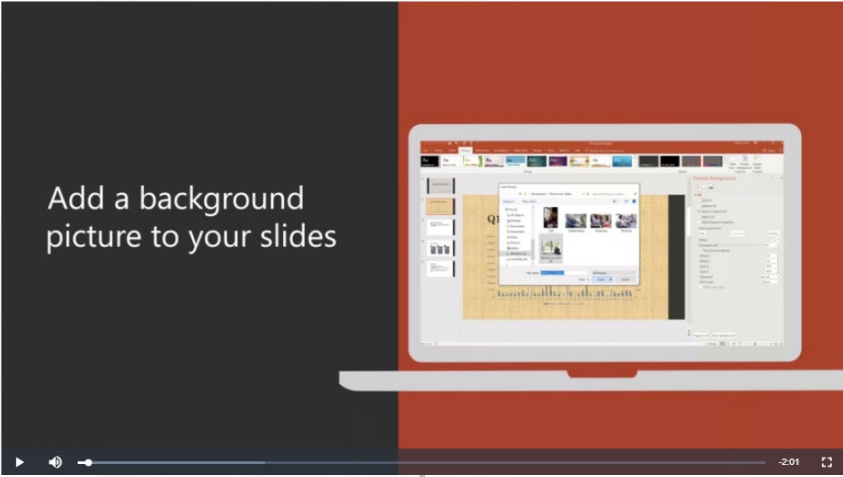
Click where you want to insert the picture on the slide

- On the **Insert** tab, in the **Images** group, Click **Online Pictures**
- Ensure Bing is showing on the left in the drop-down list of resources to search. In the box, type what you are searching for and press Enter
- Click the picture you want to insert and click **Insert**

PREV NEXT

## Insert a background

4 2



Add a background picture to your slides

- Slide margin
- In the Format Background pane
- Under Insert Picture from
- Adjust picture
- Options for adding a background

## Remove background

In Normal View:

- Select a slide that has the background picture or pattern you want to remove

PREV NEXT

INSERT CHARTS OR GRAPHS

BACK TO ADDING PICTURES & GRAPHICS TOPIC

BACK TO COURSE CONTENT

## Slide margin

Right-click the margin of the slide and then select **Format Background**

## In the Format Background pane

Choose Picture or texture fill

## Under Insert Picture from

Choose where to get the picture from

## Adjust picture

Slide the **Transparency** bar to the right to change the relative lightness of the picture

## Options for adding a background

For all slides - choose **Apply to All**  
For current slide only - simply close the **Format Background** pane

## On the Design tab of the toolbar ribbon

In the Customize group at the far end

- Select **Format Background**



## In the Format Background pane

Under Fill, select **Solid Fill**

**Format Background**

Select the down arrow  
Next to the **Color** button - A gallery of colors appear

- Select the white color - your background is removed

## Remove options

Remove background from all slides:

- choose **Apply to All** at the bottom of the **Format Background** pane

PREV NEXT



## Insert charts or graphs

4 3

Click Insert > Chart

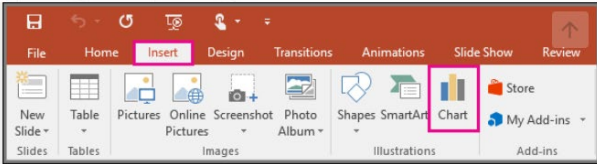


Chart Elements

Use this button to show, hide or format axis titles or data labels

PREV NEXT

CREATE & FORMAT A TABLE

BACK TO ADDING PICTURES & GRAPHICS TOPIC

BACK TO COURSE CONTENT

Click the chart type and then double-click the chart you want

Insert Chart

All Charts

- Recent
- Templates
- Column
- Line
- Pie
- Bar
- Area
- X Y (Scatter)
- Stock
- Surface
- Radar

Clustered Column

In the worksheet that appears, replace the placeholder data with your own information. Upon completion - close worksheet






