Deep Learning for 21st Century Skills in Public Health Education

Anne Ernestine Moates

Institute for Sustainable Industries and Liveable Cities (ISILC)

Victoria University

Submitted in fulfilment of the requirements of the degree of Doctor of Philosophy

(9 May 2021)

Abstract

Graduates of health-related associate degree programs in Australia require vocational competencies to address real-world issues as a responsible citizen, which aligns with deep learning for 21st century ideals. The research, conducted in a university setting, employed qualitative and quantitative methods, in a bounded case study. Associate degree in health science students' engagement in learning was explored using two different questionnaire instruments, focus group interview, and for a sub-cohort of participants, undertaking a health promotion and public health elective stream, collaborative experiential learning for entry-level support roles in health was observed via focus group interview, five individual interviews, and student written reflections from 11 participants. Descriptive analysis of quantitative and qualitative data supported an emergent theme that while the associate degree contributed to acknowledged real-life skill development, some limitations in health support role work-readiness was expressed by participants. The case study research indicates that participants showed commitment to pursuing a future health professional career, with the associate degree as their pathway. The findings apply to stakeholders, such as universities offering health-related vocationally oriented associate degree programs to bolster the applied skill content, thus preparing work-ready graduates, which may ultimately benefit the wider health services community.

Student Declaration

I, Anne Ernestine Moates, declare that the PhD thesis titled Deep Learning for 21st century skills in public health education is no more than 80,000 words in length including quotes and exclusive of tables, figures, appendices, bibliography, references and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work.

I have conducted my research in alignment with the *Australian Code for the Responsible Conduct of Research* and Victoria University's *Higher Degree by Research Policy and Procedures*.

All research procedures reported in the thesis were approved by the Victoria University *Human Research Ethics Committee*, approval number HRE16-026.

Signature  Date 9/05/2021

Table of Contents

ABSTRACT II

STUDENT DECLARATION III

TABLE OF CONTENTS IV

LIST OF FIGURES VIII

ACKNOWLEDGEMENTS X

PROLOGUE XI

CHAPTER 1: INTRODUCTION 1

- **PREAMBLE** 1
- **INTRODUCTION** 1
- **OVERVIEW OF THE STUDY** 1
- **BACKGROUND TO THE STUDY** 3
- **SIGNIFICANCE OF THE STUDY** 8
- **THEORETICAL UNDERPINNINGS** 10
- **CONCEPTUAL FRAMEWORK** 10
  - ***21st Century Skills*** *12*
  - ***The Six C's of the New Pedagogies of Deep Learning*** *12*
  - ***The Deeper Learning Competencies*** *12*
  - ***The OECD Learning for 2030*** *13*
  - ***Learning by Design*** *13*
  - ***The Four Domains of Public Health Learning Outcomes*** *13*
  - ***Conceptual Framework Integration*** *14*
  - ***Conceptual Framework relationship to Research Focus*** *14*
- **OUTLINE OF THE RESEARCH 'PROBLEM'** 15
- **RESEARCH QUESTIONS** 15
- **OUTLINE OF RESEARCH METHODOLOGY AND METHODS** 16
- **OVERVIEW OF THE LAYOUT OF THE THESIS** 18
- **CONCLUSION** 18

CHAPTER 2: LITERATURE REVIEW 19

- **INTRODUCTION** 19
- **SEARCH STRATEGY** 19
  - ***Workforce Preparation for Public Health Roles*** *20*
  - ***Entry Level Public Health Education*** *21*
  - ***Work-Readiness and Employability*** *27*
  - ***Deep Learning for 21st Century Skills*** *30*
  - ***Pedagogy for Deep Learning and 21st Century Skills*** *34*
  - ***Learner Engagement*** *49*
  - ***Technology Enabled Learning*** *62*
  - ***The Associate Degree*** *68*
  - ***Beyond the first 21 years of the 21st century*** *71*
- **GAPS IN THE RESEARCH LITERATURE** 71
- **CONCLUSION** 72

CHAPTER 3: METHODOLOGY 74

- **RESEARCH QUESTIONS** 74

THE STUDY DESIGN - CASE STUDY RESEARCH USING A MIXED METHODS APPROACH 75
CASE STUDY 75
MIXED METHODS 76
RESEARCHER – REFLECTION, REFLEXIVITY AND BIAS 77
RESEARCHER EPISTEMOLOGICAL POSITION AND WORLD VIEW 78
Stakeholders *84*
Ethics Approvals *86*
Ethical Issues – Individual Interviews and Student Written Reflections *87*
PARTICIPANTS 88
Participant Recruitment *88*
Eligibility, Exclusions, and Consent Requirements *90*
DATA COLLECTION 91
QUANTITATIVE METHODS 92
Validity and Reliability of the Questionnaire Instruments *92*
The Index of Learning Styles Questionnaire (ILSQ) Instrument Overview *93*
The Deep Learning for 21st Century Public Health Education Questionnaire (DLQ) Overview *94*
The ILSQ and DLQ Administration Procedures *96*
Data Analysis *97*
Managing the ILSQ and DLQ Data *97*
Analysis of the ILSQ and DLQ Data *98*
Presenting the ILSQ and DLQ Data *99*
QUALITATIVE METHODS 100
Focus Group Interview Data Collection *100*
Transcription of Focus Group Interviews *100*
Individual Interview Data Collection *101*
Transcription of Individual Interview *101*
Student Written Reflections Data Collection *102*
ANALYSIS OF QUALITATIVE DATA 102
Presenting the Qualitative Data as Narrative *104*
CONCLUSION 104

CHAPTER 4: PRESENTATION OF RESULTS 106

INTRODUCTION 106
INDEX OF LEARNING STYLES QUESTIONNAIRE (ILSQ) RESULTS 106
DEEP LEARNING FOR 21ST CENTURY SKILLS IN PUBLIC HEALTH QUESTIONNAIRE (DLQ) RESULTS 117
FOCUS GROUP INTERVIEWS 147
The Focus Group Interview Narratives *148*
INDIVIDUAL INTERVIEWS 155
The Individual Interview Narratives *155*
STUDENT WRITTEN REFLECTIONS 171
The Student Written Reflections Narrative *172*
CONCLUSION 179

CHAPTER 5: DISCUSSION 180

INTRODUCTION 180
SUMMARY OF THE CASE STUDY RESEARCH PARAMETERS 180
Bounded Case Study *180*
Profile of the 'Typical' Student *181*
Summary of the Typical Student Profile compared to the Literature *185*
DEEP LEARNING FOR 21ST CENTURY SKILLS - DISCUSSION 186
Learning from experience *186*
Real-life skills *187*

Life beyond study ... *187*
Associate degree as a pathway to something else ... *188*
Motivations ... *189*
Shifts in thinking ... *189*
Personal development ... *191*
Applying skills ... *192*
Learning with experience ... *193*
Ambitions ... *194*
Learning how to learn ... *194*
Critical thinking and reasoning ... *195*
Managing behaviours and emotions ... *196*
Planning for the future ... *197*
Becoming a self-regulated adult ... *197*
Self-management ... *198*
Asking relevant questions ... *199*
Finding relevant answers ... *200*
Digital default answers ... *200*
Being part of a team ... *201*
Communicating appropriately ... *202*
Assessment for learning: public health ... *202*
Critical thinking and reasoning ... *203*
Preparing for a role in health ... *204*
Not quite ready for work but developing real-life skills ... *205*
Summary ... *206*
IMPLICATIONS OF THE RESEARCH ... 207
LIMITATIONS OF THE RESEARCH ... 209
CONCLUSION ... 210

CHAPTER 6: CONCLUSION ... 211

ANSWER TO THE RESEARCH QUESTION ... 211
RECOMMENDATIONS FOR FURTHER RESEARCH ... 213
THESIS SUMMARY ... 215
THESIS CHAPTER'S - SUMMARY ... 216
CONCLUDING COMMENTS ... 218

REFERENCES ... 220

APPENDICES ... 277

APPENDIX A: EMAIL COMMUNICATIONS ... 278
APPENDIX B: ETHICAL APPROVALS TO CONDUCT RESEARCH ... 284
Victoria University Ethical Approval ... *284*
Excerpts from Ethical Approval from university where study conducted ... *285*
APPENDIX C: INFORMATION TO PARTICIPANTS INVOLVED IN RESEARCH (EXPLANATORY STATEMENT) ... 286
APPENDIX D: EXAMPLE OF RECRUITMENT CONTACT TO POTENTIAL RESEARCH PARTICIPANTS ... 288
APPENDIX E: CONSENT FORMS ... 289
Focus Group Interview consent ... *289*
Individual Interview Consent and Written Reflection Consent ... *291*
APPENDIX F: COPY OF THE ILSQ ... 293
APPENDIX G: COPY OF THE DLQ ... 298
APPENDIX H: LITERATURE EVIDENCE INFORMING DLQ DEVELOPMENT ... 306
APPENDIX I: EXAMPLE OF ILSQ LEARNING STYLES - RESULTS ... 307
APPENDIX J: FOCUS GROUP INTERVIEW GUIDED TOPICS ... 308
APPENDIX K: EXAMPLE EXCERPT OF TRANSCRIPTION – FOCUS GROUP INTERVIEW ... 309

APPENDIX L: INDIVIDUAL INTERVIEW GUIDED TOPICS 313
APPENDIX M: EXAMPLE EXCERPT OF TRANSCRIPTION – INDIVIDUAL INTERVIEW 314
APPENDIX N: EXAMPLE EXCERPTS OF STUDENT WRITTEN REFLECTIONS 318
APPENDIX O: ALL ILSQ ITEM RESPONSES 322
APPENDIX P: RESPONDENT ILSQ LEARNING STYLE DIMENSION SCORES 327
APPENDIX Q: ALL DLQ RESULTS TABLED 330
APPENDIX R: ALL DLQ Q1-Q8 DATA RESPONSES TABULATED 338
APPENDIX S: NUANCED CONTENT TABLE AND GRAPH FOR FOCUS GROUP INTERVIEWS 343
APPENDIX T: NUANCED CONTENT TABLE AND GRAPH FOR INDIVIDUAL INTERVIEWS 345
APPENDIX U: NUANCED CONTENT TABLE AND GRAPH FOR STUDENT WRITTEN REFLECTIONS 347
APPENDIX V: KEY FINDINGS INFOGRAPHIC 349

List of Figures

			Page
Chapter 1	**Introduction**	.....	
Figure 1.1	Conceptual Framework Integration and Inter-relationships		14
Figure 1.2	Schema demonstrating Conceptual Framework Relationship to Case Study Focus		15
Figure 1.3	Research methods used in Case Study		17
Chapter 3	**Methodology**	.....	
Figure 3.1	Overview of the Research Parameters Infographic		80
Figure 3.2	The relative relationships of stakeholders impacted by the case study research		85
Figure 3.3	Associate Degree in Health Science program structure		89
Figure 3.4	Qualitative Data Analysis Phases		103
Chapter 4	**Presentation of Results**	.....	
Figure 4.1	ILSQ Processing Dimension Responses graph		108
Figure 4.2	ILSQ Perception Dimension Responses graph		110
Figure 4.3	ILSQ Reception Dimension Responses graph		111
Figure 4.4	ILSQ Understanding Dimension Responses graph		113
Figure 4.5	ILSQ Dimension Scores Graph		114
Figure 4.6	ILSQ Dimension Balance		115
Figure 4.7	DLQ Q1-Q8 All Responses Trend		122
Figure 4.8	Frequency of Collated Responses DLQ Q1 Sub-questions		124
Figure 4.9	Frequency of Collated Responses DLQ Q2 Sub-questions		125
Figure 4.10	Frequency Count of DLQ Q3.I14 Graph		126
Figure 4.11	Frequency of Collated Responses DLQ Q3 Sub-questions		127
Figure 4.12	Frequency of Collated Responses DLQ Q4 Sub-questions		128
Figure 4.13	Frequency of Collated Responses DLQ Q5 Sub-questions		130
Figure 4.14	Frequency of Collated Responses DLQ Q6 Sub-questions		131
Figure 4.15	Frequency of Collated Responses DLQ Q7 Sub-questions		133
Figure 4.16	Frequency of Collated Responses DLQ Q8 Sub-questions		135
Figure 4.17	DLQ Q9 Frequency of Responses		136
Figure 4.18	DLQ Q10 Frequency of Responses		136
Figure 4.19	DLQ Q11 Frequency of Responses		137
Figure 4.20	DLQ Q12 Frequency of Responses		138
Figure 4.21	DLQ Q13 Frequency of Responses		139
Figure 4.22	DLQ Q14 Frequency of Responses		140
Figure 4.23	DLQ Q15 Frequency of Responses		142
Figure 4.24	Infographic of Key Findings		178

List of Tables

		Page
Chapter 3	**Methodology**	
Table 3.1	Summary of Research Instruments and Methods	81
Table 3.2	Schedule of Data Collection	91
Table 3.3	Summary of the ILSQ Dimensions of Learning Adapted	94
Table 3.4	DLQ Research Topic Addressed	95
Chapter 4	**Presentation of Results**	
Table 4.1	Frequency of Responses to ILSQ questions related to Processing Dimension	107
Table 4.2	Frequency of Responses to ILSQ questions related to Perception Dimension	109
Table 4.3	Frequency of Responses to ILSQ questions related to Reception Dimension	111
Table 4.4	Frequency of Responses to ILSQ questions related to Understanding Dimension	112
Table 4.5	Individual scores showing strong preference in an ILSQ Dimension	116
Table 4.6	Two strong ILSQ Dimensions in individual student responses	116
Table 4.7	DLQs 1-8 Frequency of Responses and (Percentages)	118
Table 4.8	All DLQs Q1 to Q8 Data Responses Tabulated – frequencies and (Percentages)	120
Table 4.9	DLQ Q1 – About my learning...Results	123
Table 4.10	DLQ Q2 – My general employability skills...Results	124
Table 4.11	DLQ Q3 – About asking questions...Results	126
Table 4.12	DLQ Q4 – About work-ready skills for a health-related role...Results	127
Table 4.13	DLQ Q5 – My learning style preferences...Results	129
Table 4.14	DLQ Q6 – To find information to answer assignment questions I go to...Results	131
Table 4.15	DLQ Q7 – Making inquiries...Results	132
Table 4.16	DLQ Q8 – The type of assessment which helps to develop my work-ready skills are...Results	134
Table 4.17	DLQ Q9 Frequency of Responses and (Percentages)	135
Table 4.18	DLQ Q10 Frequency of Responses and (Percentages)	136
Table 4.19	DLQ Q11 Frequency of Responses and (Percentages)	137
Table 4.20	DLQ Q12 Frequency of Responses and (Percentages)	138
Table 4.21	DLQ Q13 Frequency of Responses and (Percentages)	139
Table 4.22	DLQ Q14 Frequency of Responses and (Percentages)	139
Table 4.23	Individual Responses for Q9, Q13, Q14	141
Table 4.24	DLQ Q16 Frequency of Responses and (Percentages)	142
Table 4.25	DLQ Q17 Frequency of Responses and (Percentages)	143
Table 4.26	DLQ Q18 Frequency of Responses and (Percentages)	144
Table 4.27	DLQ Q19 Frequency of Responses and (Percentages)	144
Table 4.28	DLQ Q20 Frequency of Responses and (Percentages)	145
Table 4.29	DLQ Q21 Frequency of Responses and (Percentages)	146
Table 4.30	Focus Group Interview Nuanced Content	147
Table 4.31	Individual Interview Exemplar Participant Voice	155
Table 4.32	Illustrative Student Written Reflections	172

Acknowledgements

Thanks to all my supervisors present, Dr John Martino and Dr Trish Burton, and past, Professor Nicola Yelland, and Professor Maureen Ryan, who have provided support and encouragement and sage advice over the last few years.

I also appreciate the general assistance provided by the broader Victoria University community.

Thanks to the University which supported my research, and deepest appreciation is extended to the students who participated.

Thanks to Aden who assisted in transcription of recorded Focus Group Interviews and Individual Interviews.

Many thanks to my family and friends and work colleagues who understand why I do what I do and support me to be a responsible citizen of this world.

Thanks also to all who support and sustain responsive and responsible public health principles and practice without which I would not be here.

I would also like to acknowledge that the research was supported through an Australian Government Research Training Program Scholarship.

Prologue

I am immeasurably grateful to the student cohort for their generous contributions, and the support and encouragement afforded to me by the managers, coordinators, administrators, and colleagues of the University where I was both educator and researcher for a period of time. When I started my research in 2015, I had been teaching in an inaugural associate degree from its second year (2014), and apart from some instructive reports available at the time (Smith, 2013) I was curious about the type of person who would enrol in an associate degree rather than a bachelor's degree, or a Training and Further Education (TAFE) credential with a recognised vocational outcome.

My interest in public health spans almost a lifetime. I am indebted to the health and well-being benefits of living not only in two centuries, but also two millennia in a country which supports public health programs which promote, protect and prevent. There are many individuals who have supported me and encouraged my aspirations and efforts of the personal, professional, scholastic, and of late esoteric levels. Ever a reflective person I have also reflected about my reflections! I summarise these as: Surviving into adulthood thanks to public health programs – overcoming diseases which even a decade before I was born were deadly; and circumstantial contexts and chance opportunities in my personal life which defined a public health professional life.

I have been a nurse since I was 17 years of age, and an educator in the health professional education sector for all of this century. How could I not be interested to explore the 21st century and public health, which from my perspective was one of the reasons humans are still around and thriving. To formalise my public health passion, I completed a Master of Public Health, and worked in public health nursing roles. I consolidated my educational credentials via completing Master of Education research: thesis focused on nursing education.

Influences prior to undertaking formal research

I was employed to develop and deliver a core subject in an elective health promotion stream in an inaugural Associate Degree in Health Science which commenced in 2013. The core elective had a public health focus and was a third semester subject in a four-semester full-time program. Associate degree programs were not, at the time, commonly offered in higher education institutes. At the university where I both worked (casual contract) and undertook research activities for the PhD, the associate degree was subject to higher education

governance and funding with both ATAR Score and direct entry options but had vocational education influences. The university's graduate attributes, at the time, were only expressed for bachelor and above level programs. However, one of the aims of the Associate Degree in Health Science program was a vocational outcome and work-readiness to enter either a health promotion or health information role via elective stream.

The Associate Degree in Health Science program had modest enrolment numbers, and anecdotally was considered easier to complete than a degree academically, and in particular the health promotion stream, which included introductory public health. On-campus attendance was not compulsory except for subjects which had an applied learning component, such as laboratory procedures, and anatomy and physiology. Whilst course-work material was available via the student learning management system, tracking of student activity showed minimal engagement with the material. Attrition before second-year enrolment was anecdotally reported to be the outcome of students' transferring into higher education programs more aligned with their vocational aspirations.

Endeavours for public health authenticity was via case-scenarios which aligned with both problem-based learning and constructivist pedagogy. Collaborative work was encouraged, but was challenging, due to small class enrolments and lack of attendance, which also impacted socialisation and progressing a community of learning. A capstone project assessment was promoted to encourage experiential applied learning. I advocated for public health to be a core first year subject; this change was instigated in 2018.

Not long prior to my engagement to teach public health, a World Health Organization report predicted a global population health clinical, and support role, workforce shortage (World Health Organization, 2013). Acknowledgment that public health roles involved more than just dealing with disease outbreaks, but also workforce effective to address, in a 21st century way, the population health needs (Coronado, Koo, & Gebbie, 2014) was recommended. Public health commentators have since suggested that health professional education has not kept pace with larger world challenges (Zodpey, Evashwick, Grivna, Harrison, & Finnegan, 2017). There has been a movement towards recognising the contributions to public health research and education enabled by 21st century tools by citizen science (Caron, 2016). Certainly, there has been a shared global experience of public health reality in 2020 with the COVID-19 pandemic in 2020 (World Health Organization, 2020), and indeed, more than in previous documented population health threats is the need for support role public health competencies.

Chapter 1: Introduction

Preamble

Students undertaking vocational course in the higher education environment need skills, not just in core subjects, but also in analysing information, thinking critically, working collaboratively, making decisions, solving problems and applying knowledge to new situations which all align with 21st century skills and deep learning processes. This research gathered quantitative and qualitative information within a bounded case study methodology. The scope and findings of the study pertain to the student cohort enrolled in the Associate Degree in Health Science program, in a public university in Victoria, during a period covering three semesters from August 2016 through to December 2017.

The research premise was that engaging students with authentic experiential learning scenarios will promote deep learning. This was not implied as a hypothesis to be tested, but rather an area to explore in the context of the case study environment and the research involving associate degree students. There was researcher intention to support the philosophical and theoretical alignments inherent in the research questions and overall aims of the research, which was, in itself, a deep-learning endeavour.

Introduction

Chapter 1: Introduction provides a summary of the study and an orientation to all the chapters of the thesis. The chapter is constructed to guide the reader through key aspects related to the study. The first section is the overview of the study, followed by a more detailed synopsis of the study parameters, in respect to overview of the study, background of the study, significance of the study, research problems and research questions, research methodology and methods, and a guide to the layout of the thesis. APA 6th Style Referencing (American Psychological Association, n.d.) is used in this thesis.

Overview of the study

Research undertaken in the work-setting of the researcher can yield insight into the area due to the researcher's in-depth knowledge of the setting (Costley, Elliott, & Gibbs, 2010). This study is positioned in both the education and health science fields of knowledge, with a focus on public health education. Public health is broadly about population health improvement of as many people as possible (Frieden, 2015), health protection, and health and social care

quality (Gillam, Yates, & Badrinath, 2007), and addressing population health inequalities (Liamputtong, 2016). At the time that the study was being undertaken, the university sector used graduate attribute terminology related to being work-ready to meet industry needs, global in outlook, and made references related to lifelong learning (Nagarajan & Edwards, 2014).

This study focused on deep learning that aligned with progressing the vocational prospects of the student undertaking the associate degree program as a pathway to a career in a health setting. Deeper learning is a movement promoting learning and skills to prosper in the 21st century workforce and also be a responsible citizen (Alliance for Excellent Education, 2011; Fullan & Langworthy, 2014; The William and Flora Hewlett Foundation, 2013). Communication, critical thinking, team-work, and problem-solving are a sample of generic and transferrable skills that employers seek in employees, with educational providers tasked with preparing graduates to meet both current and future work-readiness needs (ACER, 2013; Ananiadou & Claro, 2009; Binkley et al., 2012; Organisation for Economic Cooperation and Development, 2015; Patrick et al., 2008).

The aim of the study was to determine learning approaches used by the students in how they experienced their program of learning to meet their particular needs; and in what ways alignment with deep learning for 21st century skills for work-ready public health support roles could be demonstrated. Another aim of the research was to explore the associate degree level program as an evolving higher education pathway in Australia. Consequently, the conceptual framework was an amalgamation of theories, movements, and approaches influential in the deeper learning 21st century milieu prevalent in 2014 when preparation for the study activities was undertaken. In addition, global competencies prevailing in undergraduate public health education were also incorporated into the conceptual framework. The various factors are briefly introduced below and will be discussed in more detail in Chapter 3: Methodology.

The participants in the study were part of a total eligible student cohort (total enrolment) for an Associate Degree in Health Science in one setting and one campus of a large public university. To be noted, this was the entire cohort undertaking the program in the whole university (not offered at any other campus). There were between 100 and 117 students enrolled at various times during the period the research was conducted (2016 and 2017). The number of participants who completed the Index of Learning Styles Questionnaire was 75, and the Deep Learning for 21st Century Skills in Public Health Education Questionnaire was 55. Three focus group interviews were facilitated which ranged from two to five

participants, five individual interviews were conducted, and 11 student written reflections were shared. More detail about study participants, eligibility, and related parameters is discussed in Chapter 3: Methodology.

The 21st century skills aspect was influenced by the four broad categories of 21st century skills encompassing knowledge, skills, attitudes, values and ethics, these being as related to ways of thinking, ways of working, tools for working, and ways of living in the world (Assessment and Teaching of 21st Century Skills Project, 2012; Binkley et al., 2012). Deep learning aspects were informed by literature related to the New Pedagogies of Deep Learning, for example, citizenship, collaboration, communication, creativity, character, and critical thinking (Fullan, 2013; Fullan & Langworthy, 2013; Fullan & Langworthy, 2014; Fullan & Scott, 2014); and the deeper learning competencies covering areas related to: mastering of core academic content, thinking critically, solving complex problems, working collaboratively, communicating effectively, learning how to learn, and developing an academic mindset (The William and Flora Hewlett Foundation, 2013). Elements of the Learning by Design movement (Kalantzis & Cope, nd; New Learning, nd), for example, as intended to foster higher order thinking skills and deeper learning contributes, such as, different ways of knowing as reflected in the types of learning activity implemented. Finally the contextual relationship with public health was also a consideration and for applicability at the time the Association of Schools and Programs of Public Health (2011, 2014) described domains of public health learning. These domains exemplified key features of undergraduate entry level public health capabilities ranging from core population health information through to social responsibilities, and integrative practical and applied learning, especially applicable in a college setting (Association of Schools & Programs of Public Health, 2011, 2014).

Background to the study

The literature covered here is a brief overview of the literature examined in determining gaps for the research in areas related to the associate degree in Australia, work-readiness, deep learning for 21st century skills in higher education, and learning experiences and pedagogy to enable public health role preparedness. A detailed review of the literature is presented in the Chapter 2: Literature Review.

Associate Degree

The associate degree is described as an alternate entry into higher education, and a pathway which can offer a vocational and applied outcome (Smith, 2013). The applied baccalaureate in the United States of America (USA) is comparable in terms of its practical

features and appeal to the adult learner (Bragg & Ruud, 2011). Foundation degrees, as they are termed in the United Kingdom (UK), also represent an alternate tertiary entry pathway and are characterised as vocational (Wilson, Blewitt, & Moody, 2005). In Australia, the associate degree competes with both vocational education and higher education programs (Fowler, 2017; Karmel & Lu, 2012). The teaching and learning approaches which work best in health science education is unclear, particularly at the associate degree level, as reports of associate degree level programs in Australia are limited, but there are general reports about health sciences (Anderton, 2017). However, it has been shown that international students in Australia use courses such as the associate degree as a pathway into higher education courses (Cao & Tang, 2014). However, whilst associate degrees are offered in both Vocational Education and Training (VET) and Higher Education (HE) (Gale et al., 2013), especially dual sector settings, the focus of research relates to associate degree offered as higher education in a university setting. There are 43 universities in Australia, with six being dual-sector (University Reviews, 2021b).

The Australian university system is primarily funded through student fees and Federal Government-backed student loan schemes, and research and teaching, and some State Government funding (Universities Australia, 2021). Public vocational education and training (VET) in Australia is funded by the Commonwealth and State and Territory governments, however State and Territory governments are responsible for the delivery of VET services (VOCEDplus, 2021). Private education is also available in Australia (The Good Universities Guide, 2021b). There is also a range of Government supported scholarships available to domestic and international students undertaking undergraduate studies, with many Universities and higher education providers also providing their own scholarships (Australian Government Study Assist, 2021). For the avoidance of doubt, the Associate Degree, which was the focus of the research, was funded as Higher Education not Vocational Education and Training. Australian Universities primarily use a Credit system, though not uniform across Australia, which can reflect the number of hours per week of study that is expected but may also be used for the estimation of tuition fees (Australian Government Study Australia, 2021; dictionary.university, 2021). For example, the university where the research was conducted considered a fulltime semester study load of being 48 Credit Points (each subject worth 12 Credit Points). The Associate Degree in question comprised 192 Credit Points.

Student demographics as related to associate degree programs in Australia is limited in the literature as is the picture of the associate degree student experience. Due to maintaining the privacy and anonymity of both the university and student participants, university generated

reports of the diversity of their student enrolments cannot be revealed. However, the university was one of the 8 public universities in Victoria, also one of the six dual-sector universities of Australia (four of which are in Victoria) (University Reviews, 2021b). The university had an overall enrolment of approximately 82,000 students circa 2014-2015, and the school where the program of interest was located had student enrolment of a little over 3,000 for the same time (.idCommunity, 2016a). In describing diversity of the student cohort, some inferences may be taken from 2014 Melbourne tertiary student profile data published in 2016 which indicated that 45% were enrolled in Higher Education programs and the remainder in Vocational Education and Training, and of these the majority, 67%, were domestic students (City of Melbourne, 2016). In regards international student numbers in 2014, 84% of overseas higher education students attending Melbourne campuses were from Asian countries (City of Melbourne, 2016). There were 287,128 university students studying in Melbourne in 2016 (.idCommunity, 2016a). In terms of diversity related to language, data for 2016 indicated that 32.3% of people in Melbourne spoke a language other than English at home (.idCommunity, 2016b).

Most States and Territories in Australia have a Tertiary Admission Centre (TAC) which is an organisation which manages university applications on behalf of the individual universities, by converting students final school year results into an Australian Tertiary Admissions Rank (ATAR) (VTAC, 2020, 2021). The ATAR, reflects a direct scaled comparison ranking individual students' academic achievement compared to every single student in the same year group with ATAR equivalency across Australia, and in Victoria the Victorian Tertiary Admission Centre (VTAC) calculates and releases the ATAR for Victorian students; an aggregate score out of, for example,100 for the Victorian Certificate of Education (VCE) (VTAC, 2020, 2021). The VCE is awarded on completion of year 11 and 12 at high school in Victoria, and VCE subjects are used by VTAC to calculate the final ATAR (Youth Central, 2021). Universities may have cut-off ATAR scores for entry into various programs, and these can vary depending on demand for the program in competitive markets (University Reviews, 2021a). Whilst the VCE and ATAR is the predominant entry pathway, there are other admission avenues, such as direct entry (application to the university) (Yang, 2021).

However, in terms of students generally, Melbourne research was conducted to determine what had changed about first year university students' over two decades from 1994 to 2014 (Baik, Naylor, & Arkoudis, 2015). Apart from factors such as technology advances, course delivery evolutions and less formalised teacher student dynamics, it was noted that the entry level student in 2014 knew why they wanted to be at university and transitioned more smoothly than was evident in reports from previous years, however, were less socially

engaged within the university community, and study was a challenge (Baik et al., 2015). Norton, Cherastidtham and Mackey (2018b) reported that nearly a quarter of a million students would start a bachelor degree in Australia in 2018, but more than 50,000 of them would leave university without getting a degree. Student attrition is an on-going concern (Naylor, Baik, & Arkoudis, 2018), as is academic failure (Ajjawi, Dracup, Zacharias, Bennett, & Boud, 2020), mental distress (Usher, 2019), and resilience (Chung, Turnbull, & Chur-Hansen, 2017) and incongruent student expectations (Lock & Kelly, 2020). The employability capabilities of graduates has also been questioned as not meeting industry needs (Bennett, 2018; Bennett, Knight, & Bell, 2020; Bennett, Richardson, & MacKinnon, 2016; Clarke, 2017; McPherson, 2017, 2019; Moore, 2020b).

Work-Readiness

Being work ready is an expectation of graduates of higher education programs (Business Council of Australia, 2016; Gill, 2018; Osborne, Loveder, & Knight, 2019; Prikshat, Montague, Connell, & Burgess, 2019). The *Employment Service Report 2020* details the reality of the challenges in getting relevant skills to be employed (Commonwealth of Australia Department of Jobs and Small Business, 2018). It has been suggested that fostering deep learning principles in education may support learners to develop their abilities to navigate real-world situations (Alliance for Excellent Education, 2014; Culver, Braxton, & Pascarella, 2019; Hultberg, Calonge, & Lee, 2018), though it is also suggested that deeper approach to learning by students in HE is not clearly evident (Asikainen & Gijbels, 2017). Authentic learning environment approaches related to learning by doing and as situated practice with real-world processes and outcomes is promoted (Great Schools Partnership, 2013; Herrington, nd) and has relevance in the higher education context (Ornellas, Falkner, & Edman Stålbrandt, 2019; Roach, Tilley, & Mitchell, 2018). A study which investigated whether employers demanded 21st century skills and how these varied by job characteristics found that differences were identified for both degree field requirements and education level (Rios, Ling, Pugh, Becker, & Bacall, 2020).

Academics and commentators have contributed to the body of knowledge related to the teaching, learning, development, and application of 21st century skills in post-secondary education for example, Bernhardt (2015), Carson (2019), Geisinger (2016), Silber-Varod, Eshet-Alkalai, and Geri (2019), and van Laar, van Deursen, van Dijk, and de Haan (2020). Fullan (2013) suggested that there was need to work towards applied practice in relation to new pedagogy to include real-life problem solving. The call for deep learning approaches and deeper learning outcomes also progressed to prepare learners for the yet unknown future world issues (Alliance for Excellent Education, 2011; Fullan & Scott, 2014).

Public Health Workforce Preparation and Education

In an editorial about public health education for the 21st century Fried (2015) made a case for innovation in preparing future public health workforce in regard to non-traditional public health skills such as systems science, information technology, communications, and management. Public health workforce preparation used to be mostly situated as postgraduate level study, however early this century a seminal report recommended that greater attention was needed to prepare undergraduates for public health roles, for example, education about public health and the ecological model of public health (Institute of Medicine, 2003). The educated citizen agenda progressed, stated to be shaped by the rise of undergraduate public health education (Riegelman, Albertine, & Wykoff, 2015).

Public health as undergraduate education has advanced in a number of global jurisdictions this century. For example, a search on *StudyLink* (2020) shows that at least 30 UK institutions offer undergraduate public health and related degrees. Canada has also grown capacity for local and global public health workforce through undergraduate programs (Government of Canada, 2017; Walker & Doyle-Baker, 2019). In Australia and New Zealand, an audit of university websites, revealed that at least 45 universities were found to offer some sort of undergraduate public health education (Luu, Dundas, & James, 2019). Undergraduate public health education is well-established in the USA (Kirkwood & Riegelman, 2011; Kiviniemi & Przybyla, 2019; Resnick, Selig, & Riegelman, 2017; Riegelman et al., 2015), including two year programs (Community Colleges and Public Health Leadership Group, 2014; League for Innovation in the Community College, nd; Wilson & Riegelman, 2015). There is also mounting interest in establishing formalised links between health delivery and health education organisations (Jones, 2016). Determining where public health education is best situated is contested, in terms of liberal versus scientific education, however, Kiviniemi and Mackenzie (2017) have referenced undergraduate public health education as a liberal education, suggested to improve opportunities for future employment due to the acquisition of transferrable skills. Conversely, in Australia, it is stated that public health is largely vocationally oriented (Luu et al., 2019).

The World Health Organization reported a looming future global health workforce shortage in 2013, not just in clinical care workers, but workers with abilities and skills to address population health needs (World Health Organization, 2013). On the other hand, it is cited that health professional education has not kept pace with world concerns (Zodpey, Evashwick, Grivna, Harrison, & Finnegan, 2017), and gaps in practice have been identified in Australia (Merga, 2016). There has also been a call for a public health workforce to meet 21st century challenges (Coronado, Koo, & Gebbie, 2014). Taxonomies which characterise public health

workforce functions and activities is supportive of an increasingly diversified and proliferating range of public health related front-line and support roles (Beck, Meit, Heffernan, & Boulton, 2015; Erwin, Beck, Yeager, & Leider, 2019). In relation to public health workforce capabilities, it is suggested that educational preparation programs need to better address current population health needs, from administrative to applied clinical public health practice, both at undergraduate and post-graduate entry level (Horney & Heath, 2020).

It is proposed that the communities of learning to advance evidence-based public health education pedagogy will enable education providers to better support workforce requirements for skilled workers (Merzel, Halkitis, & Healton, 2017). Varied educational designs are described for preparing undergraduate public health students to be effective future workforce, with common elements relating to core knowledge about public health (Wykoff, Khoury, Stoots, & Pack, 2015; Wykoff, Petersen, & Weist, 2013) but also active and team learning (Outram, Dundas, & Johnson, 2014; Stoots, Wykoff, Khoury, & Pack, 2015; Yeatts, 2014), popular media (Brown, 2014), experiential learning (Dundas, Hansen, Outram, & James, 2017), developing an educated citizenry (Caron, 2016; Outram et al., 2014; Petersen, Albertine, Plepys, & Calhoun, 2013), service-learning (Mackenzie, Hinchey, & Cornforth, 2019), applied learning in community projects (Nelson-Hurwitz & Tagorda, 2015; Nelson-Hurwitz, Tagorda, Kehl, Buchthal, & Braun, 2018), capstone activities (Fitzpatrick, Mayer, & Sherman, 2016), and practicums (Burke & Biberman, 2017).

McLaughlin (2019) in an *Insider Guides* article stated that public health was the career for the future. The Public Health Association of Australia, (2018) acknowledge that there is a diversity in occupations within public health. Now, more than ever, the need for competent public health workforce is pressing. The world has shared a truly global event of public health significance with the emergence of COVID-19 and a pandemic declared in March 2020 (World Health Organization, 2020). The impact of COVID-19 on the higher education sector, has seen a rapid shift to and/or expansion of digital tools and utilities in creative and expansive ways to support learning in many disciplines, not just health science (Essa, Subramanian, & Jayasuriya, 2020).

Significance of the study

This study builds on data about the associate degree learning experience in Australia, and deeper learning behaviours and activities that promote the development of 21st century capability in the context of a health-related support role. There is evidence of learner experience in higher education research in the literature related to health sciences (Bovijn,

Kajee, Esterhuizen, & Van Schalkwyk, 2017) and public health (Carroll, Sankupellay, Newcomb, Rodgers, & Cook, 2018), but at the time the research was conducted, there was limited local research about associate degree level experiences in Australia (Cao & Tang, 2014; Smith, 2013). The research also contributes information about the student perspective of higher education learning. The higher education student viewpoint is discussed in the literature regarding the ways in which they learn, and their awareness and applications related to what they learn (Abdel Meguid & Collins, 2017; Biggs, 2012; Wang, Su, Cheung, Wong, & Kwong, 2013) and questioning approaches students use (Adams, 2015; Bhavsar, Dypiangco, & Moreau, 2016; Bowker, 2010; Werder et al., 2016).

The student experience of learning is not a new research area, nor is the exploration of the deeper approach. It is suggested that a deep approach is suitable in higher education and that transformative learning theories suit adult learning contexts (Howie & Bagnall, 2015), and health professionals (Van Schalkcwyk et al., 2019). However, it is suggested that students entering higher education are not ready for adult learning approaches (Chacko, 2018; White et al., 2014). There is evidence that the factors contributing to higher rates of attrition in first year university compared to other years is complex (Australian Government, 2017; Naylor et al., 2018). There is also report that the mental and physical wellbeing of tertiary education students in Australia is impacted by financial stress, academic pressures, and relationship issues (Rickwood, Telford, O'Sullivan, Crisp, & Magyar, 2016). Associate degree level programs are often considered and used as pathway programs (Bradley, Noonan, Nugent, & Scales, 2008; Harvey & Szalkowicz, 2016; McLaughlin, Mills, Davis, Saha, & Hardie, 2013; National Student Clearinghouse Research Center, 2017; Spencer, 2019). Meeting learner expectations, linking technology and pedagogy, and promoting self-regulation of learning which addresses 21st century realities is a challenge for educators (Dabbagh & Kitsantas, 2012; Eyink, Motz, Heltzel, & Liddell, 2020; Ferreira, Simão, & da Silva, 2014; Padgett, Cristancho, Lingard, Cherry, & Haji, 2019; Schut, van Tartwijk, Driessen, van der Vleuten, & Heeneman, 2020).

The study explored the means to promote deep learning in the context of a public health role preparation. Deep versus surface learning as points of difference distinguishes what is learned rather than how much (Marton & Saljo, 1976). The study also contributes to the public health workforce education field. Workforce for public health roles prepared in formal educational programs range from public health curricula as liberal arts, sciences, and humanities (White, 2013). Developing capable workforce for public health is vital to tackle the mounting number of population health problems, with workers skilled and knowledgeable

about fundamental public health and preventative health strategies and practice; and it is a global need (Moradian et al., 2020).

Theoretical Underpinnings

Theoretical frameworks which influence educational settings with a vocational focus are diverse, for example constructivism (Dewey, 1938; Rogers, 2011), experiential learning (Kolb & Kolb, 2005), dimensions of learning (Illeris, 2003), problem-based learning (Boud, 1985), situated learning (Lave & Wenger, 1991), transformational learning (Mezirow, 1997b, 2000, 2003), transitional learning (Wildemeersch & Stroobants, 2009), adult learning theory (Knowles, Holton, & Swanson, 2005), and lifelong learning (Aspin, 2007). Adult learning approaches emphasise constructivism as well as collaboration and critical thinking (Hsu, Hamilton, & Wang, 2015), and self-direction, action learning and reflection on action which align with lifelong learning principles (Jarvis, 2004; Krogh, 2000). Responsive learning approaches and study behaviours is supportive of deep learning approaches in constructively aligned programs (Biggs, 2014; Biggs & Tang, 2009; Howie & Bagnall, 2015; Wang et al., 2013).

Conceptual Framework

To present a foundation for the research about deep learning for 21st century skills in public health education, it was essential to assemble a conceptual framework that explained the 21st century skills, deep learning, and public health workforce preparation in the context of the research population of Associate Degree in Health Science. The conceptual framework for the research was a consilience informed by an eclectic mix of theory, frameworks and education movements; chosen principally because they aligned with researcher interest in, and practice of, learning for life and work epistemology. The conceptual framework influenced the methodology and research methods approach used to enable data collection which would address the research question, and still align with bounded case study design principles. Qualitative analysis methods used in the study provide account of, rather than, create a theory about the research area. However, as suggested by Jabareen (2009) using existing literature to construct a conceptual framework is a theorisation process.

The use of a conceptual framework in the study is modelled on the meaning of conceptual framework as described by Maxwell (2005, p. 39) as '*what is out there that you plan to study, and of what is going on with these things and why – a tentative theory of the phenomena that you are investigating"*. Jabareen (2009) proposed a qualitative method for constructing

conceptual frameworks to improve comprehension of multidisciplinary phenomenon associated with multiple bodies of knowledge but does indicate achieving this preferentially via grounded theory methods. The conceptual framework is therefore created rather than found (Maxwell, 2005), and comprises interconnected concepts which collectively enable a comprehensive understanding of social reality (Jabareen, 2009). Furthermore, conceptual frameworks, comprising various aspects, either ontological or epistemic; and constructs which integrate, support an interpretive rather than determinist approach to social reality (Jabareen, 2009).

As suggested by Imenda (2014) a researcher may integrate existing theoretical and published empirical findings in a conceptual framework if their research cannot meaningfully be researched referencing only one theory or aspects within a single theory. Indeed, creating a conceptual framework which is an amalgamation of the various areas of the study is a concept and practice which is evidenced in the research literature, including public health, for example, as articulated by Handler, Issel, and Turnock (2001) who built a conceptual framework to measure performance of the public health system. The outcome of combining concepts in the conceptual framework indicates the strategic position of the research in relation to the existing body of evidence and can constructively guide presentation of results (Shikalepo, 2020).

Subsequently the graphical representation or written format of the conceptual framework functions to inform the research questions and research methods (Maxwell, 2005). On another level consideration of the study populations' philosophy and perceptions, means that the conceptual framework should not be limited to the researcher's viewpoint or theoretical understandings (Maxwell, 2005). If a study uses approaches (however labelled) from both the quantitative and qualitative traditions in ways that are jointly informative, rather than isolated and categorised, it is consequently demonstratively a mixed-methods study (Maxwell, 2016).

The conceptual framework of the research inquiry process and grounding for the analysis of the research, was informed by the following:

- 21st Century skills (Assessment and Teaching of 21st Century Skills Project, 2012; Binkley et al., 2012; National Research Council, 2012),
- The six C's of the New Pedagogies of Deep Learning (Fullan & Scott, 2014),
- The Deeper Learning Competencies (The William and Flora Hewlett Foundation, 2013),

- The Organisation for Economic and Cooperative Development (OECD) project Learning for 2030 which was about future-proofing, and preparing students for work and societal challenges that are not yet known about (Organisation for Economic Cooperation and Development, 2015),
- Learning by Design Knowledge Process Framework (Kalantzis, 2006b),
- The Four Domains of Public Health Learning Outcomes as delineated by the Association of Schools and Programs of Public Health (2011).

21st Century Skills

The Assessment and Teaching of 21st Century Skills Project (2012) defined four broad categories of 21st Century Skills which encompass knowledge, skills, attitudes, values and ethics (Assessment and Teaching of 21st Century Skills Project, 2012) and transferable skills. 21st century skills have been categorised in various ways, for example:

1. *Ways of thinking*: creativity and innovation; critical thinking, problem-solving, decision making; learning to learn/metacognition (knowledge about cognitive processes);
2. *Ways of working*: communication; collaboration (teamwork);
3. *Tools for working*: information literacy; information and communication technology literacy;
4. *Ways of living in the world*: citizenship-local and global; life and career; personal and social responsibility-including cultural awareness and competence (Binkley et al., 2012; Binkley et al., 2009).

The Six C's of the New Pedagogies of Deep Learning

As explained on the New Pedagogies for Deep Learning Global Partnership web page (New Pedagogies for Deep Learning Global Partnership, nd) which promotes dealing with real-life issues and moving towards learning to live. There are six C's, citizenship, collaboration, communication, creativity, character, and critical thinking, described as the new pedagogies of deep learning (Fullan & Scott, 2014).

The Deeper Learning Competencies

Deeper learning is suggested to support students to learn more efficiently by developing knowledge, skills, and academic mindsets simultaneously and acquire and retain more knowledge when they believe their studies are important and they are enabled to apply what they are learning in complex and meaningful ways (The William and Flora Hewlett Foundation, 2013). The Deeper Learning Competencies as per The William and Flora

Hewlett Foundation are described, within 21st Century Skills related to the cognitive, intrapersonal, and interpersonal domains (National Research Council, 2012) as: *Cognitive*: mastering core academic content, and thinking critically and solving complex problems; *Intrapersonal*: learning how to learn, and developing academic mindsets; and *Interpersona*l: communicating effectively, and working collaboratively

The OECD Learning for 2030

The Organisation for Economic Cooperation and Development (OECD) has promoted 21st century skills for many years, and was instrumental in early efforts to have consensus in definitions but also recognising differentiation beyond information and communication technologies (Ananiadou & Claro, 2009). The OECD Future of Education and Skills 2030 project started in 2015 and carried forward the 21st century skills initiative in a global drive to better prepare students for the future and beyond through policy and research and curriculum design, with two phases: 2015 to 2019 which was focused on concept mapping and international analysis, and 2019 and beyond which is aimed at developing and articulating common terminology and design of international curriculum (Organisation for Economic Cooperation and Development, 2015). The OECD also developed an animated *Learning Compass 2030* which basically illustrates the learner journey and is best viewed in-situ at the website http://www.oecd.org/education/2030-project/teaching-and-learning/learning/.

Learning by Design

Learning by Design is an approach that evolved from an experiment in classroom and curricula development which sought to transform learning environments for more relevance to a changing world (Kalantzis, 2006b). These approaches, as described as New Learning Pedagogy in summary about experiencing (known to the new), conceptualising (naming to theorising), analysing (functionally to critically) and applying (appropriately to creatively (New Learning, nd) and signify deeper learning and higher order cognition (Kalantzis, Cope, & Learning by Design Project Group, 2005).

The Four Domains of Public Health Learning Outcomes

The Four Domains of Public Health Learning Outcomes, were developed from a project of the *Association of Schools of Public Health* (ASPPH) in the USA and include: Knowledge of human cultures and the physical and natural world as it relates to individual and population

health; Intellectual and practical skills; personal and social responsibility; and integrative and applied learning examples (Association of Schools & Programs of Public Health, 2011).

Conceptual Framework Integration

The integration of key aspects of the theories and movements which informed the conceptual framework of the research inquiry process is demonstrated in Figure 1.1: *Conceptual Framework Integration and Inter-relationships*, which shows the inter-relationships across them. The integrated framework provides directions related to the public health learning outcomes.

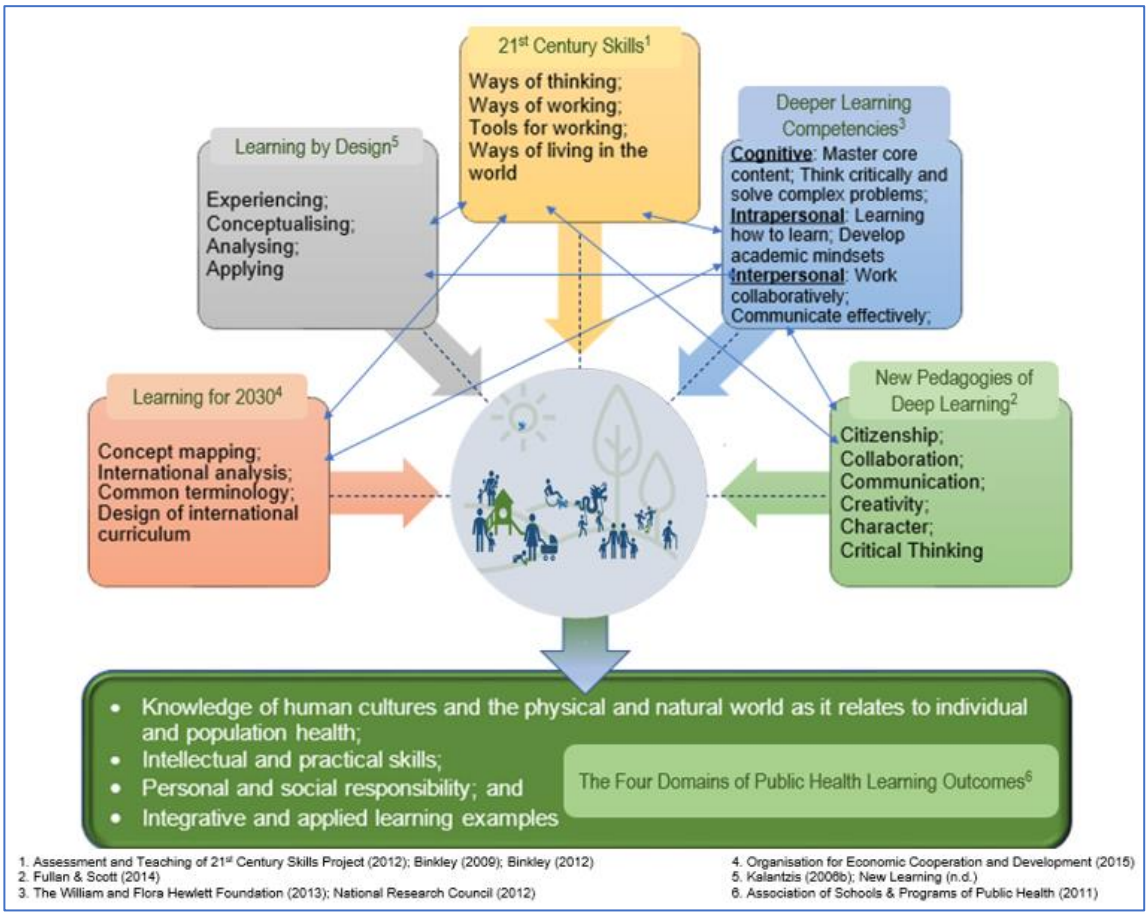


Figure 1.1*: Conceptual Framework Integration and Inter-relationships*

Conceptual Framework relationship to Research Focus

The research focus was deep learning for 21st century skills which enabled work-readiness for a role in public health after graduation. Figure 1.2: *Schema demonstrating Conceptual Framework relationship to the Case Study focus*, shows the relationship of the key aspects of the movement and theories which guided determination of work-readiness in relation to the research focus.