Chart Styles

Use this button to change the color or style of the chart

Chart Filters

Use this button for more advanced options that shows or hides data in your chart

PREV NEXT

## Create & format a table

4 4

Microsoft PowerPoint

# Add a table to a slide

Add a table

Add table styles

Change table layout

CREATE, MERGE OR GROUP OBJECTS

BACK TO ADDING PICTURES & GRAPHICS TOPIC

BACK TO COURSE CONTENT

Add a table

1. Select Insert > Table > Insert Table
2. In the Insert Table dialog box, select how many columns and rows you want
3. Select OK

Add table styles

Change table layout

Change table layout

1. Select the table
2. Select Design and choose from the Table Styles - hover to preview styles or select More to see more styles Table Styles

Change table layout

1. Select the table
2. Select Layout
3. Choose from the different groups to make changes:
  - Rows & Columns
  - Merge
  - Cell Size, etc.

## Create, merge or group objects 4 5

**Group objects**

**Ungroup objects**

Click the play button to watch the instructional video

Microsoft PowerPoint

### Group or ungroup objects

▶ 🔊 ⏮ ⏭ ⏸ ⏹ -0:39

**Group objects**

1. Press and hold Ctrl while you select each object
2. Select **Format > Group > Group**
3. Format or move the grouped object however you want

**Ungroup objects**

1. Select the grouped objects
2. Select **Format > Group > Ungroup**

PICTURES &

[BACK TO COURSE CONTENT](#)

## Adding animation, videos or audio 5

1 **ANIMATE TEXT OR OBJECTS**

2 MINS

2 **ADD, CHANGE OR REMOVE TRANSITIONS**

1 MIN

3 **INSERT A VIDEO**

4 **ADD OR DELETE AUDIO**

2 MINS

[SELECT NEXT TOPIC \(SAVE, PRINT & PRESENT\)](#)

[BACK TO COURSE CONTENT](#)

## Animate text or objects 5 1

**Add animations to text, pictures, shapes and more in your presentation**

**Manage animations and effects**

**Add more effects to an animation**

**Change the order or animations**

**Add animations to grouped objects**

Click the play button to watch the instructional video

Add animations to slides

▶ 🔊 ⏮ ⏭ ⏸ ⏹ -1:53

**Add animations to text, pictures, shapes and more in your presentation**

1. Select the object or text you want to animate
2. Select **Animations** and choose an animation
3. Select **Effects Options** and choose an effect

**Manage animations and effects**

There are different ways to start animations in your presentation

- **On click** - start an animation when you click a slide
- **With Previous** - play an animation at the same time as the previous animation in your sequence
- **After previous** - start an animation immediately after the previous one happens
- **Duration** - lengthen or shorten an effect
- **Delay** - add time before an effect runs

**Add more effects to an animation**

1. Select an object or text with an animation
2. Select **Add Animation** and choose one

**Change the order or animations**

Select an animation maker

Choose the option you want:

- **Move Earlier** - make an animation appear earlier in the sequence
- **Move Later** - make an animation occur later in the sequence

**Add animations to grouped objects**

You can add animation to grouped objects, text and more

- Press Ctrl and select the objects you want
- Select **Format > Group > Group** to group objects together
- Select **Animations** and choose an animation

[ANIMATION, PICTURE & AUDIO](#)

[BACK TO COURSE CONTENT](#)

## Add, change or remove transitions 5 2

Add slide transitions to bring your presentation to life   
To remove a transition

Click the play button to watch the instructional video  
Add transitions between slides

INSERT A VIDEO   
BACK TO ADDING ANIMATION, VIDEOS & AUDIO TOPIC   
BACK TO COURSE CONTENT

Add slide transitions to bring your presentation to life   
1. Select the slide you want to add a transition to  
2. Select the **Transitions** tab and choose a transition.  
3. Select **Effect Options** to choose the direction and nature of the transition  
4. Select **Preview** to what the transition looks like

To remove a transition   
To remove a transition   
Select **Transitions > None**

## Insert a video 5 3

### On YouTube or Vimeo

- Find the video that you want to insert
- Below the video frame, click **Share** and then click **Embed**

*Note: If you don't click embed, you'll copy the wrong code*

Add to   
Share   
Email

Embed

### iFrame

Right-click embed code and click **Copy**

Add to   
Share   
Email

```

iFrame width="560" height="315" src="https://www.youtube.com/embed/viBopnHvV

```

Video size: 560 x 315  
☒ Show suggested videos when the vi  
☒ Show player controls  
☒ Show video title and player actions  
☐ Enable privacy-enhanced mode [?]

Cut   
Copy   
Paste   
Paste as plain text   
Select all

NEXT   
ANIMATION,   
BACK TO COURSE CONTENT

### Embed code

*If the highlighted text that you copy begins with :http\* - it is the wrong code*

- Return to the previous step and click **Embed**

Use this code   
This won't work

Share   
Embed   
Email

Share   
Embed   
Email

```

iFrame width="560" height="315" src="https://www.yo
https://youtu.be/ISQ-UlxHrPr

```

PREV   
NEXT

### In PowerPoint

- Click the slide that you want to add the video to
- On the **Insert** tab, click **Video > Online Video**
- In the **From a Video Embed Code** box, paste the embed code and then click the arrow

Insert Video   
YouTube   
The largest worldwide video-sharing community!   
Search YouTube   
From a Video Embed Code   
Paste the embed code to insert a video from a web site   
Paste embed code here

PREV   
NEXT

### To preview

A video rectangle is placed on your slide, which you can move or resize

To preview your video on your slide:

- Right-click the video rectangle
- Select **Preview**
- Click the Play button on the video

PREV   
NEXT

## Add or delete audio

5

4

Add audio from your PC

Record audio

Delete audio

Click the play button to watch the instructional video

Add and record audio

1. Select **Insert > Audio**  
2. Select **Audio on my PC**  
3. In the **Insert Audio** dialog box, select the audio file you want to add  
4. Select **Insert**

1. Select **Insert > Audio**  
2. Select **Record Audio**  
3. Type in a name for your audio file  
4. Select **Record** and then speak  
5. To review your recording, select **Stop** and then select **Play**  
6. If you are happy with the recording - select **OK** or Select **Record** to re-record  
7. To move your clip, select and drag the audio icon to where you want it on the slide  
8. Select **Play**

1. Select the audio icon on the slide  
2. Press **Delete**

SAVE, PRINT & PRESENT TOPIC

BACK TO ADDING ANIMATION, VIDEOS & AUDIO TOPIC

BACK TO COURSE CONTENT

## Save, print and present your presentation

6

1

2

3

4

SAVE YOUR PRESENTATION AS PDF

1 MIN

PRINT YOUR PRESENTATION

1 MIN 30 SECS

ADD SPEAKER NOTES

45 SECS

START PRESENTING

2 MINS

GETTING STARTED WITH POWERPOINT

BACK TO COURSE CONTENT

## Save your presentation as PDF

6

1

File export

Select File > Export

Create

1. Click **Create PDF/XPS Document**  
2. Then click **Create PDF/XPS**

Export

Create PDF/XPS Document

Create a PDF/XPS Document

Package Presentation for CD

Create Handouts

Change File Type

PRINT YOUR PRESENTATION

BACK TO SAVE, PRINT & PRESENT TOPIC

Publish

Choose a location to save the file

## Print your presentation

Print

For Printer

For Settings

For copies

Click the play button to watch the instructional video

Print presentations

ADD SPEAKER NOTES

BACK TO SAVE, PRINT & PRESENT TOPIC

BACK TO COURSE CONTENT

Print

Select File > Print

For Printer

Select the printer you want to print to

For Settings

Select the options you want:

- **Slides** - from the drop-down box, choose to print all slides, selected slides or current slide
- **Print Layout** - choose to print the slides, just the speaker notes, an outline or handouts
- **Collated** - choose whether you want sheets collated or uncollated
- **Color** - choose whether you want color, grayscale or pure black and white
- **Edit Header & Footer** - select to edit the header and footer before printing

For copies

Select how many copies you want to print

Then select Print

## Add speaker notes

Add notes while creating your presentation

The Notes pane is a box that appears below each slide (outlined in magenta in the picture)

Click the play button to watch the instructional video

Microsoft PowerPoint

Add speaker notes

1

2

3

4

WingTip Toys

- Home sales page
- Support email address
- Summary

Introduce George  
Q1 Sales results  
New Product line

PREV

NEXT

START PRESENTING

CONTENT

An empty Notes pane will have the text  
Click to add notes - type your speaker notes there