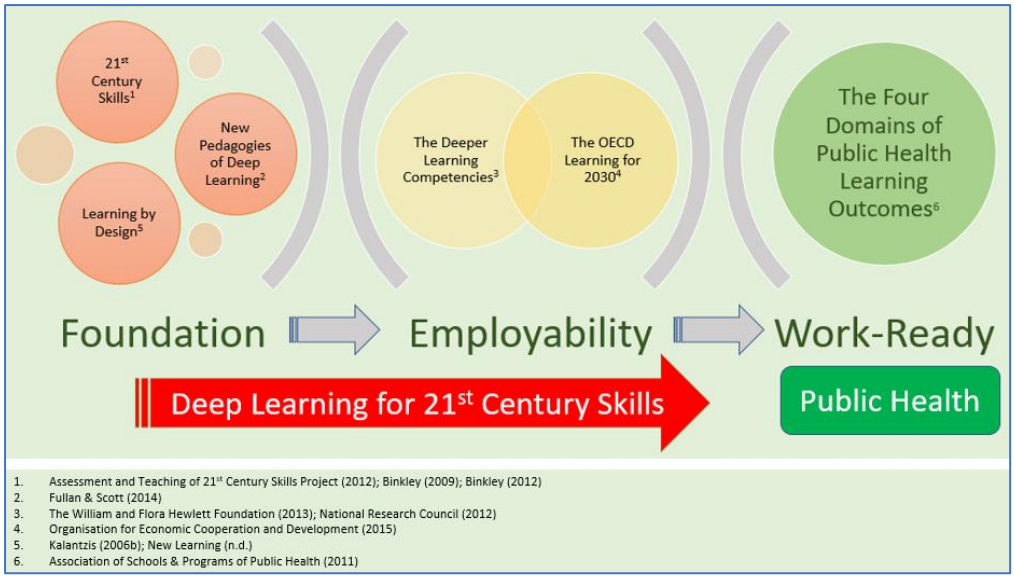


Figure 1.2: *Schema demonstrating Conceptual Framework relationship to the Case Study focus*

Outline of the Research 'Problem'

The research problem, in context, related to the associate degree anecdotally reported to be a student default choice when not offered their first preferred ranked program, possibly due to the competitive nature of university offers linked to ATAR, especially for popular courses, such as Nursing (Better Education, 2018). The ATAR, refers to *the Australian Tertiary Admissions Rank*; a ranking of Year 12 results that measures overall academic attainment compared with all other final year students, and used to determine a student's entry into university (VTAC, 2020). In addition, students who did proceed to second year had to choose one of two elective streams, health information management, or promoting health. Students anecdotally reported that completing the associate degree would not give them a direct entry role in health. The issue there-in was that the student was not cognisant of the skills that they were developing which equated to employability skills more broadly and anecdotally reported their study as time lost. Bennett and colleagues (2016) suggest that employability skills should be about developing capabilities in the areas which support workplace success.

Research Questions

The research questions were developed to explore the typical profile of the associate degree in health science student, and their perception of experiences which are indicative of deep learning for 21st century work-readiness, in particular for a health-related role in public health. So, the over-arching research question was:

In what ways can Associate Degree in Health Science students engage in deep learning promoting 21st century skills to enable work-readiness at graduation?

The over-arching research question was explored by seeking information to answer the following related questions:

- *What are the learning approaches used by Associate Degree in Health Science students?*
- *What pedagogical strategies support deep learning outcomes to promote generic and transferrable 21st Century skills?*
- *What questioning approaches do students use in an instructor facilitated Public Health Group Project?*

Outline of Research Methodology and Methods

The research was undertaken primarily as a bounded case study of human experiences, in respect of a study about undergraduate university students, at one location. A case study deepens understanding, within a bounded system, of behaviours in a particular context rather than establishing objective facts (Egbert & Sanden, 2014), and suitable where the researcher cannot control events (Yin, 2014). Research information was gathered using both quantitative and qualitative methods for the purpose of a deeper understanding of the student cohort. Qualitative research seeks understanding of actions and behaviour, whereas quantitative research seeks empirical truth (Gerrish & Lathlean, 2015): traditionally the quantitative associated with the positivist paradigm, and qualitative within the naturalist paradigm (Porter, 2008). The research aligns with a methodology of mixed methods design.

The mixed-methodology approach enables multiple viewpoints to inform the interpretation of the results. (Hyett, Kenny, & Dickson-Swift, 2014; Timans, Wouters, & Heilbron, 2019). Mixed methods research has been stated to be a third model of research in the behavioural and social sciences (Ponce & Pagán-Maldonado, 2015), and increasingly published in interdisciplinary educational journals (Lopez-Fernandez & Molina-Azorin, 2011). Creswell (2015) refers to the merging of quantitative and qualitative research for analysis and comparison of resulting as a convergent design. Quantitative data findings are discussed descriptively. In regard to the qualitative research in the health sciences, it is suggested that how it is reported lacks consensus, but could be aided by use of matrices and displays, and more attention to conceptual frameworks and theory, qualitative validity, and researcher reflexivity (Raskind et al., 2019). Epidemiological research in public health is usually by multiple sources, for example, surveillance, and population-based surveys, but also other

independent sources (Lee & Zarowsky, 2015), and mixed methods research is becoming more acceptable in public health (Kaur, 2016). Raskind and colleagues (2019) urge researchers, practitioners, reviewers and editors to also acknowledge the unique benefits of qualitative methods in the field of public health.

By means of quantitative data from two questionnaire instruments, the *Index of Learning Styles Questionnaire* (Felder & Soloman, nd-a) and the *Deep Learning for 21st Century Skills in Public Health Education* developed by the researcher for the research, and qualitative content analysis, via textual analysis activities of focus group interviews, individual interviews, and student written reflections a story emerged, profiling a learner achieving in ways demonstrative of deeper learning for future-focused health career aspirations. Figure 1.3: *Research methods used in the case study*, shows the various sources of data. ILSQ refers to the *Index of Learning Styles Questionnaire* (Felder & Soloman, nd-a), and DLQ refers to the researcher developed instrument, the *Deep Learning for 21st Century Skills in Public Health Education Questionnaire*.

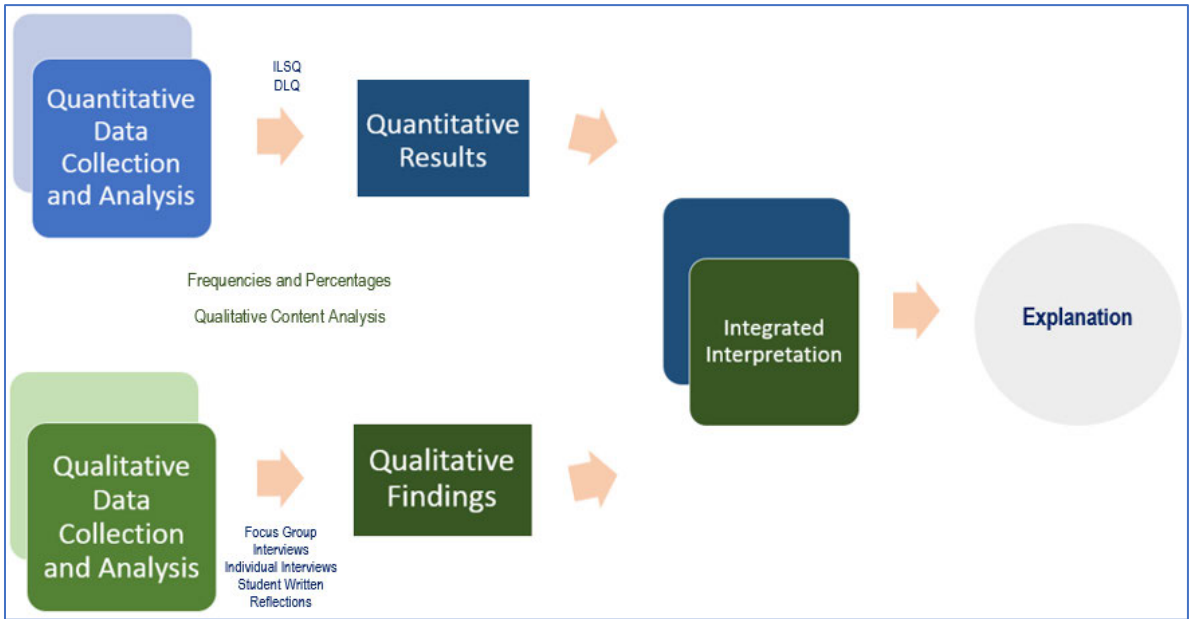


Figure 1.3: *Research methods used in the case study*

The research participants were students enrolled in the Associate Degree in Health Science program in primarily during 2016 and 2017. In the active phase of the research, 75 participants completed the ILSQ, 55 participants completed the DLQ. The researcher conducted three focus group interviews, and five individual interviews. Eleven student reflections were available for the research. More detailed information can be occasioned from participants and contribute to understanding of the social environment (Kervin, Vialle, Herrington, & Okely, 2006) Data needs to be described but also interpreted (Bell & Waters,

2014). Content analysis is used in quantitative and qualitative research to gauge answers to open questions (McMurray, Pace, & Scott, 2004).

Overview of the layout of the thesis

Chapters

Chapter 1: Introduction is a preview of the research and precedes the rest of the chapters; Chapter 2: Literature Review, is a comprehensive critical appraisal and discourse of the body of evidence related to the various research areas. Topic headings are provided to direct the reader; Chapter 3: Methodology, which details the scope of the research, methodology, the research questions, conceptual model, research methods, and instruments and processes instructive of and informing the particulars and parameters of the case study research, which is primarily a qualitative inquiry; Chapter 4: Presentation of Results, presents all the findings and is sectioned in regard to the research method and/or instrument used to gather the information; Chapter 5: Discussion, is separate from the results and provides an integrated interpretation of overall emergent themes and compares findings with the published literature; and Chapter 6: Conclusion, is a summary of the research and brings all the elements together in completing the inquiry for dissemination by thesis.

Conclusion

Chapter 1: Introduction, has provided an outline of the study parameters, in respect to overview of the study, background of the study, significance of the study, research problems and research questions, research methodology and methods, and a guide to the layout of the thesis.

Chapter 2: Literature Review

Introduction

This chapter presents a review of the literature in relation to learners undertaking early studies in associate degree level courses or similar, as vocational preparation or as a pathway into degree level programs. The literature review presents information relevant to the research questions of the study. Areas discussed will be previous studies in the area of learning for vocational outcomes, particularly related to public health, deep learning as applicable to 21st century skills, questioning and inquiry as aspects of deep learning; characteristics of learners undertaking health science and public health programs in particular. Workforce development for public health, and work-readiness will also be discussed. A major focus of this chapter is work readiness, particularly how learners are motivated both intrinsically and extrinsically to achieve skills expected by employers as applicable to the public health workforce. The literature covers a diverse range of themes in the science and art of learning, and also in preparatory programs for work-readiness in entry level public health employment. The chapter is organised into topic areas, with broad headings to provide content direction to the reader: workforce for public health, undergraduate public health education, work-readiness and employability, deep learning for 21st century skills, pedagogy, learner engagement, and technology enabled learning, and the associate degree. Under these broad headings are sub-headings. Each topic area will also include focused discussion pertinent to the area of public health.

Search Strategy

The review of local and international literature was undertaken employing selected key words and MeSH search terms were utilised and a range of electronic databases and search engines were accessed, especially EBSCO Discovery Service at Victoria University. These included Cumulative Index of Nursing and Applied Health Literature (CINAHL), CINAHL Plus, Educational Resources Information Centre, PsycINFO, Medline, ProQuest Dissertation and Theses for empirical reports, Google and Google Scholar, Health Source: Public Health, Health Science, Nursing/Academic Education, and Gaming. Open access sources and creative commons for researcher dissemination was utilised, and Professional Organisations relevant for Education and Public Health, Government and Policy documentation, non-government organisation sources as pertains to grey literature, and conference proceedings were also accessed and scrutinised.

Workforce Preparation for Public Health Roles

A survey of public health work staff in the USA showed that most respondents (72%) were female and most staff had substantial experience in public health with 18% reporting an associate degree credential, 75% a four year bachelor degree level credential, 38% masters level, and 9% a doctoral degree (participants reported more than one credential – not necessarily in public health) (Sellers et al., 2015). However, 33% did report some sort of (any) professional certification, but only 17% of participants had a degree in public health (any level) (Sellers et al., 2015). Report of public health workforce in Australia is limited to public health medicine, that is, medical practitioners working in the area of public health with 2016 data showing that males represented 62.8% of clinicians, and overall nearly 80% of clinicians were aged 50 years or older (Australian Government Department of Health, 2016). Gray and Evans (2018) describe the current public health workforce in the United Kingdom (UK) as transitioning from a predominantly medical to a multidisciplinary public health specialist workforce over a relatively short timescale (Gray & Evans, 2018). However, it must be noted that Gray and Evans (2018) promote a model of masters degree as an entry level qualification for public health and imply that countries that they describe as anglophone (Australia, New Zealand and the Republic of Ireland) which usually adopt the UK model are lagging in not requiring such high level public health entry.

The public health workforce in the USA, in the majority, were very satisfied with their job, which the researchers indicated was an unexpected finding considering the constant change and uncertainty in the field (Harper, Castrucci, Bharthapudi, & Sellers, 2015). Higher levels of supervisory support and organisational support also scored highly (Harper et al, 2015). There is an increase in areas and functions that require public health education preparation (Beck et al., 2015) and more formalised links between health delivery and health education organisations (Jones, 2016). For example, undergraduate public health capstone projects are reported, wherein students identify local public health issues, examine peer-reviewed literature and connect associations between a health issue and its correlated outcome (Fitzpatrick et al., 2016).

Career Pathway to Public Health Role

Determining a career path into public health is not straightforward, for example, in contrast to other health professions, students considering undertaking public health studies, particularly at the undergraduate level, are frequently uninformed about career prospects (Lee, 2014). A USA study found that relatively few staff working in a State Health Agency central office had any formal training of any sort in public health, though other educational attainment was quite

high (Leider, Harper, Bharthapudi, & Castrucci, 2015). Social skills, such as engaging in respectful relationships with a community, is a fundamental quality for the lay public health workforce in the UK, including support roles, community education, and projects (South, White, Branney, & Kinsella, 2013). Graduates of college level programs in the USA have the opportunity to enter support roles in public health (Wilson & Riegelman, 2015). Volunteers from diverse fields are reported as contributing experiential learning that supports future public health workforce development in public health (Marriott et al., 2015).

Koo and Miner (2010) proposed a new discipline related to public health work-force development via outcomes based public health education. An association with public health agencies and community colleges (USA) is reported to advance public health education due to the diverse student population, through specialised associate degrees that serve workforce needs, integrating public health into general education (Kirkwood & Riegelman, 2011), as is the use of public health case studies to potentially prepare a future public health workforce (Louw, Turner, & Wolvaardt, 2018). Undergraduate public health programs are established in USA (Bass, Guttmacher, & Nezami, 2008 ; Evashwick, Tao, & Arnold, 2014) and a phased approach regarding advice to students about undergraduate public health study is recommended (Arnold, Embry, & Fox, 2015) as well as Special Interest Groups (Louw et al., 2018).

Entry Level Public Health Education

Early this century education for a public health role was predominately situated as postgraduate level study, however this was also a turning point when the pre-eminence of post-graduate preparation was being challenged by proliferation of undergraduate public health preparation programs (Riegelman et al., 2015). To some extent, this change to undergraduate programs was influenced by a key report from the Institute of Medicine (USA) which recommended substantial changes in health professional education to reduce preventable adverse events (Institute of Medicine, 2000), followed up with another report recommending that public health education should be accessed by all undergraduates of health professions (Institute of Medicine, 2003).

Undergraduate Public Health Education – Global Trends

Improved access and provision of public health education at the undergraduate level has been discussed in the UK (Cole, Sim, & Hogan, 2011; Pilkington, 2008) and in Canada, in building the health education and health promotion workforce to improve local and global health (Vamos & Hayos, 2010). It is also anticipated that there will be many advances in

understanding of health, wellness and lifestyle in the coming decades (Edington, Schultz, Pitts, & Camilleri, 2016) with health professional practice likely to be increasingly information-intensive (Gray, 2016). Professional health role education is discipline specific and in the public health domain encompasses health improvement, health protection, and health service quality improvement, at least as a basis in the UK, but at the Masters level (Thorpe, Griffiths, Jewell, & Adshead, 2008). Public health in China, as suggested by Griffiths et al. (2010) is best served by both an educated workforce and better informed citizens. It was also recommended that public health education in China reform to a biopsychosocial model for health, with integration between Chinese and Western Medicine (Li, Tang, Lv, Jiang, & Griffiths, 2011). However, there is evidence that public health education in China is somewhat predisposed towards American, European, and Soviet Union models, and persists with the medical model more broadly (Jin, Dong, Zou, Shen, & Li, 2020). Content analysis of online handbook information of 47 universities in Australia and New Zealand showed that 45 offered some form of undergraduate coursework in public health (Luu et al., 2019).

Public health orientation is also found in pharmacy education (Addo-Atuah, 2014; Mager & Farris, 2016; Strand & Miller, 2014) and covered in complementary and alternative medicine disciplines such as naturopathy, chiropractic, acupuncture, and massage therapy (Brett, Brimhall, Healey, Pfeifer, & Prenguber, 2013). It is also proposed that while not everyone needs a degree in public health, a better-educated citizenry could increase the public health workforce (Outram et al., 2014; Petersen et al., 2013).

Mainstreaming Undergraduate Public Health Programs

Public health undergraduate education has become mainstream and is diverse and evolving quickly (Resnick et al., 2017). Interviews with staff from 39 universities revealed views about why public health has become more mainstream; for example, interest in health and wellness, public health's do good appeal, service-learning opportunities, and as an alternate major for students (mostly culturally diverse, female, and full-time residential college) unable to get into restricted enrolment courses such as nursing (Resnick et al., 2017). Culturally diverse students were also rationalised as understanding public health in a personal way, as do veterans and disabled persons (Resnick et al., 2017). Wykoff, Khoury, Stoots and Pack (2015) believe that the undergraduate degree in public health should both prepare graduates for the workforce and be considered a professional degree designed, delivered, modified, and evaluated primarily from the point of view that students are being prepared for the workforce. Programs also need to be regularly benchmarked against local employers, and particularly before offering a program, that there is a job market after graduation (Wykoff et al., 2015).

Social and Civic Accountabilities and Responsibilities

Butler (2015) expressed the belief that learning about civics and citizenship is critical and evolutionary in terms of transformative education worldviews, and 21st century life. Social accountability is also stated to be a duty of institutes which educate health professionals (Ventres, Boelen, & Haq, 2018). Higher education providers are also obligated to promote peer learning which develops citizen scholar attributes such as creativity, innovation and resilience in terms of value adding to social mission (McIntosh, 2019), as well as encourage students to get involved with the community they will be serving (Ayres, Stevens, & Regan de Bere, 2016; Vyas et al., 2017). However, research about how students less inclined to learn from a service learning-subject perceive the value of completing mandatory service-learning (meeting a community need), found that these students would likely not enrol in the subject if they had the option to opt out (Chan, Ngai, & Kwan, 2019). Less-inclined students had no significant difference in self-reported civic, intellectual, personal, and social development compared to those students who were more inclined towards service-learning within their study program (Chan et al., 2019).

Teaching public health to students is suggested to be effective as agency for social change (Godwin & Heymann, 2015), and recommended to start in high school (D'Agostino, 2018). A USA study involving middle school program designed to spark interest in science with students under-represented in applied sciences included survey items related to civic duty, civic efficacy and civic participation and showed positive influences regarding motivation and attitude (Sprague Martinez et al., 2016). Social accountability is also a challenge, that is, of providing confirmation that priority health needs are for the intended - patients, citizens, families, communities and the nation at large (Boelen & Woollard, 2011). As example and pertaining to social accountability is the ethical distribution for allocation of a COVID-19 vaccine globally (Liu, Salwi, & Drolet, 2020), and also equitable influenza vaccine access in developing countries during the COVID-19 pandemic (Rastegar, Tavana, Meraj, & Mina, 2021).

Liberal Education

The Liberal Education and America's Promise (LEAP) framework was developed to respond to contemporary demands for more college-educated workers and more engaged and informed citizens (Association of American Colleges and Universities, 2015). College learning outcomes that executives and hiring managers rate as most important include oral and written communication, critical thinking, ethical judgment, working effectively in teams, and real-world application of skills and knowledge (Association of American Colleges and Universities, 2018). The *Employers Priorities for Most Important College Outcomes Report*

2015 (Association of American Colleges and Universities, 2015) which included research commissioned from Hart Research Associates (2015) highlighted how employers rate certain college study level outcomes: knowledge of human cultures and the physical and natural world, intellectual and practical skills, personal and social responsibility, and integrative and applied learning (Hart Research Associates, 2015). There was 96% consensus about problem solving in diverse settings as a criterion within the *personal and social responsibility* theme, but on the other hand, quantitative reasoning, within the *intellectual and practical skills* theme, was only identified by 56% of respondents (Association of American Colleges and Universities, 2015). This latter finding aligns with findings from other research that application of mathematical principals is not something universally appreciated nor understood but is considered a priority development area in undergraduate programs (Elrod, 2014).

The Educated Citizen

An influence on public health more broadly is viewed in terms of the educated citizen and as situated as liberal arts education (Riegelman et al., 2015) and undergraduate public health education as liberal education, not just learning for learning's sake, which is suggested to optimize opportunities for future employment (Kiviniemi & Mackenzie, 2017). Educated citizenry as a component of public health and placed within a liberal arts education framework has also been discussed (Petersen et al., 2013). Students are stated to study public health because it is interesting and a basis for a future external to health sciences with broad diversify upon graduation, especially if the education includes a cap-stone project - thereby blending liberal arts and practice-based philosophy (Rozier & Scharff, 2013). The *Educated Citizen Initiative* in the USA advocates that knowing about public health issues is a fundamental element for societal responsibility (Caron, 2016). The rise of citizen science as mainstream is also gaining momentum, especially in the contributions of non-scientists addressing grand challenges (Füchslin, Schäfer, & Metag, 2019; Ryan et al., 2018), some of these about public health issues (Australian Citizen Science Association, 2020).

Strategies Promoting Student Engagement to Achieve Public Health Capabilities

Service-learning is a type of experiential learning which is claimed to improve factors related to understanding the relevance of a course of study as well as faculty attitudes (Cashman & Seifer, 2008), and influences the way the health care workforce is prepared (Martin Jr, 2014). Experiential service-learning projects in public health courses supports efforts that help students gain practical experience and prepare them for similar workforce projects (McIntire & DiVito, 2017). A Hawaiian University addressed a gap in curricular and pedagogical models with an introductory public health courses ensuring student exposure to and mastery

of core public health competencies with learning objectives related to foundation knowledge and skills, communication, information literacy, and local and global applications (Nelson-Hurwitz et al., 2018).

Capstone projects are stated to engage learners in authentic public health experiences (Petrovic-Dzerdz & Trépanier, 2018). For example, a photo-essay project related to public health was found to be a positive learning and experiential activity in research that utilised a descriptive case study methodology exploring pedagogy and learning outcomes (Dundas et al., 2017). Analysis revealed thematic pathways of public health knowledge development embodying the educated citizen agenda, and teaching and learning pedagogy, with the essential role public health has across all societies and insight of workforce implications beyond health professionals made evident (Dundas et al., 2017).

Curriculum to Develop Public Health Competencies

Friedman and Lee (2015, p. 3) state they are '*bullish*' on the future of the public health degree and believe the demand will only get stronger in years to come and pose the question about ideal curriculum for undergraduate public health education suggesting that students use the degree as preparation for entry into professional health courses leading to medicine, nursing, physical therapy, pharmacy and other speciality areas. Wykoff, Petersen and Weist (2013) comment about the recommended critical component elements of an undergraduate major in public health, described as domains of: background (science, social and behavioural sciences, math, humanities, communications, information literacy); public health; and cumulative experience and field exposure. A capstone project of an applied or inquiry experience is also recommended (Wykoff et al., 2013). Global citizen level competencies are also an imperative, and inclusive of socio-political and cultural awareness along with a focus on health and disease (Sawleshwarkar & Negin, 2017). However, there is also evidence that a lack of integration between assessment and learning has been found to have a detrimental effect on the development of professional identity in public health training in a program in the UK (Wood, 2016).

Public Health Work-Readiness Curriculum

Undergraduate curriculum in public health is also benchmarked to the needs of the workforce (Stoots et al., 2015). Researchers interviewed relevant preceptors and employers in efforts to inform their public health curriculum with findings informing competency needs, and employer expectations of graduates skilled with knowledge of their field, strong written and verbal communication, technological abilities, and professional and ethical behaviour (Stoots et al., 2015). It was also found that students want more field experience (Stoots et al., 2015).

Wang (2015) wrote about work readiness and guiding the learner/traveller towards a prosperous future, further suggesting that curriculum mapping which focuses on work-readiness has utility for outcome-based learning (Wang, 2015). Wang (2015) also discusses the vocationalism movement in higher education in relation to occupation relevancy and contends that responsibility to prepare graduates for the unpredictability of life rests with the university. A similar sentiment in relation to public health education, is that content (public health) delivered by didactic mode risks being outdated in so far as it is easy to get relevant contemporaneous information on-line (Winskell, Evans, Stephenson, Del Rio, & Curran, 2014).

Projects, Capstones, and Practicums in Public Health Role Preparation

Assessments that challenge students to work collaboratively on public health issues relevant to their local community are recommended (Nelson-Hurwitz et al., 2018), with project-based public health activities found to improve confidence in student ability to develop an evidence-based public health program directed toward a vulnerable population (DiVall et al., 2013). For example, a collaborative student teacher project in public health which explores a public health issue via literature review can be a capstone activity (Fitzpatrick et al., 2016). An innovative approach for engaging medical students about public health through case studies. supports the preparation of doctors for the practice of medicine (Vyas et al., 2017). Another example is described wherein students, undertaking a Bachelor of Arts (Public Health), execute their proposed applied learning project as a real-world application, and thereby, via application and integration of public health knowledge, skills and practice, achieve success through finalising, reflecting and sharing their project (Nelson-Hurwitz & Tagorda, 2015).

A USA survey showed that practicums generally involve alliance with governmental state health agencies and allow students to both contribute to local public health issues and prepare for the workforce (Burke & Biberman, 2017). Other research (UK) identified that whilst public health projects were almost universal, assessment was found to be shifting towards Multiple Choice Questions and Short Answer Questions rather than essays and project work (Lyon, Hothersall, & Gillam, 2016) and that more innovative approaches to teach public health, and well-trained and motivated public health educators are needed (Lyon et al., 2016). USA colleges which offer undergraduate public health programs are recommended to have at least one of their academic staff in possession of a formal credential in public health (Association of Schools & Programs of Public Health, 2014).

Associate Degree Curriculum for Public Health Roles

The final report of the *League for Innovation in the Community Colleges and Public Health Project*, USA (2014) provides background on the role of community colleges in education for public health, such as entry-level career opportunities as an outcome of associate degrees and certificate programs, with opportunity to transfer into bachelor's degree programs (League for Innovation in the Community College, nd). Wilson and Riegelman (2015) describe two curricular frameworks in relation to community colleges in the USA being suitable venues for public health education: Health navigator associate degree programs which prepare workers for roles in community health, and patient navigators and health insurance; and public health generalist and specialisations prototype, which transitions to baccalaureate programs in public health.

Work-Readiness and Employability

Engaging diverse stakeholders in public health research is important (Laird et al., 2020) and what is feasible in terms of education programs to meet stakeholder expectations of public health program graduates is contextual (Edwards, Venugopal, Navedo, & Ramani, 2019). Gaps in the work-readiness of graduates of health professional preparation programs in Australian university is reported in the literature (Merga, 2016), and it is suggested that there is risk for graduates in the workplace if they leave university with under-developed employability skills (Cavanagh, Burston, Southcombe, & Bartram, 2015). The Business Council of Australia (2016) suggests that work-readiness is not just a qualification but a mix of behaviours, skills, and values and there are multiple stake-holders with responsibility for work-readiness, for example family, business, schools, vocational, and higher education providers, government, and where applicable professional associations . It is suggested that what people choose to study is fateful (Whitney & Trosten-Bloom, 2003). Graduands readiness for entry into the workforce has been questionable, regarding lack of certain applied skills, and attributes related to work ethics and professionalism, verbal and written communication, thinking critically, ability to solve problems, and working collaboratively in teams (Casner-Lotto, 2006). Employers in the USA most highly rate college graduate skills related to interpersonal and intrapersonal skills including communication, professionalism, personal motivation, problem-solving, and working well with others (Baird & Parayitam, 2019).

Skills for Work

According to the *Foundation for Young Australians* (2019) Australia is failing to equip young people with the skills they need to succeed as indicated in a Media Release which suggests

that 70% of young people are learning skills that will be redundant by 2030 (McPherson, 2019). Australian students have found academics' understanding of contemporary workforce needs wanting (Bennett et al., 2016). The *Employment Service Report 2020* details the reality of the challenges people in Australia face in getting the relevant skills to be employed (Commonwealth of Australia Department of Jobs and Small Business, 2018). University education reform to move away from demand-driven approaches regardless of ability to a more applied focused, career-ready curricula to meet actual workforce requirements is urged in Canada (Coates, 2015). Research about employers demanding 21st century skills, such as oral and written communication, collaboration, problem solving, and critical thinking, and how these varied by job characteristics, found that differences were identified for both degree field requirements and education level; that is job advertisement comparisons showed that oral communication skills were indicated more highly in associate degree versus bachelor or graduate degrees (Rios et al., 2020).

The Australian Government Core Skills for Work Developmental Framework comprises elements of skill clusters and areas (knowledge, understanding, skills), focus areas (for each skill area), performance features, that is, the kinds of things someone knows, understands and can do at each stage (novice to expert), and influencing factors (on performance). (Australian Government, 2013). The skill cluster relates to the areas of 'navigate the world of work', 'interact with others', 'get the work done' (Australian Government, 2013). Influencing factors encompass existing skills and knowledge, familiarity with context, complexity of tasks, nature and degree of support, level of autonomy, degree of motivation, self-belief and resilience, cultural and value-based factors, and external factors (Australian Government, 2013). Stakeholders interests in a skilled workforce include students, industries which employ graduates, for example health workforce, the community, education providers (continually improve), regulatory authorities and decision-makers and policy drivers, and advocates for change (Australian Government Department of Health, 2013; Bennett, 2018; Laird et al., 2020).

Graduate Work-readiness

Graduate work-readiness and successful employment is considered to be influenced by the attainment of certain generic capabilities (Jackson, 2016). It is also recommended that generic graduate attributes should not be considered as add-on, but rather be integrated across the academic program (Nagarajan & Edwards, 2014). Using data from an Australian Graduate Survey, Jackson (2016) sought to evaluate development of generic skills and graduate qualities, as well as other factors influencing graduate identity, finding that the development of analytic skills and written communication rated highly, however the ability to

work as a team member did not rate as highly, but course experience encouraged value of other perspectives. Gender differences were identified, for example males giving higher value for analytic and problem-solving skills, whereas females more highly rating their written communication and planning skills (Jackson, 2016).

Generic Capabilities, Graduate Attributes, and Employability

Generic skills delineated in higher education graduate outcome compilations need to be applied more broadly via an integrated model of graduate employability, for example, the integrated model would encompass human capital, social capital, individual behaviours and individual attributes; factors which therefore influence perceived employability and as affected by the prevailing labour market (Clarke, 2017). Hong Kong research shows positive impacts on learning gains in generic skills by students undertaking undergraduate studies across courses which have generic skills embedded within the programs (Chow, Tse, & Armatas, 2020), however, whether these learning gains contributed to post-graduate vocational work-readiness or general employment for these students was not investigated in the research.

Students tend to be modest about their future employability (Rothwell, Herbert, & Rothwell, 2008). An outcome of a work-ready project in Sydney identified key graduate professional attributes and employability skills, including, but not limited to, areas ranging from communication, ethics, global and local perspectives, life-long learning, and self-management (Litchfield, Frawley, & Nettleton, 2010). However young adults may need structured direction to comprehend how their social, cultural, vocational, and temporal environments interconnect and influence their physical and mental capabilities, especially for the attainment of work post-graduation (Metzinger & Berg, 2015). Australian research revealed personal insight and self-awareness, resilience, communication skills, organisational skills, lifelong learning, and professionalism as most important for work-readiness of allied health graduates by allied health clinical educators, clinical supervisors and allied health directors (O'Brien, Troy, & Kirkpatrick, 2020).

An Australian mixed methods study using a theory of planned behaviour (TPB) based questionnaire to understand *Gen Y,* also referred to as millennials, intentions post-graduation, showed that *Gen Y's* who perceived greater pressure from important referents and who held greater perceptions of control and their capability to join their ideal organisation were more likely to intend to join their ideal organisation in the next six months (Warmerdam, Lewis, & Banks, 2015). The Deloitte Millenial Survey (Deloitte, 2016) reported that when evaluating job opportunities, millennials prioritised work life balance over career

progression. Polish research in the area of gainful employment of students undertaken during full-time studies, examined students' motivations to work and the selected effects of combining studies and work, revealed a strong relationship between the motivations to start work during studies and alignment between job and area of study, the opportunity to develop new skills and competencies valued by employers, and the willingness to continue working for the same employer after completing studies (Ostoj, 2020). An employer's intention to employ the graduate, and the type of work performed, in addition to work, study, and leisure balance was also a consideration (Ostoj, 2020).

Deep Learning for 21st Century Skills

Learning for future workforce development in relation to deep learning for 21st skills is also considered in the literature (Matsushita, 2018; Rios et al., 2020; Scoular, Ramalingam, Duckwork, & Heard, 2020). Students graduating from secondary school settings which foster deep learning approaches show abilities to navigate real-world situations and transition into higher education learning with inquiring minds (Alliance for Excellent Education, 2014). For example, learning about career options, especially in science is recommended to start in the early high school years (Aschbacher, Li, & Roth, 2010). Hattie (2012) implies that when teaching and learning are visible, there is a greater likelihood of students reaching higher levels of achievement but also asserts that almost any intervention can stake a claim to making a difference to student learning especially if the bar starts at zero. Deeper learning programs which strive for authentic learning to prepare students for real-world general situations, is a movement which gained momentum in USA high schools in the last decade (Alliance for Excellent Education, 2011; Mehta & Fine, 2012). Authentic learning covers a multiplicity of characteristics, foremost of emergent approaches being the learning by doing in context, and as situated practice with real-world processes and outcome measures (Great Schools Partnership, 2013; Herrington, nd; Lombardi, 2007). However, there is less empirical evidence to support development of a deeper approach to learning by students in higher education as indicated in a review study (Asikainen & Gijbels, 2017).

Deep Learning Approaches

Studies looking at enrichment of learning to prepare for vocational practice are a challenge to categorise due to the diversity and breadth reported in said practices and determining which of these align with deep learning factors is a considerable undertaking (Matsushita, 2018; McNamara, 2011; Phan, Dou, Wang, Kil, & Piniewski, 2017). The point of difference between surface and deep learning was explored by Marton and Saljo (1976) in terms of what is learned versus how much is learned. In investigating how deep learning is referenced in the

literature, it is apparent that various understandings of its application and measurement differ between studies, for example, service learning using summative co-assessment has been used as a deep learning approach to enhance employability skills and attributes looked at through the lens of critical reflection (Deeley, 2013). Another approach, is guided independent learning which is recommended as suitable for adult learners; particularly critical thinking and problem-solving skills (Hsu et al., 2015). Fullan and Langworthy (2013) make mention of deep learning work, that is, where organisations have become more horizontal and work is project-based, as measured by performance and the impact of ideas and teams' innovation. Fullan (2013) suggests that the new pedagogy of learning involves students and teachers as learning partners. Taylor (2014) personally reflects that the needs of the learner is best served by emphasising process rather than content. Hattie and Donoghue (2016, p. 9) discuss the '*skill, will and thrill*' outcomes of learning, including deep learning. Findings from meta-review research indicated that the optimal learning strategy depends on where in the learning cycle the student is located (Hattie & Donoghue, 2016). Fullan and Scott (2014, pp. 6-7) make the claim that the six Cs of deep learning is evolutionary to some extent, referencing these as character, citizenship, collaboration, communication, creativity, and critical thinking, a continuous ecology and ethics of life, learning, and resolving complex personal and societal challenges.

Deep Learning and Learning How to Learn

There has also been a call to do research related to transformation and deep approach theories of learning, due to a lack of such cross-fertilization (Howie & Bagnall, 2013). In the first instance it cannot be assumed that students know how to learn and guidance and strategies about learning how to learn may empower students to successfully complete their studies (Alton, 2016; Bowering, Mills, & Merritt, 2017; Gogus, 2008). Individual learner differences influence their personal epistemic thinking, and classroom tasks were considered authentic by students who indicated belief of knowledge as being complex and evolving, and those who consider knowledge as self-constructed perceive class activities to be complex, as found in research with undergraduate students (Barger, Perez, Canelas, & Linnenbrink-Garcia, 2018).

Constructivist Alignment as a Deep Learning Approach

Constructivism is described by Hendry, Frommer, and Walker (1999, p. 369) as a '*philosophy based on the fundamental assumption that knowledge cannot exist outside our minds*'. Golding (2011b) observed that constructivist discussion in the classroom ranged from teacher-directed through to unstructured discussions. Biggs (2014) referred to constructive alignment as being about expressing learning outcomes to be achieved by

students before teaching takes place, thereby optimising a learner-centred approach and how the learner may best be engaged to achieve the expressed outcome/s. Biggs' Constructive Alignment was used in research involving interview, survey and document analysis to determine if students would adjust their learning approaches and study behaviours depending on the teaching and classroom environment with findings indicating that deep learning approaches were more likely to be demonstrated in constructively aligned courses (Wang et al., 2013).

Surface and Deep Learning and Cognitive Load Theory

Working memory is evoked in the processing of information and skills in effective learning and can be retrieved to use in new situations, and instructional content for relevant cognitive load should encourage deep learning (Hultberg et al., 2018). Hultberg, Calonge and Lee (2018) write about long-lasting learning through instructional design using the framework of Cognitive Load Theory as developed by John Sweller (cited by Hultberg, Calonge and Lee, 2018) which describes three types of cognitive load: intrinsic (effort associated with the complexity of material), extraneous (how content or tasks are presented to students), and germane (facilitates the construction and automation of schemas). How some students approach learning is contrary to the assumption that some students change from a deep approach to surface approaches depending on the context, rather that willingness, or not, to embrace newer methods of learning was influenced by the learners pre-existing beliefs about learning and how they perceived the relevance of what they were expected to learn in relation to their career ambitions (Balasooriya, Tetik, & Harris, 2011). Some students show inability to resolve conflict between their studies and their social life, however, surface responding students show less inclination to reflect on areas that need improving, but rather reacted to lower grades by devoting more time to study and working harder (Balasooriya et al., 2011).

Self-regulating Learning for Life

Training students in how to self-regulate their learning may positively impact their academic outcomes (Ferreira et al., 2014) and life-long learning after graduating (Wang & Hu, 2012). An alternate perspective is consideration of learning what to learn across the lifespan, and the way of learning what to learn: from stimulus, reinforcement and feedback, people, and prior knowledge (Wu, 2019). Life-long learning habitus and maintaining situational attention in instructional sessions to promote individual interest for the subject is suggested to foster life-long learning (Clapper, 2014). Employability across the lifespan after graduation is also a consideration, especially for those working in the health and community sector who express a preference for on-site learning at their places of work (Choy, Billett, & Kelly, 2013). For

example, e-learning in the healthcare sector is established as means towards professional development (Cheng et al., 2014). A scoping review of use of digital media in public health is dominated by studies related to passive reception of messages and a focus on individual behaviour change (Clar et al., 2014). However, learning by doing is stated to be the learning approach preferred by health professionals in the workforce (Gil-Lacruz, Gracia-Perez, & Gil-Lacruz, 2019).

Deep Learning Orientation with 21st Century Skills Development

There was report of determined effort to use information to enhance 21st century skill development in vocational education and training in Australia (ACER, 2013) and utilising pedagogies for deep learning (Fullan & Langworthy, 2013; Kalantzis & Cope, nd; Yelland, Cope, & Kalantzis, 2008). Design of curriculum in relation to learner's understanding of outcomes is based on research constructed ideal worlds rather than the real world (Entwistle, McCune, & Hounsell, 2002; Entwistle & Smith, 2002). On the other hand research also supports that courses that are more constructively aligned support the adoption of deep learning approaches by learners (Biggs & Tang, 2009; Wang et al., 2013). Linking learner needs, pedagogy and technology in order to construct more interactive, engaging and student-centred environments that promote 21st century skills and encourage self-directed learning is suggested to be a key challenge for educators (Parker, Maor, & Herrington, 2013).

Various researchers, academics and commentators have expressed opinions about the acquisition of 21st century skills in post-secondary education (Bernhardt, 2015; Binkley et al., 2012; Brown, 2009; Dwyer, Hogan, & Stewart, 2014). Evidence about perception and performance and soft skills, such as communication, teamwork and leadership valued as graduate attributes is also reported (McCardle, 2014), though not unique to the 21st century (McGaw, 2013). Larson and Miller (2011) suggested that 21st century skills are about preparing for the future and teaching these skills is imperative. They, 21st century skills, should also be reflective of the needs of our complex world (Great Schools Partnership, 2016). McCune and Entwistle (2011, p. 303) encouraged an agenda about a will to learn in students to understand deeply and introduced the idea of a '*disposition to understand for oneself*'. Fullan (2013) conveyed the view that we need to move beyond venerating 21st century skills and actually move to apply them. There was, however, critique of the ideology of 21st century skills, that is, that the movement may clash with tradition (Kaufman, 2013). The impact, if any, of promoting and teaching 21st century skills remains unclear but is reported to be supported in Australian educational policy and frameworks (Lamb, Maire, & Doecke, 2017; Scoular et al., 2020).

Applied Science, Technology, Engineering, and Mathematics (STEM)

It could be argued that any graduate outcome that leads to a service vocation is a result of STEM curricula pervasive in 21st century education settings, as evidenced by the Government of Western Australia *Department of Education,* signifying that it is through STEM, that students develop key skills including problem solving, creativity, critical analysis, teamwork, independent thinking, initiative, communication, and digital literacy (Government of Western Australia). There is also relational commentary about certain disciplines, for example, nursing, being STEM-adjacent fields as discussed in a 2020 editorial (Davidson, 2020). Therefore public health as a STEM-adjacent area in its own right is also implied in some jurisdictions, for example, public health *is* a STEM-eligible program area categorised to enable international student entry to the public health programs in New York University, School of Global Public Health, with enables international students to apply for two additional years of employment after graduation (New York University). A STEM graduate is also highly regarded for the skilled nominated VISA pathway to permanent residency status in Australia (Australian Government Department of Home Affairs), for example, in professional, scientific and technical services predominantly, but also healthcare and social assistance areas (Prinsley & Baranyai, 2015).

Pedagogy for Deep Learning and 21st Century Skills

Meeting the learning needs of 21st century students in higher education is an area addressed in the literature (Abraham & Komattil, 2017; Merzel et al., 2017; Teo, 2019). It is suggested that there is an intersection of active and deep learning in higher education, wherein learning is referenced as engaging students with the world as an object of learning; therefore, with interaction with others, previous learning and experience influences their future life (Matsushita, 2018). Hughes (2017) advocates that within the current neoliberal episteme of Australian universities critical education in the class is potentially transformative. The literature shows a trajectory trending towards hybrid learning courses which meet the needs of diverse students (Boelens, De Wever, Rosseel, Verstraete, & Derese, 2015; Chen & Chiou, 2012; Millery, Hall, Eisman, & Murrman, 2014). Literature about core course content for introductory public health as undergraduate preparation is growing (Nelson-Hurwitz et al., 2018), as is the need for integrative programs which develop skills in dealing with the complexities of real-world public health needs (Kiviniemi & Przybyla, 2019).

At the end of the last century Catherine McLoughlin (1999) advocated that research about adaptive learning material was warranted. She was writing about instructional learning materials in print for distance learners (McLoughlin, 1999). This century, a number of

educators made robust cases about expanding the range of instructional approaches on the basis of not just effectiveness but also affordances (Newell, 2008) and allow for alternate pathways and destination points in learning (Kalantzis, 2006a) and an education revolution influenced by technology, but also how humans learn (Kalantzis & Cope, 2010a, 2010b). Skill in learning involves development of confidence, competence, and autonomy according to Morgan and Beaty (2005). In a students' development of competence to study they need confidence, however the transition towards less reliance on the course and the institution to control learning and the student taking personal responsibility for their study is considered an internal relationship (Morgan & Beaty, 2005).

The Kalantzis and Cope (2010b) *Learning by Design* is placed in the transformative learning educational paradigm as distinct from authentic. Kalantzis and Cope (2010b) discussed work, civic and personal life as changing in the knowledge society. Kalantzis and Cope (2010b) are writing about school children, but they do interestingly place emphasis on the learner, that is, that the learner's subjectivity is always particular, and it is this particularity which must be engaged. Educational design-based learning research has been recommended to inform health professional education curriculum (Steketee & Bate, 2013) and public health pedagogy (Abookire, Plover, Frasso, & Ku, 2020). Australian research about the support university educators accessed to design a quality learning experience for their students showed that all university educators who participated in the study indicated they had control over their design work as well as the sources they use to support their design work; these including colleagues, literature, workshops and seminars, conferences, institutional support services, and enrolment in postgraduate study (Agostinho, Lockyer, & Bennett, 2018).

Design-Based Learning as Pedagogy

Design-based thinking is described as an iterative process, helpful in identifying and finding solutions to problems, via understanding and observing, synthesising, ideating, developing prototypes and testing, suggested to foster metacognitive skills in students, and empowering educators to foster 21st century skills (Scheer, Noweski, & Meinel, 2012), especially creativity and innovation (Lor, 2017). Strobel, Wang, Weber, and Dyehouse (2013, p. 151) provided a definition for authenticity in design-based learning evironments which implied that it should focus on addressing some sort of gap or need or quest, in an environment outside of learning and education. Merril and Gilbert (2008) made a distinction between problem-centred learning as content-focused and peer instruction as process-focused but both are forms of learner-centred instruction. Deeley (2013) considers peer approaches such as co-

assessment as supportive of developing employability skills. Education that has a focus on experiential learning, interdisciplinary and inter-professional collaboration and on information analysis and synthesis is highly regarded in programs for public health career preparation and professional development (Abookire et al., 2020; Pfeiffer et al., 2013), as is service learning which is considered beneficial for a career in public health (Rooks & Rael, 2013).

Transformational Learning as Pedagogy

Transformational learning is proposed as best practice for the helping professions (Edwards et al., 2013). Transformational learning theory is not without its critics as demonstrated in the public communications about misrepresentations about its interpretation as out of context (Mezirow, 1997a), as people seek meanings in their experiences (Mezirow, 1997b). Transformational learning theory is suited to adult learning situations and in this regard is reckoned on learning how to think like an adult (Mezirow, 2000). Calleja (2014) contends that transformative learning is both mutually interdependent and influenced by the collective transformation. On the other hand, findings from a qualitative study indicated that success, at university, can occur without it being interpreted by the individual as a transformative experience (Benson, Heagney, Hewitt, Crosling, & Devos, 2014). Transformative learning is cited to be suitable pedagogy for health professional preparation (Van Schalkcwyk et al., 2019) and in undergraduate public health education transformative learning opportunities can be profound in the context of participating in community projects (Gardner, Ronzio, & Snelling, 2018).

Experiential Approaches as Pedagogy

Research about acquiring a deeper understanding about the student experience of learning is not new, for example, a learning environment focused on student understanding (Kiener, 2009, p. 21). Howie and Bagnall (2015, p. 348) compare transformative and deep approach theories of learning, placing the former in adult education and the latter in higher education, and suggest they are similar in that they are concerned with learning that is '*profound in its nature and impact on the learner*'. Integrative learning activities that promote real-world experience are suggested to be priming levers for high quality learning outcomes such as work-readiness, self-efficacy and team skills, in research which identified that an authentic work placement was favoured by students as giving them a sense of achieving these outcomes (Smith & Worsfold, 2015). On the other hand, work placement opportunities in neoliberal environments are suggested to be subject to inequality in relation to gender, race, and class (Allen, Quinn, Hollingworth, & Rose, 2013). Experiential, project-based active learning within an undergraduate introductory public health course was found to encourage

creativity despite some students missing nuanced population perspectives such as the medical versus social model of health (Yeatts, 2014).

Minimal Guidance versus Full Guidance Models of Instruction as Pedagogy

Minimal guidance models have not always been considered effective, for example, there is data that students may misconceive information or use it in a disorganised way (Kirschner, Sweller, & Clark, 2006). However, a contrasting view is that cognition and motivation of students is the issue and not how to teach students, but rather what to teach them (Kuhn, 2007), and another is that that problem-based learning be aligned and compatible with cognitive capability (Schmidt, Loyens, van Gog, & Pass, 2007). A case for fully guided instruction is also proposed, in that a learner is dependent on what they already know which means they may struggle to find a solution, and may engage with the problem solving but not really learn (Clark, Kirschner, & Sweller, 2012). First year teaching students have been found to prefer educator direction, cooperative learning, and knowledge construction (Baeten, Dochy, Struyven, Parmentier, & Vanderbruggen, 2016). Cognitive load theory research from the perspective of the moderating effects of self-directed behaviour, such as group work, on the relationship between motivation and cognitive load has shown that all students derived benefit from group work, however less motivated students benefited more than those who were already highly motivated; the latter demonstrating higher germane load motivation (Costley & Lange, 2018).