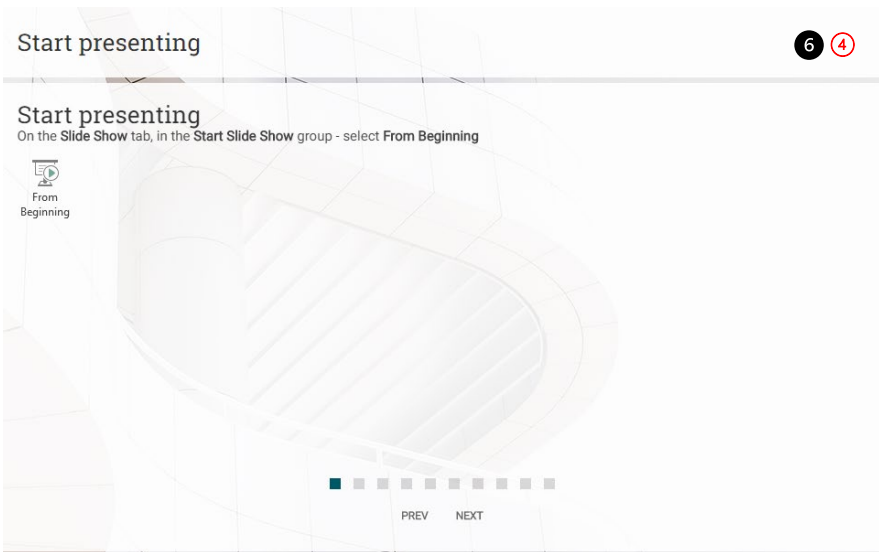
## Start presenting

6 4

### Start presenting

On the **Slide Show** tab, in the **Start Slide Show** group - select **From Beginning**

From Beginning



## Use Presenter View



BACK TO SAVE, PRINT & PRESENT TOPIC ✓

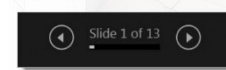
BACK TO COURSE CONTENT ✓

Select the Exit button to finish the course

### Use the controls in Presenter view

To move to the previous or next slide

- Select **Previous** or **Next**



### See all slides

To view all the slides in your presentation

- Select **See all slides**



### Slide thumbnails

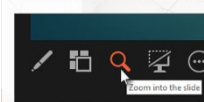
You'll see thumbnails of all slides in your presentation - you can jump to a specific slide in the presentation



### Zoom into slide

To view a detail in your slide up close:

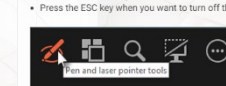
- Select **Zoom into slide** and then point to the part you want to see



### User laser or pen tool

To point to or write on your slide as you present:

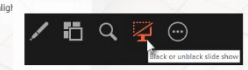
- Select **Pen** and **laser pointer** tools
- Press the **ESC** key when you want to turn off the pen, laser pointer or highlight



### Hide or unhide slides

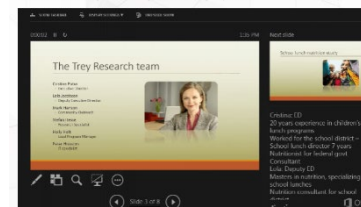
To hide or unhide the current slide in your presentation:

- Select **Black** or **unblack** slide show



### Notes in Presenter view

In **Presenter View** - you can see your notes as you present



### Change the size of the text

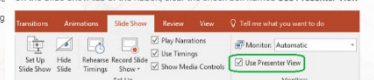
By using the two buttons (as shown) at the lower left corner of the Notes pane

- Point the mouse at the vertical line that separates them, then click and drag



### Turn off Presenter View

On the **Slide Show** tab of the ribbon, clear the check box named **Use Presenter View**



## ADDENDUM L: QUESTIONNAIRE: STUDENT EVALUATION



### PGDipNE: evaluation of the interventions

1. The first impression for the look and feel of SUNLearn after you have logged in



2. The personalized dashboard



3. Design and structure of the programme (PGDipNE)



4. Access to the modules and resources



5. Didactics snippets



6. The availability of a digital literacy course (MS Word, MS Excel and MS Powerpoint)



Student Evaluation