Hsu et al. (2015) describe a teaching and learning approach for adult learners, of guided independent learning, which has theoretical foundations which align with constructivism and authentic activities and additionally catalogued an extensive range of adult learner oriented activities as including situated learning, self-directed learning, experiential learning, critical thinking and transformative learning, collaborative learning, sense of community, modular learning, accelerated and intensive courses, hybrid or blended distant learning, new technologies and Web 2.0 for adult learning. Hsu, et al. (2015) also suggested that characteristics of an effective guided independent learning module is characterised by being highly structured with learning objectives and tasks clearly outlined; helps transfer of learning to a new setting or acquisition of a new skill; deepens understanding; applies and reinforces academic content; is meaningful; and can be completed in a timely way. However, research shows that self-efficacy is a determinant in academic success in a collaborative learning context with an internal locus of control significantly influential in the learning and assimilation of information, but also that external locus of control does not exert a significant negative impact to grade outcomes (García-Almeida & Cabrera-Nuez, 2020). Active self-directed learning (ASDL) as a four part learning cycle: sensitisation, exploration, integration,

and application, and the teaching of self-responsibility and team management skills was promoted in a university public health program in Europe with report that students were re-energised to engage in problem-based learning (Czabanowska, Moust, Meijer, Schroder-Back, & Roebertsen, 2012).

Heutagogy as Pedagogy

Heutagogy is a learner-centred activity; that is, the learner controls the learning and what they choose to learn (Abraham & Komattil, 2017; Chacko, 2018; Tümen Akyıldız, 2019), and deemed to support student-determined learning activities (Narayan, Herrington, & Cochrane, 2019). Heutagogical approaches align with work-based learning (Blaschke & Hase, 2021; Hase, 2009; Hase & Kenyon, 2001) and work-based learning comprises a broad range of learning outcomes, and that knowledge can potentially be transdisciplinary (Boud & Solomon, 2007, 2001) Findings from research which used a heutagogical approach is that there is risk that active demotivation may occur if background knowledge is lacking especially if explicit instruction is not given, also finding that ability to self-regulate, engage in peer discussion, critically analyse, and reading and research were considered important attributes by participants (Stoszkowski & McCarthy, 2019). . Aspects of heutagogy as self-determined learning has also been found to be of interest to health professionals students and micro-learning associated with learning how to do clinical procedures (De Gagne et al., 2019), enable best practice by medical science faculty (Love et al., 2018), and foster potentially transformative outcomes, though assessment needs to align with learning activities (Narayan et al., 2019).

Inquiry-based Approaches as Pedagogy

Researchers who linked inquiry-based learning and innovation in a conceptual model acknowledged this as supporting a student-centred orientation (Acar & Tuncdogan, 2018). Kirkup (2013) reported using inquiry-oriented learning to engage students undertaking science programs in Australia. However, student factors have been shown to contribute to failures of inquiry-based learning designs by educators in an Australian study comprising data from four studies in a medical faculty citing findings that some students perceive educational designs in contrary ways which drives them to adopt a more surface approach to learning (Balasooriya et al., 2011).

Co-inquiry as Pedagogy

Researchers testing hypothesis associated with metacognition in relation to inquiries described a divergent finding that both individual and shared learning activities are relatable in metacognitive constructs shared in a community of inquiry, and that a students' cognitive

presence helps with regulation of their learning in collaborative constructive learning settings (Garrison & Akyol, 2013). A balance between teacher-control and student-independence and between having set answers and a free-for-all is recommended for a community of inquiry (Golding, 2011a). Shared questions (between student and teacher), was found to flatten the student teacher hierarchy, as reported from case-study findings in research co-inquiry (Werder et al., 2016). Co-inquiry may advance the Scholarship of Teaching and Learning (SoTL) with the potential to enrich learning (Werder et al., 2016). However, review research revealed that there is a lack of clarity as to the status of SoTL in relation to the field of education, higher education and pedagogic research; with a perception that SoTL work lacks rigour (Fanghanel, Pritchard, Potter, & Wisker, 2016).

Argument-driven Inquiry as Pedagogy

Argument-driven Inquiry (ADI) describes a framework for use in science education and a means to develop scientific habits of mind (Sampson, Grooms, & Walker, 2010). Research findings of the application of ADI suggest that students demonstrated better disciplinary engagement (Sampson, Grooms, & Walker, 2011). ADI is an effective method for improving the academic achievement and science process skills of pre-service science teachers laboratory reporting, but not significantly, and it is suggested that age is a factor which might influence its effectiveness (Demircioglu & Ucar, 2015). Argumentation has also been found to improve online information searching strategies, and development of metacognitive skills of students in a Turkish university (Reisoğlu, Toksoy, & Erenler, 2020).

Appreciative Inquiry as Pedagogy

Appreciative Inquiry which was pioneered in the 1980s by David Cooperrider and Suresh Srivastva is a strength-based method to facilitate change in organisations (Cooperrider, nd). Rather than traditional, deficit-based problem-solving mind sets (what we want less of) Appreciative Inquiry reframes questions about what we want more of (The Center for Appreciative Inquiry, nda, ndb) and is a change management approach which requires a particular way of asking guided questions that encourages positive thinking (Techtarget Network, nd). Appreciative inquiry, reported as the model used in an online instructional strategy for the development of adult learning motivation, engagement, and performance is considered to have potential to have a positive impact on the online learning classroom environment (Johnson, 2014). Johnson (2014, p. 1) coined the term "*Appreciative Andragogy*" adapting and applying the inherent Appreciative Inquiry principles to encourage interactivity in an online classroom setting; suggesting that application of its principles has an ability to take the distance out of distance learning. Appreciate inquiry is also proposed to

bridge the gap between research and practice in a health-related setting, for example, in terms of co-inquiry, as reported as a means to improve dementia care (Hung et al., 2018).

Question versus Answer-centred Approaches as Pedagogy

To promote deep thinking, educators should consider a taxonomy of questions, skilfully used to enhance student engagement and promote critical thinking, as well-crafted questions promote learning and poorly constructed questions inhibit it (Tofade, Elsner, & Haines, 2013). Teacher questioning approaches is the subject of research in higher education in particular (Brown, 2009; Craig, Sullins, Witherspoon, & Gholson, 2006; Gentry, 2015) and how questions are utilised in the learning context and alignments with a teacher-centred questioning approaches (Gentry, 2015; Kirkup, 2013; Liu, Cheng, & Lin, 2013; Tofade et al., 2013). For example, the questioning techniques, timeliness of response, and awareness of unique learning goals and situations were themes about teacher effectiveness identified in research from Singapore (Goh, 2014).

However, the view of the learner controlling inquiry is recommended for question-centred pedagogy as there is a structural difference between question and answer centred approaches (Bowker, 2010). Education approaches which place questioning, or more accurately, confidence to question as a development stage in learning from fresher, novice, intermediate, expert and graduate has been explored, with the questioning placed within the expert stage (Morgan & Beaty, 2005). First year medical science students have been found to need support in how to ask suitable questions, especially in problem-based learning environments (Adams, 2015), which supports what Bowker (2010) contends, that instead of expecting students to answer questions educators should be encouraging students to ask questions.

Educators also need to learn about how to teach students to ask questions as a means to promote learning as it cannot be presumed that students can do this (Bowker, 2010), or have the aptitude to ask sophisticated questions, even after teaching approaches designed as a question-centred pedagogy, as found in a natural sciences program, though improvement was demonstrated over time (freshman, sophomore, senior) (Bhavsar et al., 2016). Nor can it be presumed that students can generate great answers, so educators require tolerance for ambiguity (Bowker, 2010). Findings from experimental research comparing rudimentary question and answer (Q&A) forums with more elaborate Q&A discussion forums is that students enjoy superior learning performance with the latter (Liu et al., 2013). In large student cohort learning environments, such as lecture, an option to engage in a teacher

moderated anonymous discussion platform outside of formal lecture, may encourage students less likely to participate in public, to engage in learning forums, to pose questions, and/or view answers pertinent to their scholarship needs (Tan, Small, & Lewis, 2020). College students have been found to use textual cues before visual cues in their search for credible health information on-line and highly rate design values as high credibility regardless of actual information; with some students making efforts to cross-reference information across more than one web-site which influenced their perception that the information was credible (Pariera, 2012).

Problem-based-learning Approaches as Pedagogy

Problem-based-learning (PBL) has been used as a means for groups to develop higher-order thinking skills, collaboration skills and be more self-directed in learning (Cotton, 2011). It was determined by survey that many first-year students required training and support to become self-directed learners in curriculum which adopt a PBL approach (Pepper, 2010). PBL-fatigue has also been reported and initiatives to overcome this in students has been examined (Czabanowska et al., 2012). Teaching problem-solving should not be limited to well-structured problem solving but be extended to real-life problem solving (van Merriënboer, 2013). Scaffolding is a teaching method that enables a student to solve a problem, carry out a task, or achieve a goal through a gradual shedding of outside assistance (Pinantoan, 2013) and been found to be of value during PBL processes (Smith & Cook, 2012), and constructivist pedagogy such as case study as individual or collaborative effort (Dabbagh & Dass, 2013).

Factors influencing the quality of learning in a PBL environment have been found to include the range of questioning techniques when responding to different learning issues, timeliness of their response to unexpected learning obstacles, and awareness of unique learning goals and situations for individual learners (Goh, 2014). Health science students reportedly prefer problem-solving activities (Zoghi et al., 2010). In the context of PBL, constructive alignment between the intentions of PBL and assessment is challenging, more so regarding health sciences education as the ideology of PBL does not burn so hotly now, with persisting ambivalence about its precepts (van der Vleuten & Schuwirth, 2019). Servant-Miklos (2019, p. 632) stated that '*information processing has largely been erased from the psychology of learning*'. A constructivist approach, therefore, is proposed superior in the context of medical education (Servant-Miklos, 2019). Problem-based learning (PBL) compared to conventional lecture in relation to constructivist pedagogy contributing to self-efficacy, in a university setting study reported higher engagement with PBL, especially in a cooperative context (Alt, 2015). Heutagogy, as related to self-directed learning may suit PBL contexts as self-directed,

learner-centred activity; that is, the learner controls the learning and what they choose to learn (Abraham & Komattil, 2017; Chacko, 2018; Tümen Akyıldız, 2019).

Online Learning Approaches as Pedagogy

Qualitative differences in the way first-year university students participate in online inquiry with variation in their approaches and the use of technologies, as well as, workload as perceived by the student was found in Australian research which utilised two questionnaires informed by existing research, related to deep and surface approaches (Ellis, 2014; Ellis, 2016; Ellis & Bliuc, 2016). Findings showed that deep approaches to inquiry positively aligned with deep approaches to online technologies and inquiry-based approaches is the goal of a deeper understanding; through improved research skills, pursuing answers to key questions that they have developed (Ellis & Bliuc, 2016). On the other hand, it was found that educators adopt inquiry-based learning approaches in efforts to enhance the student-focused learning experiences, and that students who scored highly on the deep approaches to inquiry responded positively with strategies which were proactive, reflective and autonomous, but could not ensure that technology had been used, or helpful, as intended (Ellis, 2016; Ellis & Bliuc, 2016). Baum (2013) describes results from a study in relation to augmenting guided-inquiry learning (online) in an undergraduate science related class in the USA with findings suggestive of highly engaged students, stated to be contrary to similar reported studies. Online guided inquiry also helped students adapt to a cooperative learning strategy, and students were less confused about the course than when they had previously experienced a guided-inquiry learning course (without online material), and suits independent students motivated towards learning, manage their time well, and have strong literacy and technology skills (Baum, 2013).

Technology-Driven Approaches as Pedagogy

Using platforms such as a Learning Health System is purported to be helpful because of the leverage afforded with the real-time analysis of data (Bernstein, Friedman, Jacobson, & Rubin, 2015). Analysis of data about cross-entropy errors in human behaviour determinants in proposing an ontology-based deep learning model, purports to both predict human behaviours accurately and generate explanations for the behaviours within health social networks (Phan et al., 2017). The 2013 Horizon report suggested that outcomes of learning analytics will have significant impact on the evolution and refinement of higher education, especially in the design of personalized and online learning environments (Johnson et al., 2013). Conversely, concerns have been raised about the potential ethical issues related to Learning Analytics, such as how they are adopted, location tracking and biometrics in regard to privacy, students knowing or not-knowing if their academic behaviours are being tracked;

therefore that clear guidelines regarding stewardship and ownership of data needs to be addressed (Arroway, Morgan, O'Keefe, & Yanosky, 2016; Nixon, 2016; Reyes, 2015).

Learning Analytic Approaches as Pedagogy

The use of learning analytics raises the potential of breaching privacy laws, and potentially undermining an institute's own philosophy of student development, especially in regard to predictive analytics about a student's expected performance based on student information derived from systems used to manage the student journey (Willis, Campbell, & Pistilli, 2013). In game-based learning, instructional support is predicated in breaching learning analytics ethics, for example, how meta-analytical techniques implies a degree of intrusive guestimates in relation to the type of support needed in a gaming activity (Wouters & van Oostendorp, 2013). Inferring a learner's cognitive, motivational and emotional state during a digital game in a non-invasive way, based on the analysis of gaming behaviours as a means to exploit digital education game's pedagogical potential was determined in research:The boundaries here being that a learner is suggested to have good balance between efficient exploration and exploitation; that is, be both aware of, and motivated to, solve a current problem (Bedek, Seitlinger, Kopeinik, & Alber, 2012).

Edutainment as Pedagogy

Edutainment and repurposing existing games for learning is described in the literature, which also acknowledges efforts to identify and apply pedagogical requirements (Moreno-Ger, Burgos, Martinez-Ortiz, Sierra, & Fernandez-Manjon, 2008). Gamification pedagogy as referenced from the perspective of experiential learning theory as active student-centred learning to increase student intrinsic motivation and self-efficacy, indicated positive reports from research which utilised interview data (Banfield & Wilkerson, 2014). The theoretical work of Bouvier, Lavoue and Sehaba (2014) highlights that engagement depends on user characteristics such as motives, expectations, abilities, and skills; and on the form, content, and context of the activity (environmental, social, self, and action engagement). Learning games which involve risk-taking are found to be particularly enjoyed by males, with competition viewed as an attractive element of a game; that is, winning the game is important (Robinson, 2013), though competition, has not been found to contribute to students learning gains and only partly contributes to motivation (Vandercruysse, Vandewaetere, Cornillie, & Clarebout, 2013).

Instructional support is suggested to be used to nurture cognitive skills and knowledge attainment, rather than incite in-game performance (Wouters & van Oostendorp, 2013). Filsecker and Kerres (2014) outline a conceptual framework that integrates motivation and

volition in support of educational games and learning within games, and, in brief, discuss engagement as a volitional process. Gaming, for example, video games, has been found to contribute to development of 21st century skills such as leadership and solving problems (Hewett, Zeng, & Pletcher, 2020). Computer-assisted instruction which included gaming attributes such as rewards and score, whilst can be entertaining, does not additionally provide benefit in comparison to simulation without gaming attributes in relation to motivation to learn (Vogel, Greenwood-Ericksen, Cannon-Bowers, & Bowers, 2006). Applying game theory to public health scenarios has helped students to understand how community care networks decide which programs to pursue, and also explained the behaviours of organisations on a concept of game theory wherein there is a paradox in decision making (Westhoff, Cohen, Cooper, Corvin, & McDermott, 2014).

Qualitative research from the UK refers to social sciences educator role ambivalence in perceptions of their being entertainer and service provider firstly, and then educator - this being what students expect in neoliberal education settings, with some suggestion that educators sometimes misplaced empathy towards students, since it was not likely that the educator had the same reality from their own university study (for example, education loan debt) (Wong & Chiu, 2019). Osseweijer (2006, p. 591) wrote about the *Three-E Model: Entertainment, Emotion and Education* in relation to science communication, framed as an ethical issue, as balance is required between entertainment and learning. Educational gaming is a powerful pedagogy, but it is suggested that the focus is on engagement and the primacy of the entertainment is why the player learns (Tulloch, 2014).

Popular Education Approaches as Pedagogy

Liberatory pedagogy, or popular education as a complementary learning approach with health promotion students in the USA is stated to help, within classroom settings, applications to address real world social inequities (Wiggins & Perez, 2017). Yelland, Cope and Kalantzis (2008) critiqued the tendency to map new technology, such as online learning onto outdated pedagogical models. Commentary has also been made that specific learning goals and objectives are limited in smart learning environments (Spector, 2014). Pang and Ross (2010) recommended enabling interpretive and application skills via activity-based learning for students transitioning from secondary school into higher education. Initiatives such as using interactive teaching methodology is reported to actively engage students, for example via an Audience Response System which helped clarify thinking and focus on key points, and motivation to learn (Abdel Meguid & Collins, 2017).

Simulations as Pedagogy

Using computers to mediate learning is commonplace however, participatory practices do not necessarily enhance learning (Joubert & Wishart, 2012), of note, that participants commitment to the goals or philosophical underpinning of an initiative (in this case knowledge building) cannot be assumed. On the other hand it is noted that students cannot undergo a physical sensorimotor experience of real-world phenomena through their virtual world activities (Loke, 2015). Engagement and simulation was a focus of critical narrative review of learning engagement in healthcare simulations outside of the health sciences literature, with the researchers proposing defining components covering the cognitive, behavioural, and emotional whilst also being context-dependent (Padgett et al., 2019). Australian researchers suggest agile learning in practice (clinical) is potentially developed through simulation, as per multiple outcomes that can emerge from comparable starting factors (Rooney, Hopwood, Boud, & Kelly, 2015). One of the utilities afforded in simulations is the ability to use time-compression (Pastore, 2015), and in scenario based nursing simulations it has been reported that there can be considerable truncation of an experiential activity down to its fundamental outcomes, though the opposite is also supported (Moates, 2011).

Assessment for Learning Approaches as Pedagogy

It was Boud and Associates (2010) whom, after reviewing the state of assessment in higher education in Australia, recommended assessment for learning as one of the seven propositions for reform. Undergraduates who are actively involved in assessment in the context of learner-centred assessment have been reported to find the process of assessment fairer in comparison to assessments such as exams (Flores, Veiga Simão, Barros, & Pereira, 2015). Learning has also been shown to be valued if it is related to a practicum and a student's future professional role (Donnison & Penn-Edwards, 2012). Lack of integration between assessment and learning in a public health program, however, has been found to be detrimental in the development of professional identity (Wood, 2016). Australian researchers propose that authentic work-integrated learning assessments need better alignment between stakeholders, based on student interview data (Ajjawi, Tai, et al., 2020).

Assessment modalities used as a motivator for learning, and learning to learn, are a valid first year university pedagogy, supported by research about first year transition strategies and whether the students demonstrated surface or deep approaches to learning (Donnison & Penn-Edwards, 2012). The researchers contend that using a surface approach (assessment as a motivator for learning, and learning to learn) as stated previously, is a valid first year pedagogy; an initial learning stage in lifelong learning (Donnison & Penn-Edwards, 2012).

Student perceived positivity about the usefulness of group discussion in learning and life relevance, was found to be influenced by how a group discussion was graded in research conducted with undergraduate students in a USA university setting (Clinton & Kelly, 2020).

Credible Information-seeking for Assessment for Learning

A study analysed the Wikipedia information-seeking behaviour of a diverse group of college students from two Midwestern USA universities, finding that a few students demonstrated in-depth knowledge of the Wikipedia editing process, while most had some understanding of how the site functioned and a few lacked even such basic knowledge as the fact that anyone can edit the site (Menchen-Trevino & Hargittai, 2011). As a caveat, study participants had been advised by their instructors not to cite Wikipedia articles in their schoolwork, nonetheless often used it in their everyday lives (Menchen-Trevino & Hargittai, 2011). The use of Wikipedia citations in peer-reviewed journals has been increasing since 2002 (Tomaszewski & MacDonald, 2016). Google use is ubiquitous (Schroeder, 2014), and college students are reported to favour public access search-engines such as Google (Purdy, 2012). In terms of accessing information, it has been found that students gravitate towards using tools which are easy and quick to use despite efforts to provide more sophisticated and streamlined database access (Asher, Duke, & Wilson, 2013).

Research from Pakistan suggests that university students of all levels (undergraduate through to post-graduate Business programs) demonstrate satisfactory online information searching skills as measured through student self-report by survey, though the researchers express there is a lack of research in this area (Muhammad, Shafiq Ur, Khalid, & Ghulam, 2018). A similar sentiment was expressed in relation to the digital literacy skills of students, with researchers reporting there is a lack of information about how students write their assessments and how they discern (if at all) if information sources used are credible (Bhatt & MacKenzie, 2019). Sites such as Google Scholar are used, even at the graduate level (Cothran, 2011). Pre-professional health students have also been found to need guidance in information literacy skills and how to access academic databases, as differentiation from having internet skills (Ivanitskaya, Hanisko, Garrison, Janson, & Vibbert, 2012). Interview data about how librarians meet public health researchers needs in regard to information science, showed that few participants (who were already skilled researchers) understood the breadth of librarian knowledge and skill sets (Hunt & Bakker, 2018). The library services information needs of public health students, determined by survey, indicated a strong need for more tailored library instructions, particularly discipline specific information and locating non-traditional resources such as statistics and grey literature (Le, 2014). Participants in the afore-mentioned research regarded their expertise in using Google as an information source,

higher than Google Scholar, and was the only source which 100% of respondents had used (Le, 2014).

Reflective Learning-based Approaches as Pedagogy

Educators are suggested to pay more attention to using teaching and learning processes to expand learning through reflection (Wegener, 2013). Students have been shown to initiate reflection in a range of ways (van Velzen, 2015), and meta-analysis findings support that the teaching of critical thinking skills to college students is worthwhile, has positive effects, and better outcomes are achieved in the long-term (Niu, Behar-Horenstein, & Garvan, 2013). Research exploring critical thinking in relation to how instructors develop an assessment task designed for a second-year health promotion program in an Australian University; that is, the use of assessment for promoting student learning was perceived by students as a positive experience (Vu, Tran, & Kirwan, 2015). It is suggested that student thinking should progress through their study journey and that they graduate ready to negotiate intellectual challenges which are a part of life, through student self-reflective processes with encourage cognitive gains (Laird, Seifert, Pascarella, Mayhew, & Blaich, 2014). Laird and colleagues (2014) sought to uncover specific learning approaches and their influences on outcomes of cognitive development, finding that cognitive development is as '*nuanced as the approaches taken to spur it*' (p. 424).

Student Written Reflection as Pedagogy

Getting students to reflectively write about their experience in participating in a public health project is reported in the literature (McIntire & DiVito, 2017) and health promotion learning (Lee, Yanicki, & Solowoniuk, 2011). Qualitative analysis of written reflections is reported in the research literature as part of the research design (Bashan & Holsblat, 2017; Castleberry et al., 2016), though not suggestive of strong statistical evidence for learning, rather as guiding personal development (Bjerkvik & Hilli, 2019). However, there is robust support to use reflective learning approaches, particularly valued in terms of its lifelong learning transferability (Colomer, Serra, Cañabate, & Bubnys, 2020) and despite the time required to formally reflect, can be perceived as a positive experience (Langley & Brown, 2010), but may involve deep, measured strategies for efficacy (McNamara, 2011).

Motivation to Learn as Pedagogy

Biggs and Tang (2007, p. 31) contended that there is no such thing as an unmotivated student; students want to do something and it is education practices which erode motivation. In similar vein Kuhn (2007) suggested that the concern facing educators was not how to teach students but what to teach them. Wu (2019) refers to learning about what to learn as a

lifespan challenge. Review research found that understanding how students are motivated can help educators align activities which promote academic performance where students were found to show increased motivation when educators have high expectations and use a variety of instructional styles in an open, interactive and guided environment wherein they can connect with students (Sedden & Clark, 2016). Educators are advocated to control the class situation, not students, and that the student needs to understand they do have a voice, and that educators are interested in their educational achievements (Sedden & Clark, 2016).

A review study based on self-determination theory in regard to determinants, mediators and outcomes of motivation in health professions education, suggests that motivation could be enhanced by changes in the educational environment, and also by knowing about the students' characteristics, for example, intrapersonal and interpersonal determinants (Orsini, Binnie, & Wilson, 2016). Women were shown to have a more self-determined profile than men and self-direction was considered an intrapersonal determinant and autonomous motivation was influenced by the intrapersonal and interpersonal determinants, with an example of the latter being academic conditions and lifestyle (Orsini et al., 2016). Autonomous motivation influenced three outcomes: Cognitive, affective and behavioural, with deeper study motives and strategies identified as an overall positive correlation as a behavioural outcome, the implication being that controlling motivation had contrary consequences and strengthening autonomous motivation enhances self-regulated learning (Orsini et al., 2016). Approaches to learning (deep versus superficial) was found to not predict grade point average, that is, there was no relationship demonstrated, however, there was indication that increasing age did predict employment of deeper learning approaches in early childhood teacher students (Cetin, 2016).

Integrated Approaches as Pedagogy

An integrated curriculum, even if based on lecturing, compared to a traditional curriculum was shown to improve students' perceptions of their educational context and be as effective as Problem Based Learning (PBL) in promoting students' deep learning approaches in research investigating the relationships between students (first year medicine) perception of their educational context and learning approaches in three learning environments differing by their teaching formats (lecture or PBL) (Gustin, Abbiati, Bonvin, Gerbase, & Baroffio, 2018). In higher education the flipped classroom has been shown to have beneficial outcomes on engagement, knowledge, and skills (Murillo-Zamorano, López Sánchez, & Godoy-Caballero, 2019). Whilst students are reported to enjoy the flexibility of the flipped classroom, they also report they want structure and guidance (Wanner & Palmer, 2015). Flipped classrooms are described as being used in schools of public health at the graduate level (Howard, Scharff, &

Loux, 2017). More recently it is suggested that to meet 21st century needs a dialogic pedagogy should be considered (Teo, 2019).

Learner Engagement

Determining how best to engage learners in their enrolled programs is discussed in the literature (Farr-Wharton, Charles, Keast, Woolcott, & Chamberlain, 2018; Kahu, 2013; Lei, Cui, & Zhou, 2018; Murillo-Zamorano et al., 2019). Influences on the career choice of learners and how they engage with learning has been explored, for example, last century parental influence had a central role on the career choices that young people made (Otto & Call, 1985). On the other hand, Strader and Katz (1990) suggested that it was persuasive communication rather than neutral messaging that was more influential in relation to student intentions about career choice. Gendered and stereotype influences persist in relation to career directions, for example females gravitate towards the social sciences and males into technical associated careers (Gadassi & Gati, 2009; Lightbody & Durndell, 1996; Solbes-Canales, Valverde-Montesino, & Herranz-Hernández, 2020). Evidence about occupational and career aspiration has implicated everything from self-concept and social support (Chen, Chen, Hu, & Wang, 2013), work-family orientation (Morgan, Gelbgiser, & Weeden, 2013), location (Abreu, Koster, & Venhorst, 2014; Suhonen, 2014), educational debt (Choi, 2014) socio-economic class (Laughland-Booÿ, Mayall, & Skrbiš, 2015), genetics (Rimfeld, Ayorech, Dale, Kovas, & Plomin, 2016), peer pressure (Ogunleye, 2018), and the anticipation of multiple careers after graduation (Grosemans, Hannes, Neyens, & Kyndt, 2020).

Formal Schooling Factors and Learner Engagement

UK research found that in the transition to higher education programs the prior knowledge of students cannot be assumed, for example low-level retention of basic concepts, and that it is worth determining what students remember from their pre-university learning so that programs use a deeper-teaching approach which is more student-focused (Jones et al., 2014). It is not unusual that first year university students indicate that there is a disconnect between their expectations and current course content and indicate intention to discontinue their current course and enrol in another, which was a finding in qualitative research from Taiwan, which also found that instructors make stereotypical assumptions about Asian students being passive learners (Chalapati, Leung, & Chalapati, 2018). On the other hand, outcomes from meta-analysis of student engagement literature suggests a relationship between overall student engagement and academic achievement, with significant differences reported between Eastern and Western students in relation to average effect sizes for their overall behavioural, emotional and cognitive engagement and academic achievement (Lei et

al., 2018). The researchers rationalised these findings as influenced by memorization and recitation, stated to be a common learning style in Eastern students, as requiring more effort in emotional and cognitive engagement, rather than behavioural more common in Western students (Lei et al., 2018).

Transitions and Learner Engagement

Students can be stressed by the transition to university though this can be mitigated by efforts to engage students by the intensity of extracurricular activity involvement, in findings from USA research (Knifsend, 2020). The researcher tested a hypothesis to determine if there was a point at which students can be too involved, however it was found that 10 or more hours a week was linked with positive psychosocial outcomes (Knifsend, 2020). Transition from compulsory schooling to post-secondary education is associated with high dropout rates in first year (Elffers & Oort, 2012) and in Australia, Technical and Further Education (TAFE) students underperform in their first year transition into higher education and find the transition stressful (Bowden, Abhayawansa, & Bahtsevanoglou, 2015; Catterall, Davis, & Yang, 2013). A report indicated that nearly a quarter of a million students would start a bachelor's degree in Australia in 2018, but more than 50,000 of them would leave university without getting a degree, however, also reported that many people who do not finish their course would, however, find it interesting, learn useful skills, make lasting friendships and connections, and believe that their enrolment brings more benefits than costs.

Melbourne research comparing the university student profile of the last century with the current century (1994 and 2014) found, apart from understandable factors such as technology advances, course delivery evolutions and less formalised teacher student dynamics, that the entry level student in 2014 knew why they wanted to be at university and transitioned more smoothly than reports from previous years (Baik et al., 2015). However, the 2014 entry students were less socially engaged within the university community, with less time on campus and keeping to themselves and motivation to, and coping with, study remaining a challenge for many students (Baik et al., 2015).

Resilience and Learner Engagement

Resilience measurement and impact as reported in literature review is a challenge (Reavley, Bassilios, Ryan, Schlichthorst, & Nicholas, 2015) and ambiguity around terminology is also extant (Shean, 2015). Resilience is a factor to consider in the learning journey and the young person, particularly, adapting to the stressors of transitioning to adulthood (Tollit et al., 2015). Mixed methodology research was used to describe the learning strategies of at-risk youth in

an urban life skills program; suggestive findings being that adult learning concepts can be applied with empowerment of special importance (Shaw, Conti, & Shaw, 2013). A disjunct between the supports students use and those they need in adjusting to higher education is also reported (Coates & Ransom, 2011). Support and help via online platforms have been found to encourage learner comfort in seeking help which correlates with student achievement (Kitsantas & Chow, 2007), and use of a virtual interactive consulting agent was positively perceived by students in helping them transition into higher education, however deemed sub-optimal by counsellors (Lahav, Talis, Cinamon, & Rizzo, 2020).

Processes and characteristics (individual and contextual) to enhance resilience in the health professions in particular was covered in a review of the literature and identified that being female and maintaining a work-life balance consistently relate to resilience across the health disciplines studied in the review (nursing, social work, psychology, counselling and medicine) (McCann et al., 2013). Saudi Arabia research showed statistical differences between undergraduate male and female students in both social-emotional learning and interpersonal skills, also as predictive of a students' adjustment, motivation to achiever, and being socially connected (Turki, Jdaitawi, & Sheta, 2018). Research from Italy has provided evidence that females have a more proactive and cautious cognitive processing, in comparison to their male counterparts, whereas males demonstrate a more reactive and fast cognitive processing style, as behavioural performance assessed via computing response speed, accuracy rates, and response consistency (Bianco et al., 2020).

Traditional versus Non-Traditional Students and Learner Engagement

Australian research reports that non-traditional first year students who were more mature age, had caring obligations, and an income, reported higher resilience compared to the more traditional younger first year student (Chung et al., 2017). However, Cherrstrom, Zarestky and Deer (2017) state that adult learners often experience uncertainty and isolation and had fewer opportunities to build relationships with peers, a finding from their research focused on graduate students and building communities for support and learning situated in Vygotsky's zone of proximal development (cited by Cherrstrom et al., 2017, p. 49). Students who employ successful adjustment-seeking behaviours are reported to be better able to negotiate conflicts between academic expectations and their personal and social responsibilities (Geyer, 2018).

Research comparing traditional and non-traditional college students (the latter described as over 25 years of age) found that traditional students more commonly reported procrastination due to fear of failure, however, while non-traditional students reported significantly higher

intrinsic motivation, a-motivation was found to be significantly higher in traditional students (Warden & Myers, 2017). Review research indicates that traditional university students (younger students) taking a psychology program in a college setting in the USA prefer educators who were entertaining and funny, whereas non-traditional students prefer courses taught in an orderly manner (Van Doorn & Van Doorn, 2014).

Student Adjustment Behaviours and Learner Engagement

Successful adjustment-seeking outcomes was found to be higher in students with higher levels of political (understanding and influencing others), and adjustment-self-efficacy skills (confidence in asking teachers to make adjustments to suit them) (Geyer, 2018). First year university students have also been found to more frequently electronically message about academic, social, income, and personal stressors at either end of their first semester of study (Pitt, Oprescu, Tapia, & Gray, 2018). University students feel comfortable with digital technologies and use social media for connecting and interacting with friends rather than for academic communication, and prefer face-to-face communication generally, but prefer to learn by themselves, work independently and to study at home according to research from Canada (Gallardo-Echenique, Bullen, & Marques-Molias, 2016). New Zealand research shows there is a link between emotional well-being when starting university as a determinant of active engagement in learning and academic achievement, at least in a cohort of mature students during their first semester of study (Geertshuis, 2019).

On the other hand, academic procrastination is suggested as a maladaptive behaviour in the undergraduate community (Zhang et al., 2018). Twenty years or so ago, published research findings indicated that students who identified themselves as procrastinators actually planned for their procrastination tendencies within their study plans; that is, they did leave things to the last minute (Pychyl, Morin, & Salmon, 2000). On the other hand, it was found, in a modest study from India, that most of the students (college) who responded in a survey about study habits did not ideally follow effective study habits: the majority did not revise their lectures, and they collaborated in assignments even if they were marked as individual (Kumar, 2015). Cross-sectional research from China, with over 1000 health professional undergraduate students, identified that academic procrastination is impacted by self-esteem and self-efficacy for self-regulation, and a fear of failure (Zhang et al., 2018). In similar vein, academic failure was found to be an important and personal event in the lives of university students in Australia, and the ways these students make sense of their experience of failure matters for either persisting or not with study (Ajjawi, Dracup, et al., 2020).

Student Self-Regulation Behaviours and Learner Engagement

Self-regulation is described as the effective regulation of one's own learning in the pursuit of personal goals (Nietfeld, Shores, & Hoffmann, 2014, p. 961). Students not attending class is prevalent and it is suggested that they may not be developmentally ready to enter into adult learning environments (White et al., 2014). Student attendance of at least 40% of their classes in a college setting in India, was associated with the student more likely to endorse human values, for example, creativity, respecting others, and loyalty compared to those who had less attendance, and efforts to foster student self-efficacy and altruism among other societal ideals is recommended (Cheruvalath, 2017). Students who were passionate about their academic activities experienced less burnout than non-passionate students in research about psychology students (mostly female) in a college setting (Saville, Bureau, Eckencrode, & Maley, 2018). Student's readiness for self-directed learning cannot be assumed and it is suggested that learners should be ready for self-direction, and this is especially important in relation to self-directed learning with technology (Sumuer, 2018). Student perceived positivity about the usefulness of group discussion in learning and life relevance, was found to be influenced by how a group discussion was graded in research conducted with undergraduate students in a USA university setting (Clinton & Kelly, 2020).

Zusho (2017) explored self-regulated learning and compared it with student approaches to learning and student engagement in the college environment and implied that college students struggle with blended learning when tasked with demanding academic assignments. New Zealand academic Ella Kahu (2013) proposed a conceptual framework (Kahu Framework) to enable a better understanding of student engagement to improve student outcomes. Kahu (2013) also advocated for investment into research about how emotions, behaviour and cognitive strategies impact learner engagement. Nelson and Clarke (2014) reference the *Kahu Framework* as providing comprehensive conceptualisation of student engagement in first year experience in university in Australia. Utilising the Kahu Framework is also reported to improve retention (Nelson & Clarke, 2014). The Kahu Framework has since been refined to reflect enhancing student success and retention (Picton, Kahu, & Nelson, 2018).

Millennial generation medical students engagement of learning has been to be reported as potentially negatively impacted by stressors such as excessive workload, difficulties with studying and time management, work-life balance and relationships, peer relations, health concerns, and finances, as well as unique system-level concerns pertaining to school administrative failures, lack of assistance with career planning, and assessment-related

performance pressures (Hill, Goicochea, & Merlo, 2018). Research from Canada found that the expectations of students from a working-class background was oriented towards vocational outcomes in regard to their educational goals (Lehmann, 2009).

Student Retention Factors and Learner Engagement

Student persistence in their study endeavours and continuing enrolment in a college setting was found to be influenced by factors such as age, work hours, income, and also having a high-grade point average (Nakajima, Dembo, & Mossler, 2012). Other predictors of first year retention have been reported such as parents' education, semester hours, participation in student support programs, and income aid (Mertes & Hoover, 2014). Income support may not be available, so students work while studying and this impacts attrition (Munro, 2011). The most common cited reason for discontinuing study in first year was personal commitments and the need to work to support self in Australian research (Coates & Richardson, 2010). However modest participation in paid work of up to ten hours a week was found to improve academic engagement and performance as well as boost generic skills for transition into the workforce (Coates, 2011). Israel research reports that the higher the number of working hours, and less income support reported by university students was predictive of conflicted relations, poorer grades, uncertain future study plans, and mental health issues (Cinamon, 2016). The afore-mentioned research also showed that students who reported better work, school and life balance was predictive of achieving higher grades, expressing positive future plans, and better health (Cinamon, 2016). Using the utility of predictive analytics (via statistical software) is also proposed to identify students at risk of attrition and mitigating this by customised intervention strategies (Seidel & Kutieleh, 2017).

Student Study Behaviours and Learner Engagement

Using learning management systems and authentic online learning linking learner needs, pedagogy and technology encourages self-directed approaches and student-centred learning promoting 21st century skills (Parker et al., 2013). Research about master's level public health highlighted impacts on study habit, and motivation, for example, case-based pedagogy which requires students to take an active role in their learning, for example, challenges in instructional skill set (learning objectives to be met), limitations in which topics can be case-based, and team-based learning dependent on team dynamics and function were influential (Sibbald, Speechley, & Thind, 2016). The *Thalluri-Penman Good Practice* Model (Penman & Thalluri, 2014) was proposed to improve the learning experience of science students as well as student retention and success and is applicable throughout the student journey. The *Thalluri-Penman Good Practice* Model is depicted as a sphere with six sub-spheres – the first the core which relates to the student demographic; other spheres

represent key strategies and initiatives which students themselves suggested supported their learning (Penman & Thalluri, 2014).

Self-Directed Student Learning and Learner Engagement

Some international students may find self-directed learning a challenge according to reported research of a curriculum initiative to encourage international students of health sciences to develop self-efficacy, particularly English language and academic skills (Fenton-Smith, 2012). Australian research about the prompts for the metacognition of learning, self-regulation, and assessment for learning in an undergraduate biomedical science student cohort supports utilising meta-learning assessment tasks to foster self-reflective independent learning (Colthorpe, Sharifirad, Ainscough, Anderson, & Zimbardi, 2018). The study just mentioned also utilised a self-report feature about whether the student found the meta-learning tasks helpful for their learning, with 85% of respondents indicating positive benefit, and those who did not did not state why, and a few implied prior abilities regarding how to study and reflect (Colthorpe et al., 2018). This same research found a significant difference, that is, higher academic scores in students exposed to meta-learning tasks in comparison to cohorts in previous years prior to meta-learning tasks being introduced, however providing a caveat of the results as cautionary and not solely attributable to meta-learning activities (Colthorpe et al., 2018).

Student Motivations and Learner Engagement

Australian research about applying an alignment model for sustaining student motivation and active learning in a multi-cultural context found that alignment (course aims and objectives, content, structure, delivery, assessment methods and outcomes) and student motivation did not necessarily always go together (Tian, 2012). Whilst the study just mentioned focused on students from China completing their studies in Australia, there is potential to extrapolate key issues which may resonate across student populations, for example, adjusting to life in a foreign country and specifically, the demands of an open learning environment (Tian, 2012). Student motivation and performance was reflected in poor tests scores and reluctance to engage with other students; late arrival at lectures and tutorials; being uncommunicative in class; and not engaging in prescribed activities (Tian, 2012). Research which explored motivation as precedent, and time spent, and academic performance as consequences, involving full time first-year business administration undergraduate students (self-reported as having no, or negligible working hours outside of the classroom), found that high intrinsic and extrinsic motivation significantly influences deep learning in a positive way, and that deep learning leads to higher academic performance (Everaert, Opdecam, & Maussen, 2017).

Uffler, Bartier and Pelaccia (2017) explored health science student motivation correlating with where they sit in a lecture hall environment, finding that the further the students were from the first row, the less they were motivated. Of note, in the afore-mentioned research the *Motivated Strategies for Learning Questionnaire* (MSLQ) (authored by Pintrich et al, cited by Uffler et al., 2017) was administered, and which measures a number of components of motivation, for example intrinsic and extrinsic motivation, which they analysed quantitatively as recommended by the authors of the MSLQ, however noting that the items can be considered as qualitative variables (Uffler et al., 2017). Traditional lecture hall environment as promoting more focused attention, deeper processing of content and better understanding in comparison to small-group activities was reported in research from the USA, however the comparison group (small-activities and discussion cohort) reported more active engagement and meaningful processing; the difference explained as dependent on the learning environment (Bolden, Oestreich, Kenney, & Yuhnke, 2019).

Smith and Skrbiš (2017) explored social inequality of motivation, using data from the *Social Future and Life Pathways Project* (cited by Smith & Skrbiš, 2017, p. 441) from secondary schools in Queensland, using dependent variables based on entrance scores used to allocate university degree places which are competitive in the context of course offers. This same review highlighted several factors found to contribute to receiving a competitive rank: stable parental background, hard work, competing with others and a positive attitude to school work, however students who attributed success to obeying their teachers and having a supportive family were less competitively ranked, with females showing stronger association for belief in hard work than males (Smith & Skrbiš, 2017).

Student Learning Styles and Approaches and Learner Engagement

Particular teaching strategies can suit all learners depending on what is being taught (Rogowsky, Calhoun, & Tallal, 2015). Groupings of students who have different learning styles report less task-related difficulties in group experiences (Soetanto & MacDonald, 2017). Van Doorn and Van Doorn (2014) created an extensive table cataloguing a typology of traditional and non-traditional student learning styles and needs and compared these in themes related to learning needs, institutional support needs, computer technology needs, educational culture and social needs, faculty matched abilities, learning styles (visual, auditory and tactile/ kinaesthetic), and course subject needs. A key message from the researchers is that faculty should beware a one-size-fits-all approach, and rather meet the diverse needs of their learner groups (Van Doorn & Van Doorn, 2014).

Pashler, McDaniel, Rohrer, and Bjork (2009) wrote that there is no adequate evidence base to justify incorporating learning styles assessments into general educational practice, a finding which aligns with experimental research findings which failed to find statistical evidence to support meshing of learning style with instructional evidence (Rogowsky et al., 2015). On the other hand, Neil Fleming, designer of the visual, aural, read/write, and kinaesthetic (VARK) questionnaire for learners' preferences, asserted that '*absence of evidence is not evidence of absence'* (2012, p. Para 2 heading). Despite the critics of student learning style identification (Pashler et al., 2009; Rogowsky et al., 2015), determining learning style preference has an established, evidence-based and published manifest, for example, the *Felder-Soloman Index of Learning Styles* (Brown et al., 2009; Felder & Brent, 2005; Felder & Soloman, nd-a, nd-b), *Kolb Learning Style Inventory* (Borun, Schaller, Chambers, & Allison-Bunnell, 2010; Kolb & Kolb, 2005; Kolb & Kolb, 2014; Massey, Kim, & Mitchell, 2011; Williams, Brown, & Etherington, 2012), VARK Learning Styles (Espinoza-Poves, Miranda-Vílchez, & Chafloque-Céspedes, 2019; Fleming, nd; Good, Ramos, & D'Amore, 2013), and the *ASSIST Inventory* (Brown, White, Wakeling, & Naiker, 2015; Entwistle & Tait, 2013). Pearson (2020) in discussing the neuromyth about learning styles, never-the-less suggests working with them as an opportunity for growth.

Learning Styles used in sciences, including Health Sciences

Learning styles was the focus of research about a large health science student cohort in Australia who completed the Kolb Learning Style Inventory (26% response rate) with with results indicating a converger learning style (think and do) as the most frequently preferred style with diverger (feel and watch) and accommodator (feel and do) the least preferred. (Zoghi et al., 2010). Zoghi and colleagues (2010) recommended that educators take learning style, such as the *Kolb Learning Style Inventory* preferences of health science students into consideration when planning, implementing, and evaluating teaching activities, such as including more problem-solving activities that fit within the converger learning style (Zoghi et al., 2010). Learning style preferences and academic success of preclinical allied health students was determined using the VARK inventory, with most showing multimodal learning preferences with kinaesthetic being the most reported unimodal preference (Good et al., 2013). In addition, the study just referenced also found that students with a strong aural learning preference performed poorly in an environment with heavy lecture and laboratory combinations (Good et al., 2013). A comparative analysis study published in 2020 shows that there is significant variation of learning styles, as determined using the VARK Model, among and within the disciplines of social sciences, nursing, medicine, dentistry, and engineering (Mirza & Khurshid, 2020). For example, the ASSIST Inventory which primarily identifies if learners engage surface, deep, or strategic learning approaches was

administered to chemistry students with findings indicating preference towards surface learning approaches (Brown, White, Wakeling, & Naiker, 2015).

The Felder-Soloman Index of Learning Styles Questionnaire and Student Engagement

Engineering students have been found to be significantly more sequential and more sensing than liberal arts and education students and significantly more visual than the liberal arts students in relation to the Index of Learning Style dimensions and learning profiles (Litzinger, Lee, Wise, & Felder, 2005). Mauritius research which utilised the *Felder-Soloman Index of Learning Styles Questionnaire* shows that there was a difference in learning styles between engineering and management students (Khan, Khan, & Gobin, 2012). Felder and Soloman (nd-b) suggest that active learners tend to like group work more than reflective learners and sensing learners like learning facts, intuitive learners prefer discovering possibilities and relationships and visual learners remember best what they see, and verbal learners get more out of words both written and spoken (Felder & Soloman, nd-b). Sequential learners struggle if steps are skipped and instructors jump from topic to topic, whereas global learners need the big picture of a subject before mastering the details (Felder & Soloman, nd-b). Research which involved administering the *Felder-Soloman Index of Learning Styles Questionnaire* with health science students showed that 44% reported a preference for active learning, 60% sensing, and 64% sequential (Brown et al., 2009). Learning style preferences of medical students in public health medicine were investigated using a cross-sectional design with findings suggestive of balance across the domains using the *Index of Learning Styles* but six other factors measured were significantly associated with learning style preferences: age, race, fathers' occupation, mothers' occupation, and pre-university education (Rahim, Maideen, Rashid, & Abdulrahman, 2019).

Student Collaboration and Learner Engagement

Researchers in Spain tested hypothesis related to factors predicted to be positively associated with knowledge construction in cooperative learning experience; these being creativity, internal locus of control, self-efficacy towards knowledge content, and motivation towards collaborative pedagogical techniques with university unergraduates (García-Almeida & Cabrera-Nuez, 2020). In the research just mention results did not support the hypotheses in relation to creativity, and motivation, but there was supportive evidence for the other areas of focus (García-Almeida & Cabrera-Nuez, 2020). Research with masters level public health students questioned the assumption that team-based activities, such as team projects, facilitate learning, but of note did provide insight about the value of team work as being foundational for life, work, and other study; therefore a highly regarded transferable skill (Walker, Lang, Caruso, & Salas-Hernandez, 2020). Collaborative projects via web, for

example, Google Docs, are also reported to have positive results (Chu & Kennedy, 2011). On the other hand, in a college setting with heterogeneous groupings students were found to self-sort into small peer groups to elevate deep learning and cognitive skills (Freeman, Theobald, Crowe, & Wenderoth, 2017), and groups of fewer than five members has been shown in meta-analysis study, to be statistically significant in terms of content knowledge in team-based learning (Swanson, McCulley, Osman, Scammacca Lewis, & Solis, 2019).

A large, five university mixed-mode research project in Mexico sought information from teachers about teacher and student perception about out-of-class teamwork, finding teacher perceived advantages related to learning, abilities, and motivation, but problems with organisation, training, and assessing (Barajas, Vela, & Huerta, 2016). Whilst students opinions were not sought in the afore-mentioned study, the researchers suggested that it is the teachers' task to develop the team-working skills of their students (Barajas et al., 2016). Gender and group work preference have been found to be significant factors regarding a student's contribution to a group assessment and that an individual assessment within the group task was the only factor to influence group work contribution (Joo, 2017). The study just referenced found that the involvement of the females in group work was statistically greater than that of the males, and students who reported a preference for working with others were more likely to contribute in a group assessment task in comparison to students who reported preference to work alone (Joo, 2017). The influence of collaborative learning on continuing to second year of college study has been found to be mediated by positive peer interactions, regardless of race, gender or precollege academic ability (Loes, An, Saichaie, & Pascarella, 2017).

Student Focus and Participation, and Learner Engagement

In Australian research about the focus of attention of students during lectures it was found that student attention wavered and declined progressively from between 10 to 20 minutes into the lecture and that the provision of partial notes as opposed to complete notes or no notes was not more advantageous (Machida, Chin, & Johnson, 2018). UK experimental research showed that the type of PowerPoint content contributed to active learning in lecture environments, for example when compared to using PowerPoint with only text and bullet points (control), PowerPoint slides with evocative metaphoric images (experiment) was linked to more evidence of active learning (Roberts, 2019). Research involving medical students aimed to determine why they were not participating in a new curriculum which promoted adult and active learning via small groups and collaborative learning approaches found issues suggestive of not being developmentally ready (White et al., 2014). An investigative study about research capacity among health science students in Sub-Sahara

Africa found that demographic variables of being male and having prior undergraduate experience in a science degree were significantly associated with voluntary research involvement (Bovijn et al., 2017). Millennials (those born between 1980 and 2000) reportedly do not use traditional hierarchical learning models, particularly in relation to health knowledge (Lloyd et al., 2013).

Student Projects and Learner Engagement

Action learning to meet industry expectations has positive outcomes, at least in engineering education, as well as supporting a deep learning approach in the context of a complex and real project (Stappenbelt, 2010). In health sciences and education placements students indicated authenticity in terms of using reflective journaling as beneficial in industry related skills for their aligned profession, but there was dissonance between student, university, and industry; students wanted their assessments to be relevant for their current and future work roles (Ajjawi, Tai, et al., 2020). Capstone projects to address authentic social imperative issues are suggested to improve service-learning outcomes, and civic responsibility in students undertaking undergraduate public health programs in the USA, as well as benefit the community (Mackenzie et al., 2019).

Educator Influences and Learner Engagement

Low-stakes assessment in formative progress, for example, in a study about medical education established that the consequences of not-participating is a motivator for serious test-taking behaviours (Schuttpelz-Brauns et al., 2020). In a cross-global study (USA, Netherlands, and Canada), educator communication style and approachability influenced the students perception on the learning opportunity afforded in low-stake assessment; that is, the educator who shows genuine interest in the learning needs of the individual student (Schut et al., 2020). Teaching and student factors have also been found to influence the student experience of assessment as found in research with undergraduate students in the UK; a mediator being the teacher/student relationship (Lynam & Cachia, 2018). Other UK research highlighted a lack of student agency, that is, particularly unable or unwilling to engage with feedback, and what the student perceived as inconsistency and subjectivity in how different educators marked the assessment (Francis, Millington, & Cederlöf, 2019). A different perspective for student experience of assessment was explored in a Malaysian university, with interview data showing that some students' goal orientation is towards a performance level outcome, and some mastery level (Kaur, Noman, & Awang-Hashim, 2018). USA research revealed that how a student rated their instructors teaching effectiveness related positively to that students' assessment, with other findings suggestive of information gaps in student evaluation of teaching and course content (Wei, Lundy, & Wilson, 2019).

Student Assessment Experiences and Learner Engagement

Research which included interviews with first year chemistry students at either end of an exam results spectrum showed that students with the highest grades conceived learning as understanding, whereas those with the lowest grades preferred rote learning, however students who predominantly adopted a deep approach also, at times, used surface approaches in specific circumstances. (Almeida, Teixeira-Dias, Martinho, & Balasooriya, 2011). The researchers in the afore-mentioned study administered the Approaches and Study Skills Inventory for Students (ASSIST) developed by Tait, Entwistle and McCune 1998 (cited by Almeida et al., 2011, pp. 155-156) which assesses approaches to learning, which includes items determining if deep, surface or strategic approaches to learning are identified (Almeida et al., 2011). The same researchers stated that all the students with the worst grades agreed that multiple-choice test was a good assessment method; that is, good grade with limited study effort, and finding that deep learners participated in all activities proposed by the teacher, but surface learners only did the mandatory tasks (Almeida et al., 2011). The ASSIST Inventory was updated in 2013 incorporating the Revised Approaches to Studying Inventory (RASI) (Entwistle & Tait, 2013).

Peer Assessment and Learner Engagement

Peer assessment has also been reported, for example, educators were surveyed and more than 50 percent agreed that students were not sincere while assessing their peers, and over 60 percent did not believe students were competent to assess their peers, nor that peer assessment was effective (Agrawal & Rajapakse, 2018). However, in another phase of the same research project, just referenced, it was found that peer assessment scores were highly reliable and that educators need not lack confidence in promoting peer assessment, especially online tools for both ease of use and time-saving benefits (Agrawal & Rajapakse, 2018).

Student Cheating Behaviours and Learner Engagement

On a divergent note, cheating is also reported in the research literature, for example, Anderman and Koenka (2017) indicated that it is students who decide whether to cheat, however it is suggested that teachers can help shape the decisions that these students make about cheating. The authors suggest that educators can help mitigate cheating behaviours by an emphasis on mastery (inclusive of remediation and resubmission and exam re-sits), not stressing students about grades, communicating expectations clearly, avoiding the publicising of student grades, and talking about cheating (Anderman & Koenka, 2017). Systematic Review findings by researchers indicates a trend for an increase in both commercial contract cheating and academic misconduct in higher education settings

(Newton, 2018). Australian research shows that non-university higher education provider students are 12 times more likely to report engaging with a contract academic writing service compared to university students (Bretag et al., 2020). There is evidence that some Australian students regularly outsource assessments, regardless of the type of assessment task (Ellis et al., 2020). There is a direct association between self-control and cheating, as indicated in student report research, with mediating factors related to degree of academic preparation, chances to cheat, and views about academic integrity (Yu, Glanzer, Johnson, Sriram, & Moore, 2018). However, contract written assignments can be discerned by markers only some of the time as shown in a modest pilot study in which markers detected contract written assignments 62% of the time (Dawson & Sutherland-Smith, 2018).

Technology Enabled Learning

Conceiving of learning environments that are engaging to students, without the benefit of technology of some sort is hard to imagine in the 21st century, for example, technology, especially digital affordances are described in the literature (Hämäläinen, Kiili, & Smith, 2017; Silber-Varod et al., 2019). Technology is ubiquitous and pervasive everywhere, for example in education, digital technology, educational gaming, simulation, and virtual applications abound (Bouvier et al., 2014; Damassa & Sitko, 2010; Dumitrache & Almăşan, 2014; Henderson, Selwyn, & Aston, 2015; Johnston, Boyle, MacArthur, & Manion, 2013; Padgett et al., 2019). A World Health Organization commissioned report supports the use of e-learning technologies in undergraduate health professional education programs (Al-Shorbaji, Atun, Car, Majeed, & Wheeler, 2015). The world is becoming one big information system and the term *Internet of Things* describes where every-day physical objects are connected to the internet and identify themselves to other devices: synonymous, also, with the *Internet of Everything* (Techopedia, 2020). Personal learning as a pedagogy and strategies used by students to support informal and formal learning, for example via social media is correlated with self-regulation of learning (Dabbagh & Kitsantas, 2012). An example of technology used in public health learning is *The Educated Citizen* undergraduate public health initiative in Australia, which showed positive outcomes to increase public health literacy via the use of the internet, and smartphone-based learning alongside more traditional teaching methods (Outram et al., 2014). The rise in citizen science activities, is also a growth area, which would not be possible without digital applications (National Academies of Sciences Engineering and Medicine, 2018).

Personal Mobile Technology

However, mobile technology can be considered distractive, for example, in a research study combining questionnaire and experiment it was found that students' beliefs were neutral about whether they felt distracted by mobile phone use; and there was no difference in quiz scores between those using devices while listening to a lecture and those who did not (Elder, 2013). The same research also indicated that those who did use their mobile phone in class expected lower scores than students who did not, but that mobile phone usage was increasingly accepted in class and an important aspect of college life (Elder, 2013). Elder (2013) has commented that whilst the students lacked motivation to participate in the research, there was not any observation of decrements whilst multi-tasking.

However, research does support that engaging in non-learning related social media/mobile phone activities in the class setting instead of traditional notetaking was linked to poorer academic outcomes, with the researchers recommending further study to determine if the student's learning style influences multi-tasking in the learning setting (Demirbilek & Talan, 2018). This finding correlates with other research which found that the frequent interruptions from engaging with social media negatively impacts student concentration on task (Thompson, 2017), and another study which found that electronic devices used in class leads to divided attention, which subsequently has detrimental effects on exam scores (Glass & Kang, 2018). Data from a mixed-method study with students and instructors in a Canadian university, showed that while students acknowledged that off-task technology use in the classroom can be distracting, its use was considered a matter of personal autonomy, only to be regulated if distracting for others (Neiterman & Zaza, 2019). Contrary research findings link learning approach and multi-tasking with different media; that is, time spent, and frequency of use, as positively aligned with a deep learning approach, with females achieving higher media-multi-tasking scores than their male counterparts (Law & Stock, 2019).

Survey research asking university students about the use of mobile phones in class as rated in terms of a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis found that whilst the student was often engaged in non-learning activities on their mobile device, they did also use it for open access materials related to their learning (Derounian, 2020). Students also indicate that they use their mobile device because the teaching and/or teacher is boring, admit being addicted to using their devices, and that they know more about mobile technologies than their teachers (Derounian, 2020). Use of information communication technology in the science classroom is considered as beneficial, as found in a student survey about technologies; of note, use of online quizzes, virtual classroom, and Facebook

(Penman & Thalluri, 2014). Twitter and Facebook are considered helpful in healthcare education practice (Smith & Lambert, 2014) as a way to enhance communication and access to real-world practices and expertise. It has also been found that undertaking research involving Facebook is viewed positively by adolescent participants (Moreno, Grant, Kacvinsky, Moreno, & Fleming, 2012).

Designs for Technology Enabled Education

Scanlon, McAndrew and O'Shea (2015) discuss how technology influences pedagogy as related to designing for educational technology, and highlight instruction outcome factors such as unpredictability in relation to motivation, and directions students take during their programs of study, as well as what constitutes success in both formal and informal learning. Ellis (2014) described two studies in efforts to capture emerging descriptions and empirical measurements of key aspects of students' experience of learning, technology, curriculum activities, and outcomes and how they relate. It was found that some students had different perceptions about learning space (classroom, online) and separated the two, even if integration was required for a learning task; some avoiding the use of technology because they did not like it and others because they had time constraints (Ellis, 2014).

Potential Benefits of Educational Gaming and Technology Enabled Education

Researchers explored how and what types of learning do students in an interdisciplinary communication course experience in engaging with Second Life, and is this learning transferable to real life?; finding that project-based experiential learning can be conducted more easily with the use of virtual worlds (Jarmon, Traphagan, Mayrath, & Trivedi, 2009). Virtual world gaming with Second Life is still used in learning contexts, for example, anatomical sciences, with participants reporting positive experiences in relation to their learning (Lorenzo-Alvarez, Rudolphi-Solero, Ruiz-Gomez, & Sendra-Portero, 2020). It was also found that in a chemistry laboratory there was minimal differences comparing real versus the virtual, however, behaviour difference was significant, in relation to less anxiety reported in virtual laboratory activities (Hu-Au & Okita, 2020).

Researchers who undertook a review of educational gaming found that it helped improve long-term retention of information but is not more helpful than traditional didactic methods, however both are successful in increasing student knowledge (Blakely, Skirton, Cooper, Allum, & Nelmes, 2009). Using simulations to help emergency preparedness, for example, '*Pandemic*' helps improve self-reported knowledge related to public health functional capabilities (Araz & Jehn, 2013), and managing outbreaks (Lukens et al., 2014). Pandemic simulations have been accessible on-line as co-operative strategy games for at least two

decades (Asmodee Digital, 2019). Certainly, some benefits are shown in virtual systems to enhance student learning, but not as a complete package especially for competency-based skills, for example, nursing (Mosalanejad, Shahsavari, Sobhanian, & Dastpak, 2012).

Potential Drawbacks of Educational Gaming and Technology Enabled Education

Simulating real world situations using Second Life pose challenges in how second life constructs reality, as found in nursing simulations (Tiffany & Hoglund, 2014). Assumptions about people and their professional identities founded in reality may become distorted in the virtual world and the complexity of the virtual simulation may require more effort than would be required in the actual world (Marshall, 2014). On-line simulation was used to both encourage student learning and student participation in health care reform in the USA, as it was noted previously, that health education undergraduates were not inclined to learn about the complexity of the health care (Jecklin, 2010). Whilst detailed result information was not reported, the researcher commented that learning and participation was evident, however students lost interest in health education (Jecklin, 2010).

Educational gaming students may exploit the properties of an instructional program to progress while not actually learning (Muldner, Burleson, Van de Sande, & VanLehn, 2011). On the other hand, immersive virtual worlds, not just gaming, is suggested to compete, perhaps negatively, with students who already spend a considerable proportion of their day on social media activities (Savin-Baden, 2008). Research from Germany indicates that many university students are permanently connected to social media and get anxious if internet connection is lost (Vorderer, Krömer, & Schneider, 2016). Hong Kong research shows potential negative health associated with gaming and social media addiction in a sample of university students (Wong et al., 2020). There is also the issue of the capacity for cheating in virtual worlds (Kafai & Fields, 2009) and in educational gaming environments (Cook-Chennault & Villaneuva, 2019), and ethical issues associated with technology-based instruction and tools (Lucey & Grant, 2009; Richards & Dignum, 2019). Concerns have also been expressed related to cyber-bullying and its potential impact on academic performance, and health and well-being of students (Ata & Adnan, 2016; Fabito et al., 2018).

Potential Conflicts of Interest with Technology Enabled Education

UK research found that university students enrolled in a module titled *Living, Learning and Working on the Digital Economy* viewed the Web as both a space of student participation but also student surveillance which they contend constitutes a real obstacle to meaningful participation; students were required to keep a reflective blog and a Twitter account as part of the module (Costa, Murphy, Pereira, & Taylor, 2018). The researchers also comment that

education should liberate the learner and that tools used should shape students to become informed citizens by taking ownership of their learning, citing that the participants were not ready to fully change their learning practices from consumers to producers of knowledge, being less committed to participating online between scheduled classes, and actually organised their practice to comply with assessment activities (Costa et al., 2018). Other research indicates that the socialisation context is an essential factor in strategic co-creation of new knowledge with the researchers also developing a conceptual framework, the *Strategic Co-Creation of New Knowledge*, because there was scant research about this in the literature (Lim, Shelley, & Heo, 2019). Concern has been expressed that faculty members in the student 'social' community is a potential conflict particularly in relation to perceived boundaries in relation to social media (Smith & Lambert, 2014).

Personalising Learning as Technology Enabled Education

Paludan (2006, p. 1) posed the question about why personalised learning modalities had not advanced to date at the time suggesting several potential scenarios which could eventuate by 2025, these being total personalisation, personalised timing, automated teaching, and the status quo. In their review of compulsory schooling Gonski and colleagues (2018) recommended personalised learning approaches, and to use technology more effectively to enable it. Conversely, in the post-compulsory schooling context, it has been suggested that technology supported personalised learning lacks infrastructure and support within educational institutions, for example, that Massive Open Online Courses (MOOCs) are not really courses, rather a collection of knowledge and learning objects (Spector, 2014).

Podcasts, Response Systems and Discussion Forums as Technology Enabled Education

Creative podcasting, however, has shown some benefit as a deep learning approach in first-year chemistry students, in research which involved students working in groups to promote collaboration, contextualisation and digital communication of understanding; that is, create and submit a three-minute podcast on Web Course Tools (WebCT) discussion boards (Pegrum, Bartle, & Longnecker, 2014). There was some correlation between podcast results and exam outcomes but no significant results, therefore, the researchers do not suggest that supplementary podcasts improve student learning outcomes as measured by assignment results, but rather can foster deep learning in an appropriately structured task (Pegrum et al., 2014). Use of student response systems whilst not found to increase lecture attendance in a course including public health content in a student cohort undertaking university study in Australia indicates that the tool greatly influenced their likelihood to engage with the content, and half of the respondents responded positively as conducive to their learning (Carroll et al.,

2018). Popular culture and/ or media in learning programs is described in health education contexts also (Brown, 2014; Wiggins & Perez, 2017).

Learning Analytics in Technology Enabled Learning

Learning analytics was discussed previously in this chapter (Arroway et al., 2016; Nixon, 2016; Reyes, 2015), however how they are used for learning in higher education may vary. For example, educators accessing student enrolment information via Learning Management Systems (LMS); their background, activity within the LMS, and interaction with the material, with the view to improving retention and university return on investment (Huband, Parkin, Gibson, & Ifenthaler, 2019). On the other hand, there are genuine concerns about privacy issues in how student data is accessed and used when learning analytic systems are utilised in education, especially for research purposes (Tsai, Whitelock-Wainwright, & Gašević, 2020), and suggestion that students due to concerns, do not share all their data and make efforts to disguise audit trails (Ifenthaler & Schumacher, 2016). In research about personalised feedback via learning analytics affordances, focus group data indicated that students were mostly engaged with the feedback, and despite negative emotions that can be experienced in the type of feedback received, motivation to study increased (Lim et al., 2020). Learning analytics in the context of citizen science projects in higher education has also been discussed in the literature (Teo, 2020).

The Rise of Citizen Science as Technology Enabled Education

More recently citizen science has been flagged as another movement which may be formally recognised as making valued contributions progressing informal scholarship in related fields (Lukyanenko, Wiggins, & Rosser, 2019). The escalation in digital and communication technologies this century has led to vast user-generated content, with contributions, often-times from anonymous citizens, challenging traditional scientific viewpoints and research methods (Callaghan, Rowley, Cornwell, Poore, & Major, 2019). Information quality of the collective citizen science information is variable (Lukyanenko et al., 2019), and complex with ethical issues yet to be fully explored (Wiggins & Wilbanks, 2019). A meta-review shows that while traction for citizen science is growing in some discipline areas in higher education there is a lag in the social sciences (Tauginienė et al., 2020). However, as suggested by Provenzi and Barello (2020) there is public health urgency for scientific citizenship afforded by the truly global experience of COVID-19 pandemic.

The Associate Degree

Information from the Australian Qualifications Framework (AQF) places the associate degree as a level 6 qualification, which is at the same level as an advanced diploma, but between a diploma at level 5 and a bachelor's degree at level 7 (Australian Qualifications Framework Council, 2013). There are subtle differences in relation to AQF criteria, that is, graduates at level 5 will have specialised knowledge and skills for skilled/ paraprofessional work and/ or further learning, level 6, broad knowledge and skills for skilled/ paraprofessional work and/ or further learning, and level 7 a broad and coherent knowledge and skills for professional work and/ or further learning (Australian Qualifications Framework Council, 2013). In addition, the AQF states that for all of these levels, generic learning outcomes are embedded within the qualifications, that is, four broad categories covering skills in relation to fundamentals, people, thinking, and personal (Australian Qualifications Framework Council, 2013). The volume of learning varies between the levels, full time, with diploma ranging from 1 to 2 years, advanced diploma 1.5 to 2 years, the bachelor 3 to 4 years, and the associate degree 2 years (Australian Qualifications Framework Council, 2013).

The Associate Degree or Equivalent around the World

The New Zealand Qualifications Authority describes various levels of qualifications in its New Zealand Qualifications Framework (NZQF), though the terminology is different, and it is not clear if a qualification parallels the associate degree (New Zealand Qualifications Authority, 2016). However, the NZQF references Diploma 5, Certificate 6, or Diploma 6 and Diploma 7 levels, and bachelor's degree and above qualifications are not assigned numerical levels (New Zealand Qualifications Authority, 2016). The numerical levels as cited earlier, refer to theoretical and/ or technical knowledge and skills relative to specialised/ strategic contexts (New Zealand Qualifications Authority, 2016). The USA does not appear to have a national qualifications framework, so qualifications akin to associate degree in Australia, are variously called, for example, associate degree, or applied baccalaureate (National Student Clearinghouse Research Center, 2017; Shapiro et al., 2016; Spencer, 2019). However, these degrees have analogous features to the associate degree offered in Australia, and literature evidence indicates the applied nature of the programs, as also stated to be appealing to adult learners (Bragg & Ruud, 2011). In the USA, these level of qualifications time to completion varies from two years to 3.3 years (Shapiro et al., 2016). Foundation degrees, also comparable to the Australian associate degree, as described in the UK literature were developed as alternate tertiary entry pathways and characterised as including vocational requirements (Wilson et al., 2005). Other jurisdictions also describe qualifications of variation, and as indicated in a 2016 joint report, a common feature between AQF and

European Qualification Framework is that the levels are outcome based (Australian Government & European Commission, 2016).

Associate Degree as Pathway to Higher Education Programs

In practical terms, the associate degree is described as an alternate entry into higher education and as a pathway which can offer a vocational and applied outcome (Smith, 2013) and considered undergraduate study. The infrastructure to support programs such as the associate degree in the community has also helped inform planning, for example, in Victoria (Phillips KPA, 2010). The associate degree level program competes with both vocational education and higher education and its place in the post-compulsory education sector nebulous apart from being a pathway into higher level studies (Karmel & Lu, 2012). Literature about the teaching and learning approaches which work best in health science education at an associate degree level in Australia is limited, however, there is report that international students in Australia use courses such as the associate degree as a pathway into higher education courses (Ling & Tran, 2015). International students reported that the pathway to higher education as the most important factor motivating them to undertake vocational education and associate degree program (Ling & Tran, 2015). The research by Ling and Tran (2015) was based on interviews of Chinese international students undertaking diploma and associate degree programs in Australia and found that the students used an intermediary, for example, an education agent, in making decisions regarding transitioning from diploma to associate degree and higher education programs, as was family, teachers and coordinators, and peers from the same cultural background (Ling & Tran, 2015). However, in 2013 it was reported that there were more completions of associate level degrees in the higher education sector compared to the vocational education and training sector (Gale et al., 2013).

Associate Degree versus Vocational Qualification

There was call for increased alignment between the Vocational Education and Training (VET) and Higher Education (HE) sectors in the last decade (Brownie, Bahnisch, & Thomas, 2011). Australian VET students transitioning into HE courses found the new learning context as a positive, but also that first semester can be stressful for them (Catterall et al., 2013). Transitioning from secondary school into higher education can be challenging for a variety of reasons, and as suggested by Pang and Ross (2010, p. 29) faculty overlook the metacognitive challenges students face; that is, the expectation that the transitioning student is both self-aware and self-directed in regard to their learning skills, performance, preferences and barriers. South Australian research published in 2009 discussed the movement of learners between vocational education and training (VET) and higher

education (HE) (Harris, 2009). One of the findings was that the typology of movement from HE to VET was mature-aged female students in part time study, and transitioning into a different field of study, whereas VET to HE movement was typified by younger female students studying full-time, often to the same or similar field of study (Harris, 2009). The main reasons determined for all students was improving employment prospects, followed by personal interest, development, or recreation, and gaining or improving practical skills (Harris, 2009).

Associate Degree Completions

The National Student Clearing House Research Center (2017) published a snapshot report about certificate and associate degree pathways in the USA related to completions in 2010 to 2011. The research findings showed that the likelihood of a student completing a bachelor's degree varied based on the age of the student, with mature adult learners least likely to complete, but it also showed that overall, 65 percent of students who completed an associate degree enrolled in a four-year institution, and 41 percent of them earned a bachelor's degree over the next six years (National Student Clearinghouse Research Center, 2017). Other research from the USA suggests that by redirecting students to associate degree pathways that are guaranteed to transfer to bachelor level studies (as supported by particular policies and legislation within some USA states), community colleges ensure that students who attain these degrees will not lose credits when they enrol in a four-year institution, particularly for general education requirements (Spencer, 2019).

It is reported that in 2014, just five universities enrolled 71% of the commencing and continuing domestic associate degree students in Australia (Harvey & Szalkowicz, 2016). Harvey and Szalkowicz (2016) call for an expansion of nested undergraduate courses in Australian universities which have multiple exit points, thus enabling students with partial completion to receive some recognition. The authors describe nested undergraduate courses as those at lower levels embedded within a bachelor's degree course: for example, a diploma, advanced diploma, or associate degree (Harvey & Szalkowicz, 2016). However, diplomas and associate degrees are not always nested, a point Harvey and Szalkowicz (2016) made in view of their contention that attrition can be mitigated through nested courses, referencing data which suggests that thousands of students' complete units of study yet leave the institution with no credit. This is also reflected in students who complete their first year of study in a traditional bachelor's degree and then withdraw rarely receiving recognition for their studies (Harvey & Szalkowicz, 2016).

Beyond the first 21 years of the 21st century

As school leavers in Australia are now all born in the 21st century there is preparation for what is their future. Certainly, in the public health sphere there has been a global hiatus with COVID-19. There are novel and innovative and pragmatic education approaches outside of the typical higher education sphere. In recent years and with the advent of smart technologies the scope for personalised adaptive learning is hyped as an emerging pedagogy (Peng, Ma, & Spector, 2019). Personalised learning was also a focus of research about how best to assess the social and cognitive aspects of collaborative problem-solving in education (Care, Scoular, & Griffen, 2016). There is momentum in the rise of Citizen Science (National Academies of Sciences Engineering and Medicine, 2018). As described by Simpson (2013) citizen science projects involve non-professionals taking part in crowdsourcing, data analysis, and data collection and the boundaries of citizen science as a field are not clearly delineated. Burke et al. (2017) advance that addressing 21st environmental protection wicked problems, suggested to be climate change, energy, land use, and water quantity and quality, requires a systems approach – that is thoughtful synthesis of science and decision-making into a framework which includes consideration also of novel sources of data, such as citizen science.

Charles-Edward Winslow, a pioneer in public health education in the USA in the early part of the 20th century recommended a "*definite and inspiring program*" in relation to the "*untilled fields of public health*", especially for those uncertain about career choice (Winslow, 1920, p. 23). Interestingly, McLaughlin (2019) reports that public health is forecast as a career for the future in Australia, with a number of ways to achieve a public health role through both undergraduate study options and post-graduate pathways (McLaughlin, 2019). It is noted that Israel is also seeking to broaden its public health workforce through undergraduate public health education and reduce inequality of career opportunity (Bashkin & Tulchinsky, 2017) however the authors do state that major challenges with student recruitment and employment after graduation and that having a practicum (full final year of program) is significant.

Gaps in the Research Literature

There is limited research literature about the typical associate degree student in Australia, and their experiences, especially in relation to work-readiness preparation and development and employability for health roles, particularly public health support roles. There is no research literature about public health education in associate degree level programs in

Australia to date, however there is associate degree level public health specialisation programs advertised (The Good Universities Guide, 2021a). Developing 21st century skills is discussed in the context of future proofing for workforce generally (Joyce, 2019; Martin, 2018), but there is limited research in applications of public health education curriculum (Fried, 2015; Friedman & Lee, 2015). Students work on relevant world impacting problems in engagement with deep learning tasks, with affordances that digital technology provide, is identified as a feature of deep learning in respect to educational pedagogy (Fullan & Langworthy, 2014). Deep learning in the context of public health education (excluding reference to deep learning as machine learning) is limited (Dundas et al., 2017), but is reported in health professional education (Delgado et al., 2018; Vyas et al., 2017) and is indicated to support well-being of the learners who engage in deep learning behaviours (New Pedagogies for Deep Learning Global Partnership, 2019). There is report of a global public health charter (Moore, McKee, Borisch, & Ricciardi, 2016) and global health competencies for 21st century global health professions (Sawleshwarkar & Negin, 2017; Wilson et al., 2014). Public health education models which prepare for formal profession as public health practitioner are described (Fee & Bu, 2007; Godwin & Heymann, 2015), however, preparatory competencies for a support role in public health, as curriculum, are limited (Horney & Heath, 2020; Horney et al., 2017).

Conclusion

In this chapter the researcher has reviewed the local and international literature related to the public health workforce, undergraduate public health education, work-readiness, deep learning for 21st century skills, pedagogy, student engagement, enabling learning through technology, and the Associate Degree. The COVID-19 pandemic has more than ever affirmed the urgent need to equip people with introductory public health skills to support entry level roles in various contexts. Graduates with abilities across both public health basics and generic work-ready skills are essential in our 21st century habitus as are education programs to promote responsive citizenship, foster deep learning potentials, and engender proactive interest to question and then question some more in efforts to excel, remain resilient and socially accountable.

In reviewing the literature, the researcher has presented key information relevant to the case study research area. There is continued interest in promoting deep learning approaches in higher education contexts as well as innovative personal learning strategies. Evidence was presented about learner engagement in relation to varying pedagogical approaches. Public health as an applied education area as explored in terms of strategies which both prepare

entry level practitioners and meet work-ready requirements of prospective employers was also reviewed. Public health is growing momentum as undergraduate education. There is limited accessible research about associate degree education in Australia.

Chapter 3: Methodology

Introduction

Chapter 3: Methodology revisits the research questions, and provides an overview of, and rationale for choosing research methodology to address the research questions: being a bounded case study using mixed methods. This chapter also provides information about the study population group and setting and how participants were invited to participate in study activities, including eligibility and consent requirements. The researcher details the research methods that were used in collecting data and the rationale for making these choices. The researcher describes the instruments and activities that were used to support data collection. Activities and procedures that constituted data analysis will also be described. Information about the researcher's epistemological position and world-view in relation to the study as well as researcher reflexivity and bias is presented. Ethical issues in relation to the study is also covered.

Research questions

The over-arching and primary research question was:

> *In what ways can Associate Degree in Health Science students engage in deep learning promoting 21st century skills to enable work-readiness at graduation?*

To seek deeper understanding of the over-arching research question, the researcher included several delineating research questions, these being:

- *What are the learning approaches used by Associate Degree in Health Science students?*
- *What pedagogical strategies support deep learning outcomes to promote generic and transferrable 21st Century skills?*
- *What questioning approaches do students use in an instructor facilitated Public Health Group Project?*

The research supports an inductive/ interpretive rather than normative paradigm. Interpretive paradigms involve research approaches carried out with people in their habitus, as related to the phenomenon, and creating events by looking at them from within (Sharp, 2012). A mixed-methods research design explores the topic area, principally as the research was about young people, most of them on the cusp of career aspirations through achieving certain skill and knowledge capabilities through higher education. The study is primarily

qualitative and includes some data collected in a quantitative way. The most efficient way to answer the research questions was to get the answers from the student cohort; that is, in their own voice, acknowledging them as the experts about their own learning journey.

The Study Design - Case Study Research using a Mixed Methods Approach

Case study

Creswell (2007, p. 73) refers to case study research as '*the study of an issue explored through one or more cases within a bounded system*'. The research is bounded by a focused inquiry about deep learning in a cohort of students enrolled in an Associate Degree in Health Science program at one campus within one university setting in Victoria, Australia during an 18-month time frame straddling 2016 and 2017.

The value of case study design is its ontological alignment as contributing to theory (Kervin et al., 2006) and a field setting, and researcher reflexivity has epistemological implications (Wildemeersch & Stroobants, 2009). (Stake, 1981) implied that there is benefit in researchers being sensitive to and acclimated to the phenomena and setting before doing fieldwork and urged against presumption to tell the story that appears most meaningful to the researcher; and rather practice progressive focusing to avoid early delimitations before seeking to explain. Progressive focusing is regulated by inductive orientation and an emphasis on the fact that preliminary research questions involve presumptions which may not be accurate because there is variation in human culture and actions (Jupp, 2006).

Case study suits 'how' and 'why' research questions (Yin, 2014) and seeks to provide in-depth understanding using single or collective cases over one setting, within a setting or multi-site with data collection typically extensive using multiple kinds of data (Creswell, 2007). Yazan (2015) compared the case study approaches as respectively used by Yin, and Merriam, and Stake, all of whom promoted the use the multiple sources of data, however, Yin supports combining qualitative and quantitative methods, whilst Stake, and Merriam advocate using qualitative methods only. Case study research is appropriate for observing people, and describing, analysing, and interpreting their behaviours, situated in reality (Sharp, 2012), and considered effective to investigate real-world issues (Harrison, Birks, Franklin, & Mills, 2017). It is also recommended that for education research, the researcher reflect about case study qualities and if they connect with the research purpose and questions (Hamilton, 2011). Specifying parameters about the case study potentially mitigates the potential to collect a considerable quantity of data (Heale & Twycross, 2018), thus allocating limits enhances the feasibility of completing the project (Baxter & Jack, 2008).

Case study designs support learning about groups of people who share something in common (Creswell, 2015). The researcher was inclined towards case study design and the work of Creswell (2015) combining what he refers to as a *Convergent Design*; quantitative and qualitative data are analysed and the results merged with the purpose of comparison. The advantages of a convergent design which supports mixed methods is that comparisons can be made and used to confirm quantitative findings with qualitative data, and permits validation of conclusions about the extent of the phenomena (Greenhalgh, Bidewell, Crisp, Lambrox, & Warland, 2020; Guest, 2012) .

Mixed Methods

Mixed methods research is used only, as stated by (Ponce & Pagán-Maldonado, 2015) "*when the complexity of the research problem cannot be addressed from the unique perspective of a quantitative or qualitative study*" (p.114). Mixed methods can be applied in various phases of a research study, for example, using quantitative measurement tools with qualitative research methods to produce quantitative and qualitative data for the research question (Ponce & Pagán-Maldonado, 2015). Mixed methods research is described in education literature (Cameron, 2010; Lopez-Fernandez & Molina-Azorin, 2011; Ponce & Pagán-Maldonado, 2015). Mixed methods has also been reported to be commonly used in health sciences research (Kaur, 2016) and become more prominent in academic journals (Lopez-Fernandez & Molina-Azorin, 2011) and in public health (Padgett, 2012). Expressed views about the pros and cons of mixed methods are similar in the public health community (Brown, Elliott, Leatherdale, & Robertson-Wilson, 2015). In Vocational Education and Training (VET) research, the discipline fields which show high levels of acceptance for mixed methods research are those related to education, health and the social sciences (Cameron, 2009, 2010). Mixed methods is also credited with contributing valuable insight into complex research areas and public health issues, for example, through population health reviews (Campbell & Moore, 2018). Some universities offer mixed methods research courses in public health (Dalla Lana School of Public Health, 2020; John Hopkins Bloomberg School of Public Health, 2020; Monash University Public Health and Preventative Medicine, 2020).

The study utilised a mixed methods approach comprising quantitative and qualitative methods. Quantitative research methods are about empirical measurement, that is, scientific truth, whereas qualitative research methods relates to actions and behaviours, for example, understanding and meaning of human activities (Gerrish & Lathlean, 2015). Qualitative methods are practical for poorly understood research topic areas, and the findings generated may consequently require that the research questions need adjustments (Greenhalgh et al.,

2020). As an evidence-based field, public health practice also includes monitoring and evaluation of activities to enable future planning with data derived from many sources, for example, surveillance, population-based surveys and other independent sources (Lee & Zarowsky, 2015). Data is also derived from population-based surveys, independent sources and in public health research, there is mounting evidence that mixed methods research is being used, as opposed to the positivist approach which aligns with epidemiological principles (Kaur, 2016). Mixed methods research was stated to be increasingly published in interdisciplinary educational journals (Lopez-Fernandez & Molina-Azorin, 2011), and stated to be a model of research in the behavioural and social sciences (Ponce & Pagán-Maldonado, 2015).

Researcher – Reflection, Reflexivity and Bias

A researcher who works in the setting of the research undertaken has insider knowledge and may therefore find and share insights that may be of interest to the wider community (Costley et al., 2010). Review of literature pertaining to the benefits of researcher reflection affirm its contribution to both professional and personal development (Chan, 2017; Stehlik, 2011, 2013) and embodying researcher reflexivity (Attia & Edge, 2017). It has been suggested that being a reflexive researcher is a developmental approach to research methodology with development of the researcher as central, and functioning within environments of which they are an active principal (Attia & Edge, 2017), and are participant in (Chan, 2017), and the teller of the story (Primeau, 2003). Because of a vested interest a researcher may have in their own research project, ethically balancing their subjective objective dichotomy is recommended (Stynes, Murphy, McNamara, & O'Hara, 2018). Stynes and colleagues (2018) have thoughtfully explored this quandary and recommend rigorous self-appraisal to moderate the risk of subjective interpretation of qualitative data.

Educational research, as suggested by Tangen (2013) is socially sensitive. Domains of research ethics are described as being within the research community, in protection of participants, and in the value and role of research in society, and an ethical matrix is proposed covering values of wellbeing, autonomy and justice (Tangen, 2013). Understanding how the interests and perspectives of the researcher and how the narratives within qualitative research are subjective constructions is acknowledged as a reflexivity strategy (Primeau, 2003). In this respect, the reflexive researcher considers the concept of voice in how the story is represented (Primeau, 2003). However, it is suggested that personal narrative entails contemplations of the social positioning of those involved as stories of personal experience are strategic especially in auto-ethnography (Reed-Denahay, 2017). In qualitative inquiry the researcher is obliged to indicate their position in regard to the information collected,

particularly within interpretivist and constructivist paradigms as influenced by life experiences (Pitard, 2017). It is unavoidable that self-reflection and reflexivity is experienced by a researcher undertaking PhD study (Chan, 2017), for example in their personal motivations (Stehlik, 2013), sharing experiences (Guerin et al., 2013) and ethical praxis related to ontological and epistemological assumptions (Clayton, 2013).

Qualitative description is considered suitable for research about human experiences and views, especially the what, where, and who (Roudsari, 2019), is flexible in methods and a desirable way to get rich data to understand the research findings more deeply (Kim, Sefcik, & Bradway, 2017). The qualitative description approach as fashioned by Bradshaw, Atkinson and Doody (2017) is an inductive process which describes the phenomenon, recognises the subjective perspectives of both participant and researcher, contributes to understanding and describing a phenomenon rather than validate existing theory, and the researcher is actively involved with participants in some way. Furthermore, applying a quantitative logic to qualitative analysis is supported in the literature regarding thematic analysis as a means of organising and reporting analytic observations (Braun & Clarke, 2016; Clarke & Braun, 2017). In addition the research is conducted where the participants experience the phenomenon, and there is scope for interpretation of the phenomenon, from both subjective and insider position, which is referred to as an emic stance (Bradshaw et al., 2017).

Researcher Epistemological Position and World View

The researcher's personal ontological philosophy is a belief that several realities can co-exist and is predicated on factors related to personal and professional influences. An influencing factor is the researcher's vocational and professional background and experience, spanning more than three decades, in nursing, including public health and community nursing, health ethics, and health science and nursing education. An orientation towards scholarship and application of learning has been progressed by completing studies at bachelor level (applied science – nursing), and several graduate programs (community and child health, neonatal intensive care, nursing education), and masters level studies in public health, and research master's in education. The researcher's professional philosophy aligns with public health and socio-ecological models of health, for example, striving to be socially accountable, a stance influenced by a number of instructive publications (Ahola-Launonen, 2015; Boelen & Woollard, 2011; Council of Academic Public Health Institutes of Australia (CAPHIA), 2016a, 2016b; Czabanowska et al., 2014; Gibbs, Davis, & Crouch, 2016; Rourke, 2006; Wilkinson & Marmot, 2003).

As an active player in the research as bounded case study, the researcher contends that the research is positioned fundamentally within the interpretive domain because of what Egbert and Sanden (2014, p. 34) also referred to as post-positivist, with multiple truths possible in natural settings because reality is complex. Being both a health professional and an educator, the researcher is influenced by theoretical perspectives which fits their world-view, but open to change as conditional on context, for example bioethical issues and credible evidence. Transformational theory, such as how a learners' experiences shape their learning (Mezirow, 2000), and, in particular, in pre-professional education for health-related roles (Edwards et al., 2013; Gardner et al., 2018) has also influenced the researcher. Therefore some constructive and subjective epistemology is operating, especially in regard to social construction, that is an individuals' knowledge and perceptions about what they know is built from their idiosyncratic experiences (Egbert & Sanden, 2014). Experiential learning theory (Kolb & Kolb, 2005; Kolb & Kolb, 2014; McCarthy, 2016), as applicable in health professional education (Dimmitt, 2017; Dundas et al., 2017) aligns with the researcher practise over the years as an educator in applied service learning programs, such as nursing.

Ideologies of the heutagogical approach (Hase & Kenyon, 2001; Moore, 2020a; Tümen Akyıldız, 2019) in relation to educational design, especially for education in the health sciences (Chacko, 2018), as well as evolving digital capabilities to support learning, for example, learning analytics (Arroway et al., 2016) and personalised adaptive learning (Peng et al., 2019), has also been instructive. Affordances inherent in non-formal learning (Brown, Dunlop, & Scally, 2018; Brown, 2019) and the rise of citizen science as mainstream (Australian Citizen Science Association, 2020; Wiggins & Wilbanks, 2019) are other areas of professional and research interest. The tenets of Social Accountability Theory (Boelen & Woollard, 2011; The World Bank, 2007; Ventres et al., 2018), and the notions of civics and educated citizens for promulgating societal beneficence (Boydell, McMullen, Cordero, Steyn, & Kiare, 2019; Butler, 2015; Outram et al., 2014) also resonates with the researcher's personal views. Indeed, a protagonist of educational reform in the 20th century, John Dewey, advocated for socially responsive citizenship being developed via authentic learning experiences (Dewey, 1938). Some features of parametricism, as borrowed from architecture (Schumacher, 2009, 2016), which aspire to improve society through malleable methods is also of particular interest to the researcher. Additionally, there is alignment with the work of Gibbons and colleagues (1994) in writing about the confluence of science and research and social accountability and reflexivity in contemporary society referred to as 'Mode 2 Knowledge'. Mode 2 Knowledge is characterised by heterogeneity, is transdisciplinary and knowledge carried out in the context of application, as opposed to 'Mode 1 Knowledge' which is more traditionally oriented and associated with scientific sanction (Gibbons et al.,

1994). Therefore, exploring work ready skills in the context of public health applications is a legitimate area of research focus.

Therefore, there is no hegemony of paradigms which underpin the research, and the researcher contends, that the eclectic conceptual framework, described later in the chapter, compliments their inclination towards progressing a socially beneficial, liberalised and dynamic, personalised learning for living and legacy, educational paradigm, especially for public health role preparation. A summary overview of the research parameters is presented in Figure 3.1 *Overview of the Research Parameters Infographic*.

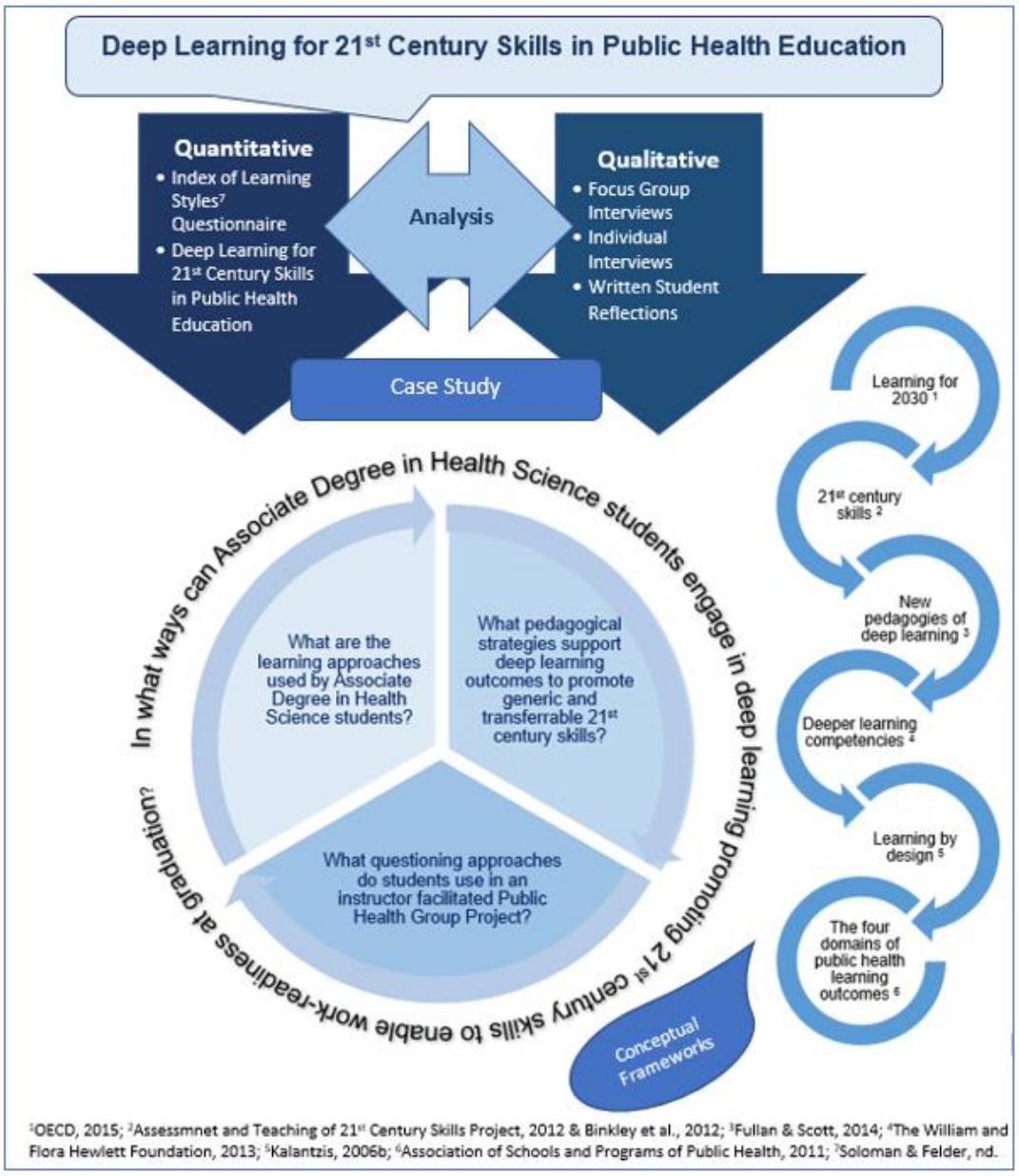


Figure 3.1*: Overview of the Research Parameters Infographic*

A summary of the research instruments and methods is presented in Table 3.1: *Summary of Research Instruments and Methods*. A detailed discussion of these methods follows.

Table 3.1: *Summary of Research Instruments and Methods*

Summary of Research Instruments and Methods
Questionnaires
Index of Learning Styles (Felder & Soloman, nd-a)
Deep Learning for 21st Century Skills in Public Health Education (developed by the researcher)
Focus Group Interviews
Individual Interviews
Written Reflections (Student written reflections)

Questionnaires

Two questionnaires were administered. The Index of Learning Style Questionnaire (Felder & Soloman, nd-a), which is a validated tool used and reported in the research literature (Burgoon, 2018; Felder & Spurlin, 2005; Graf, Viola, Leo, & Kinshuk, 2007; Heenaye, Gobin, & Khan, 2012; Khan et al., 2012; Litzinger et al., 2005; Lwande, Muchemi, & Oboko, 2021; Wang & Mendori, 2015) was used to determine learning style preferences. A learning style construct is a useful explanation that assists people to have insight into what helps them learn (Feldman, Monteserin, & Amandi, 2015). The second questionnaire was developed by the researcher, the Deep Learning for 21st Century Skills in Public Health Education Questionnaire, its intent to seek information, rather than utility as a psychometric tool, and requested some demographic information, but mostly comprised Likert-style options, open question responses, ratings, and matching. The rationale for choosing questionnaires is that descriptive information regarding relationships between conditions can be determined (Egbert & Sanden, 2014). Additionally, the quantitative aspect reflects the means by which the questionnaire data is analysed (Sharp, 2012). Implied consent will be assumed in the anonymous completions, with all students enrolled in the Associate Degree in Health Science having equal opportunity to participate. When anyone in the given population has a chance of participation and participants are asked the same questions in a like manner, responses can be reported as frequencies and percentages (Pope, Ziebland, & Mays, 2006). Quantitative data will be analysed using descriptive means and frequency counts, looking for trends in data direction. The rationale for choosing a thematic alignment in analysing the data is that the data needs to not just be interpreted but also described (Bell & Waters, 2014). A qualitative content analysis is used in quantitative and qualitative research to gauge responses to open questions (McMurray et al., 2004). A qualitative content analysis involves simple reporting of common qualifying and quantifying trends in data, and use of codes' frequency (Vaismoradi & Snelgrove, 2019).

Focus Group Interviews

Participants from all levels of the Associate Degree in Health Science student cohort were invited to share their insights about their learning experiences via focus groups interview, and participants provided written consent. A focus group can be culturally nuanced and facilitate discussion by means of mutual support (Kitzinger, 2006). The focus group is a suitable method for examining complex issues and novel topic areas and can be used in mixed methods research with the advantage that it permits insight into beliefs and attitudes of people who may share certain experiences (Carey & Asbury, 2016). However, focus group interview is a one-time interaction, and is about the topic discussed and not the interaction of the focus group participants (Carey & Asbury, 2016). Regarding the research, it was possible that focus group participants may have contributed to the questionnaire components, and individual interview. The rationale for focus group, is to get information about the shared interests and experiences of the group, with a researcher as moderator (Bell & Waters, 2014). The researcher was both moderator and facilitator in the research project. As supported by Kitzinger (2006), facilitation involves urging debate and recording statements which are then transcribed. Kitzinger (2006) further suggests that focus group research usually uses purposive sampling but for research with a small population pool, a representative sample, of ideally between four to eight people is recommended. A qualitative content analysis, via textual analysis activities, of focus group data aligns with thematic analysis, in terms of coding and summary of the recorded transcript narrative (Bell & Waters, 2014; McMurray et al., 2004). As suggested by Porter (2008) thematic analysis determines themes, but is not dependent on how many times the theme is mentioned, rather that it was mentioned. In explaining themes it is acceptable to provide accompanying representative direct quotations from the focus group transcripts (Rosenthal, 2016).

Individual Interviews

More detailed information can be occasioned from an individual interview, and contributes to the understanding of the social environment, and phenomenology as relative to understanding the participant perspective of an experience is enabled (Kervin et al., 2006). The goal of the interview, which is guided by open-ended questions, is to gain understanding of the participant experiences, not direct them about what to say (Peel, 2020). Purposive sampling was applied to this aspect of the research, however all the potential cohort population had equal opportunity to be invited. Individual interviewees may have participated in completing questionnaires and focus group interview, but not student written reflection. All interviewees provided written consent. A qualitative content analysis supports thematic analysis for the same rationale which applies to focus group interview. In the research

conducted, the researcher conducted all the individual interviews, and analysed all the narrative. Themes are explained and accompanied by representative direct quotations from the interview transcripts (Rosenthal, 2016).

Student Written Reflections

Existing written reflections completed by students who had participated in a group public health project was included in the research especially regarding public health education. The rationale for garnering written reflections is that they contribute to understanding the research cohort (Kervin et al., 2006). Written reflections as research data is reported in the literature (Castleberry et al., 2016). Purposive sampling was integral as only students who had participated in a group public health project and had completed written reflections could be invited to share their reflections. Participants who contributed written reflections may have completed questionnaires and participated in focus group interview, but not individual interview. A qualitative content analysis aligns with thematic analysis, the rationale being that an existing document can be used as research data (Sharp, 2012) and subjected to textual analysis activities (Kervin et al., 2006); thereby also amenable to discourse type analysis if it concerns social interactions (Egbert & Sanden, 2014).

For elucidation purposes, thematic analysis, as adopted for the case study, refers broadly to what Vaismoradi and Snelgrove (2019, pp. Section 2.2, Paragraph 1) describe as '*the rich and complex nuanced interpretation of the data as the theme'*. Researcher intuition is also crucial as is being creative and innovative according to Vaismoradi and Snelgrove (2019), who also recommend presenting results by use of models, maps, or storyline. Pope, Ziebland and Mays (2006) also reference the use of models or diagrams to show theme connectedness. Thematic analysis can be used across different types of epistemologies and in its own right as a research method (Nowell, Norris, White, & Moules, 2017). Clarke and Braun (2017) refer to the flexibility of thematic analysis which encompasses everything from research questions, sample scope and composition (participants' lived experiences), approaches to data collection, and methods used to determine meaning, thus useful to identify patterns within and across data. Code and theme generation derived from qualitative data is consistent with thematic analysis with codes representing the network for themes, which provide a structure in organising and reporting analytic observations, thus are the patterns of meaning, which are supported by a fundamental organising idea (Clarke & Braun, 2017).

Braun and Clarke (2016) write about student researchers, and also published researchers, who are generating themes while working with small samples, and applying complex

analysis. Furthermore, methodologies, which essentially do qualitative analysis akin to 'quantitative logic', means that themes can be established early on in analysis, and thus coding becomes a means of evidentiary support of themes that have been identified (Braun & Clarke, p. 741). A theme relates to something important about the data, in regard the research question, which may show a patterned response (Braun & Clarke, 2006). Pope et al. (2006) also suggest that qualitative data can be analysed quantitatively, for example, using simple counts, though the intent is not to quantify data. In addition, taxonomies or classifications and clustering can be an outcome of thematic analysis and used to illustrate connections via the use of diagrams or models (Bazeley, 2012; Guest, 2012; Pope et al., 2006; Smith & Osborn, 2003).

Ethical Issues in Educational Research

Ethical issues in research where the researcher has a dual role of educator plus researcher is discussed in the literature (Shi, 2006). Human participants in research is vital to develop basic and applied knowledge in social science (Shamoo & Khin-Maung-Gyi, 2002). Research should have established protocols to guide the researcher (Stichler, 2014). Ethical approvals for research with students must be rigorous to reduce coercion and concerns regarding confidentiality (Parsell, Ambler, & Jacenyik-Trawoger, 2014). For example, dual educator/researcher roles, informed consent, use of incentives, privacy, anonymity, confidentiality, and data quality needs to be addressed (Roberts & Allen, 2015). Recruiting students for research projects, especially in higher education with demand for student participation at a premium is a challenge (Far, 2018). However, it has been reported that students' rate the perceived educational benefit of participating in research more highly than the perceived costs (Brewer & Robinson, 2018; Roberts & Allen, 2013).

Stakeholders

(Brooks, te Riele, & Maguire, 2014) discuss stakeholders of educational research in terms of ethics and utilitarianism, for example, those immediately impacted or more broadly for community benefit. Identifying and addressing the concerns of stakeholders affected by the research, for example, in educational research, students, teachers, and parents, to the establish socially important focus meaningful for them (Kervin et al., 2006). Consideration of the relative importance of partners in a project can warrant activities such as a stakeholder analysis (Kennon, Howden, & Hartley, 2009), for example in health-related contexts (Edwards et al., 2019). Quality assurance is another aspect which can be informed by the

various stakeholder points of view (Kettunen, 2015), as is decision-making processes (Brugha & Varvasovszky, 2000).

To be noted: The research was undertaken at a university where the researcher was employed - a different university to where the researcher was enrolled as a PhD Candidate.

Inquiries about undertaking research with students enrolled in the Associate Degree in Health Science with the Head of School of the University where the researcher was employed on a sessional contract, were discussed with the Executive Dean of the School and the Deputy Director of Academic Policy and Governance of the University. The research was referenced in communications as a project "highly relevant to the [universities] strategy – being focused on the development of work ready skills for these students". In regard to contacting potential participants, it was deemed appropriate to make contact directly via email or Blackboard (Student Learning System). Refer to Appendix A: *Email Communications: Endorsing the Research Project – (Part a) Key University Stakeholders.* Figure 3.2: *The relative relationships of stakeholders impacted by the case study research* shows the various stakeholders in the setting of the research. The relationships overlap in some parameters, regarding initial inquiries about undertaking research (Head of School) through to Human Research Ethical approvals and Learning Advisory. Support in principle was also dependent on stakeholders such as program coordinators, teachers and facilitators of the program, and of course, all potential student participants. In a broader sense members of the community and future workforce areas are also stakeholders of educational programs, which is acknowledged as a factor by (Kettunen, 2015) who particularly reference customership, for example, employers, communities, and private people (p. 37).

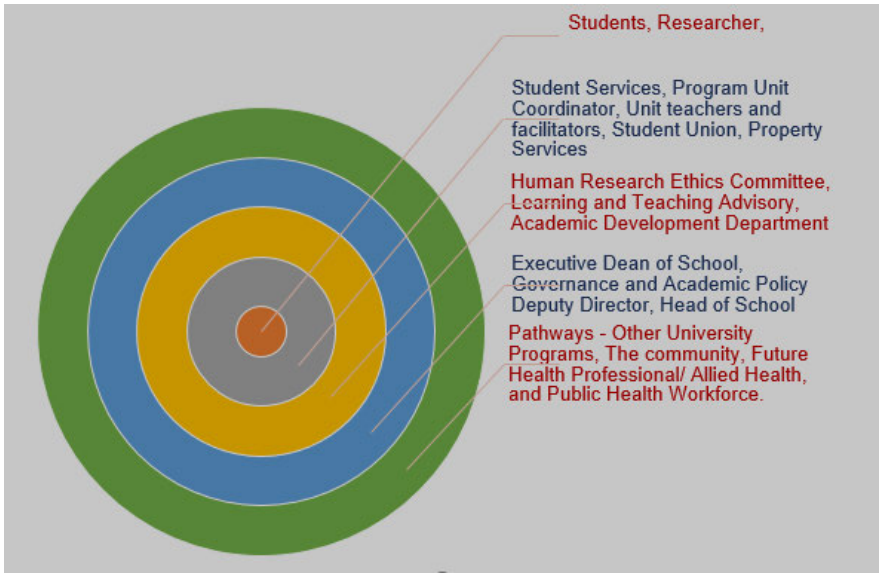


Figure 3.2: *The relative relationship of stakeholders impacted by the case study research*

Ethics Approvals

The types of ethical issues and related activities that need addressing in a research, and as identified by Creswell (2014, pp. 93-94 Table 4.1) differ depending on stage of the research.

- *Prior to conducting the study*: seeking ethics approval to conduct research and permissions to conduct research in the researcher's place of employment;
- *Beginning the study*: disclosing the purpose of the study to participants and not pressuring them into signing consent forms;
- *Collecting data*: treating participants fairly, avoiding deception and respecting potential power imbalances;
- *Analysing data*: avoiding disclosing only positive results, respecting privacy and the anonymity of participants; and
- *Reporting, sharing, and storing data*: complying with ethical issues, avoiding falsification, and storing as per regulatory requirements.

Prior to conducting the research

The researcher had approval to undertake research at their place of employment from the Associate Dean of the School, which can be demonstrated in the email endorsement encouraging potential participants to engage in the research, which is presented in Appendix A: *Email Communications: Endorsing the Research Project – (Part b) Endorsement Encouraging Research.* Formal Human Ethics approval was granted by the Victoria University Research Ethics Committee in 2016. The researcher undertook an additional ethics approval to conduct research at their place of employment, which was approved. The ethical approvals can be viewed in Appendix B: *Ethical approvals to conduct research.*

Beginning of the research

Full disclosure of the research was provided to all potential research participants using the format required by Victoria University. All participation was voluntary. All research data was to be de-identified. As key stakeholders in the research, all potential participants were advised that the research could provide useful information about how best to meet the learning and work ready needs of future Associate Degree in Health Science Students. All potential participants were provided with an Information to Participants involved in Research (Explanatory Statement), which is provided in Appendix C: *Information to Participants involved in Research (Explanatory Statement)*. In addition, all potential participants were contacted via individual email; an example of wording used is provided in Appendix D: *Example of Recruitment Contact to Potential Research Participants.*

Collecting data

Full disclosure about the research was provided to all research participants and conducted on-campus at times convenient to the participant. No commercial or financial incentives were offered. All participation was voluntary and written consent required for Focus Group participation, Individual Interviews, and Student Written Reflections. As discussed earlier, all potential participants were provided information about the research, and this was reiterated with actual participants. As research activities were undertaken during the participants on-campus time the researcher made available (purchased by the researcher) fruit and packaged snacks, such as health bars.

Analysing data

Objective analysis of the quantitative data was undertaken using descriptive measures such as frequencies and percentages if applicable, so generalisations about significance cannot be stated. However, naturalistic generalisation and transferability is possible, that is, with naturalistic generalisation, which is defined by Mills, Durepos, and Wiebe (2009, pp. 600-601) as "a *process where readers gain insight by reflecting on the details and descriptions presented in case studies*". Some readers may find that the findings are in concord with their own experiences (Mills et al., 2009). In terms of rigour for qualitative data, Brooks, te Riele and Maguire (2014) suggest additional analyses such as subjecting transcripts to frequency counts of key words. All qualitative data was de-identified and code descriptors used which cannot be attributed to any individual.

Reporting, sharing, and storing data

Any data reported is de-identified in the thesis, and any content naming the university where the research was conducted is redacted. The research was an individual project. Data is electronically filed in a secure computer system. Hardcopy material (questionnaires) are filed in a secure location and de-identified, that is, content cannot be attributed to any individual. Consent forms are filed in a secure location.

Ethical Issues – Individual Interviews and Student Written Reflections

There was a transparent separation of the research process from the researcher's teaching role and obligations as an educator. As the individual interviews were pertinent to the research question related to participation in the public health group project, interviews could not be conducted until formal resulting had been completed. As the public health group project was an elective in the third semester of a four-semester program, eligible participants were not invited to be interviewed until the semester following completion of the public health

group project. This same timeline was applicable regarding seeking permission to access Student Written Reflections. Student written reflections were existing documents. That is, they were not written for the purposes of the research but were an optional assessable component in the collaborative group projects within the elective stream related to promoting health. The reflections were an individually assessed item within the two group assessed projects undertaken over two semesters and referred to in the study as the Public Health Group Project. The student written reflections pertained to experiences of peer collaboration during the projects, with guidance to reflect about the overall experience: what went well, challenges, recommendations for improvement, and their learnings about their self. The task was allocated 5% of the total grade and if the student provided any written reflection they received 5%. Students had to achieve 50% overall to pass the subject and as no single assessment (three in total) was more than 50%, it was possible to achieve a pass without completing all the parts of each assessment. Therefore, completing and submitting a written reflection, which was one part of an overall assessment task, was not mandatory.

Participants

Participants were recruited by purposive sampling from the total enrolled Associate Degree in Health Science student cohort in Semester Two, 2016 and Semester One, 2017. Active research data collection commenced in August 2016 and was completed in August 2017. Participants were mostly school leavers with a few mature age students. There were no exclusions, as such. All participation was voluntary. Signed written consent was required from students before participating in focus group interview, individual interview and researcher access to student written reflections, for qualitative data collection processes. Refer to Appendix E: *Consent forms used in the research*. Completion of the questionnaires implied consent. Any identifying information was redacted. Seeking basic demographic data of students was part of the research design, though only in very limited capacity. That is, demographic information was to determine a typical student profile, for example, gender, age, career aspiration, and year of study.

Participant Recruitment

Whilst purposive sampling was the primary means of recruitment, given the modest overall potential cohort, participation was representative. For example, as suggested by Kitzinger (2006) representative samples of a small population, who are grouped together, such as in a tutorial group. The Head of School sent a global email to enrolled students, encouraging participation in the study activities. Initial communication and invitation to participate in the

study was via the Blackboard (Learning Management System) messaging with the Information to Participants involved in Research (Explanatory Statement) provided as an attachment. The initial contact was followed up by researcher presentation in the class setting (during tutorials), providing information about the research and inviting participation. During these class presentations a hard-copy Information to Participants involved in Research (Explanatory Statement) was distributed to all present.

At the time of initial recruitment there were two program-year levels represented and eight different semester subjects – with most of these subjects having at least two tutorial groups. For elucidation, Figure 3.3: *Associate Degree in Health Science Program structure* shows the general configuration of the Associate Degree in Health Science program which was the subject of the case study research. For privacy purposes, the topic areas are used rather than the actual subject title.

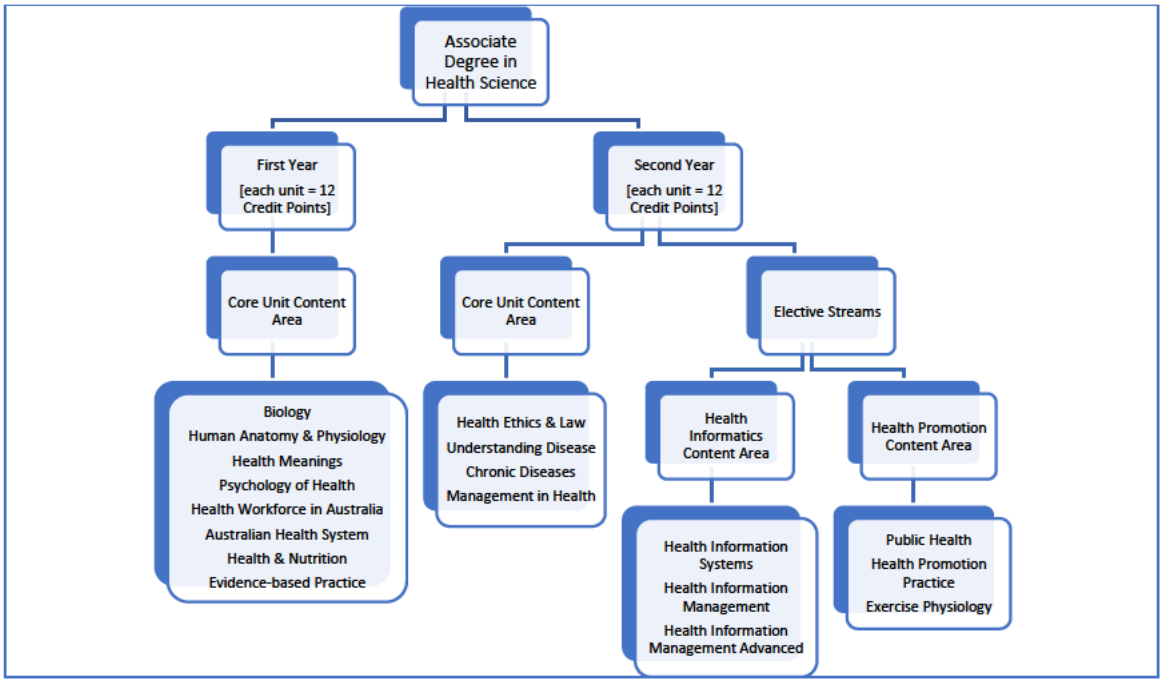


Figure 3.3: *Associate Degree in Health Science program structure*

The class presentations were followed up by individual email to each student enrolled in the Associate Degree in Health Science. The program-year level, as indicated above was represented by:

- First year- first semester, and second semester
- Second year – first semester (Elective Stream – Health Information), and (Elective – Health Promotion)
- Second year – second semester (Elective Stream – Health Information), and (Elective Stream – Health Promotion).

- Other – a few students with part-time enrolment, repeating, or undertaking a subject as an elective for another course program.

Eligibility, Exclusions, and Consent Requirements

Participants were assumed to be eligible to participate by being at least 18 years of age or studying in the year in which they would reach 18 years of age. Other demographic information was limited to inquiries embedded in one of the research instruments used (the researcher developed, *Deep Learning for 21st Century Skills in Public Health Education Questionnaire*): age, gender, and first-language. Participation in all research activities was voluntary. All students were eligible to participate in completing the questionnaire instruments. The researcher was only permitted access to program level student enrolment information via Blackboard (Student Learning System), which provided only the student's name, their university identification, and their student email address. At the time of initial recruitment, the entire enrolled student cohort number 117 individuals, and of these there was no way to filter if they were active students. Based on this limited access it could be implied based on naming conventions that there were 58 female students, 53 male, and 6 indeterminate. Of this number of enrolments, it could be further determined that 18 students were enrolled in second year, therefore 99 first year. However, it was not possible, based on the researcher's permitted access, which enrolments represented either full time or part time study loads. Researcher permitted access did not include any data related to how each individual students' study was funded. Therefore, as no-one was excluded, and all enrolled students were invited to participate in completing the questionnaires, 75 out of 117 students (64%) volunteered and completed the Felder and Soloman (nd-a) *Index of Learning Styles Questionnaire*, and 55 out of 117 students (47%) volunteered and completed the researcher developed questionnaire, *Deep Learning for 21st Century Skills in Public Health Education.* To be noted, many participants may have completed both questionnaires, which is to suggest that the respective percentages reported above do not represent an 'either/or' scenario. The completions of a pre-determined number of questionnaires were not required as frequency (number of responses) and percentages were used in describing the data, not inferential statistics.

Students who were undertaking their first year of study were eligible to participate in the Focus Group 1 Interview. Five out of a potential 99 students (5%) undertaking first year study volunteered. There were three females and two males in the group. Students who were undertaking their second year of study were eligible to participate in the Focus Group 2 Interview and out of a potential pool of 18 students, four (22%) volunteered, all females.

Students who had completed the Introduction to Public Health Elective Stream subject were eligible to participate in the Focus Group 3 Interview. At the time of recruitment, the potential pool of eligible participants numbered 11 and only two (male and female) volunteered to participate. For the Individual Interviews students who had commenced either start of year or mid-year intake the year prior had completed the Introduction to Public Health Elective Stream subject (in a full-time study load would have been completed in the students' third semester of study) were eligible to participate in the Individual Interview. The potential pool was 15 students, five (33%) volunteered; one male and five females. Students who were completing the Health Promotion Elective Stream were eligible to provide their Written Reflections about participating in a collaborative group project. The cohort for this part of the research was recruited after all of the above was completed. At the time of recruitment there were 11 eligible participants and each of them (100%) volunteered.

Completion of the anonymous Questionnaires was deemed to be implied consent. Signed informed consent was required for participation in the Focus Group Interviews, Individual Interviews, and access to Student Written Reflections.

Data Collection

The timing of data collection, quantitative versus qualitative, was not interdependent. The only stipulated timed event, in terms of when to collect data was for the individual interview, and the student written reflections component, which could only occur after the potential participants had completed the Introduction to Public Health subject and been formally resulted. The schedule of data collection can be viewed in Table 3.2: *Schedule of Data Collection.*

Table 3.2: Schedule of Data Collection.

Case Study Activity	Date Range
Index of Learning Style Questionnaire	August 2016 to March 2017
Deep Learning for 21st Century Skills in Public Health Education Questionnaire	August 2016 to March 2017
Focus Groups	October 2016 – August 2017
Individual Interviews	October 2016 to May 2017
Student Written Reflections access	August 2017 and November 2017

Quantitative Methods

Quantitative data was collected via two different questionnaires. All students enrolled in the Associate Degree in Health Science during the second semester of 2016 and the first semester of 2017 were invited to participate in the research by completing one or both questionnaires. The two questionnaires used were the *Index of Learning Style Questionnaire* (ILSQ) (Felder & Soloman, nd-a), see Appendix F: *Copy of the ILSQ* and Appendix G: Copy of *the Deep Learning for 21st century skills in Public Health Education Questionnaire* (DLQ) which the researcher developed based on a body of literature related to the research questions. Qualitative data about the learning approaches was also enabled in the DLQ with some items inviting open-text response.

Validity and Reliability of the Questionnaire Instruments

The *Index of Learning Styles Questionnaire* (ILSQ) is a validated instrument which was freely accessible for use in educational research (Felder & Soloman, nd-a). The ILSQ has been used and validated in a number of studies and disciplinary area (Felder & Spurlin, 2005; Khan et al., 2012; Litzinger et al., 2005; Omar, Mohaffyza, & Paimin, 2015; Wang & Mendori, 2015). The Index of Learning Styles Questionnaire offers a choice of two responses to 44 questions, which are used to determine individual student preferences, across four domains comprised of opposite preferences: Active versus Reflective, Sensing versus Intuitive, Visual versus Verbal, and Sequential versus Global (Felder & Soloman, nd-a, nd-b).

The *Deep Learning for 21st Century Skills in Public Health Education Questionnaire* (DLQ) was developed by the researcher. The DLQ questionnaire was evidence-informed by an extensive review of the prevalent literature in 2015 which related to areas to be addressed in the study questions. The research was not testing a hypothesis, nor any experimental conditions, nor intended for psychometric applications beyond the research study. The DLQ statements were compiled from existing literature which identified key aspects related to the study research questions. The questionnaire's reliability or validity was not an expressed research outcome, nor was there intent for it to be subjected to inferential statistic procedures in the research methodology. However, to ensure the validity and reliability of the instrument, participants were encouraged to seek clarification about the statements (none did). A reference list was available on request. The potential research population (117) was limited to one setting (the program was only delivered in one location). Sampling error was not applicable as the research was a case study and primarily via qualitative means. Responses to questionnaire items were analysed in terms of frequency of responses (and percentages).

The Index of Learning Styles Questionnaire (ILSQ) Instrument Overview

The *Index of Learning Styles questionnaire* (ILSQ) provides an indication of the preferences of the person undertaking the survey, related to four dimensions of a learning style model (active/reflective, sensing/intuitive, visual/verbal, and sequential/global) developed by Felder and Silverman (1988), originally used in engineering education, and validated by Felder and Soloman (nd-b) for public (non-commercial) use by educators and researchers. The original model included five dimensions, the fifth being the inductive/deductive (organization) (Felder & Silverman, 1988), however, whilst reiterating these as valid learning style preferences, Felder in an Author's Preface, (2002), to the seminal Felder and Silverman (1988) publication explained the rationale for removing this dimension from the scale. At that time the prevalence of teaching approaches in college teaching (late last century) was to start with fundamentals before proceeding to applications which was predominantly a deductive style, rather than problem-based approaches (inductive) (Felder, 2002). Since using the ILSQ in the research, the Richard Felder's Legacy Website closed on the 31 December 2018 (Richard Felder's Legacy Website).

The ILSQ broadly categorises the four dimensions of learning style preference adapted from Felder and Silverman (1988) and Felder and Soloman (nd-b) as: Perception (awareness) which measures preference in the sensory and/or intuitive learning domain; Reception (response) which measures preference in the visual and/or verbal learning domain; Processing (managing) which measures preference in the active and/or reflective learning domain; and Understanding (knowing) which measures preference in the sequential and/or global learning domain.

The ILSQ is constructed of 44 items with two potential responses (poles of the dimension it measures). Each dimension has 11 items. For example, the Active/Reflective domains are identified through questions 1, 5 and every subsequent fourth question up to item 41; Sensing/Intuitive from question 2, 6 and every subsequent fourth question up to item 42; Visual/Verbal from question 3, 7 and every subsequent fourth question up to item 43; and Sequential/Global from question 4, 8 and every subsequent fourth question up to item 44.

- An example of an Active/Reflective learning dimension question is item 25: *I would rather first*: a) try things out; or b) think about how I'm going to do it.
- An example of a Sensing/Intuitive learning dimension question is item 2: *I would rather be considered*: a) realistic; or b) innovative.
- An example of a Visual/Verbal learning dimension question is item 39: *For entertainment, I would*: a) watch television; or b) read a book.

- An example of a Sequential/Global learning dimension question is item 8: *Once I understand:* a) all the parts, I understand the whole thing; or b) the whole thing, I see how the parts fit.

Table 3.3: *Summary of the ILSQ Dimensions of Learning adapted*, expresses the researcher's elucidation of the learning style dimension as explained in the analogy of 'the story', of key features of the ILSQ adapted from published research (Brent & Felder, nd; Felder & Brent, 2005; Felder & Silverman, 1988; Felder & Soloman, nd-a, nd-b; Felder & Spurlin, 2005; Khan et al., 2012; Litzinger et al., 2005; Wang & Mendori, 2015).

Table 3.3: *Summary of the ILSQ Dimensions of Learning adapted*

Dimension	Style Preference	Characteristics of Style Preference – Story analogy	ILSQ items
Processing			
How the learner manages the information	Active	Preference to actively engage with learning material – supports the learner who prefers to experience the story	Option (a) for: 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, 41
	Reflective	Preference to think about the information – support the learner who prefers to critically analyse the story	Option (b) for: 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, 41
Perception			
How the learner becomes aware of information	Sensing	Preference for details – supports the learner who prefers the facts in a story	Option (a) for: 2, 6, 10, 14, 18, 22, 26, 30, 34, 38, 42
	Intuitive	Preference for meaning – supports the learner who prefers the message in the story	Option (b) for: 2, 6, 10, 14, 18, 22, 26, 30, 34, 38, 42
Reception			
How the learner responds to the information	Visual	Preference for visual depictions of information – supports the learner who prefers observing the story	Option (a) for: 3, 7, 11, 15, 19, 23, 27, 31, 35, 39, 43
	Verbal	Preference for words via auditory processing or text – supports the learner who prefers the narration of the story	Option (b) for: 3, 7, 11, 15, 19, 23, 27, 31, 35, 39, 43
Understanding			
How the learner uses the information	Sequential	Preference to learn the details in stages – supports the learner who prefers to incrementally build the story	Option (a) for: 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44
	Global	Preference to have an outcome goal – supports the learner who prefers to generate their own story	Option (b) for: 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44

The Deep Learning for 21st Century Public Health Education Questionnaire (DLQ) Overview

The *Deep Learning for 21st Century Skills in Public Health Questionnaire* (DLQ) is an instrument the researcher developed for the study. It was informed by research and policy literature prevalent in 2015 to 2016 in Australia and overseas, with the focus on evidence related to the research question topics areas. See Appendix G: *Copy of DLQ*, and Appendix H: *Literature evidence informing DLQ development*. One reason for developing and administering this questionnaire was to find out about the typical profile of the associate degree student cohort in relation to the case study, and beliefs about some fundamental public health tenets. Overall, there were 21 topic areas in the questionnaire comprising a total of 80 items.

Main themes addressing the research questions are shown in Table 3.4: DLQ *Research Topic Addressed,* which refers to the content in parentheses.

Table 3.4: DLQ *Research Topic Addressed*

Question	Item	DLQ in relation to Research Topic Area	Response Option
1	1-8	About my learning...*[21st Century skills/ Deep Learning/ Learning Approach/ Work-readiness/ Pedagogy]*	8 Likert Scale items
2	9-13	My general employability skills...*[Employability skills/ Work-readiness]*	5 Likert Scale-items
3	14-17	About asking questions...*[Questioning approach/ Learning Approach/ Deep Learning/ Pedagogy]*	4 Likert Scale items
4	18-24	About work-ready skills for a health- related role...*[Work-readiness/ Public Health]*	7 Likert Scale items
5	25-34	My learning style preference...*[Learning approach/ Pedagogy]*	10 Likert Scale items
6	35-45	To find information to answer assignment questions I go to... *[Questioning approach/ Learning approach/ Deep Learning/ Pedagogy]*	11 Likert Scale items
7	46-52	Making inquiries...*[Questioning approach/ Deep Learning/ Pedagogy]*	7 Likert Scale items
8	53-60	The type of assessment which helps to develop my work ready skills are...*[Work-readiness/ Deep Learning/ Learning Approach/ Pedagogy]*	8 Likert Scale items
9	61	The learning program was my preferred first enrolment... *[Demographic]*	Closed options
10	62	I am...*[Demographic - gender]*	Closed options
11	63	My first language is...*[Demographic]*	Open text
12	64	My age last birthday...*[Demographic]*	Open text
13	65	I am doing this program as a pathway into another program... *[Demographic]*	Closed options
14	66	If I am offered a place in another program I will not continue with my current learning program... *[Demographic]*	Closed options
15	67	My current enrolment is best described as...[Demographic]	Closed options
16	68	My plan for the future is to work in the career profession of... *[Work-readiness]*	Open text
17	69-72	My motivation to learn is best described as...*[21st century skills]*	Ranked items
18	73-76	Barriers to my learning are...*[21st century skills]*	Ranked items
19	77	If I was not enrolled in my current learning program I would be doing... *[Demographic]*	Open text
20	78-79	What skills I think employers' value...*[Employability skills/ Work-readiness]*	Matching
21	80	My ideal learning environment would be...*[Learning approach/ Pedagogy]*	Open text

The ILSQ and DLQ Administration Procedures

The ILSQ

The ILSQ was administered as a hardcopy tool. Education researchers were permitted to freely use the ILSQ. All online completion data is also retained by Soloman and Felder (and legacy) in perpetuity (Richard Felder's Legacy Website). The ILSQ was completed once only by 75 volunteer participants during scheduled time at the end of class tutorials. Each of the 75 individually completed ILSQ were coded and de-identified. The researcher entered and submitted each individually completed ILSQ instrument into the ILSQ website, one at a time, and downloaded and saved each report as a pdf document. The researcher used data extracted from responses to the 44 items, and also the information from the automatically generated learning preference domain reports. See Appendix I: *Example of ILSQ Learning Styles Results Report*, for an example of an automatically generated report. The code used for each ILSQ hard-copy instrument completed was used as the naming convention. Therefore each report could be matched back with the ILSQ response set from which it was generated. The coding used, for example, LS1 to LS75, with L for Learning, S for Style and a numerical identifier. As advised by Brent and Felder (nd), the questionnaire results provides information to the individual about their preferred learning style. If the ILSQ outcomes are used for class cohorts a caveat is put forward that results should not be over-interpreted (Brent & Felder, nd). There was the potential risk that respondents could either randomly or consistently choose responses in the ILSQ, that is, all a) or all b) responses, or other patterns, without due consideration of their actual opined response, however, there was diversity in responses within each individually completed ILSQ.

The DLQ

The initial DLQ was developed as a web-accessible questionnaire by link to *Qualtrics* via Victoria University licence for a limited period in 2016. The resultant report of the responses to the web-version was encouraging in relation to completing all items. No queries were raised. Therefore, the DLQ was adapted to a hardcopy instrument for use in 2017. The DLQ was administered at the same time as the ILSQ in 2017. There was no option to provide identifying information in the DLQ. Overall, there were 55 completed DLQs for analysis. Completion of the DLQ implied consent. All completed DLQs were coded. The coding convention was similar to the one used for the ILSQ but with the prefix of DL; D referring to Deep, and L referring to Learning, followed by a numerical identifier from 1 through to 55.

Data Analysis

The researcher posed questions which suited a qualitative methodology primarily, with some quantitative data to describe participant attributes. From the outset research questions were potentially modifiable, which, as suggested by Creswell (2015) can be a feature of qualitative research. Asking open-ended questions related to a central phenomenon also suits qualitative methodology (Creswell, 2015), and are used in social, behavioural, education, and health research (Creswell, 2015; Sharp, 2012; Yin, 2014). Multiple approaches to inquiry and collection of data in the field is also supported using qualitative methodology (Creswell, 2007). Furthermore, analysis of data can be inductive, and the ensuing complex description gives meaning to naturalistic collective situations and more generally either converge or diverge from a predominant world view of a phenomenon (Creswell, 2007). Thorne (2016) discusses integrity of purpose in interpretive description approaches which comes from having a real-world question, familiarity with the existing empirical data (known and unknown) and understanding stakeholder receptiveness to generated research answers. Focusing on subject and context is a feature of analysis of qualitative data using qualitative content analysis, which can include attitudes, opinions, perceptions, and also experiences (Graneheim, Lindgren, & Lundman, 2017). When a researcher moves between both inductive and deductive methodologies to allow for a more complete understanding of their data this is considered an abductive approach (Graneheim et al., 2017).

Managing the ILSQ and DLQ Data

All questionnaire extracted data, were entered into Excel spreadsheets, that is, one for all ILSQ and ILSQ Learning Preference domains, and another for all DLQ data. A limitation of the research was that the ILSQ and the DLQ were administered as discrete instruments, therefore no correlation between individual participant responses across both of the questionnaires was possible. Simple descriptive statistics and within-questionnaire comparisons only could be scrutinised. That is, responses within the each individually completed ILSQ or within each individually completed DLQ. For example, it could be noted if a participant chose all a) responses in the ILSQ, or alternatively all b); or other likely patterns such as alternate a) and b) and so forth. However, there was no evidence to either support or refute spurious responses. It was, however, possible to map the ILSQ learning preference domain reports with the responses which were entered to generate it, due to the matching coding used. Finding response patterns in the DLQ was more of a challenge because of the variety in the questions and items, though it was possible to check for congruence in response in items with related inquiry information.

Analysis of the ILSQ and DLQ Data

Analysis of the information provided by students in completing the ILSQ and DLQ comprised all of the quantitative data for the research, including some open-ended question text also extracted from the DLQ. As mentioned previously, all completed ILSQ and DLQ were de-identified and/or identifiers redacted, and a code applied. It should be noted that the coding refers to a naming code only and was not instrumental for numerical weightings and scales as this was not a feature of the research analysis protocols. The responses were about qualitative statements in both instruments used. The rationale for using the tools was to show frequencies and trends in responses. Using the instruments was not to validate (DLQ), nor seek statistical certainty (DLQ and ILSQ). Frequency counts and percentages of responses and where applicable, simple descriptive statistics, such as the average was calculated. The most prevalent measure used was percentages of the whole.

ILSQ Data Analysis Processes

The data analysis of the ILSQ completions was limited to descriptive measures only, as it was never a research intention to show cause and effect outcomes. The ILSQ was an existing validated tool which contained items which aligned with some of the research question areas. Even so, the raw data in itself is informative in the grouped scoring as it shows some trends in respondent thinking and behaviours about their learning, as revealed on the day they completed the ILSQ. It was possible, therefore, to interpret thematic tendencies from the collated responses, that is, before they were submitted for determination of learning preference domains. For example, using basic calculations of the number of responses (please note, for ease of presentation all calculations are rounded up or down to the nearest whole number), 75 = 100%, 57 = 75%, 38 = 50%, and 19 = 25%, some illustrative findings can be demonstrated. Please note, none of these scores (frequency or responses and percentages) infer measures of significance (inferential).

DLQ Data Analysis Processes

The DLQ data was not collected to test hypotheses, so inferential statistic calculations were not applied, therefore measures of significance do not comprise a study method. However, the responses in some items enabled raw counts which indicated trends in responses. For example, basic percentages (rounded up or down to the nearest whole number) for each overall response could be calculated for many of the items, apart from open-text responses.

Presenting the ILSQ and DLQ Data

Presentation of the quantitative data is best illustrated in tabular and/or graphical form in reference to the individual items on both the questionnaires. Where applicable in graphic representation of the data, trend direction is demonstrated. Any text provided as responses to open-ended questions in the DLQ was also used and presented in tables, as a compilation of responses, rather than an expression of in-depth opinions.

Qualitative Methods

Focus Group Interview Data Collection

The researcher facilitated each of the focus group interviews. The interviews were conducted in the classroom at the end of a tutorial session as pre-arranged with the tutorial teacher. Only volunteer students participated. Prior to interview participants read the Information to Participants involved in Research (Explanatory Statement) document and Consent Form prior to providing signed consent. Participants complied with requests not to mention anyone by name during the interview. The participants were also shown the recording equipment being used to audio-record the discussion. The researcher used a *Livescribe* smartpen[1] and recording paper. Back-up audio was also captured via an Android Tablet device. *Livescribe* also enabled written data to align with recorded audio. Open-ended pre-prepared questions were used to guide discussion, see Appendix J: *Focus Group Interview Guided Topics*, though divergent topic areas were acceptable especially if the participants introduced related information which was pertinent to the research topic area. These areas related to their reason for enrolling in an associate degree, their understanding about associate degree level programs, deep learning behaviours, experience of 21st century skills (for example, communication, citizenship, creativity), work-readiness and employability skills, asking questions (for example where they seek information), study habits and ideal study environment, and experiences so far, for example program content related to public health if applicable (Focus Groups 2 and 3). Each focus group interview averaged about 30 minutes including pre-recording preparation and post-recording wrap-ups. The length of the focus group interviews was influenced by the setting, and volunteer participant availability, and conducted in-between their class commitments. Consent forms were filed in a secure location. As stated previously, three focus group interviews were conducted.

Transcription of Focus Group Interviews

The researcher engaged a student from another university (unrelated program) to do a first-sweep transcription of all Focus Group Interview audio using the *Livescribe* audio provided as a digital audio file. Each interview was transcribed verbatim as much as possible, and only the researcher narrative truncated. The first-sweep transcriptions were undertaken over

[1] The *Livescribe* platform is a ballpoint smart-pen, with an embedded computer and digital audio recorder, which facilitates note-taking with *Anoto* digital paper; thereby synchronising written notes, and facility for the audio to be uploaded to a computer (with *Livescribe* software) via a docking station https://us.livescribe.com/

several months in 2017 and were presented in typed format in Word. The researcher undertook a more in-depth transcription of all recorded data aided by the back-up recording capture on the Android Tablet device. Researcher commentary was also un-truncated as this was integral in regard to reflexive ethnography aspects potentiated by the type of research being undertaken. See Appendix K: *Example of Focus Group Interview Transcription*.

Individual Interview Data Collection

Five individual interviews were conducted. The researcher conducted all the interviews. Each individual interview was conducted on-campus in a private location. Participants complied with requests not to mention anyone by name during the interview. The participants were also shown the recording equipment being used to audio-record the discussion. The researcher used a *Livescribe* smartpen and recording paper. Back-up audio was also captured via an Android Tablet device. *Livescribe* also enabled written data to align with recorded audio. Open-ended pre-prepared questions were used to guide discussion, see Appendix L: *Individual Interview Guided Topics*, though divergent topic areas were acceptable especially if the interviewee provided related information which was pertinent to the research topic areas. These topics included their reason for enrolling, and their understanding about associate degree level programs, deep learning behaviours and motivation, and influences on learning, their experience of 21st century skills, work-readiness related to the associate degree program, inquiry and questioning approaches they used, their public health learning experiences in the associate degree program, their ideal learning environment, and future plans. Prior to interview participants read the Information to Participants involved in Research (Explanatory Statement) document and Consent Form prior to providing signed consent. These consent forms were subsequently filed as per research ethics and institute record maintenance guidelines. Interviews ranged from 40 to 60 minutes.

Transcription of Individual Interview

The researcher engaged a student from another university (unrelated program) to do a first-sweep transcription of all the individual interviews, the same person was engaged to do a first-sweep transcription of the *Livescribe* audio only. Verbatim transcription was provided in Word format. Subsequently the researcher undertook the deeper transcription process and with the assistance of written notes and back-up Android Tablet device audio, a complete transcription of all interviews was available for analysis. For transcription purposes each interviewee was given a coded identification. That is, II1 represented the first interviewee (Individual Interview 1), through to II5 which was the code given for the person who

participated in Individual Interview 5. Pseudonyms were assigned and used presentation purposes. See also Appendix M: *Example of Individual Interview Transcription*.

Student Written Reflections Data Collection

Student written reflections were existing documents. See Appendix N: *Examples of Student Written Reflections*. The written reflections were in Word format and de-identified. Eleven Student Written Reflections were provided, which comprised two parts for most of them. Each reflection was coded SR, with S representing Student and R representing Reflection, along with a numerical. The letters a. and b. represented the two parts of the reflection. Therefore, an example coded reflection would be documented as SR4a. Pseudonyms were assigned and used for presentation purposes.

Analysis of Qualitative Data

The analysis process used for the Focus Group Interviews, Individual Interviews, and Student Written Reflections was similar so the process will be described collectively and referred to as the qualitative data. In regard to the type of textual analysis used, qualitative data thematic analysis terminology is used in reference to identifying embedded information (explicit and implicit themes) which may answer research questions (Taylor, Kermode, & Roberts, 2011) and a thematic analysis describes organising concepts in the analytical observational process (Braun & Clarke, 2016; Clarke & Braun, 2017). The 'data analysis spiral' as described by Creswell (2007) is an approach in which organisation of the data is key, and supports the analysis commencing during data collection and progressing upward in stages until the findings are presented in a written account. As suggested by Kervin et al. (2006) the process can be recursive and they describe the processes involved as related to becoming familiar with the data, categorising the data, and synthesising the data. It is stated that a researcher will know they have located a theme because it relates indirectly to what they thought they may find or indirectly connected to articulated research aims (Taylor et al., 2011). The analysis of the qualitative data was a phased process. Figure 3.4: *Qualitative Data Analysis Phases* shows the steps the researcher implemented to organise the qualitative content analysis (transcriptions and existing written reflections) which supported a thematic analysis approach via textual analysis activities.

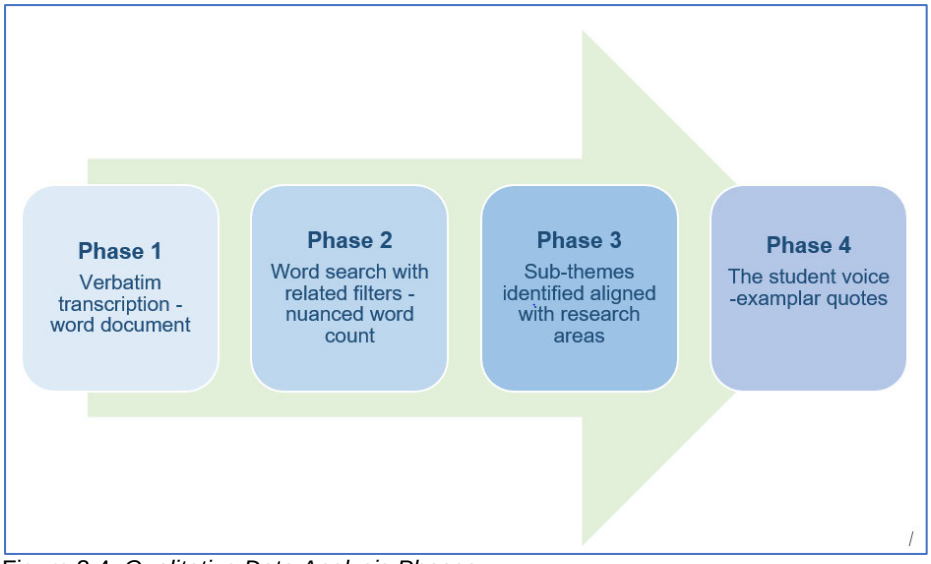


Figure 3.4: *Qualitative Data Analysis Phases*

Phase 1: Verbatim transcription.

This phase involved verbatim transcription into a Word document, apart from Student Written Reflections which were already in written format. During the deeper-level transcription process, commonalities in expressed comments, but also areas of divergence were noted. Whilst no inferences can be made about any of the expressed views, especially divergent ones, where applicable a notation was made in relation to tone, for example, laughter, and sarcasm.

Phase 2: Word Search with Related Filters

This phase involved applying word search and related filters, for example, ask, asking, question, questioning. In regard case study research this phase supported textual analysis, activities which aligns with qualitative content analysis (McMurray et al., 2004). Multiple readings of the transcriptions and written reflections occurred during this phase. Nuanced context was inherent in relation to researcher's reflexivity. Freely accessible software designed to assist with word count and simple qualitative content analysis, for example, *Databasic*, was used to tabulate words in a spreadsheet. The use of word processing is supported in the literature as especially helpful for term searches in large amounts of text (Pope et al., 2006). To counteract siloing of words outside of their context, the researcher undertook keyword searches related to the research questions in addition to finding emergent themes. The researcher thus catalogued a large number of recurrent words/phrases which were tabulated. During this phase the researcher essentially applied a quantitative element to the qualitative content analysis as a planned strategy, which is a strategy which is supported in qualitative research instructive publications (Pope et al., 2006; Thorne, 2016).

Phase 3: Sub-themes identified

The tabulated words/terms were categorised into sub-themes as related to the research topic areas where applicable. In Phase 3, the qualitative data was edited, but as a means to highlight areas of content which provided a diaspora of student experiences for describing what was revealed in relation to the research question areas and themes that emerged. The researcher retained the nuanced and impassioned voice of the students, to be evidenced with verbatim exemplar quotes.

Phase 4: The student voice – exemplar quotes

The participants were the expert about their own experiences. Prioritising the participant voice and the use of representative citations can facilitate the reader's capability to determine the credibility and authenticity of the research data (Graneheim et al., 2017; Symon & Cassell, 2012).

The researcher found exemplar quotes as expressed by the participants as illustrative of the sub-themes derived from the qualitative content analysis.

Presenting the Qualitative Data as Narrative

The researcher did not set out to deconstruct the verbatim narratives of the focus group interviews, individual interviews and the student written reflections, as this would be counterintuitive in intent for deep description. The sub-themes were signposts in relation to the research questions, and the nuanced content a potential storyline in its own right. The personal stories and reflections disclosed were ethnographically germane and evocative as expressed in the participants own voice and vernacular. For example, one focus group participant in a few words, captured the essence of the researcher's exploration about deep learning, *"...I got myself here so I can get myself somewhere else*..."**.** Therefore, the student's voice is used to present the findings. This aligns to the tradition of qualitative description, that is, it reveals the philosophical foundations integral to the research questions (Bradshaw et al., 2017).

Conclusion

The research process provided a considerable body of data. The mixed-methodology approach permits for information from multiple viewpoints to inform the interpretation of the results especially in a contextualised case study (Harrison et al., 2017; Hyett et al., 2014; Timans et al., 2019). This chapter has provided detail about the methodology used in the study and the rationale for choosing a bounded case study with mixed methods. In addition,

information about the study population and recruitment activities was provided. Ethical issues were discussed. Detail about the two questionnaire instruments, the ILSQ and the DLQ used in the study was provided as well as an explanation related to validity and reliability especially in the development of the DLQ. More explicit information was presented in relation to all the research activities, being administering the ILSQ and the DLQ, focus group interviews, individual interviews, and accessing student written reflections. Information about the data collection was provided under explanatory sub-headings, including managing the data, presenting the data, and analysing the data.

The analysis findings will be presented in the Chapter 4: Presentation of Results and discussed in Chapter 5: Discussion.

Chapter 4: Presentation of Results

Introduction

The findings from the various data collection methods will be described in this chapter. The research design was a bounded case study comprising several sources of data. The bounded case study design was chosen because the research was conducted in one setting (one campus of a city university campus) with a participant cohort (enrolled students) from one program of study (undergraduate Associate Degree in Health Science) and conducted during 2016 and 2017 which was inclusive of periods of time when active research was not undertaken, and times when students were not accessible for participation due to normal university semester times and breaks.

This chapter will present the findings from the two questionnaires which were used to survey volunteer participants: the *Index of Learning Styles Questionnaire* (ILSQ) (Felder & Soloman, nd-a) and the *Deep Learning for 21st Century Skills in Public Health Education Questionnaire* (DLQ) which was developed by the researcher for this research. In addition, a discussion of the themes that emerged from qualitative content analysis of the Focus Group Interviews, Individual Interviews, and Student Written Reflections will be presented. All data is anonymised.

Index of Learning Styles Questionnaire (ILSQ) results

Responses to the ILSQ provided a snapshot of the students' learning style in terms of their understanding at the time they completed the tool. All the tabulated responses can be viewed in Appendix O: *All ILSQ item responses*. The findings will be discussed in terms of general responses which are indicative of the typical student profile; that is applicable only to the cohort of students who completed the ILSQ. This focused view is acceptable in relation to bounded case study methodology (Harrison et al., 2017). The profile discussion will be followed up by an in-depth explanation of the findings in relation to the learning styles reported across the four dimensions, which were determined when all responses were submitted to the ILSQ website (Felder & Soloman, nd-a). For the purposes of clarity 'trending' as used in the following sections refers to the most popular response.

The results are indicative of learning preference inclinations within the student cohort at the time of administering the ILSQ; students were representative of more than half of the total student cohort enrolled in the program at the time, across all semesters (four semesters of a two-year program full time). This is a calculation based on 117 active enrolments that could

be confirmed. 75 out of the total population pool of 117 is an 64% response rate. However, actual response rates do not necessarily need to achieve certain bench-mark levels to correlate with research quality (Fosnacht, Sarraf, Howe, & Peck, 2017).

Describing the responses in the ILSQ

To reiterate, the ILSQ is a publicly accessible (non-commercial) tool used to determine learning style profile based on four dimensions: processing -active/reflective, perception-sensing/intuitive, reception-visual/global, and understanding-sequential/global) via a series of questions (11 for each dimension) (Soloman & Felder, nd-a). Each of these dimensions will be described.

ILSQ Processing Dimension

Table 4.1 Frequency of Responses to ILSQs questions related to Processing Dimension.

Table 4.1 *Frequency of Responses to ILSQs questions related to Processing Dimension*

ILSQs related to Processing Dimension			**Frequency of Responses [Percentage]**	**Style Preference**
1	*I understand something better after I*			
	a	Try it out	57 [76%]	Active
	b	Think it through	18 [24%]	Reflective
5	*When I am learning something new, it helps me to*			
	a	Talk about it	50 [67%]	Active
	b	Think about it	25 [33%]	Reflective
9	*In a study group working on difficult material, I am more likely to*			
	a	Jump in and contribute ideas	50 [67%]	Active
	b	Sit back and listen	25 [33%]	Reflective
13	*In classes I have taken*			
	a	I have usually gotten to know many of the students	51 [68%]	Active
	b	I have rarely gotten to know many of the students	24 [32%]	Reflective
17	*When I start a homework problem, I am more likely to*			
	a	Start working on the solution immediately	23 [31%]	Active
	b	Try to fully understand the problem first	52 [69%]	Reflective
21	*I prefer to study*			
	a	In a study group	64 [37%]	Active
	b	Alone	11 [63%]	Reflective
25	*I would rather first*			
	a	Try things out	40 [53%]	Active
	b	Think about how I'm going to do it	35 [47%]	Reflective
29	*I more easily remember*			
	a	Something I have done	49 [65%]	Active
	b	Something I have thought a lot about	26 [35%]	Reflective
33	*When I have to work on a group project, I first want to*			
	a	Have "group brainstorming" where everyone contributes ideas	50 [67%]	Active
	b	Brainstorm individually and then come together as a group to compare ideas	25 [33%]	Reflective
37	*I am more likely to be considered*			
	a	Outgoing	45 [60%]	Active
	b	Reserved	30 [40%]	Reflective
41	*The idea of doing homework in groups, with one grade for the entire group*			
	a	Appeals to me	36 [48%]	Active
	b	Does not appeal to me	39 [52%]	Reflective

The majority of the processing dimension responses indicated an active preference (questions 1, 5, 9, 13, 25, 29, 33, and 37). Question 21 showed the highest number of responses for an active option (and lowest for reflective). Question 17 showed the highest response for a reflective option (and lowest for active). Question 41 was the most balanced in terms of responses, with 36 respondents choosing the active option versus 39 choosing the reflective option. Figure 4.1: *ILSQ Processing Dimension Responses graphed*, is the visual representation of the results.

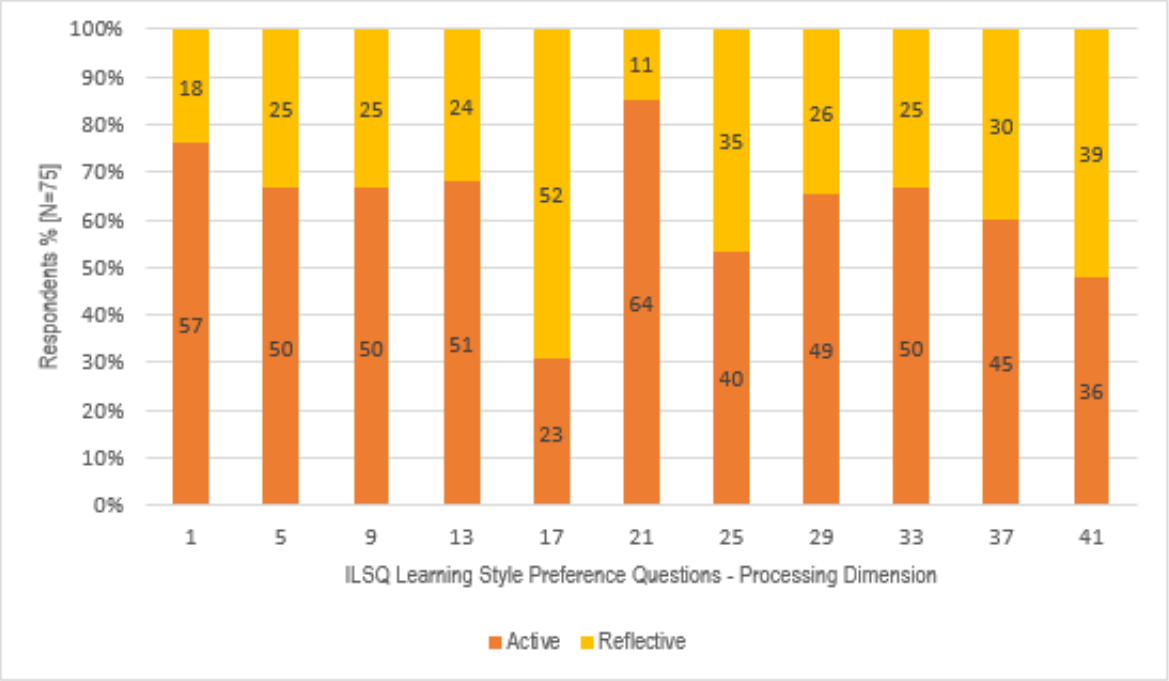


Figure 4.1*: ILSQ Processing Dimension Responses graphed*

ILSQ Perception Dimension

The perception dimension of the ILSQ instrument is assessed via the questions 2, 6, 10, 14, 18, 22, 26, 30, 34, 38, and 42 and determined style preference of either sensing or intuitive. The results can be viewed in Table 4.2: *Frequency of Responses to ILSQs questions related to Perception Dimension.*

Table 4.2: *Frequency of Responses to ILSQs questions related to Perception Dimension*

ILSQs related to Perception Dimension			**Frequency of Responses [Percentage]**	**Style Preference**
2	*I would rather be considered*			
	a	Realistic	55 [73%]	Sensing
	b	Innovative	20 [27%]	Intuitive
6	*If I were a teacher, I would rather teach a course*			
	a	That deals with facts and real life situations	62 [83%]	Sensing
	b	That deals with ideas and theories	13 [17%]	Intuitive
10	*I find it easier*			
	a	To learn facts	40 [53%]	Sensing
	b	To learn concepts	35 [47%]	Intuitive
14	*In reading nonfiction, I prefer*			
	a	Something that teaches me new facts or tells me how to do something	29 [39%]	Sensing
	b	Something that gives me new ideas to think about	46 [61%]	Intuitive
18	*I prefer the idea of*			
	a	Certainty	51 [73%]	Sensing
	b	Theory	24 [27%]	Intuitive
22	*I am more likely to be considered*			
	a	Careful about the details of my work	51 [61%]	Sensing
	b	Creative about how to do my work	24 [39%]	Intuitive
26	*When I am reading for enjoyment, I like writers to*			
	a	Clearly say what they mean	37 [49%]	Sensing
	b	Say things in creative interesting ways	38 [51%]	Intuitive
30	*When I have to perform a task I prefer to*			
	a	Master one way of doing it	40 [53%]	Sensing
	b	Come up with new ways of doing it	35 [47%]	Intuitive
34	*I consider it higher praise to call someone*			
	a	Sensible	34 [45%]	Sensing
	b	Imaginative	41 [55%]	Intuitive
38	*I prefer courses that emphasize*			
	a	Concrete material (facts, data)	45 [68%]	Sensing
	b	Abstract material (concept, theories)	30 [32%]	Intuitive
42	*When I am doing long calculations*			
	a	I tend to repeat all my steps and check my work carefully	49 [65%]	Sensing
	b	I find checking my work tiresome and have to force myself to do it	26 [35%]	Intuitive

Most of the questions showed a preference for the sensing style preference (questions 2, 6, 10, 18, 22, 30, 38, and 42) and the remainder for intuitive preference. The most responses for sensing and lowest for intuitive was question 6. Question 14 had the most responses for intuitive and least for sensing. The most balanced response across the cohort was for question 26. Figure 4.2: *ILSQ Perception Dimension Responses graphed* shows the relative differences sensing versus intuitive per question.

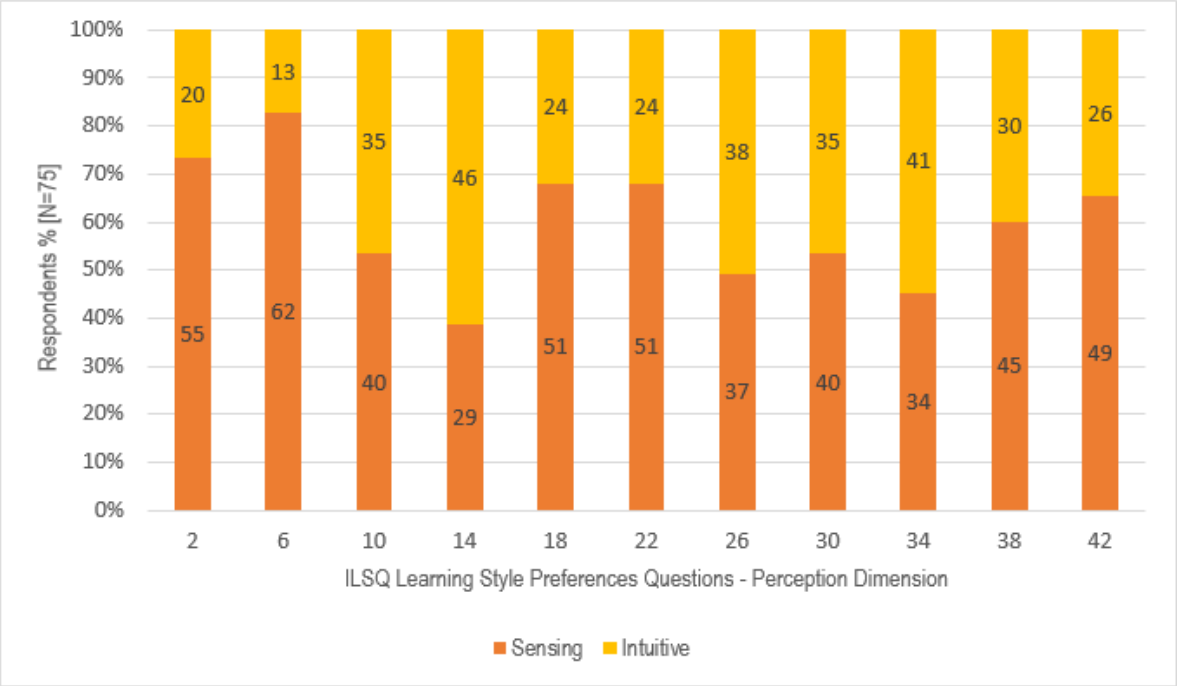


Figure 4.2: *ILSQ Perception Dimension Responses graphed*

ILSQ Reception Dimension

The reception dimension of the ILSQ instrument is assessed via questions 3, 7, 11, 15, 19, 23, 27, 31, 35, 39, and 43 and determines if someone has either a visual or verbal learning style preference. All but one question (question 15) showed a preference for visual learning style. Results can be viewed in Table 4.3: *Frequency of Responses to ILSQs questions related to Reception Dimension.* Figure 4.3*: ILSQ Reception Dimension Responses graphed* is a visual representation of the results.

Questions 19 and 43 had the highest number of responses for visual style (64 [85%] and 65 [87%] respectively). As indicated earlier question 15 had the most responses for verbal style.

Table 4.3: *Frequency of Responses to ILSQs questions related to Reception Dimension*

ILSQs related to Reception Dimension			Frequency of Responses [Percentage]	Style Preference
3	*When I think about what I did yesterday, I am most likely to get*			
	a	A picture	61 [81%]	Visual
	b	Words	14 [19%]	Verbal
7	*I prefer to get new information in*			
	a	Pictures, diagrams, graphs, or maps	57 [76%]	Visual
	b	Written directions or verbal information	18 [24%]	Verbal
11	*In a book with lots of pictures and charts, I am likely to*			
	a	Look over the pictures and charts carefully	57 [76%]	Visual
	b	Focus on the written text	18 [24%]	Verbal
15	*I like teachers*			
	a	Who put a lot of diagrams on the board	29 [39%]	Visual
	b	Who spend a lot of time explaining	46 [61%]	Verbal
19	*I remember best*			
	a	What I see	64 [85%]	Visual
	b	What I hear	11 [15%]	Verbal
23	*When I get directions to a new place, I prefer*			
	a	A map	56 [75%]	Visual
	b	Written instructions	19 [25%]	Verbal
27	*When I see a diagram or sketch in class, I am most likely to remember*			
	a	The picture	50 [67%]	Visual
	b	What the instructor said about it	25 [33%]	Verbal
31	*When someone is showing me data, I prefer*			
	a	Charts or graphs	53 [71%]	Visual
	b	Text summarizing the results	22 [29%]	Verbal
35	*When I meet people at a party, I am more likely to remember*			
	a	What they looked like	49 [65%]	Visual
	b	What they said about themselves	26 [35%]	Verbal
39	*For entertainment, I would rather*			
	a	Watch television	59 [79%]	Visual
	b	Read a book	16 [21%]	Verbal
43	*I tend to picture places I have been*			
	a	Easily and fairly accurately	65 [87%]	Visual
	b	With difficulty and without much detail	10 [13%]	Verbal

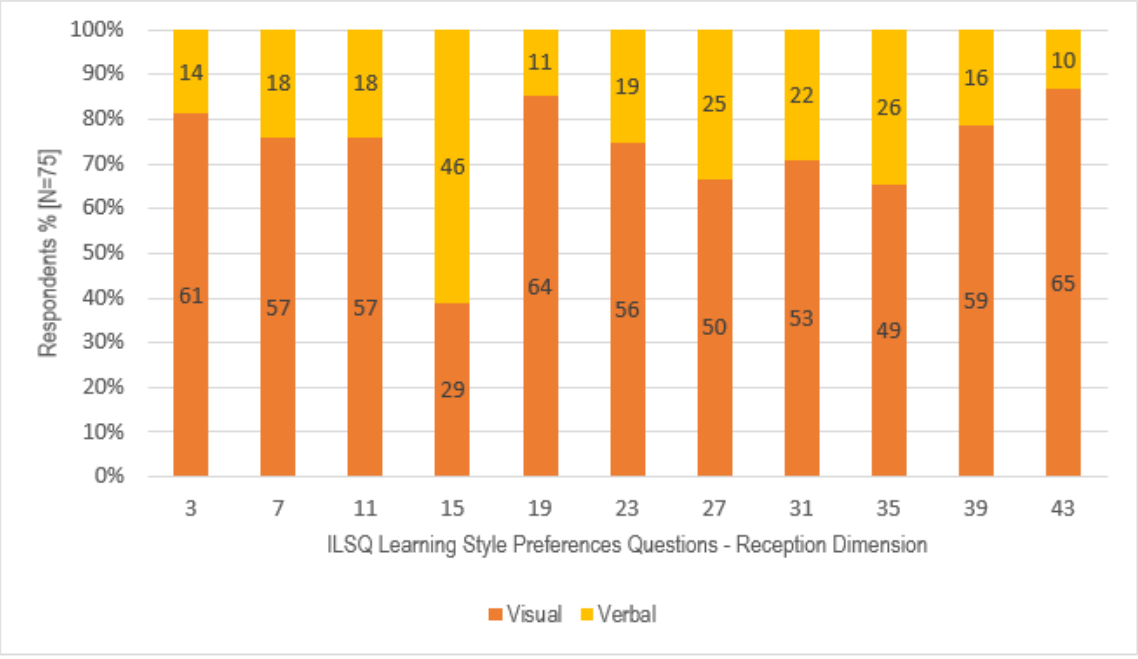


Figure 4.3: *ILSQ Reception Dimension Responses graphed*

ILSQ Understanding Dimension

Table 4.4: *Frequency of Responses to ILSQs questions related to Understanding Dimension* shows the results for the questions related to the understanding dimension and either sequential or global learning style preference (questions 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, and 44).

Table 4.4: *Frequency of Responses to ILSQs questions related to Understanding Dimension*

ILSQs related to Understanding Dimension			**Frequency of Responses [Percentage]**	**Style Preference**
4	*I tend to*			
	a	Understand details of a subject but may be fuzzy about its overall structure	25 [33%]	Sequential
	b	Understand the overall structure but may be fuzzy about details	50 [67%]	Global
8	*Once I understand*			
	a	All of the parts, I understand the whole thing	44 [59%]	Sequential
	b	The whole thing, I see how the parts fit	31 [41%]	Global
12	*When I solve math problems*			
	a	I usually work my way to the solution one step at a time	61 [81%]	Sequential
	b	I often just see the solution but then have to struggle to figure out the steps to get to them	14 [19%]	Global
16	*When I'm analysing a story or a novel*			
	a	I think of the incidents and try to put them together to figure out the themes	51 [68%]	Sequential
	b	I just know what the themes are when I finish reading and then I have to go back and find the incidents that demonstrate them	24 [32%]	Global
20	*It is more important to me that an instructor*			
	a	Lay out the material in clear sequential steps	55 [68%]	Sequential
	b	Give me an overall picture and relate the material to other subjects	20 [32%]	Global
24	*I learn*			
	a	At a fairly regular pace. If I study hard, I'll "get it"	46 [61%]	Sequential
	b	In fits and starts. I'll be totally confused and then suddenly it all "clicks"	29 [39%]	Global
28	*When considering a body of information, I am more likely to*			
	a	Focus on details and miss the big picture	27 [36%]	Sequential
	b	Try to understand the big picture before getting into the details	48 [64%]	Global
32	*When writing a paper, I am more likely to*			
	a	Work on (think about or write) the beginning of the paper and progress forward	44 [59%]	Sequential
	b	Work on (think about or write) different parts of the paper and then order them	31 [41%]	Global
36	*When I am learning a new subject, I prefer to*			
	a	Stay focused on that subject, learning as much about it as I can	45 [60%]	Sequential
	b	Try to make connections between that subject and related subjects	30 [40%]	Global
40	*Some teachers start their lectures with an outline of what they will cover. Such outlines are*			
	a	Somewhat helpful to me	43 [57%]	Sequential
	b	Very helpful to me	32 [43%]	Global
44	*When solving problems in a group, I would be more likely to*			
	a	Think of the steps in the solution process	45 [60%]	Sequential
	b	Think of possible consequences or applications of the solution in a wide range of areas	30 [40%]	Global

Most of the responses to the questions indicated a preference for a sequential learning style (questions 8, 12, 16, 20, 24, 32, 36, 40, and 44). Question 12 had the most responses for a sequential style (61 [81%]) and least for global (14 [19%]). Question 4 had the most responses (50 [67%]) for a global learning style preference, closely following by question 28 (48 [64%]). The results are depicted visually in Figure 4.4: *ILSQ Understanding Dimension Responses graphed*.

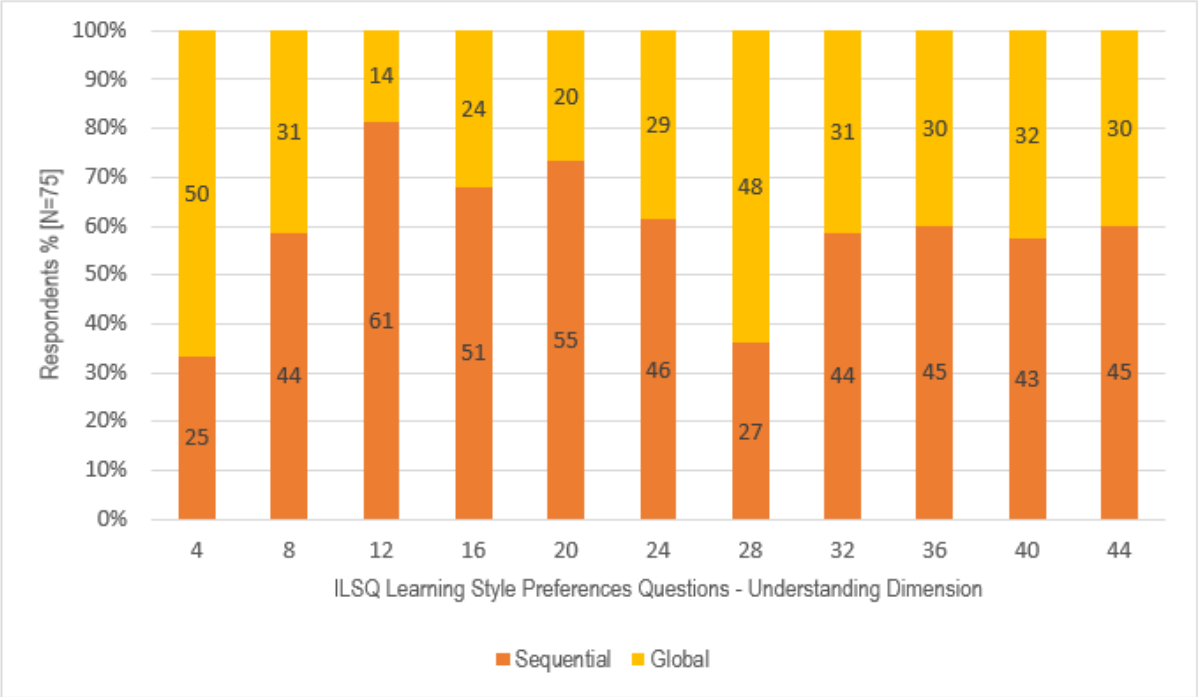


Figure 4.4: *ILSQ Understanding Dimension Responses graphed*

Summary of ILSQ question responses

The highest number of responses, 65 (87%) was for a reception dimension question (visual versus verbal learning style preference) - question 43: I tend to picture places I have been, a) *Easily and fairly accurately [visual]*, versus b) *With difficulty and without much details [verbal]*. Therefore, conversely, Item 43 also had the lowest response, 10 (13%) for response b).
An item which was evenly balanced in terms of responses across a) and b) was Item 26: When I am reading for enjoyment, I like writers to a) *Clearly say what they mean,* with 37 (49%) responses, versus b) *Says things in creative, interesting ways* with 38 responses (50%). In contrast to the implication that the student reads for enjoyment, is Item 39: For entertainment, I would rather a) *Watch Television,* 59 (79%), versus b) *Read a book*, 16 (21%).

ILSQ Dimension Scores

Interpreting the data related to the four dimensions (active/reflective, sensing/intuitive, visual/verbal, and sequential/global) was enabled via the detailed reports generated via the *Index of Learning Styles Questionnaire* website (Felder & Soloman, nd-a). Each completed ILSQ was coded. The coding was chronological from LS1 through to LS75, and this same code was used for entering the data online, with the code automatically appearing on the generated report.

The generated report provided outcome scores based on the responses and provided information about learning style dimensions. Each report was saved as a pdf. Analysis of all the data in the individual reports was undertaken after entry of results into an EXCEL spreadsheet.

ILSQ Dimension Scores were analysed. Figure 4.5*: ILSQ Dimension Scores Graph* shows the frequencies of the ILSQ Dimension Scores, for example, the blue columns are the counts of respondents who scored 1 or 3. The orange column is the number of respondents who scored 5 or 7, and the grey column are the number of respondents who scored 9 or 12. The paired learning style dimension categories are indicated by the blue double ended horizontal arrow above the columns. The explanation for what the scoring (1 or 3, 5 or 7, 9 or 12) is within the graphic below.

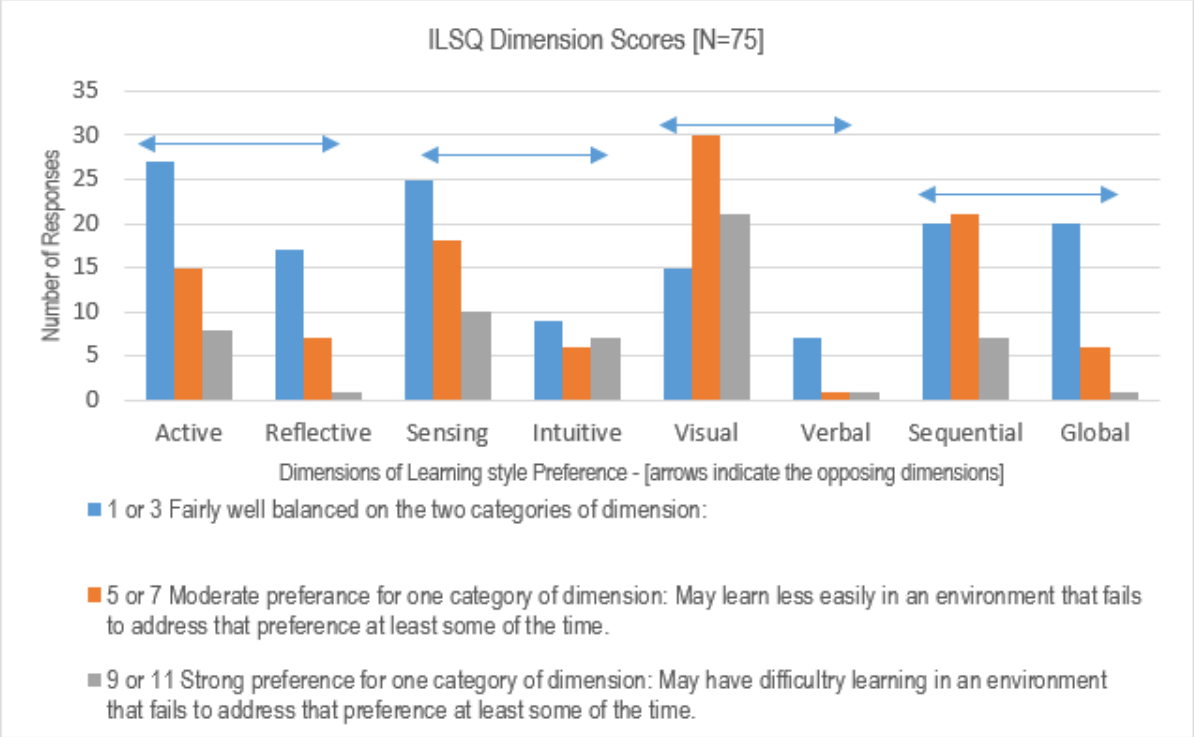


Figure 4.5: *ILSQ Dimension Scores Graph*

To show frequency in learning style preference balance (regarding the dimension) the scores which related to *moderate* preference (5 or 7) and *strong* preference (9 or 11) were combined. In Figure 4.6: *ILSQ Dimension Balance* shows that *strong* preferences were found across all the dimensions but did not represent the majority in any of the dimensions; rather most frequency was towards either the *balanced* as, for example, Active/Reflective and *moderate* preference as, for example, Visual, and Sequential.

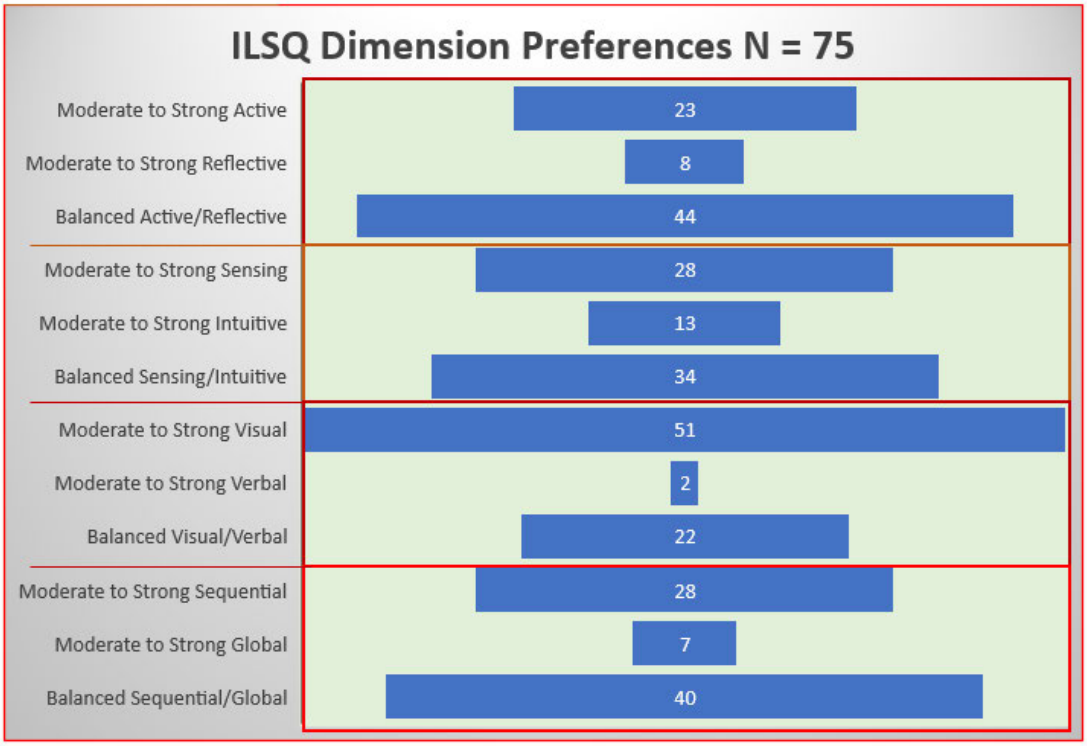


Figure 4.6: *ILSQ Dimension Balance*

The direction of learning style preference combining both *moderate* and *strong* preference for one category of dimension compared to *balanced* score on the preference scale. These results cannot be interpreted to have any cause-and-effect value but do provide a snapshot of the respondents learning style preference at the time they completed the ILSQ. It is important to also note, that it cannot be inferred that any of the ILSQ responses correlate with the individual respondent's experience of their then current studies. Apart from the Visual category, which clearly showed the highest trending direction, the other three dimensions were reasonably balanced.

The basic analysis of the data shows a range of preferences demonstrated, and for all four dimension category pairings most showed a *balanced* inclination, particularly in the Active/Reflective dimension and to a lesser extent in the Sequential/Global dimension. In the former it is worth noting that, for this cohort of respondents, only 8 out of 75 (just over 10%) showed a *moderate* to *strong* Reflective learning preference. The strongest link to a learning style preference overall is shown by 51 out of 75 (68%) respondents showing a *moderate* to *strong* Visual learning style preference as compared to 2 out of 75 (just under 3%) indicating in their responses a *moderate* to *strong* verbal learning style preference.

Further detailed examination of the results using just the *strong* preferences is in that there were 56 individual results over all the dimensions (N=300) which scored either 9 or 11,

which, in interpreting the ILSQ scale indicates a *strong* preference shown towards a particular dimension. Table 4.5: *Individual scores showing a strong preference in an ILSQ dimension*, shows the number of respondents who scored either 9 or 11 in a dimension. It is clear in the colour highlighted table cells in the *Number of respondents with a score or 9 or 11 (strong) preference* column, which pole of the dimension dominates.

Table 4.5: *Individual scores showing a strong preference in an ILSQ dimension*

Dimensions	Number of respondents with a score of 9 or 11 (*strong*) preference
Active	8
Reflective	1
Sensing	10
Intuitive	7
Visual	21
Verbal	1
Sequential	7
Global	1

There were a number of respondents, 27 (N = 75), who showed a *strong* preference in only one dimension, and 14 (N = 75), who showed two *strong* preferences for learning style in their overall individual results. No respondent showed three *strong* preferences or four *strong* preferences. The combinations of the two dimensions which were *strongly* preferred are shown in Table 4.6: *Two Strong ILSQ Dimensions in individual student responses*. The Visual dimension is represented in 10 of the pairings, that is, out of the total of 14 respondents (being the number who showed two *strong* preferences overall) – see last four rows of Table 4.2. The next dominant dimension in the pairings were Intuitive (5), Active (5), Sensing (4), Sequential (2), and Sensing, Global, and Verbal were only paired once. Reflective was not represented.

Table 4.6: *Two Strong ILSQ Dimensions in individual student responses*

Two Dimensions – Strong Preference	Number of Respondents
Active and Intuitive	1
Active and Sequential	1
Intuitive and Verbal	1
Intuitive and Global	1
Visual and Sequential	1
Intuitive and Visual	2
Active and Visual	3
Sensing and Visual	4

The scoring, for example, 1, 3, 5, 7, 9, or 11, for each of the four dimensions, for each individual respondent is presented in Appendix P: *Respondent ILSQ Learning Styles Dimension Scores*

Deep Learning for 21st Century Skills in Public Health Questionnaire (DLQ) Results

Fifty-five students completed the *Deep Learning for 21st Century Skills in Public Health Questionnaire* (DLQ). The Likert Scale items had almost 100 percent response, and many respondents provided narrative in the open text areas. The item with the most incomplete response was item 20 which required students to either drag and drop in the online DLQ option or draw lines (matching) to their choices in the hardcopy option.

Each of the first eight DLQ questions comprised a number of sub-questions, with these all-together accounting for 60 different items for response. The Likert Scale ranged from Strongly Agree, Agree, Somewhat Agree, Neither Agree Nor Disagree, Somewhat Disagree, Disagree, and Strongly Disagree. This range was used to encourage respondents to be frank in their opinion, and actually provide a response rather than leave it blank. That is, the researcher included what is fundamentally a neutral response to mitigate a respondent choosing a forced option they did not really prefer. It also potentially moderated the risk of a response not being recorded (left blank). There were very few blank responses overall, which indicated a high-level of engagement with the DLQ. Whilst there was the risk that respondents could either randomly or consistently choose a response in the Likert Scale items, without due consideration of their actual opined response, there was overall, in fact diversity within each individual DLQ completed, and a written comment provided, as previously stated, by many, in all of the open-ended text areas.

As indicated previously in the Chapter 3: Methodology, the DLQ addressed the research themes broadly catalogued as 21st century skills, deep learning, learning style, questioning approach, employability skills, work-readiness, pedagogy, and general demographic related to enrolment into the associate degree; within the case study boundaries (refer to Chapter 3: Table 3.4: *DLQ Research Area Addressed*). The results are summarised and where applicable presented in graphical and/or tabulated format. No inferences can be made about significance as data was subjected only to a descriptive analysis of frequency and percentages. For avoidance of doubt reference to trend/ trending is not an inferential measure but rather used in the context of ‘the most popular’ or ‘most frequent’ response. Unless otherwise specified all data relates to the total number of individual DLQ completed, that is, N = 55. All DLQ results can be viewed in Appendix Q: *All DLQ results tabled*.

The first part of the DLQ result reporting will focus on all the Likert Scale responses, which comprised the first eight questions, and first 60 items. This will be followed by reporting results for all other questions and items as relevant to the type of question category used to elicit data. Appendix R: *All DLQ Q1-Q8 Data Responses Tabulated* shows all results.

DLQ Questions 1 to 8

Table 4.7 DLQs 1-8 Frequency of Responses and (Percentages) presents all the responses in terms of frequency of responses to the Likert-style options, and the percentages (rounded up or down to the nearest whole number) out of the total number of 55 DLQ completed. The blue highlighted cells represent the highest number (frequency) of that response.

Table 4.7*: DLQs 1-8 Frequency of Responses and (Percentages)*

Question	Question theme and sub-questions	Likert-Style responses Frequency Count and (Percentage to nearest whole number)								Total completions
Q 1	***About my learning…***	Blank	Strongly Agree	Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Disagree	Strongly Disagree	Total
1.I1	My learning program encourages me to be creative	0	5 (9)	13 (24)	19 (35)	9 (16)	5 (9)	3 (5)	1 (2)	55
1.I2	I have the opportunity to demonstrate personal responsibility in my learning program	1 (2)	8 (15)	26 (47)	15 (27)	5 (9)	0 (0)	0 (0)	0 (0)	55
1.I3	Collaboration with colleagues is enabled in my learning program	0 (0)	11 (20)	25 (45)	13 (24)	3 (5)	1 (2)	2 (4)	0 (0)	55
1.I4	I am learning skills which will help me to manage real-world situations	0 (0)	9 (16)	10 (18)	22 (40)	9 (16)	3 (5)	0 (0)	2 (4)	55
1.I5	The skills I am learning can be applied to different contexts	0 (0)	7 (13)	17 (31)	22 (40)	5 (9)	4 (7)	0 (0)	0 (0)	55
1.I6	Practical skill development is supported in my learning program	0 (0)	8 (15)	17 (31)	17 (31)	9 (16)	2 (4)	2 (4)	0 (0)	55
1.I7	My learning program presents me with authentic real-world experience	1 (2)	5 (9)	8 (15)	20 (36)	15 (27)	5 (9)	1 (2)	0 (0)	55
1.I8	My learning program is helping me to develop effective work habits	0 (0)	5 (9)	17 (31)	14 (25)	11 (20)	4 (7)	4 (7)	0 (0)	55
Q 2	***My general employability skills…***	Blank	Strongly Agree	Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Disagree	Strongly Disagree	Total
2.I9	I am learning how to communicate effectively	0 (0)	6 (11)	21 (38)	18 (33)	6 (11)	3 (5)	1 (2)	0 (0)	55
2.I10	Asking effective questions is a valued employability skill	0 (0)	11 (20)	25 (45)	14 (25)	5 (9)	0 (0)	0 (0)	0 (0)	55
2.I11	I am learning to be an effective team member	1 (2)	5 (9)	24 (44)	15 (27)	8 (15)	1 (2)	1 (2)	0 (0)	55
2.I12	I am learning how to solve problems	0 (0)	6 (11)	22 (40)	14 (25)	7 (13)	5 (9)	1 (2)	0 (0)	55
2.I13	I am learning new skills which I can use in any work setting	0 (0)	7 (13)	16 (29)	14 (25)	12 (22)	3 (5)	3 (5)	0 (0)	55
Q 3	***About asking questions…***	Blank	Strongly Agree	Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Disagree	Strongly Disagree	Total
3.I14	I am encouraged to ask questions in class	0 (0)	9 (16)	25 (45)	14 (25)	5 (9)	2 (4)	0 (0)	0 (0)	55
3.I15	My intellectual skills are being developed in my learning program	0 (0)	8 (15)	17 (31)	18 (33)	8 (15)	2 (4)	2 (4)	0 (0)	55
3.I16	My learning program promotes my critical thinking skills	0 (0)	8 (15)	19 (35)	16 (29)	7 (13)	4 (7)	1 (2)	0 (0)	55
3.I17	I am confident about how to ask effective questions to get relevant information	0 (0)	7 (13)	21 (38)	14 (25)	7 (13)	3 (5)	3 (5)	0 (0)	55
Q 4	***About work-ready skills for a health-related role…***	Blank	Strongly Agree	Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Disagree	Strongly Disagree	Total
4.I18	The science I am learning will help me get a job when I graduate	0 (0)	3 (5)	14 (25)	30 (55)	4 (7)	2 (4)	2 (4)	0 (0)	55
4.I19	Learning about human cultures will help me be work-ready for the health field	0 (0)	7 (13)	24 (44)	18 (33)	4 (7)	1 (2)	1 (2)	0 (0)	55
4.I20	I am learning specific skills to work in a health-related role	0 (0)	7 (13)	22 (40)	15 (27)	3 (5)	5 (9)	3 (5)	0 (0)	55
4.I21	Learning about the natural world as it relates to population health will prepare me to work in a health-related role	0 (0)	7 (13)	18 (33)	19 (35)	6 (11)	5 (9)	0 (0)	0 (0)	55

4.I22	I am doing this learning program to get a job in the health field	0 (0)	19 (35)	19 (35)	10 (18)	3 (5)	3 (5)	1 (2)	0 (0)	55
4.I23	To be work-ready in a health role I need to learn about the physical world in relation to population health	0 (0)	13 (24)	27 (49)	9 (16)	3 (5)	1 (2)	1 (2)	1 (2)	55
4.I24	I prefer to learn by getting real-world experience in the field	0 (0)	21 (38)	22 (40)	5 (9)	4 (7)	2 (4)	1 (2)	0 (0)	55

Q 5	***My learning style preferences....***	Blank	Strongly Agree	Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Disagree	Strongly Disagree	Total
5.I25	I learn best by doing	0 (0)	22 (40)	25 (45)	7 (13)	1 (2)	0 (0)	0 (0)	0 (0)	55
5.I26	I prefer to study alone	0 (0)	12 (22)	14 (25)	15 (27)	11 (20)	1 (2)	2 (4)	0 (0)	55
5.I27	I learn best by attending class	1 (2)	11 (20)	18 (33)	14 (25)	10 (18)	0 (0)	0 (0)	1 (2)	55
5.I28	I prefer to study with my student peers	1 (2)	4 (7)	13 (24)	17 (31)	13 (24)	7 (13)	0 (0)	0 (0)	55
5.I29	I prefer to work with authentic case-studies in class	0 (0)	12 (22)	13 (24)	20 (36)	6 (11)	1 (2)	2 (4)	1 (2)	55
5.I30	I prefer to learn with a social group	0 (0)	5 (9)	17 (31)	17 (31)	8 (15)	5 (9)	3 (5)	0 (0)	55
5.I31	I learn best outside of the class setting	0 (0)	12 (22)	8 (15)	17 (31)	11 (20)	6 (11)	1 (2)	0 (0)	55
5.I32	I do independent study outside of the program-related material provided	0 (0)	12 (22)	8 (15)	16 (29)	13 (24)	4 (7)	1 (2)	1 (2)	55
5.I33	I learn best during whole of class discussions	0 (0)	10 (18)	19 (35)	17 (31)	4 (7)	4 (7)	1 (2)	0 (0)	55
5.I34	I prefer to work through course material in my own time	0 (0)	9 (16)	10 (18)	16 (29)	14 (25)	5 (9)	1 (2)	0 (0)	55

Q 6	***To find information to answer assignment questions I go to...***	Blank	Strongly Agree	Agree	Somewhat Agree	Neither Agree not Disagree	Somewhat Disagree	Disagree	Strongly Disagree	Total
6.I35	My student friends	1 (2)	10 (18)	23 (42)	12 (22)	4 (7)	1 (2)	3 (5)	1 (2)	55
6.I36	My teacher	1 (2)	9 (16)	21 (38)	11 (20)	7 (13)	3 (5)	2 (4)	1 (2)	55
6.I37	The internet on my mobile device	0 (0)	17 (31)	26 (47)	10 (18)	2 (4)	0 (0)	0 (0)	0 (0)	55
6.I38	The provided course-work resources	0 (0)	18 (33)	23 (42)	7 (13)	7 (13)	0 (0)	0 (0)	0 (0)	55
6.I39	Library text sources	0 (0)	7 (13)	10 (18)	13 (24)	14 (25)	5 (9)	4 (7)	2 (4)	55
6.I40	Library data-base peer-reviewed texts	0 (0)	10 (18)	10 (18)	10 (18)	14 (25)	5 (9)	5 (9)	1 (2)	55
6.I41	Wikipedia	0 (0)	3 (5)	5 (9)	10 (18)	15 (27)	7 (13)	10 (18)	5 (9)	55
6.I42	Google Scholar	0 (0)	10 (18)	15 (27)	12 (22)	11 (20)	3 (5)	4 (7)	0 (0)	55
6.I43	The gray literature (Government and non-Government websites)	0 (0)	3 (5)	18 (33)	15 (27)	11 (20)	3 (5)	3 (5)	2 (4)	55
6.I44	My family	1 (2)	2 (4)	8 (15)	13 (24)	13 (24)	9 (16)	4 (7)	5 (9)	55
6.I45	Someone working in the relevant field	0 (0)	4 (7)	13 (24)	9 (16)	14 (25)	7 (13)	6 (11)	2 (4)	55

Q 7	***Making inquiries...***	Blank	Strongly Agree	Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Disagree	Strongly Disagree	Total
7.I46	I am confident about where to find answers for assignment questions	0 (0)	9 (16)	25 (45)	9 (16)	9 (16)	2 (4)	0 (0)	1 (2)	55
7.I47	I am comfortable asking questions to get information for assignment tasks	0 (0)	11 (20)	23 (42)	16 (29)	3 (5)	1 (2)	0 (0)	1 (2)	55
7.I48	I prefer to ask my questions via an internet search engine	0 (0)	11 (20)	15 (27)	17 (31)	7 (13)	3 (5)	0 (0)	2 (4)	55
7.I49	I use answers to questions that other people have already asked	0 (0)	6 (11)	12 (22)	12 (22)	18 (23)	3 (5)	2 (4)	2 (4)	55
7.I50	I prefer it when teachers ask the questions in class	0 (0)	5 (9)	14 (25)	20 (36)	13 (24)	1 (2)	1 (2)	1 (2)	55
7.I51	I learn best when students ask questions in class	0 (0)	4 (7)	18 (33)	15 (27)	16 (29)	0 (0)	1 (2)	1 (2)	55
7.I52	I am learning to ask effective questions	0 (0)	7 (13)	16 (29)	20 (36)	10 (18)	1 (2)	0 (0)	1 (2)	55

Q 8	***The type of assessment which helps to develop my work ready skills are...***	Blank	Strongly Agree	Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Disagree	Strongly Disagree	Total
8.I53	Exams	0 (0)	3 (5)	7 (13)	13 (24)	11 (20)	8 (15)	6 (11)	7 (13)	55
8.I54	Written assignments such as essays	0 (0)	2 (4)	11 (20)	19 (35)	9 (16)	9 (16)	3 (5)	2 (4)	55
8.I55	Oral presentations	0 (0)	9 (16)	10 (18)	20 (36)	5 (9)	4 (7)	2 (4)	5 (9)	55
8.I56	Group assignments	2 (4)	9 (16)	13 (24)	17 (31)	8 (15)	3 (5)	0 (0)	3 (5)	55
8.I57	Individual assignments	0 (0)	12 (22)	21 (38)	19 (35)	0 (0)	2 (4)	0 (0)	1 (2)	55
8.I58	Practical projects	0 (0)	17 (31)	22 (40)	13 (24)	0 (0)	2 (4)	0 (0)	1 (2)	55
8.I59	Simulated activity	0 (0)	13 (24)	23 (42)	12 (22)	6 (11)	0 (0)	0 (0)	1 (2)	55
8.I60	Practical laboratory	0 (0)	19 (35)	18 (33)	12 (22)	4 (7)	0 (0)	0 (0)	2 (4)	55

To illustrate the findings of the following discussion, refer to the baseline Q1 to Q8 calculated data responses as presented in Table 4.8*: All DLQ Q1 to Q8 data responses tabulated - frequencies and [percentages].* The total number of responses which are shown as 'AGREED TOTAL' (green shading) are inclusive of the range of responses in this pole, of Strongly Agree, Somewhat Agree, and Agree. The Neither Agree Nor Disagree, or 'Neutral' responses are shaded in grey. The total number of responses which are shown as 'DISAGREED TOTAL' (red shading) are inclusive of the range of responses in this pole, of Somewhat Disagree, Disagree, and Strongly Disagree. There were several blank responses, no more than one per item statement and this non-response was across several completed DLQ, that is, not attributable to a single respondent; this column is not shaded. As stated earlier there were 55 completed DLQs for analysis.

Table 4.8: *All DLQ Q1 to Q8 data responses tabulated - frequencies and [percentages]*

Q1	About my learning .[21st Century Skills]	Strongly Agree [%]	Agree [%]	Somewhat Agree [%]	AGREED TOTAL [%]	Neither Agree Nor Disagree [%]	Somewhat Disagree [%]	Disagree [%]	Strongly Disagree [%]	DISAGREED TOTAL [%]	Blank [%]
1.I1	My learning program encourages me to be creative	5 [9.1]	13 [23 6]	19 [34 5]	37 [67 3]	9 [16.3]	5 [9.1]	3 [5.5]	1 [1.8]	9 [16.4]	0 [0]
1.I2	I have the opportunity to demonstrate personal responsibility in my learning program	8 [14.5]	26 [47 3]	15 [27 3]	49 [89.1]	5 [9.1]	0 [0]	0 [0]	0 [0]	0 [0]	1 [1 8]
1.I3	Collaboration with colleagues is enabled in my learning program	11 [20.0]	25 [45 5]	13 [23 6]	49 [89.1]	3 [5.5]	1 [1.8]	2 [3.6]	0 [0]	3 [5 5]	0 [0]
1.I4	I am learning skills which will help me to manage real-world problems	9 [16.4]	10 [18 2]	22 [40 0]	41 [74 5]	9 [16.4]	3 [5.5]	0 [0]	2 [3.6]	5 [9.1]	0 [0]
1.I5	The skills I am learning can be applied to different contexts	7 [12.7]	17 [30 9]	22 [40 0]	46 [83 6]	5 [9.1]	4 [7.3]	0 [0]	0 [0]	4 [7 3]	0 [0]
1.I6	Practical skill development is supported in my learning program	8 [14.5]	17 [30 9]	17 [30 9]	42 [76.4]	9 [16.4]	2 [3.6]	2 [3.6]	0 [0]	4 [7 3]	0 [0]
1.I7	My learning program presents me with authentic real-world experience	5 [9.1]	8 [14 5]	20 [36.4]	33 [60 0]	15 [27.3]	5 [9.1]	1 [1.8]	0 [0]	6 [10.9]	1 [1 8]
1.I8	My learning program is helping me to develop effective work habits	5 [9.1]	17 [30 9]	14 [25 5]	36 [65 5]	11 [20.0]	4 [7.3]	4 [7.3]	0 [0]	8 [14.5]	0 [0]
Q2	**My general employability skills [Employability Skills]**										
2.I9	I am learning how to communicate effectively	6 [10.9]	21 [38 2]	18 [32.7]	45 [81 8]	6 [10.9]	3 [5.5]	1 [1.8]	0 [0]	4 [7 3]	0 [0]
2.I10	Asking effective questions is a valued employability skill	11 [20.0]	25 [45 5]	14 [25 5]	50 [90 9]	5 [9.1]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
2.I11	I am learning how to be an effective team member	5 [9.1]	24 [43 6]	15 [27 3]	44 [80 0]	8 [14.5]	1 [1.8]	1 [1.8]	0 [0]	2 [3 6]	1 [1 8]
2.I12	I am learning how to solve problems	6 [10.9]	22 [40 0]	14 [25 5]	42 [76.4]	7 [12.7]	5 [9.1]	1 [1.8]	0 [0]	6 [10.9]	0 [0]
2.I13	I am learning new skills which I can use in any work setting	7 [12.7]	16 [29.1]	14 [25 5]	37 [67 3]	12 [21.8]	3 [5.5]	3 [5.5]	0 [0]	6 [10.9]	0 [0]
Q3	**About asking questions [Questioning approach]**										
3.I14	I am encouraged to ask questions in class	9 [16.4]	25 [45 5]	14 [25 5]	48 [87 3]	5 [9.1]	2 [3.6]	0 [0]	0 [0]	2 [3 6]	0 [0]
3.I15	My intellectual skills are being developed in my learning program	8 [14.5]	17 [30 9]	18 [32.7]	43 [78 2]	8 [14.5]	2 [3.6]	2 [3.6]	0 [0]	4 [7 3]	0 [0]
3.I16	My learning program promotes my critical thinking skills	8 [14.5]	19 [34 5]	16 [29.1]	43 [78 2]	7 [12.7]	4 [7.3]	1 [1.8]	0 [0]	5 [9.1]	0 [0]
3.I17	I am confident about how to ask effective questions to get relevant information	7 [12.7]	21 [38 2]	14 [14 5]	42 [76.4]	7 [12.7]	3 [5.5]	3 [5.5]	0 [0]	6 [10.9]	0 [0]
Q4	**About work-ready skills for a health-related role [Work-Readiness]**										
4.I18	The science I am learning will help me get a job when I graduate	3 [5 5]	14 [25 5]	30 [54 5]	47 [85 5]	4 [7.3]	2 [3.6]	2 [3.6]	0 [0]	4 [7 3]	0 [0]
4.I19	Learning about human cultures will help me be work-ready for the health field	7 [12.7]	24 [43 6]	18 [32.7]	49 [89.1]	4 [7.3]	1 [1.8]	1 [1.8]	0 [0]	2 [3 6]	0 [0]
4.I20	I am learning specific skills to work in a health-related role	7 [12.7]	22 [40 0]	15 [27 3]	44 [80 0]	3 [5.5]	5 [9.1]	3 [5.5]	0 [0]	8 [14.5]	0 [0]
4.I21	Learning about the natural world as it relates to population health will prepare me to work in a health-related role	7 [12.7]	18 [32.7]	18 [32.7]	43 [78 2]	6 [10.9]	5 [9.1]	0 [0]	1 [1.8]	6 [10.9]	0 [0]
4.I22	I am doing this learning program to get a job in the health field	19 [34.5]	19 [34 5]	10 [18 2]	48 [87 3]	3 [5.5]	3 [5.5]	1 [1.8]	0 [0]	4 [7 3]	0 [0]

4.I23	To be work-ready in a health role I need to learn about the physical world in relation to population health	13 [23.6]	27 [49.1]	9 [16.4]	49 [89.1]	3 [5.5]	1 [1.8]	1 [1.8]	1 [1.8]	3 [5 5]	0 [0]
4.I24	I prefer to learn by getting real-world experience in the field	21 [38.2]	22 [40 0]	5 [9.1]	48 [87 3]	4 [7.3]	2 [3.6]	1 [1.8]	0 [0]	3 [5 5]	0 [0]
Q5	**My learning style preferences [Learning style]**										
5.I25	I learn best by doing	22 [40.0]	25 [45 5]	7 [12.7]	54 [98 0]	1 [1.8]	0 [0]	0 [0]	0 [0]	O [0]	0 [0]
5.I26	I prefer to study alone	12 [21.8]	14 [25 5]	15 [27 3]	41 [74 5]	11 [20.0]	1 [1.8]	2 [3.6]	0 [0]	3 [5 5]	0 [0]
5.I27	I learn best by attending class	11 [20.0]	18 [32.7]	14 [25 5]	43 [78 2]	10 [18.2]	1 [1.8]	0 [0]	0 [0]	1 [1 8]	1 [1 8]
5.I28	I prefer to study with my student peers	4 [7 3]	13 [23 6]	17 [30 9]	34 [61 8]	13 [23.6]	0 [0]	7 [12.7]	0 [0]	7 [12.7]	1 [1 8]
5.I29	I prefer to work with authentic case-studies in class	12 [21.8]	13 [23 6]	20 [36.4]	45 [81 8]	6 [10.9]	1 [1.8]	2 [3.6]	1 [1.8]	4 [7 3]	0 [0]
5.I30	I prefer to learn with a social group	5 [9.1]	17 [30 9]	17 [30 9]	39 [70 9]	8 [14.5]	5 [9.1]	5 [9.1]	0 [0]	10 [18.2]	0 [0]
5.I31	I learn best outside of the class setting	12 [21.8]	8 [14 5]	17 [30 9]	37 [67 3]	11 [40.o]	6 [10 9]	1 [1.8]	0 [0]	7 [12.7]	0 [0]
5.I32	I do independent study outside of the program-related material provided	12 [21.8]	8 [14 5]	16 [29.1]	36 [65 5]	13 [23.6]	4 [7.3]	1 [1.8]	1 [1.8]	6 [10.9]	0 [0]
5.I33	I learn best during whole of class discussions	10 [18.2]	19 [34 5]	17 [30 9]	46 [83 6]	4 [7.3]	4 [7.3]	1 [1.8]	0 [0]	5 [9.1]	0 [0]
5.I34	I prefer to work through course material in my own time	9 [16.4]	10 [18 2]	16 [29.1]	35 [63 6]	14 [25.5]	5 [9.1]	1 [1.8]	0 [0]	6 [10.9]	0 [0]
Q6	**To find information to answer assignment questions I go to [Questioning approach]**	**Strongly Agree [%]**	**Agree [%]**	**Somewhat Agree [%]**	**AGEED TOTAL [%]**	**Neither Agree Nor Disagree [%]**	**Somewhat Disagree [%]**	**Disagree [%]**	**Strongly Disagree [%]**	**DISAGREED TOTAL [%]**	**Blank [%]**
6.I35	My student friends	10 [18.2]	23 [41 8]	12 [21 8]	45 [81 8]	4 [7.3]	1 [1.8]	3 [5.5]	1 [1.8]	5 [9.1]	1 [1 8]
6.I36	My teacher	9 [16.4]	21 [38 2]	11 [20 0]	41 [74 5]	7 [12.7]	3 [5.5]	2 [3.6]	1 [1.8]	6 [10.9]	1 [1 8]
6.I37	The internet on my mobile device	17 [30.9]	26 [47 3]	10 [18 2]	53 [96.4]	2 [3.6]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
6.I38	The provided course-work resources	18 [32.7]	23 [41 8]	7 [12.7]	48 [87 3]	7 [12.7]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
6.I39	Library text sources	7 [12.7]	10 [18 2]	13 [23 6]	30 [54 5]	14 [25.5]	5 [9.1]	4 [7.3]	2 [3.6]	11 [20.0]	0 [0]
6.I40	Library data-base peer-reviewed texts	10 [18.2]	10 [18 2]	10 [18 2]	30 [54 5]	14 [25.5]	5 [9.1]	5 [9.1]	1 [1.8]	11 [20.0]	0 [0]
6.I41	Wikipedia	3 [5 5]	5 [9.1]	10 [18 2]	18 [32.7]	15 [27.3]	7 [12.7]	10 [18.2]	5 [9.1]	22 [20.0]	0 [0]
6.I42	Google Scholar	10 [18.2]	15 [27 3]	12 [21 8]	37 [67 3]	11 [20.0]	3 [5.5]	4 [7.3]	0 [0]	7 [12.7]	0 [0]
6.I43	The gray literature (Government and non-Government websites)	3 [5 5]	18 [32.7]	15 [27 3]	36 [65 5]	11 [20.0]	3 [5.5]	3 [5.5]	2 [3.6]	8 [14.5]	0 [0]
6.I44	My family	2 [3 6]	8 [14 5]	13 [23 6]	23 [41 8]	13 [23.6]	9 [16.4]	4 [7.3]	5 [9.1]	18 [32.7]	1 [1 8]
6.I45	Someone working in the relevant field	4 [7 3]	13 [23 6]	9 [16.4]	26 [47 3]	14 [25.5]	7 [12.7]	6 [10.9]	2 [3.6]	15 [25.5]	0 [0]
Q7	**Making inquiries [Questioning approach]**										
7.I46	I am confident about where to find answers for assignment questions	9 [16.4]	25 [45 5]	9 [16.4]	43 [78 2]	9 [16.4]	2 [3.6]	0 [0]	1 [1.8]	3 [5 5]	0 [0]
7.I47	I am comfortable asking questions to get information for assignment tasks	11 [20.0]	23 [41 8]	16 [29.1]	50 [90 9]	3 [5.5]	1 [1.8]	0 [0]	1 [1.8]	2 [3 6]	0 [0]
7.I48	I prefer to ask my questions via an internet search engine	11 [20.0]	15 [27 3]	17 [30 9]	43 [78 2]	7 [12.7]	3 [5.5]	0 [0]	2 [3.6]	5 [9.1]	0 [0]
7.I49	I use answers to questions that other people have already asked	6 [10.9]	12 [21 8]	12 [21 8]	30 [54 5]	18 [32.7]	3 [5.5]	2 [3.6]	2 [3.6]	7 [12.7]	0 [0]
7.I50	I prefer it when teachers ask the questions in class	5 [9.1]	14 [25 5]	20 [36.4]	39 [70 9]	13 [23.6]	1 [1.8]	1 [1.8]	1 [1.8]	3 [5 5]	0 [0]
7.I51	I learn best when students ask questions in class	4 [7 3]	18 [32.7]	15 [27 3]	37 [67 3]	16 [29.1]	0 [0]	1 [1.8]	1 [1.8]	2 [3 6]	0 [0]
7.I52	I am learning to ask effective questions	7 [12.7]	16 [29.1]	20 [36.4]	43 [78 2]	10 [18.2]	1 [1.8]	0 [0]	1 [1.8]	2 [3 6]	0 [0]
Q8	**The type of assessment which helps to develop my work ready skills are [Work-Readiness]**										
8.I53	Exams	3 [5 5]	7 [12.7]	13 [23 6]	23 [41 8]	11 [20.0]	8 [14 5]	6 [10.9]	7 [12.7]	21 [38.2]	0 [0]
8.I54	Written assignments such as essays	2 [3 6]	11 [20 0]	19 [34 5]	32 [58 2]	9 [16.4]	9 [16.4]	3 [5.5]	2 [3.6]	14 [25.5]	0 [0]
8.I55	Oral presentations	9 [16.4]	10 [18 2]	20 [36.4]	39 [70 9]	5 [9.1]]	4 [7.3]	2 [3.6]	5 [9.1]	11 [20.0]	0 [0]
8.I56	Group assignments	9 [16.4]	13 [23 6]	17 [30 9]	39 [70 9]	8 [14.5]	3 [5.5]	0 [0]	3 [5.5]	6 [10.9]	2 [3 6]
8.I57	Individual assignments	12 [21.8]	21 [38 2]	19 [34 5]	52 [94 5]	0 [0]	2 [3.6]	0 [0]	1 [1.8]	3 [5 5]	0 [0]
8.I58	Practical projects	17 [30.9]	22 [40 0]	13 [23 6]	52 [94 5]	0 [0]	2 [3.6]	0 [0]	1 [1.8]	2 [3 6]	0 [0]
8.I59	Simulated activity	13 [23.6]	23 [41 8]	12 [21 8]	48 [87 3]	6 [10.9]	0 [0]	0 [0]	1 [1.8]	1 [1 8]	0 [0]
8.I60	Practical laboratory	19 [34.5]	18 [32.7]	12 [21 8]	49 [89.1]	4 [7.3]	0 [0]	0 [0]	2 [3.6]	2 [3 6]	0 [0]

The Blank responses could have represented an oversight by the individual respondent, in relation to the actual presentation layout of the hardcopy survey. To reduce the number of pages, the actual layout of the survey was compressed, and spacing between items minimised. There are likely other alternate reasons why some statements had no response, for example, none of the Likert Scale options was deemed suitable, or other variables were not represented, for example, a range where in some situations they might agree, but in others they would not. Most respondents followed the instruction to choose one option only per item.

For presentation purposes the responses to each theme were collated by combining all the positive responses indicated as Agreed, all the negative responses indicated as Disagreed, and the Neither Agree Nor Disagree indicated as Neutral. Before proceeding to the more detailed discussion of the results for DSQ 1 to 8, an all responses trend (meaning most frequent) for the item response is presented as a summary graph in Figure 4.7: *DLQ 1-8 All Responses Trend*. Some items within the questions had more negative responses than positive, however the most dominant response was towards Agreement.

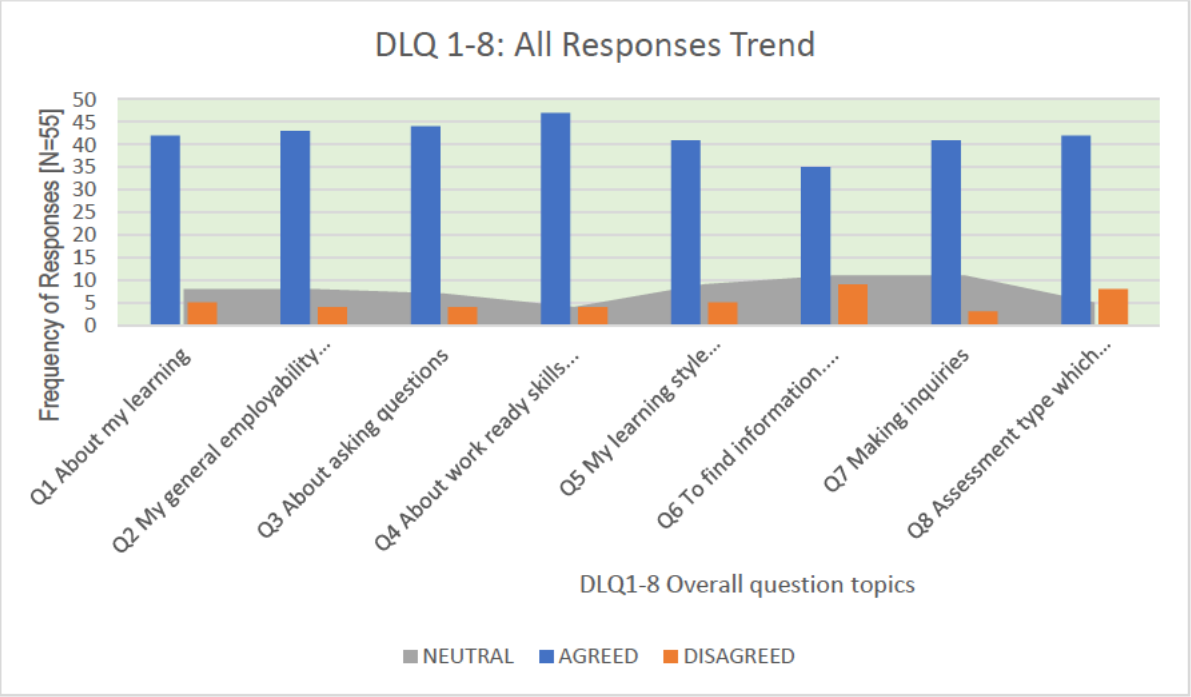


Figure 4.7: *DLQ 1-8 All Responses Trend*

The next section will explore these results for the DLQ questions 1 to 8 in more detail. The section headings align with the relevant DLQ question.

Q1: About my learning...

The first question, Q1: *About my learning*... had eight sub-questions related to 21st century skills. The trend was overwhelmingly predisposed towards agreeing with all the items (sub-questions) below. For presentation purposes, and because no significance is inferred due to descriptive statistic calculations only, all percentages (%) are rounded up or down (as applicable) to the nearest whole number. The number of DLQs completed for analysis was 55 [N=55]. The Table 4.9: *DLQ Q1 - About my learning… Results* presents the results as discussed above.

Table 4.9: *DLQ Q 1*: *About my learning… Results*

Q1 About my learning.... *[21st Century Skills]*		AGREED TOTAL [%]	NEUTRAL TOTAL [%]	DISAGREED TOTAL [%]
1.I1	My learning program encourages me to be creative	37 [67]	9 [16]	9 [16]
1.I2	I have the opportunity to demonstrate personal responsibility in my learning program	49 [89]	5 [9]	0 [0]
1.I3	Collaboration with colleagues is enabled in my learning program	49 [89]	3 [6]	3 [6]
1.I4	I am learning skills which will help me to manage real-world problems	41 [75]	9 [16]	5 [9]
1.I5	The skills I am learning can be applied to different contexts	46 [84]	5 [9]	4 [7]
1.I6	Practical skill development is supported in my learning program	42 [76]	9 [16]	4 [7]
1.I7	My learning program presents me with authentic real-world experience	33 [60]	15 [27]	6 [11]
1.I8	My learning program is helping me to develop effective work habits	36 [66]	11 [20]	8 [15]

Whilst the type of data can be discussed in terms of descriptive statistics, the researcher did not think this was warranted for each question, and the modest number of surveys completed**.** As mentioned previously, the DLQ was about collating data to profile the typical student (within the bounded case study) undertaking associate degree study, but also, for the researcher to explore both contextual and situational influences in relation to the research themes. Question 1 to 8 of the DLQ aligned with several areas of the research questions related to 21st century skills, deep learning, work-readiness, learning approaches, and pedagogy.

The most notable result was with Q1.I2: *I have the opportunity to demonstrate personal responsibility in my learning program,* in which no negative responses were given, with only five (9%) of respondents providing a Neutral response. Q1.I1: *My learning program encourages me to be creative* scored the most negative responses with nine (16%)

respondents who 'Disagreed' overall. The collated results can be viewed in Figure 4.8*: Frequency of Collated Responses DLQ Q1 Sub-questions.*

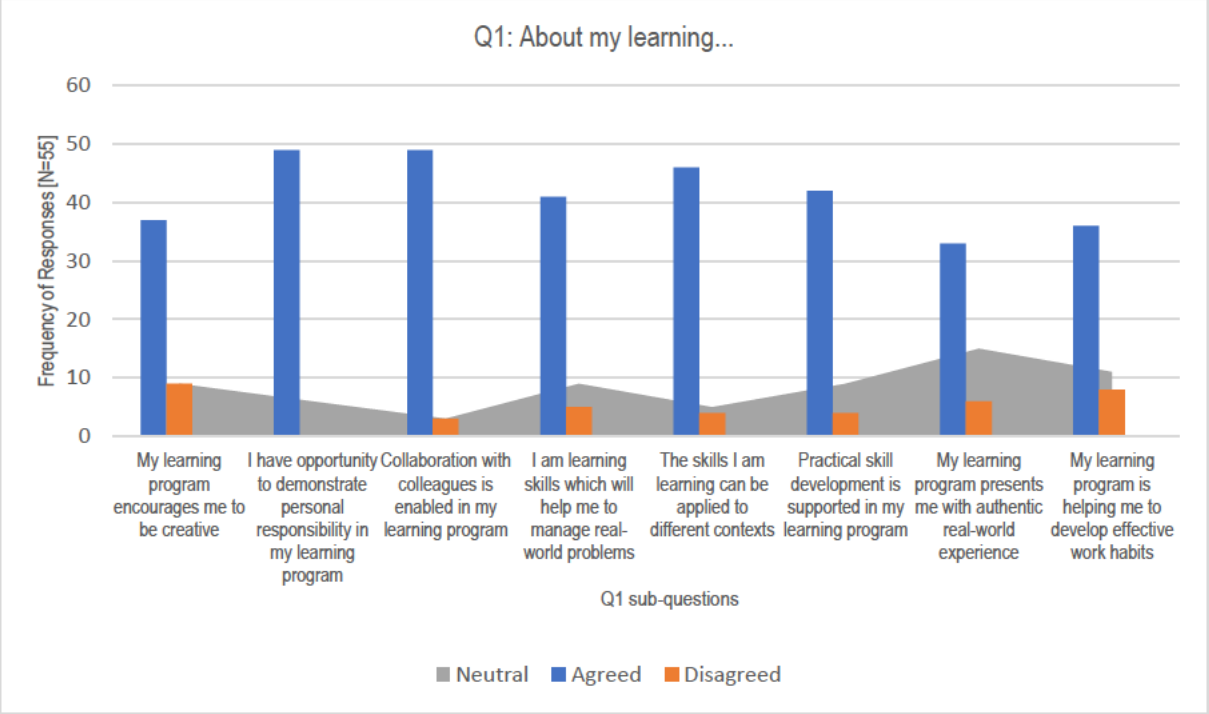


Figure 4.8*: Frequency of Collated Responses DLQ Q1 Sub-questions.*

Q2: My general employability skills

The DLQ question 2 was patently seeking responses related to employability skills and work-readiness and whether the respondent had an opinion about whether they were learning and developing them. As per Q1: *About my learning*..., it was evident that the respondents, as can be seen in the Table 4.10: *DLQ Q2 - My general employability skills…Results*, again overwhelmingly indicated positive agreement to the five sub-items:

Table 4.10: *DLQ Q2 - My general employability skills…Results*

Q2 My general employability skills... *[Employability Skills]*		AGREED TOTAL [%]	NEUTRAL TOTAL [%]	DISAGREED TOTAL [%]
2.I9	I am learning how to communicate effectively	45 [82]	6 [11]	4 [7]
2.I10	Asking effective questions is a valued employability skill	50 [91]	5 [9]	0 [0]
2.I11	I am learning how to be an effective team member	44 [80]	8 [15]	2 [4]
2.I12	I am learning how to solve problems	42 [76]	7 [13]	6 [11]
2.I13	I am learning new skills which I can use in any work setting	37 [67]	12 [22]	6 [11]

The most notable findings related to this DLQ question 2 theme was in Q2.I10: *Asking effective questions is a valued employability skill*, with no negative (Disagree) responses, and only five respondents recording a Neutral response. This finding was also noteworthy as it aligns with one of the research themes about the questioning approach used by associate degree students, and implies, based on the results, that the respondents had insight into behaviours which behoves valuable employee attributes. Q2.I13: *I am learning new skills which I can use in any work setting*, also supports alignment with 21st century skills which enables transfer and/or repurposing of skills into any work setting. Graphical representation of the collated results can be viewed in Figure 4.9: *Frequency of Collated Responses DLQ Q2 Sub-questions*.

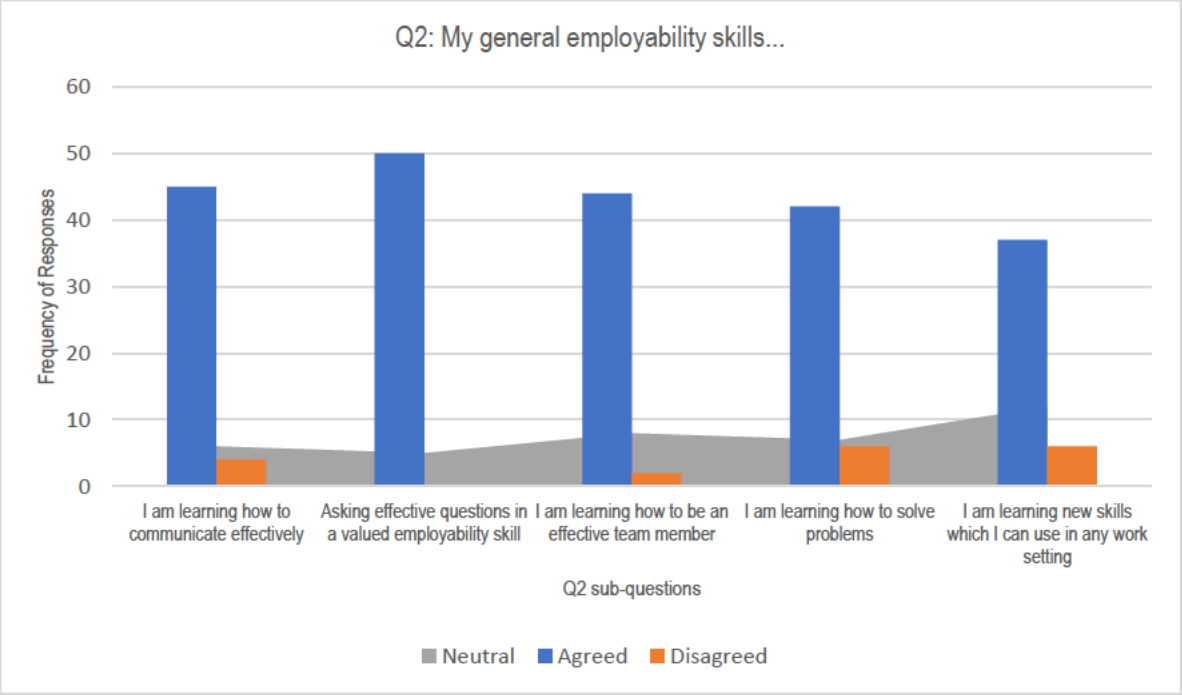


Figure 4.9: *Frequency of Collated Responses DLQ Q2 Sub-Questions*

Q3: About asking questions...

Question 3 was the first themed area of the DLQ to address the research question area related to the questioning approaches used by students undertaking associate degree studies, as well as deep learning, learning approaches, and pedagogy. The other DLQ questions which also sought information about the questioning approaches research area is Q6: *To find information to answer assignment questions I go to...*, and Q7: *Making inquiries...* both discussed later in the chapter. The results imply that the respondents, at the time Agreed that their learning program promotes intellectual and critical thinking, and that they were both encouraged to, and confident in their ability to ask effective questions.

This follows on from the previous theme of employability skills, where-in the majority of respondents Agreed that asking effective questions is a valuable employability skill. The results for Q3 *About asking questions*… is presented in Table 4.11: *DLQ Q3 – About asking questions…Results.*

Table 4.11: *DLQ Q3 – About asking questions…Results.*

Q3 About asking questions… *[Questioning approach]*		AGREED TOTAL [%]	NEUTRAL TOTAL [%]	DISAGREED TOTAL [%]
3.I14	I am encouraged to ask questions in class	48 [87]	5 [9]	2 [4]
3.I15	My Intellectual skills are being developed in my learning program	43 [78]	8 [15]	4 [7]
3.I16	My learning program promotes my critical thinking skills	43 [78]	7 [13]	5 [9]
3.I17	I am confident about how to ask effective questions to get relevant information	42 [76]	7 [13]	6 [11]

The most conspicuous response was for Q3.I14: *I am encouraged to ask questions in class.* To show this in more detail refer to Figure 4.10*: Count of DLQ Q3.I14 Graph* which shows that even the Disagreed (2) response was towards the weaker pole of Somewhat Disagree.

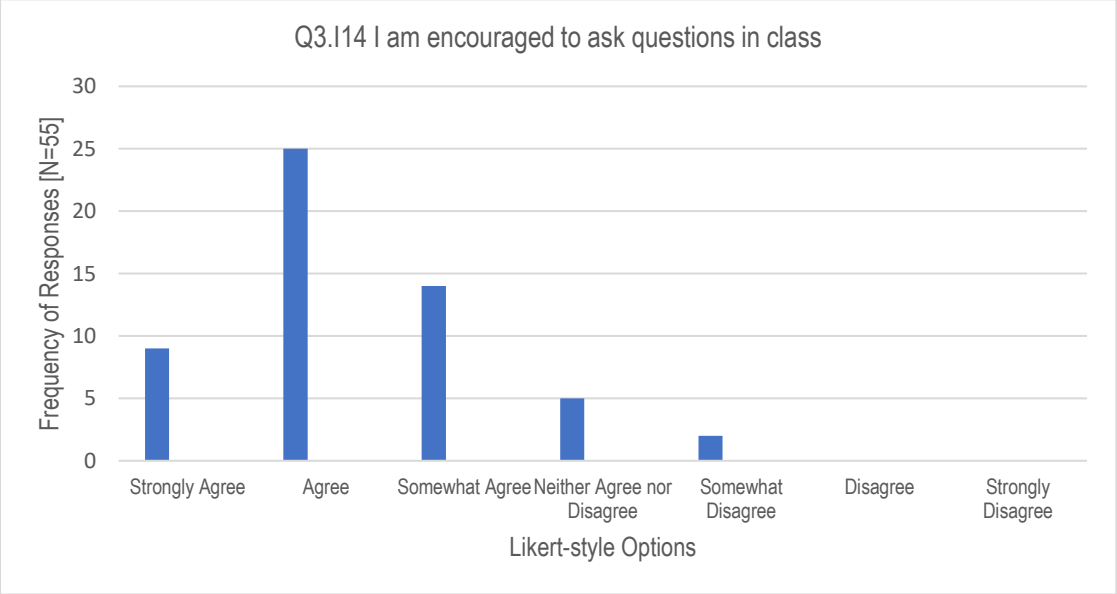


Figure 4.10: *Count of DLQ Q3.I14 Graph*

Graphical representation of the collated results for all the sub-questions can be viewed in Figure 4.11 Frequency of Collated Responses DLQ Q3 Sub-questions.

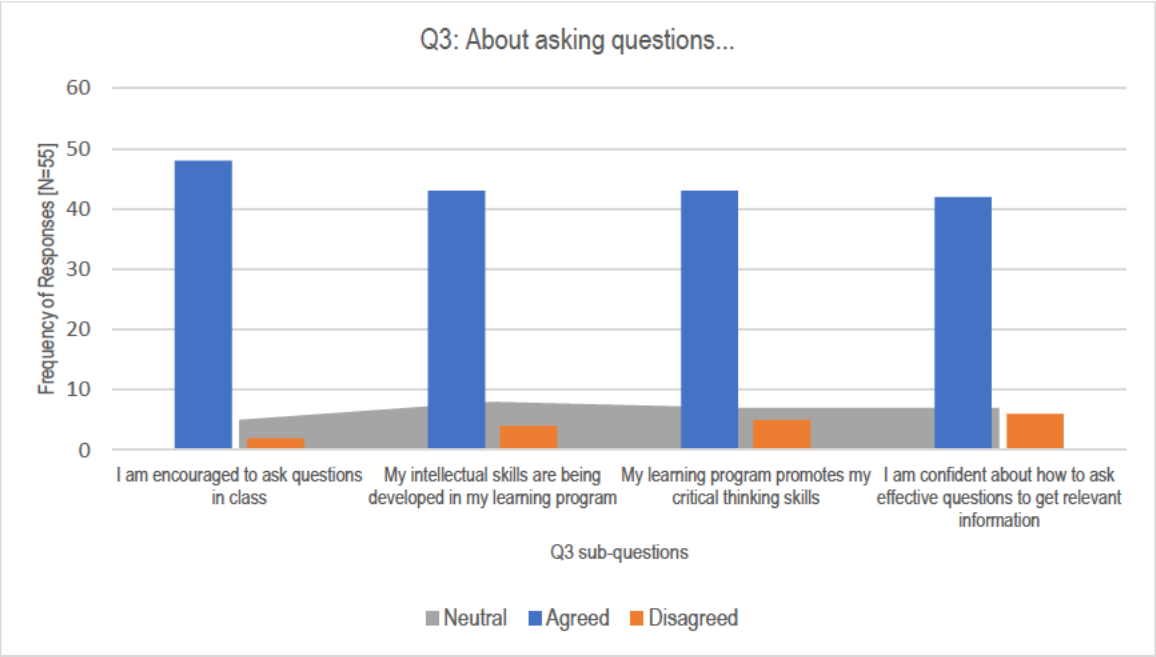


Figure 4.11: *Frequency of Collated Responses DLQ Q3 Sub-questions*

Q4: About work-ready skills for a health professional role...

DLQ question 4 addressed the research theme related to both work-readiness and public health, and contained seven items. The results for DLQ question 4 can be viewed in Table 4.12: *DLQ Q4 – About work-ready skills for a health-related role…Results.*

Table 4.12: *DLQ Q4 – About work-ready skills for a health-related role…Results*

Q4 About work-ready skills for a health-related role…*[Work-Readiness]*		AGREED TOTAL [%]	NEUTRAL TOTAL [%]	DISAGREED TOTAL [%]
4.I18	The science I am learning will help me get a job when I graduate	47 [86]	4 [7]	4 [7]
4.I19	Learning about human cultures will help me be work-ready for the health field	49 [89]	4 [7]	2 [4]
4.I20	I am learning specific skills to work in a health-related role	44 [80]	3 [6]	8 [15]
4.I21	Learning about the natural world as it relates to population health will prepare me to work in a health-related role	43 [78]	6 [11]	6 [11]
4.I22	I am doing this learning program to get a job in the health field	48 [87]	3 [6]	4 [7]
4.I23	To be work-ready in a health role I need to learn about the physical world in relation to population health	49 [89]	3 [6]	3 [6]
4.I24	I prefer to learn by getting real-world experience in the field	48 [87]	4 [7]	3 [6]

Other areas of the DLQ also sought information about work-readiness, these being *Q 8: The type of assessment which helps to develop my work-ready skills are...*, and *Q16: My plan for the future is to work in the career/profession of...* Respondents Agreed, in the majority, with all the statements of DLQ question 4. Of note is that all these statements support alignment with work-ready beliefs of the students who completed the DLQ. Given that the research

participants were all enrolled in an associate degree in health science program the statements pertain to generic work-readiness broadly, but not specific, to working in a health area. Respondents tended towards the Agreed, that science would help them get a job when they graduate. Items related specifically to public health are Q4.I21*: Learning about the natural world as it relates to population health will prepare me to work in a health-related role*, and Q4.I123: *To be work-ready in a health role I need to learn about the physical world in relation to population health*, with 78% (N=43) with the former and 89% (N=49) of the latter overall Agreeing with the statements. The respondents also strongly indicated preference for learning by doing with Q4.I23: *I prefer to learn by getting real-world experience in the field* with 87% (N=48) Agreeing with the statement.

Whilst the results show that many respondents choose a Likert Scale choice in the Agreed pole, it is worth highlighting the number of Neutral responses, that is, the number of respondents who chose Neither Agree Nor Disagree. As the DLQ were anonymous it is not possible to know for sure why respondents provided a Neither Agree Nor Disagree response for statements. However, it was possible, as previously stated, to consider this choice as a considered one, rather than a default response, based on the variability within the individually completed DLQ. Visual representation of all the sub-questions is presented in Figure 4.12: *Frequency of Collated Responses DLQ Q4 Sub-Questions*.

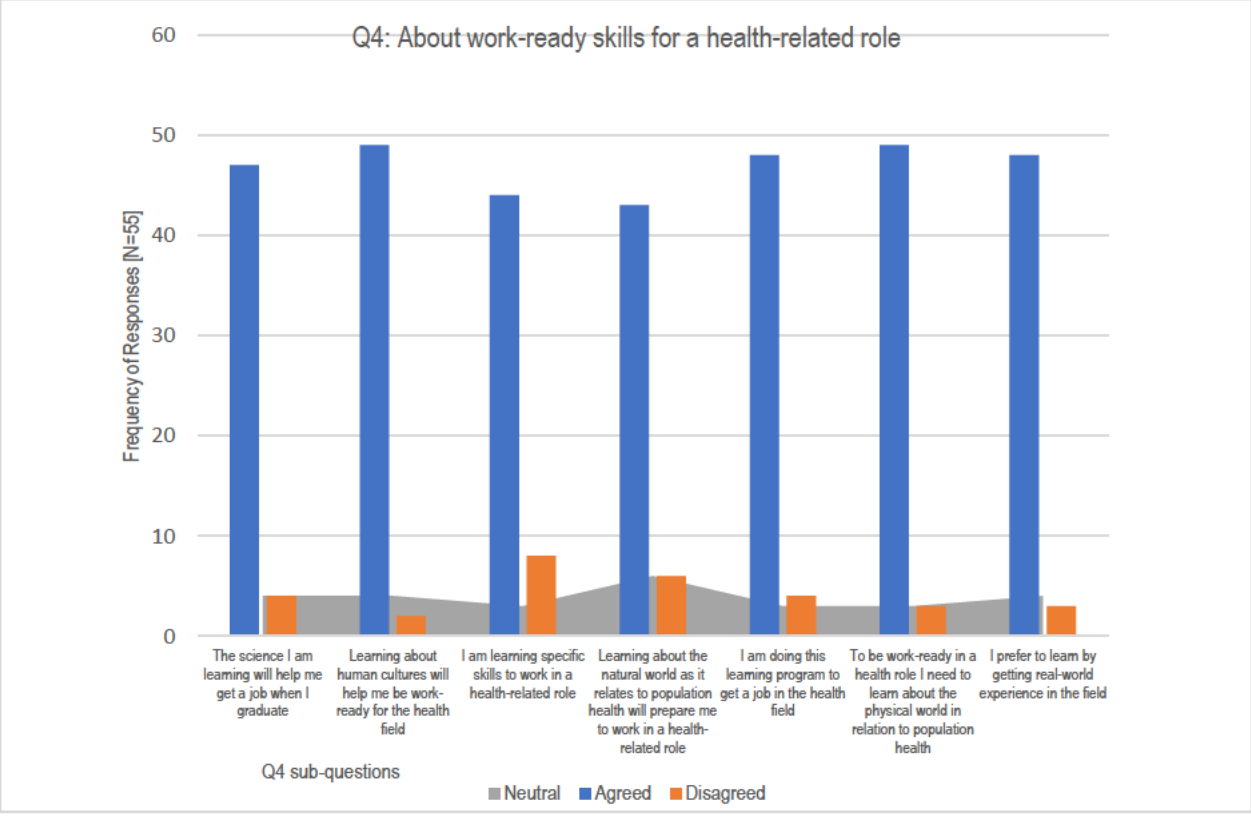


Figure 4.12: *Frequency of Collated Responses DLQ Q4 Sub-questions*

Q5: My learning style preferences...

DLQ question 5 related to the learning approaches of students, and pedagogy, and symmetry with findings from the ILSQ which was discussed earlier in this chapter. Table 4.13: *DLQ Q5 – My learning style preferences…Results*, shows the results for DLQ question 5.

Table 4.13: *DLQ Q5 – My learning style preferences…Results*

Q5 My learning style preferences… *[Learning style]*		AGREED TOTAL [%]	NEUTRAL TOTAL [%]	DISAGREED TOTAL [%]
5.I25	I learn best by doing	54 [98]	1 [2]	0 [0]
5.I26	I prefer to study alone	41 [75]	11 [20]	3 [6]
5.I27	I learn best by attending class	43 [78]	10 [18]	1 [2]
5.I28	I prefer to study with my student peers	34 [62]	13 [24]	7 [13]
5.I29	I prefer to work with authentic case-studies in class	45 [82]	6 [11]	4 [7]
5.I30	I prefer to learn with a social group	39 [71]	8 [15]	10 [18]
5.I31	I learn best outside of the class setting	37 [67]	11 [40]	7 [13]
5.I32	I do independent study outside of the program-related material provided	36 [66]	13 [24]	6 [11]
5.I33	I learn best during whole of class discussions	46 [84]	4 [7]	5 [9]
5.I34	I prefer to work through course material in my own time	35 [64]	14 [26]	6 [11]

As per the previous four DLQ question theme areas, most respondents Agreed with the item statements. Almost 100% of the respondents Agreed with Q5.I25 *I learn best by doing,* with 54 out of 55 (98%), the 2% (one respondent) who chose a Neutral response. That is, there was no Disagreed shown for this item. An unexpected finding was with Q5.I27: *I learn best by attending class*, which indicated that 78% of respondents Agreed with this statement. This response may be related to the fact that respondents completed the DLQ on a day they attended for on-campus class and/or tutorials. Graphical representation of the collated responses can be viewed in Figure 4.13: *Frequency of Collated Responses DLQ Q5 Sub-questions.*

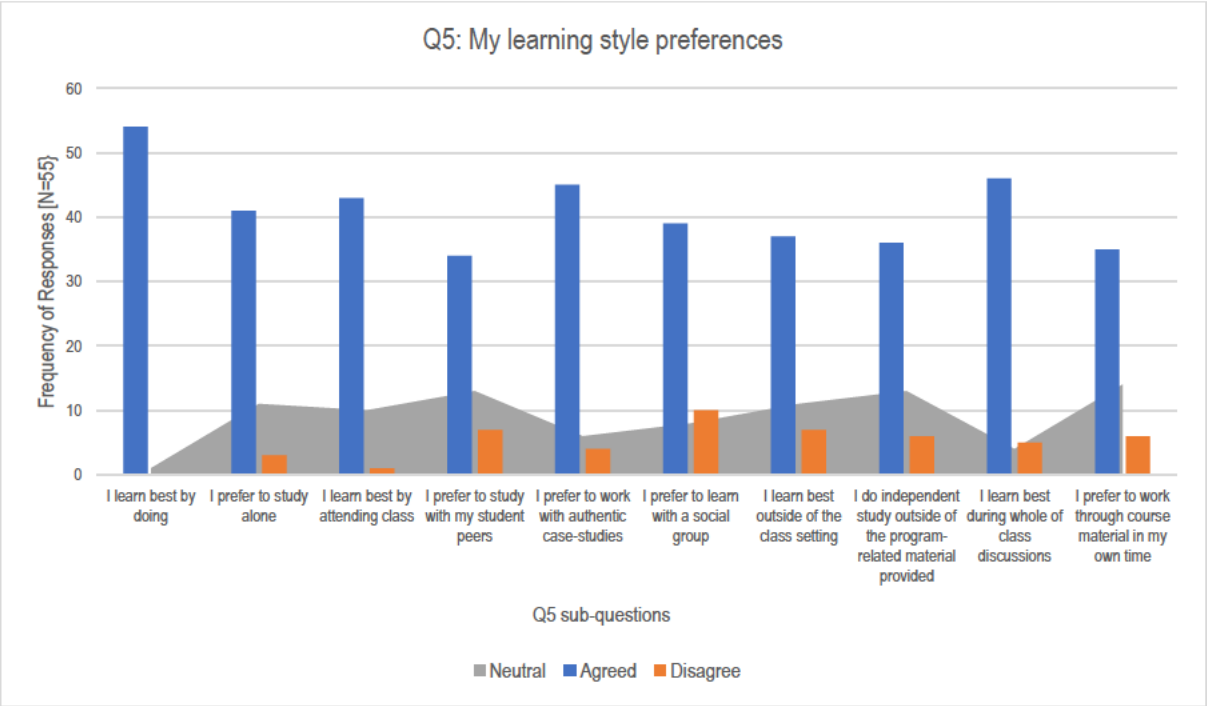


Figure 4.13: *Frequency of Collated Responses DLQ Q5 Sub-questions*

In DLQ question 5 the items included what may be considered some contradictory statements. That is, there was high Agreement with *Q5.I26: I prefer to study alone*, but also with *Q5.I28: I prefer to study with my student peers*, and *Q5.I30: I prefer to learn with a social group*. Overall, the items in Q5: *My learning style preferences...*garnered some contradictory responses as can be noted in the previous paragraph. It could also be suggestive of the student who is flexible in the learning preference depending on the situation and context. For example, the respondents were undertaking a range of units, common core in the first year, and common core and electives in second year. Some of the units undertaken by respondents included mandatory practical activities in a science laboratory setting, individual and group projects, and assessments ranging from exams through to capstone projects.

Q6: To find information to answer assignment questions I go to...

This DLQ question and its statements aligned with the pedagogy, questioning approaches, learning approaches, and deep learning researcher questions, that is, formally exploring where associate degree students (within the boundary of the case study) sourced information in relation to assignment questions. This theme was also investigated in the Individual Interviews. The item statements and results for DLQ Q6 can be viewed in Table 4.14: *DLQ Q6 - To find information to answer assignment questions I go to...Results.*

Table 4.14: *DLQ Q6 - To find information to answer assignment questions I go to... Results*

Q6 To find information to answer assignment questions I go to...*[Questioning approach]*		AGEED TOTAL [%]	NEUTRAL TOTAL [%]	DISAGREED TOTAL [%]
6.I35	My student friends	45 [82]	4 [7]	5 [9]
6.I36	My teacher	41 [75]	7 [13]	6 [11]
6.I37	The internet on my mobile device	53 [96]	2 [4]	0 [0]
6.I38	The provided course-work resources	48 [87]	7 [13]	0 [0]
6.I39	Library text sources	30 [55]	14 [26]	11 [20]
6.I40	Library data-base peer-reviewed texts	30 [55]	14 [26]	11 [20]
6.I41	Wikipedia	18 [33]	15 [27]	22 [20]
6.I42	Google Scholar	37 [67]	11 [20]	7 [13]
6.I43	The grey literature (Government and non-Government websites)	36 [66]	11 [20]	8 [15]
6.I44	My family	23 [42]	13 [24]	18 [33]
6.I45	Someone working in the relevant field	26 [47]	14 [26]	15 [26]

The most dominant information source with most Agreement is Q6.136: *The internet on my mobile device*. Almost all respondents, 53 out of 55 (96%), Agreed with this statement. The other 4% chose a Neutral response. That is, none of the respondents overtly Disagreed. The only other statement which had no Disagreed responses was Q6.I38: *The provided coursework resources.* It should be noted that coursework resources were provided via the Student Learning System. The other statements showed Agreement generally, except for Q6.I41: *Wikipedia*, which had marginally more respondents who Disagreed (22; 40%) than Agreed (18; 33%), and nearly as many who responded in the Neutral (15; 27%). Visual representation of the collated responses can be viewed in Figure 4.14: *Frequency of Collated Responses DLQ Q6 Sub-questions.*

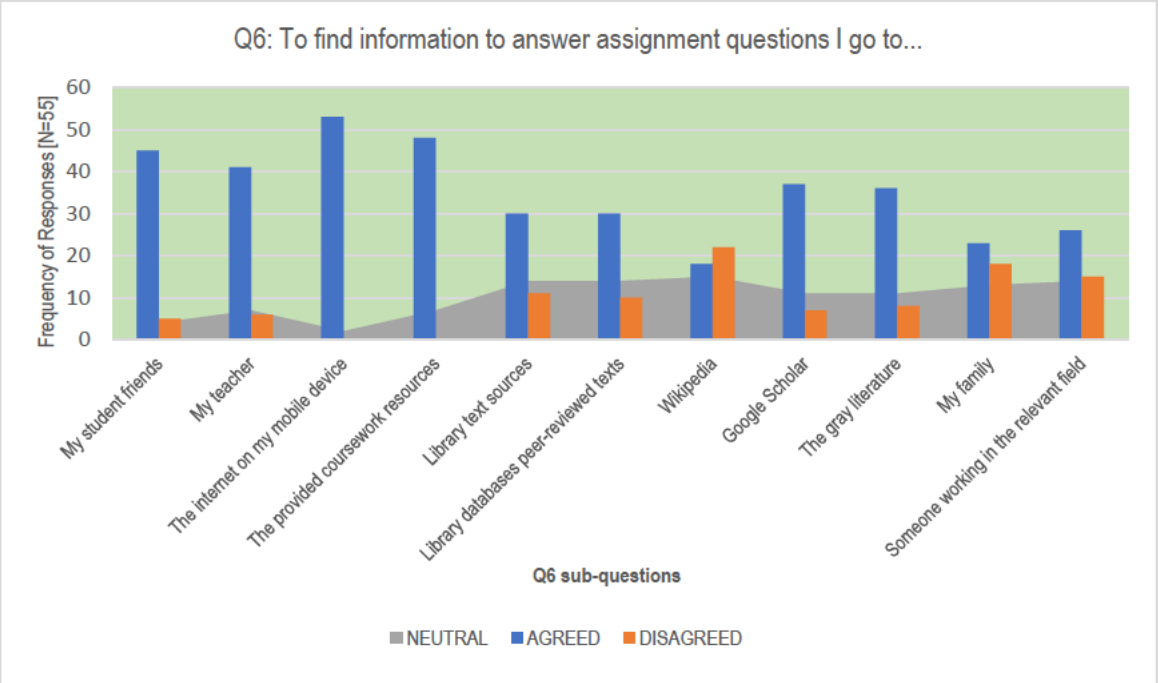


Figure 4.14: *Frequency of Collated Responses DLQ Q 6 Sub-questions*

Q7: Making inquiries...

DLQ question 7 also correlated to the pedagogy, questioning approaches, and deep learning research questions. Some explanatory notes in relation to the wording of the items is warranted and this is due to tools available to access information have engineered 'analytics' logarithms and 'memory' systems, for example, predictive text, such as that which pops up in smart technology devices. The researcher rationale is that a question posed to a search engine has likely been asked before, and the items were considered in relation to respondent acknowledgment of questioning behaviours in using various informatics tools.

The predictive text and data analytics just mentioned presage the use of pre-existing inquiries, which is the motivation in seeking information in response to Q7.I49: *I use answers to questions that other people have already asked*. It is not uncommon for large service and/information organisations to have FAQs (frequently asked questions) to assist inquirers, though the researcher speculates that the intention may be more about reducing direct contacts and the cost of frontline staffing, however, cannot be verified in this research. Q7.I48: *I prefer to ask my questions via an internet search engine* also correlates to the item in DLQ Question 6, Q6.I37: *The internet on my mobile device*. However, the researcher suspected that there would be some divergence in overall responses due to unfamiliarity about internet search engines; that is, what they are, for example, that Google is a web-based search engine.

The item statements and results for DLQ Q7 are shown in Table 4.15: *DLQ Q7 – Making inquiries…Results.*

Table 4.15: *DLQ Q7 - Making inquiries... Results*

Q7 Making inquiries… *[Questioning approach]*		**AGREED TOTAL [%]**	**NEUTRAL TOTAL [%]**	**DISAGREED TOTAL [%]**
7.I46	I am confident about where to find answers for assignment questions	43 [78]	9 [16]	3 [6]
7.I47	I am comfortable asking questions to get information for assignment tasks	50 [91]	3 [6]	2 [4]
7.I48	I prefer to ask my questions via an internet search engine	43 [78]	7 [13]	5 [9]
7.I49	I use answers to questions that other people have already asked	30 [55]	18 [33]	7 [13]
7.I50	I prefer it when teachers ask the questions in class	39 [71]	13 [24]	3 [6]
7.I51	I learn best when students ask questions in class	37 [67]	16 [29]	2 [4]
7.I52	I am learning to ask effective questions	43 [78]	10 [18]	2 [4]

The trends in responses to the items for DLQ7 is Agreement, though several statements had more than one quarter of total respondents choosing a Neutral option, for example, Q7.I49: *I use answers to questions that other people have already asked*, with 18 (33%). This item also scored the most Disagreement in the overall question, with 13% (7) choosing options in the negative pole, though still relatively low. Q7.I46: *I am confident about where to find answers for assignment questions*, and Q7.152: *I am learning to ask effective questions* both had just over three quarters of the respondents (43; 78%) Agreeing with these statements.

The DLQ Question 7 findings support the trend of respondents' (as per DLQ 3 item results) also affirming confidence and comfort in undertaking inquiry related activities in their learning program. As stated earlier the inclusion of a statement about using an internet search engine was to determine if there was discernment between using the internet on a mobile device (an internet search engine) and recognising this inquiry as being via an internet search engine. Whilst correlation analysis was not the intention of this research, it can be noted that this item did not have as high agreement as the Q6:*To find answers to assignment questions I go to*....item Q6.I36: *The internet on my mobile device,* in which nearly 100 % (53; 96%) of respondents agreed, with just over three-quarters (43; 78%) agreeing with the statement Q7. I48: *I prefer to ask my questions via an internet search engine.* Graphical representation of the collated responses can be viewed in Figure 4.15: *Frequency of Collated Responses DLQ Q7 Sub-questions.*

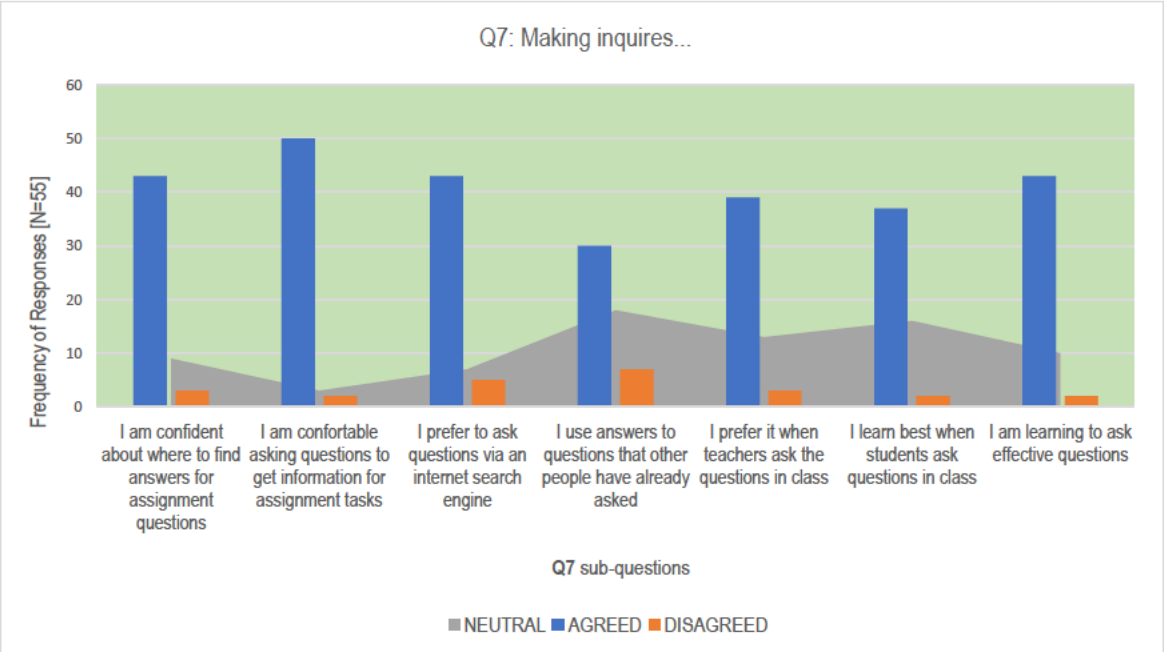


Figure 4.15: *Frequency of Collated Responses DLQ Q7 Sub-questions*

Q8: The type of assessment which helps to develop my work-ready skills are...

This DLQ question and its eight statements align with the research questions related to work-readiness, deeper learning, learning approaches, and pedagogy. Given that assessment is used to determine knowledge and skill acquisition in formal education it seemed reasonable to seek information about a student's experience of assessment. And in view of the research agenda determining what the respondents considered helpful in terms of assessment for learning and development of work-ready skills was an imperative. The options in the statements covered the range of assessment types which were used in their learning program at the time the research was conducted. The item statements and results can be viewed in Table 4.16: *DLQ Q8 - The type of assessment which helps to develop my work-ready skills are...Results.*

Table 4.16: *DLQ Q8 - The type of assessment which helps to develop my work-ready skills are...Results*

Q8 The type of assessment which helps to develop my work ready skills are…*[Work-Readiness]*		AGREED TOTAL [%]	NEUTRAL TOTAL [%]	DISAGREED TOTAL [%]
8.I53	Exams	23 [42]	11 [20]	21 [38]
8.I54	Written assignments such as essays	32 [58]	9 [16]	14 [26]
8.I55	Oral presentations	39 [71]	5 [9]]	11 [20]
8.I56	Group assignments	39 [71]	8 [15]	6 [11]
8.I57	Individual assignments	52 [95]	0 [0]	3 [6]
8.I58	Practical projects	52 [95]	0 [0]	2 [4]
8.I59	Simulated activity	48 [87]	6 [11]	1 [2]
8.I60	Practical laboratory	49 [89]	4 [7]	2 [4]

The overall results trended towards the Agreed pole. The question did not ask respondents to rate or compare the type of assessments in relation to best fit for work-ready skills, rather whether they thought the type of assessment helped them to develop work-ready skills. Almost all of the 55 respondents, that is 52 (95%), considered that individual assignments, and practical projects helped to develop their work-ready skills. In fact, there were not any Neutral responses for these two types of assessments. The options which had the highest Disagreed numbers was Exams (21; 38%), and then Written assignments such as essays (14; 25%), and Oral presentations (11: 20%). The Exams option also had the highest Neutral responses (11: 20%). It was also the Exams option which had the most balanced response with 23 (41%) Agreeing and 21 (38%), as previously noted, Disagreeing. Visual representation of the collated results can be viewed in Figure 4.16: *Frequency of Collated Responses DLQ Q8 Sub-questions.*

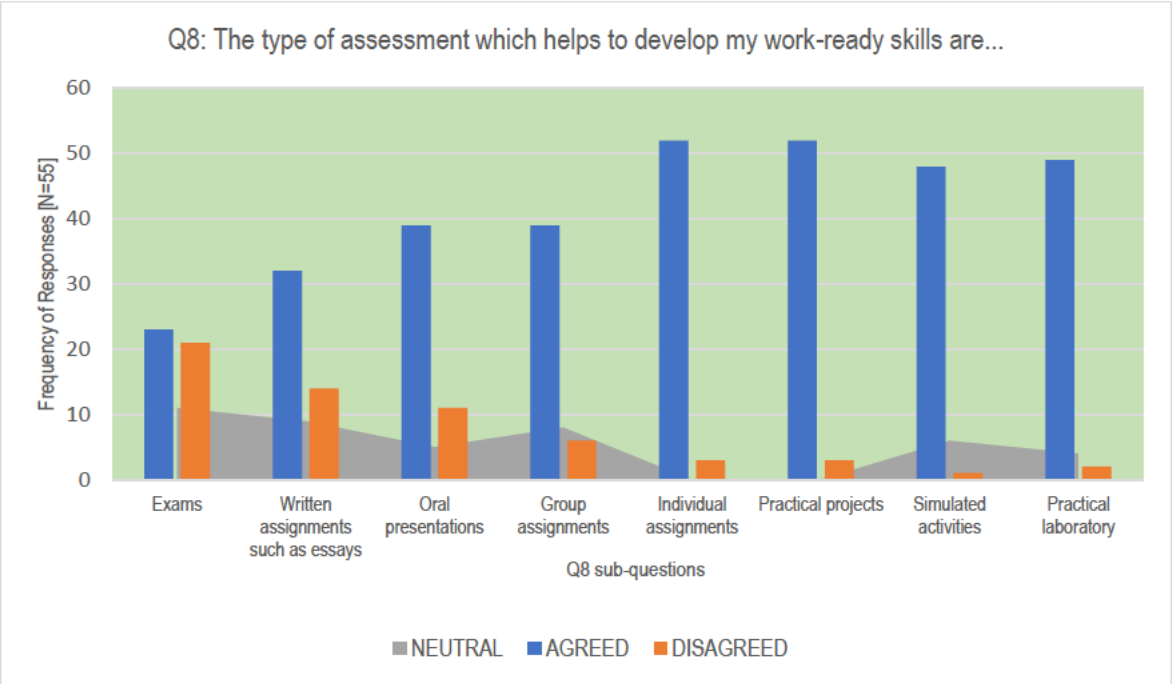


Figure 4.16: *Frequency of Collated Responses DLQ Q8 Sub-questions*

DLQ Questions 9 to 16

Question 9 to 16 and related items in the DLQ are mostly demographic and were included in efforts to profile that typical student undertaking the associate degree within the confines of the case study boundaries. The results will be described and where applicable visually presented via graph and/or table. The following sections will be headed by the relevant DLQ question.

Q9: This learning program was my preferred first enrolment...

DLQ9 was a single item question with two options, Yes or No. The rationale for asking this question was for a vicarious determination for intention to complete the program. There was researcher experience that there was considerable attrition after the first year of the program. The rationale for posing the question is to confirm that students enrolled into the program, not as their first choice. Related questions about intention to exit if they were offered a place in their preferred program, and/or were using their current enrolment as a pathway program was also a DLQ question and will be discussed later. Question 9 addressed the area about enrolment first preference. Collated results are presented in Table 4.17: *DLQ Q9 Frequency of Responses and (Percentages).*

Table 4.17: *DLQ Q9 Frequency of Responses and (Percentages)*

Question	Frequency of Responses (Percentages – nearest whole number)		Total
Q9: This learning program was my preferred first enrolment	**Yes**	**No**	
	16 (29)	39 (71)	55

The results showed that 71% of respondents indicated that their enrolment was not their preferred first choice. Visual representation of the collated responses can be viewed in Figure 4.17: *DLQ Q9 Frequency of Responses.*

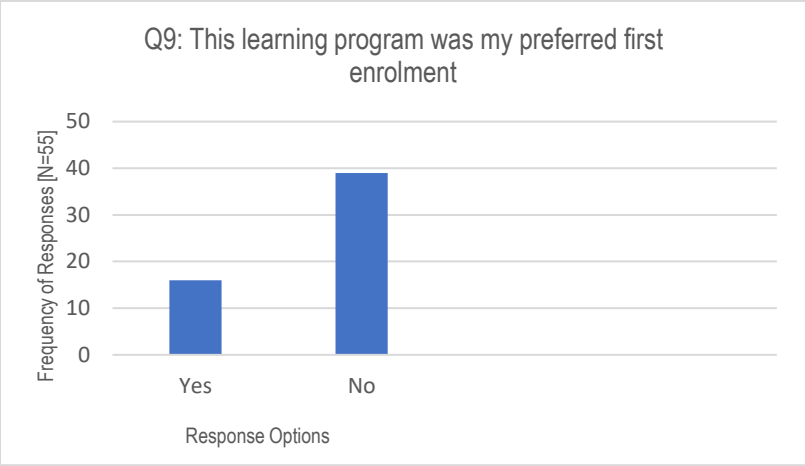


Figure 4.17: *DLQ Q9 Frequency of Responses*

Q10: I am...

This DLQ, 10, was a demographic question about gender, limited to female, male, or other, and cannot be assumed to accurately represent actual demographics of the entire associate degree enrolment at the time of the research. However, it did indicate the demographic, female (56% of respondents) being on campus on the day they completed the DLQ. The frequency of responses can be viewed in Table 4.18: *DLQ Q10 Frequency of Responses and (Percentages)* and visually represented in Figure 4.18*: DLQ Q10 Frequency of Responses.*

Table 4.18: *DLQ Q10 Frequency of Responses and (Percentages)*

Question	Frequency of Responses (Percentages – nearest whole number)			**Total**
Q10: I am... (gender)	**Female**	**Male**	**Other**	
	31 (56)	23 (42)	1 (2)	55

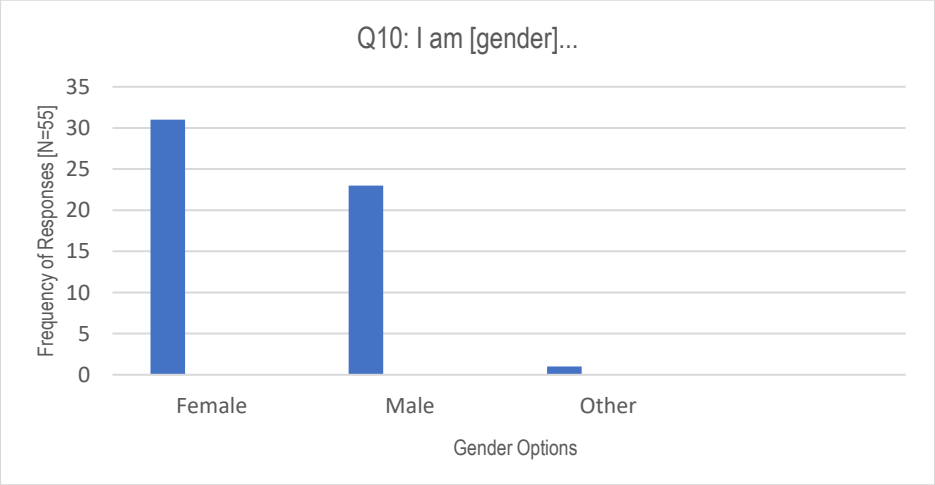


Figure 4.18: *DLQ Q10 Frequency of Responses*

Q11: My first language is...

Information about a respondents' first language is largely demographic. Respondents were invited to disclose their first language as a written text response. Given that the program was offered in a city known for cultural diversity it was of interest to explore language diversity. It is notable that most respondents, 41 (75%), indicated that English was their first language. Three respondents indicated Dari as their first language, two for Bisaya and Somali, respectively, and all other languages (Cantonese, Chinese, French, Greek, Hindu, Kurdish, and Spanish) was indicated once. See the collated responses in Table 4.19: *DLQ Q11 Frequency of Responses and (Percentages)* and graphical representation in Figure 4.19: *DLQ Q11 Frequency of Responses*.

Table 4.19: *DLQ Q11 Frequency of Responses and (Percentages)*

Question	Frequency of Responses (Percentages – nearest whole number)											Total
Q11: My first language is...	**Bisaya**	**Cantonese**	**Chinese**	**Dari**	**English**	**French**	**Greek**	**Hindi**	**Kurdish**	**Somali**	**Spanish**	
	2 (4)	1 (2)	1 (2)	3 (5)	41 (75)	1 (2)	1 (2)	1 (2)	1 (2)	2 (4)	1 (1)	55

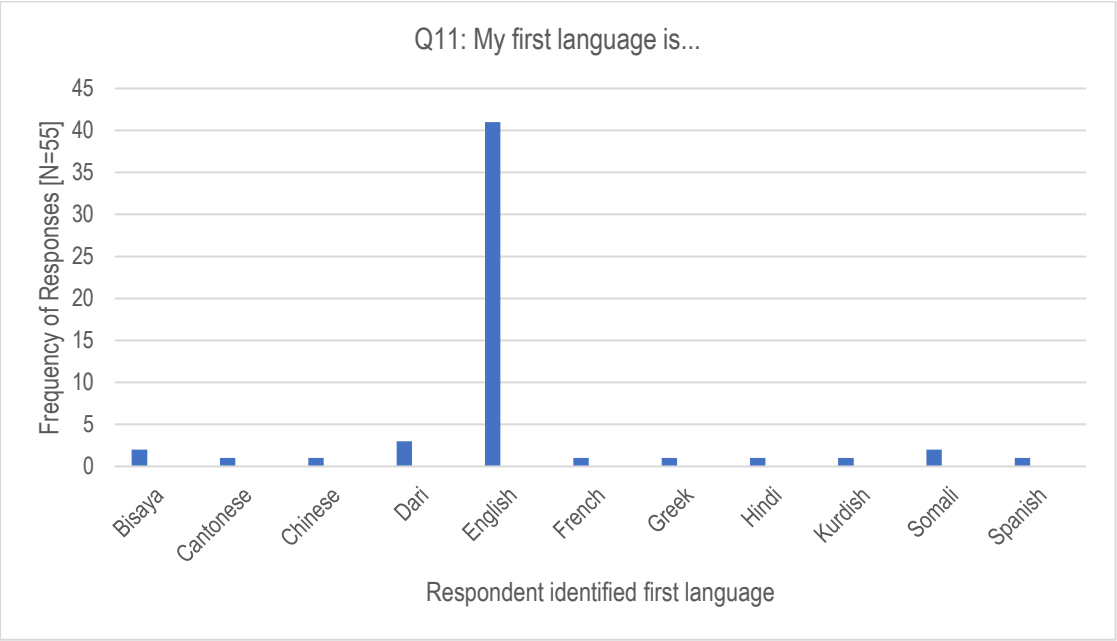


Figure 4.19: *DLQ Q11 Frequency of Responses*

Q12: My age last birthday...

This DLQ question was demographic in nature. As for the previous question, respondents were invited to disclose their age at last birthday as a written text response. Ages of

respondents ranged from 16 years to 27 years. The respondent who said they were 16 years at last birthday may signpost a poorly expressed question, therefore a potential misunderstanding of the question parameters. Secondary schooling is usually completed at age 17 or 18 and completion of year 12 or equivalent was a condition of enrolment. However, the average age at last birthday of the respondents, as calculated, was 18.8 years of age, and the median was 19. It will be noted in the Figure 4.20: DLQ Q12 Frequency of Responses that there were equal numbers of respondents who were 18, and 19 years of age at their last birthday, collectively 36 (65%) of respondents, which can be viewed in Table 4.20: DLQ Q12 Frequency of Responses and (Percentages). These numbers are indicative that most respondents were studying in the first few years of completing post-compulsory schooling.

Table 4.20: *DLQ Q12 Frequency of Responses and (Percentages)*

Question	Frequency of Responses (Percentages – nearest whole number)									Total
Q12: My age last birthday was...	**16 years**	**17 years**	**18 years**	**19 years**	**20 years**	**21 years**	**22 years**	**27 years**	**Blank**	
	1 (2)	4 (7)	18 (33)	18 (33)	6 (11)	4 (7)	1 (2)	1 (2)	2 (4)	55

Figure 4.20: *DLQ Q12 Frequency of Responses*

Q13: I am doing this program as a pathway into another program...

DLQ Question 13 extends the information sought from Q9: *This program was my preferred first enrolment*... The respondents were given three options to choose, Yes, No, and Not Sure. The researcher is not suggesting these findings are generalisable to the entire enrolled cohort or other program areas or institutions offering associate degree level programs. The

responses indicate that 73% of the respondents were certain of their intent of the program as a pathway into another program, and 16% not sure. Only 11% of respondents indicated that their enrolment was not, at the time of completing the DLQ, a program they were completing as a pathway into further studies. The frequency of responses and percentages can be viewed in Table 4.21: *DLQ Q13 Frequency of Responses and (Percentages).*

Table 4.21: *DLQ Q13 Frequency of Responses and (Percentages)*

Question	Frequency of Responses (Percentages – nearest whole number)			Total
Q13: I am doing this program as a pathway into another program...	**Yes**	**No**	**Not sure**	
	40 (73)	6 (11)	9 (16)	55

The responses are visually represented in Figure 4.21: *DLQ Q13 Frequency of Responses*.

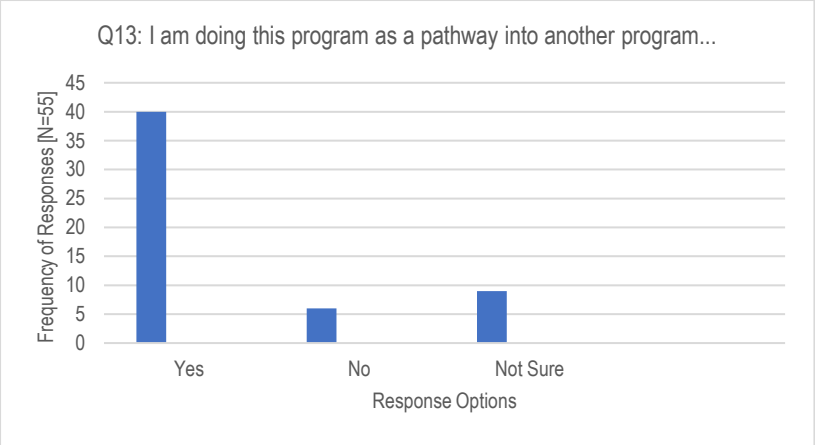


Figure 4.21: *DLQ Q13 Frequency of Responses*

Q14: If I am offered a place in another program I will not continue with my current learning program...

Table 4.22: *DLQ Q14 Frequency of Responses and (Percentages)* shows responses to the query about respondents' intentions should they be offered a place in another program of study.

Table 4.22: *DLQ Q14 Frequency of Responses and (Percentages)*

Question	Frequency of Responses (Percentages – nearest whole number)				Total
Q14: If I am offered a place in another program, I will not continue with my current learning program...	**No**	**Yes**	**Not Applicable**	**Will defer and complete current program**	
	5 (9)	30 (55)	10 (18)	10 (18)	55

This DLQ question extends from Q13 and indicates respondents' choice if offered their (assumed) preferred program. As can be seen in the Figure 4.22: *DLQ Q14* Frequency of Responses, that the trending direction is that Yes, 30 respondents would not continue with their current learning program. Whilst this number is not as high as the number of respondents who indicated that they were undertaking their program as a pathway, it does show an intention that 10 would complete the program they started. The Not Applicable option, may have served here as a default Neutral option, or a Not Sure.

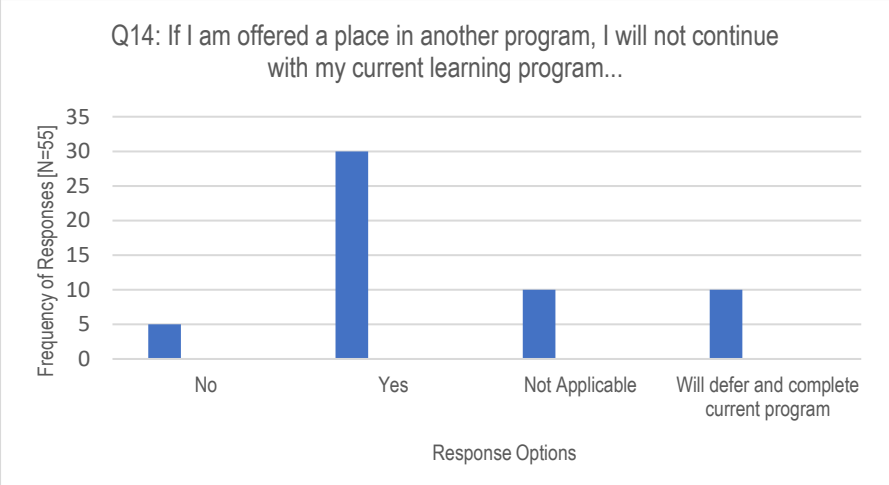


Figure 4.22: *DLQ Q14 Frequency of Responses*

Related DLQ Qs - 9, 10, 14 – looking for alignment in individual responses

The researcher undertook simple comparative measures with the data obtained from responses to DLQ questions 9, 10, and 14. That is, looking at individual respondent responses to each of the three questions: first enrolment preference (Q9), program as a pathway (Q13), and intention if offered a place in another program (Q14). Whilst no statistical inferences can be made based on the responses, it can be shown if there was correlation across the individual respondent answers relative to the three questions. The individual results of each respondent (N=55) for Q9, Q13, and Q14 is documented in Table 4.23: *Individual Responses for Q9, Q13, and Q14*, and shows all student responses in relation to the three questions in the survey which relates to the respondents first enrolment preference (Q9), their program as a pathway (Q13), and their intention if offered a place in another program (Q14).

Whilst no statistical inferences or certainty can be made based on individual respondent responses, it can be inferred that there was a possible alignment in intention across the individual respondent answers in relation to the three questions. By way of example, the yellow highlight across the row shows that two respondents said Yes to the learning program being their first enrolment preference, and then either saying No to both Q13 and Q14. Alternatively, the most common alignment (19 respondents) indicative of intention is highlighted in blue where they chose No to Q9, and Yes to both Q13 and Q14. This suggests that for the 19 respondents who had this sequence, that the learning program was not their first enrolment preference and that they were using the learning program as a pathway and if offered another a place in another program they would discontinue their current learning program. Three respondents, highlighted in green across the row, indicated that despite the program not being their first enrolment preference, they would continue the program even if offered a place in another program, by deferring that offer and finishing their current program.

The rows highlighted in pink (six respondents) suggest some contradictory alignment. That is Yes, the program was their first preference, and Yes it was a pathway, and Yes they would accept another program offer, despite the program being their first preference. Other variables in the individual responses are likely but were not explored further.

Table 4.23: *Individual Responses for Q9, Q13, and Q14*

Question	Q9 *This learning program was my preferred first enrolment...*		Q13 *I am doing this program as a pathway into another program...*			Q14 *If I am offered a place in another program, I will not continue with my current learning program...*			
Response Options	**Yes**	**No**	**Yes**	**No**	**Not Sure**	**Yes**	**No**	**Not Applicable**	**Will Defer and Complete Current Program**
DL1		✓	✓			✓			
DL2	✓			✓			✓		
DL3		✓		✓				✓	
DL4		✓	✓			✓			
DL5	✓			✓			✓		
DL6		✓	✓			✓			
DL7		✓	✓			✓			
DL8	✓		✓			✓			
DL9	✓		✓			✓			
DL10	✓			✓					✓
DL11	✓				✓				✓
DL12		✓		✓				✓	
DL13		✓	✓					✓	
DL14	✓		✓						✓
DL15	✓				✓				✓
DL16		✓	✓			✓			
DL17		✓	✓				✓		
DL18		✓	✓						✓
DL19		✓			✓	✓			
DL20	✓		✓			✓			
DL21		✓			✓			✓	
DL22	✓		✓			✓			
DL23		✓	✓				✓		
DL24		✓			✓			✓	
DL25		✓	✓			✓			
DL26	✓		✓			✓			
DL27		✓	✓			✓			
DL28		✓	✓			✓			
DL29		✓	✓			✓			
DL30		✓	✓			✓			
DL31		✓			✓	✓			
DL32		✓	✓			✓			
DL33		✓	✓						✓
DL34		✓	✓					✓	
DL35		✓	✓			✓			
DL36	✓		✓						✓
DL37	✓		✓			✓			
DL38		✓	✓			✓			
DL39		✓	✓			✓			
DL40	✓		✓						✓
DL41	✓		✓			✓			
DL42		✓			✓	✓			
DL43		✓	✓			✓			
DL44		✓	✓						✓
DL45		✓	✓					✓	
DL46		✓	✓			✓			
DL47		✓	✓			✓			
DL48		✓	✓			✓			
DL49		✓			✓			✓	
DL50		✓	✓			✓			
DL51		✓	✓			✓			
DL52	✓		✓					✓	
DL53		✓			✓			✓	
DL54		✓	✓				✓		
DL55		✓		✓					✓

Q15: My current enrolment is best described as...

This question was a demographic one and indicative of the respondents' current year of study in the associate degree program (two years full time). Whilst there were likely some respondents doing part time study, and some repeating a semester, this data was not requested. More than half (58%) of respondents were in their first year of the program. Figure 4.23: *DLQ Q15 Frequency of Responses* shows the numbers.

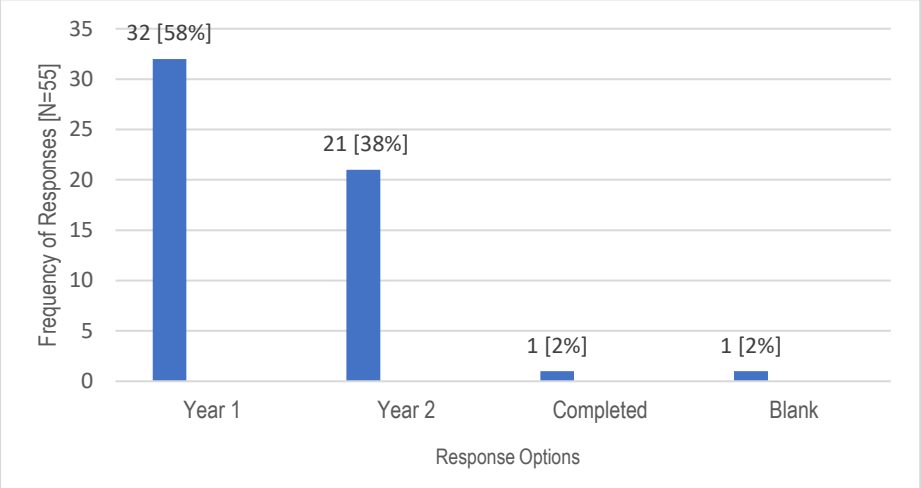


Figure 4.23: *DLQ Q15 Frequency of Responses*

Q16: My plan for the future is to work in the career/profession of...

This question was an open-text option and most respondents provided a written response, some more than one. For presentation purposes the responses were grouped in the related career/professional field and supports responses to related DLQ statements that indicated the respondents were undertaking the course as a pathway program or preparation path until such time as they could transfer to their preferred bachelor's degree program. The findings can be viewed in the Table 4.24: *DLQ Q16 Frequency of Responses.* The most popular response related to a health-related role. Whilst there were 10 respondents who implied they were unsure, at least 12 indicated they planned to work in nursing, and 4 in midwifery.

Table 4.24: *DLQ Q16 Frequency of Responses*

Career/	Number	Career/	Number	Career/	Number	Career/	Number	Career/	Number
Nursing	12	Unsure	10	Physiotherapy	7	Midwifery	4	Dietician	3
Chiropractic	3	Social Work	2	Myotherapy	2	Osteopathy	2	Health	2
Pharmacy	2	Biomedical Engineer	1	Medical Records	1	Sports Science	1	Chinese Medicine	1
Paramedic	1	Radiography	1	Psychologist	1	Exercise Physiology	1	Flight Attendant	1
Health Promotion	1	Dental Nurse	1	Dentist	1	Sex Worker Health	1	Unspecified	3

Q17: My motivation to learn is best described al...

This question required respondents to rank in order from 1 to 4 the item which best aligned with their motivation to learn. The items themselves were purposefully describing areas that can be linked to 21st century skills affinities. The analysis of the responses was basically a count of the rank items. The ranking order was not important in terms of 21st century skills, rather what the respondent considered their priority motivational factor. The collated responses can be seen below in the Table 4.25: *DLQ Q17 – Frequency of Responses*

Table 4.25: *DLQ Q17 Frequency of Responses*

Q17: My motivation to learn is best described as... [Rank 1 to 4]	Rank 1	Rank 2	Rank 3	Rank 4
Learning how to be a responsible citizen of the world	6	10	18	17
Learning how to demonstrate social responsibility	7	15	20	9
Learning how to express my character as an individual	19	14	5	13
Learning how to use skills in other contexts	19	12	8	12

Descriptive analysis (as inferential statistics was never planned for this research) is enabled. For example, there were two items which both had 19 respondents rank as their number 1 motivation. *Learning how to express my character as an individual*; and *Learning how to use skills in other contexts*. (This also aligns with characteristics of the ILSQ Global Dimension learning style preference, though not demonstrated in findings). The least ranked number 1 were the other two items: *Learning how to be a responsible citizen of the world*; and *Learning how to demonstrate social responsibility*. *Learning how to be a responsible citizen of the world* was the item which was the most common rank 4 choice

Q18: Barriers to my learning are...

This item was related to 21st century skills as the items were all areas which may influence the student in the formal learning they undertake. The researcher was interested in why a student might not prioritise their commitment to realising their vocational goals, for example, the cohort of students undertaking associate degree studies with a view to progress to further studies to work as a health professional as their career aspiration. The evidence that respondents aspired to health-related careers was shown in Q10. As per the previous question, Q18 required respondents to rank items from 1 to 4, but this time about known barriers. In hindsight it may have been more instructive in relation to the research to ask respondents to provide some detail about the item *My motivation to study is affected by other factors*, or used different wording, given that this was the most commonly rank 1 chosen.

Work commitments, and family commitments also had two-digit numbers. It was notable that social commitments were least cited as rank 1.

The researcher speculates that the respondents may have interpreted the 'social' as 'having fun' rather than also being a responsible citizen and having social responsibility. However, the researcher cannot verify why the items were ranked as they were. All the collated data is presented in Table 4.26: *DLQ Q18 Frequency of Responses.*

Table 4.26: *DLQ Q18 Frequency of Responses*

Q18: Barriers to my learning are... [Rank 1 to 4]	Rank 1	Rank 2	Rank 3	Rank 4
My work commitments are a priority	13	12	9	17
My family commitments are a priority	12	9	23	7
My social commitments are a priority	7	22	13	9
My motivation to study is affected by other factors	19	8	6	18

Q19: If I was not enrolled in my current learning program, I would be doing...

This question was speculative. As an open-text response was required there was opportunity for the respondent to leave this item blank. On the contrary, only 7 respondents left this item blank. The collated results matched as far as practicable into specific areas, for ease of presentation, is illustrated in Table 4.27: *DLQ Q19 Frequency of Responses*

Table 4.27: *DLQ Q19 Frequency of Responses.*

Q21: If I was not enrolled in my current learning program I would be doing...	
Related area of response	**Frequency of responses**
Work-related response	23
Other study/ course	17
No response/ not applicable	8
Not sure	6
Gap year	1

Based on these results it can be stated that 23 (42%) of the 55 respondents were prioritising work-related alternative activity if they were not enrolled in their current learning program, and only 17 (31%) prioritised a study or learning program. There were 7 (13%) blank responses, and 6 (11%) responses which indicated uncertainty (not sure) about what they would be doing. One respondent stated that they would probably take a gap year.

Q20: What skills I think employers value...

This question was included to determine respondents understanding of employability skills as expressed in the literature at the time and distinguish personal attributes as distinct from these. In retrospect this DLQ question was 'test-like' and was the least completed question in the DLQ.

However, the responses that were provided can be described, even from respondents who only partially matched the items, with only three out of the 55 completed DLQ being blank for this question. The best matched option is for *Commitment* as a personal attribute (correctly matched by 36 respondents). The best match for a General Employability Skill was for *Technology* (matched by 28 respondents), closely followed by all the others, with *Initiative and enterprise* only matched by 19 respondents. *Dealing with Pressure*, and *Common Sense* were both erroneously matched as a General Employability Skill by more than 50% of respondents but indicates that the respondents, at the time they completed the DLQ, considered applicable in the context of a work-setting. The item, *Sense of Humour*, which is a Personal Attribute, was the item that was least matched. However, there is no great range between any of the responses so indications of certainty cannot be stated. Collated responses for DLQ Q20 is presented in the Table 4.28: *DLQ Q20* Frequency of Responses

Table 4.28: *DLQ Q20 Frequency of Responses*

General Employability Skill	Personal Attribute	Matched as General Employ-ability Skill	Matched as Personal Attribute	Not Matched	Total*
Using technology		29	15	10	54
Learning		28	12	13	53
Problem solving		28	23	5	56
Teamwork		27	25	7	59
Communication		26	27	7	60
Self-management		23	26	6	55
Panning and organising		23	21	12	56
Initiative and enterprise		19	21	13	53
	Commitment	14	36	6	56
	Loyalty	15	34	9	58
	Honesty and integrity	17	31	9	57
	Enthusiasm	14	30	11	55
	Reliability	24	27	8	59
	Personal presentation	18	27	12	57
	Motivation	18	27	11	56
	Positive self-esteem	21	22	13	56
	Sense of humour	14	21	18	53
	Adaptability	28	17	10	55
	Balanced attitude life and work	24	16	16	56
	Common sense	32	16	8	56
	Dealing with pressure	31	15	7	53
*Some respondents gave more than one response.					

Q21: My ideal learning environment would be...

This question was an open-text option which all, but five respondents completed. The suggestions covered a broad range. For example, 11 respondents indicated a preference for some sort of practical and/or hands-on learning environment as their ideal. A not so expected response was the 9 responses which indicated a yearning for a *motivating setting*, the nuances of this response cannot be known. The collated results are presented in the Table 4.29: *DLQ Q21 Frequency of Responses*

Table 4.29: *DLQ Q21 Frequency of Responses*

Q21: My ideal learning environment would be... [some respondents provided more than one response]	
Related area of response	**Frequency of responses**
Practical/ hands-on	11
Motivating setting	9
Classroom	8
Home	8
Quiet place	7
Library	3
Small class	3
Online	3
One-on-one	1
Non-study related responses	4
No response	5

Focus Group Interviews

The Focus Group interviews will be discussed together as the guided discussion was similar across all three. The transcription of the three focus groups generated about 6,000 words, including facilitator commentary where applicable. Analysis of focus group communications is contingent on the dialogue between participants rather than individuals (Sim & Waterfield, 2019), therefore the exemplar quotes are attributed to the group as a whole. The Focus Group Interview Narratives will be discussed under sub-headings and include illustrative Focus Group participant quotes. Identifiers for the relevant focus group will be used for example, for Focus Group Interview One the identifier FG1 will be used, and it follows that FG2 and FG3 is self-explanatory. Content in parenthesis has been added by the researcher.

Several themes emerged from the nuanced content, some of which mapped across more than one theme. The identification of themes was guided by direct alignment with research topic areas, and indirectly with implicit Word and term searches were conducted and critically examined. Due to transcription as close as practicable to the vernacular, there were words which were used often but unrelated to the nuanced content. An example of this is the use of the word 'like', and another, 'yeah'. As the researcher was also the facilitator and main transcriber, where applicable, an annotation regarding tone, for example, sarcasm, or amusement (laughter) will be provided. The Nuanced content tables can be viewed in Appendix S: *Nuanced Content Table and Graph for Focus Group Interviews*. Focus group themes which emerged can be seen in Table 4.30: *Focus Group Interview Nuanced Content*.

Table 4.30: *Focus Group Interview Nuanced Content*

Research areas	Nuanced content
Engagement in associate degree	Class, lecture, tutorial, school, university, institution, course, program, subjects, students, associate degree, pathway, preference, transfer, change, different, another, bachelor, degree, teacher, lecturer, information, higher education
Deep Learning	Work, working, shift, learn, understand, know, knowledge, want, need, have to, get, take, gain, learn, understand, know, knowledge, independent, earning, money, spending, buying, freedom, free, friend, friendly, partner, pet, use, using, used, did, try, apply, think, thinking, thought, me, myself, my own, information. solutions
21st Century Skills	Communicate, talk, say, tell, words, oral, express, listen, show, discuss, explain, write, health, nursing, paramedic, medicine, Chinese medicine, biomedicine, radiography, clinic, hospital, science, success, pass, finish, end, graduate, good, better, organised, focused, knuckle-down, motivate, initiative, confidence, creative, self-responsibility, self-management, job, career, future, work-ready, connect, social media, information, solutions, opinion
Work-readiness/ Employability Skills	Under-cooked, pressure, difficult, can't do, fail, burnt-out, regret, don't know, don't understand, wrong, confused, real-life skills, skills, can, action, work-placement, teamwork, group, co-workers, diversity, person, people, individual, friendly, connect, deadlines, self-management, organised, information, solutions
Learning Approaches	Study, practice, trial and error, figure out, exams, pace, assignments, projects, read, time, deadlines, last minute, quickly, smash it out, now, straight away, when, before, sometimes, earlier, after, self-management, motivate, self-responsibility, organised, myself, my own, solutions
Questioning Approaches	Help, support, advice, give, questions, ask, asking, what, how, search, find, database, library, google, google scholar, social media, phone, laptop, connect, internet, information, solutions
Pedagogy	Experience, life, opportunity, real, feel, see, notice, doing, did, tried, apply, teamwork, trial and error, time, questions, discuss, explain, people, individual, teacher, lecturer, practice, communicate, show, tell, share, information
Public Health	Real-life problems, issues, diversity, people, help, support, connect, teamwork, group, projects, real-life skills, ask, question, see, hear, find, give, think, experience, information, solutions

The Focus Group Interview Narratives

Pathway to a career in health – *Engagement in associate degree*

One of the areas addressed in the Focus Group Interviews was to find out some of the reasons why the participants enrolled in the associate degree in health science program, rather than a bachelor's degree, as well as their understanding about associate degree level study generally. Whilst it was evident, based on the DLQ responses that enrolling in the associate degree was not a first preference as indicated by the majority of respondents, it was of interest to determine subsequent experience, especially for those students who persisted through to completing the program.

There was some ambivalence about associate degree level study, and to some extent not highly regarded. As stated by a participant in FG1, *"[I]'ve noticed no-one seems to ... know what an associate degree is…"* How the associate degree was perceived in the university setting was confusing as perceived, also in the FG1 with a participant saying that, when describing the associate degree to people they "...*have to explain it is between Tafe and University…something like in the middle…it's confusing!"* Its perception as higher education was also in doubt with a participant in FG1 linking confusion about the associate degree in the higher education arena because in applying, they stated *"...it didn't even have it listed under Higher Ed...".*

In seeking the reasons for enrolment into the associate degree, whilst not overall consensus, as there were several participants who had enrolled into the associate degree as their first choice, for others it was a fall-back program. One of the reasons participants showed consensus about was in relation to having an ATAR score too low to be offered a place in their preferred program, which was bachelor degree level [The ATAR, refers to *the Australian Tertiary Admissions Rank*; a ranking of Year 12 results that measures overall academic attainment compared with all other final year students, and used to determine a student's entry into university (VTAC, 2020)]. There was some dissonance expressed in regard to the perception of the associate degree by others. As one FG1 participant expressed, "…*pretty much all of my friends have very high ATARs and are like in Bachelor of Science and… I say it's the associate degree…and they go, okay…* (sarcastic tone)*…. It's kind of looked down…put down a little bit...".*

There was accord in all the Focus Group Interviews that one of the merits of the associate degree included its pathway to other study potential, for example, as described by a participant nearing completion of the program, in FG3, "…*pathway for other programs I want to study in the future, such as nursing or Chinese medicine*". The Focus Group Interviews also supported evidence from the DLQ that there was an intention to work in a health-related role as a career and/or personal aspiration. Various health related areas were mentioned and again aligned with roles expressed in the DLQ, for example, nursing, radiography, and paramedicine. As stated by an FG3 participant in relation to how the associate degree, and in particular undertaking the public health elective would help them, *"…job opportunities…ah…because of health care industry…well placed and a subject I have interest in...".*

Becoming a self-regulated adult – *Deep learning*

There was narrative evidence that the Focus Group Interviewees, especially in FG1, which were all first year students, acknowledged their transition from school student to university student, for example, as one FG1 participant expressed, "…*in high school… you don't have to worry about any things because the teacher organises… they tell you what to do in class and stuff…whereas in university… you have to organise everything…you have to do your own work…".* Participants also shared information about ways they had developed, especially in relation to independence as an adult. As one FG1 participant affirmed, *"I've become a lot more independent, getting into the city on my own… spending my own money...buying things…"*

Self-reflective narrative was apparent in the Focus Group discussion. A particularly profound example is from a student in FG2 who described the impact of the associate degree after trying bachelor's degree level study, "*I …started a bachelor…it was too…you know…the wrong time…it (associate degree) has shown me what sort of things I want to do with my life".* Participants identified developing in areas such as teamwork and being more open-minded, and having more confidence in their communications. For example, an FG2 participant shared how they felt more at ease dealing with adults, such as their teachers, "*I'm better at talking to teachers…like helped… my communication skills...I was just always so shy. Now I can go to any teacher, and to the office…and talk to them…".*

There was a distinctly different perspective in relation to transitions in FG3 participants who were in their final semester of the program, reflecting more philosophically about their overall experiences since enrolling. The student voice in this instance, was illustrative of expertise

and insight about their personal experience. For example, as stated by one of the FG3 participants, reflecting back on two years of study, *"I would change course or change directions... okay…I think I would have gone to another school – arts school…a different field… my self-responsibility. I got myself here so I can get myself somewhere else..."*

As just mentioned, Focus Group Interview participants shared reflections related to resilience and maturity in their outlook, but also about self-regulation. For example, as shared by an FG1 participant, in comparing her first semester experiences with those of a friend undertaking bachelor level study, they said, "…*I feel I have come further than then… my friend…has no idea what she is doing…and says 'I don't know where I am',… in a way I feel more organised….then them…".* How their university experience moulded these skills and their awareness of consequences, was also acknowledged, more deeply from participants with more experience within the program. A case in point, from one of the FG3 participants, *"…uni pushes you to that direction… pushes you into the environment and... forces ... sometimes...gives you like umm ... deadlines……take action…. or else you got to fail….more like self-management…".*

Planning for the future – *21st century skills*

The Focus Group participants, as stated previously, were primarily interested in a career in a health related, usually, recognised profession role, such as nursing. There was also some ambivalence about the associate degree as a launching mechanism to career aspirations. It was evident that most of the focus group participants planned on further study beyond the associate degree to get them in their career of choice. As stated by an FG2 participant in regard to why they chose health sciences and then the public health elective it was because of the 'health'. For example, "…*when I looked at like the subjects you do and stuff, it looked like kinda what I wanted to do cause there were other health ones I could do but this was the one that interested me the most...".* And that they were doing the program to get into a bachelor level course which would get them the career they wanted. As emphatically stated by a participant, also from FG2, "…*yeah! Otherwise we wouldn't be doing this course*!". A few career aspirations were mentioned in the focus group interviews, for example, nursing, medicine, paramedicine, Chinese medicine, radiology, biomedicine, and health information management. However, there was also some uncertainly, as one FG1 participant stated, "*I have no idea*…".

Not quite ready for work but developing real-life skills – *Work-readiness*

It was also apparent that some focus group participants, particularly in FG2 and FG3, did not think the associate degree was sufficient to have them work-ready for a role in health after graduation, though there were some qualifiers apparent. That is, that they did not have certain skills, but, as stated by an FG2 participant, it "…*depends what area you want to be working for in health…".* Another FG2 participant said, of the associate degree, that, "…*you still feel a bit like undercooked….like I'm not work ready yet*…". On the other hand there was acknowledgement that other skills were being developed and matured which could transfer into careers, regardless of industry. To illustrate this insight, an FG1 participant shared the following about their understanding about generic work-readiness, for example collaborative working environments, *"…in careers …you definitely need to know how to work with co-workers… and your boss...teamwork... could be helpful in working solutions…".*

There was also shared information which indicated appreciation for some of the applied learning and assessment activities which could be helpful, especially in relation to future health professional roles. An illustrative example of this sentiment was eloquently expressed by an FG3 participant, *"…projects and stuff…gets you to apply and looks at real-world problems…even in exams we've had come up with policy…potential to improve a health issue…it kind of gets your opinion on the stuff...like in the context of health…important…its important…".* There was some discussion about applied learning rather than just theory which aligned with DLQ findings which showed that the majority of respondents preferred learning by doing. For example, as indicated by an FG3 participant, and in relation to their future self, they said in the affirmative that for them… "*Yeah...I think…I think…it would be more helpful for me to get a job in the future instead of sitting in the class…"* The next logical step would then be that what is learnt can be passed on to someone else, which is the sentiment shared by an FG2 participant who had considered this as an outcome enabled by their learning journey in that, *"…then you can pass on your knowledge to your co-workers…they might learn something useful*

However, there was also expressed evidence that actually having a job, while they studied made them feel more secure about their prospects, as conveyed by an FG3 participant, "…*it also make me not a worried about my future…"* because they do have skills that can earn them an income. And as communicated by an FG2 participant, as a downside of being a full-time student needing an income stream who suggested work was their priority over study,

rationalised this sentiment*, "…I am gaining things out of uni, but like…I'm not earning anything…".*

Learning how to learn – *Learning approaches*

Learning how to learn was not an expressed research aim, though of interest to the researcher as an aligning theme in relation to the learning approaches used by students undertaking the associate degree program. There were a variety of conditions expressed by Focus Group Interview participants as contributing to their ideal learning environment ranging across all hours of the day and into the late night, quiet study-alone preferences through to study-buddies, and steady organised study pace through to last minute cramming for exams. For example, as shared by a first year student, in FG1, "*I don't wanna leave anything to the last second, like if…if the assignment has one day left I don't wanna hand in one the last day…panic on that day…".* An FG2 participant, on the other hand, described how they approached deadlines in terms such as, "*…I'm an organised person…so I like to study at a steady pace…"*

Pressure was also offered as a means to work better, as stated by an FG2 participant, *"…I work better when I'm under pressure…".* In terms of motivation there were also some diverse opinions. As stated previously, some participants liked to study alone, and others liked social connections as motivating and helpful in their learning. As indicated by an FG2 participant, in relation to a study partner, also keeping them on track, "…*like someone who motivates me…yeah…ask each other questions…might have different takes on things….I get distracted easily by myself…yeah…".* Having social situations which are helpful was also highlighted by some Focus Group participants. For example, as expressed by an FG1 participant in regard to class colleagues, "…*it's very helpful to have that connection with them… well I mean it's the students that help me I guess…".*

Other areas addressed related to motivation was described in terms of energy. An FG3 participant stated that*, "…sometimes…don't have enough energy to complete most tasks…therefore less likely to attend the class and complete the assessment…"* Factors influencing priorities, for example, work versus study, was also implicated, but as an external motivator, as one FG1 participant disclosed*, "…it's difficult once exams come on…you have to knuckle down, and ask someone to do your shifts at work…".*

Overall, there was discussion related to the impact of relatively small class numbers, with various views expressed. For example, an FG3 participant described both the positive and

negative aspects of small class numbers*, "…you can express a bit more…but in big classes you get more diversity…".*

Digital default answers – *Questioning approaches*

Whilst not particularly asked during the focus group interviews, it was indicated that reading was not a priority behaviour, for example as stated by an FG3 participant, "*I don't read books!'* In another context, there was discussion about why a question might be asked as well as how and in what format in relation to seeking information for assessment tasks. For example, an FG1 student provided an illustrative example of posing a question for a search engine, *"…well I guess it mostly depends on what you decide to ask...like let's say it's like an essay or something umm, for example, an essay …I did it about…'how happiness leads to success'…so, I would type in key words in the search…like… psychology, happiness, success…"*

A search engine which was nominated as being popular came up in all the focus group interviews, this being Google. As an FG3 student explained, it was particularly the utility of Google to provide some suggestions or alternate avenues to explore further, that truly encapsulated the 'web' inherent in the World Wide Web. In the example below, the student uses the term 'branch out': *"Google…hmm does help us get the ...the…such as peer review article…there are some...statistics from the government website…that are more reliable. It's easy to use. You can put in one word …it's like a jumping board... you can branch out...and sources of one type or another...".*

What was apparent was participant reliance on digital information to answer assignment questions. The most common first point of accessing information, as indicated above, was almost universally stated to be Google. There also seemed some reluctance to admit to using Google, which was illustrated by an FG2 participant who after saying they use Google, qualified this with*, "I just thought I'd tell you I was kidding because they tell you don't use Google…".* Google Scholar was also mentioned several times during the focus group interviews, though one FG2 participant disclosed that*, "I still don't know how to use it…".*

Another area of discussion centred on social media, though it was mainly in the vein of being a distraction. An FG1 participant provided some insight into their understanding of the pitfalls and opportunities afforded with social media usage*, "…um I think it depends on how you use social media, it's like some people have a more professional, …some connect for parties…and …connecting with people for learning purposes…".*

Learning with experience - *Pedagogy*

Learning, whilst not explicitly expressed as learning, was evident in some of the statements made by students in the Focus Group Interviews. For example, a student in FG3 stated, in relation to what skills they had developed in their program of study, *"…improving the academic writing…and…the…the… it can be thinking more critically….oral presentations…help you …kind of be in front of people and…um...independent study because of Blackboard…other options to take responsibility...take opportunities...".* An FG3 participant particularly referenced what value they attributed to their program of study, as to*, "…get experience…that the most important part…".*

There was also some indication that participants had inadvertently learnt life-lessons in civic realities that arise in dealing with challenging situations. For example, the Focus Group Two participants were collectively relating a story of shared experience of a difficulty in engaging a group peer in undertaking a fair share of work*, "…we tried to be friendly…we told them what to do…we helped them out…I don't know how we can learn from this…we tried everything…really…".*

Public Health - *Assessment for learning*

This theme was most apparent in the Focus Group Three interviews, but also touched on in Focus Group Two, relative to collaborative processes. In enquiring about the relative merits of an authentic project as an assessment activity, an FG3 participant forwarded their opinion about projects, "…*gets you to apply, and looks at real-world problems…even in exams we've had to come up with policy…potential to improve a health issue…it kind of gets your opinion on the stuff…the context of health…".* Complimentary to the *learning with experience* theme, the FG2 participants jointly contributed the following insight about their group project experience*, "… we just needed to just focus and make sure we had our stuff ready…we kept like waiting…waiting, waiting… we should have just done it. But we were just focused on waiting…and …we just kept putting it off and that's why we didn't have enough time…".*

Individual Interviews

Individual interviews were conducted with five students who had completed their public health elective and participated in a public health group project as part of their studies in the program. The public health subject was in one of two elective streams and was offered in the third semester of the Associate Degree in Health Science. The areas to address were informed by the literature related to the research questions, as discussed in the Chapter 3: Methodology. A considerable volume of transcribed text (about 13,000 words) was subject to a qualitative content analysis using search term strategies. As the narrative was conscientiously transcribed to capture the participants' own voice, where possible, notations were made if they laughed, or used a certain tone, for example, sarcasm. The vernacular generated frequently used words that were not descriptive of the context in which they were used, such as 'like', though it is not to suggest that using 'like' so frequently, is not an important social condition from which its absence could potentially be considered an aberration. A nuanced content analysis was conducted. See Appendix T: *Nuanced content table and graph for Individual Interviews*. The themes that emerged were similar to those from the Focus Group Interviews with some additional themes due to the more focused guided questions, for example, about future aspirations. Examples from the nuanced content analysis are presented in Table 4.31: *Individual Interview Exemplar participant voice*.

Table 4.31: *Individual Interview Exemplar participant voice.*

Individual Interview Research Question areas	Exemplar participant 'voice'
Engagement in Associate Degree in Health Science	*"It's not a degree that you can just finish and then go into world and to make a change in…"*
21st Century Skills	*"I do think some of it is maturity and growing up…"*
Deep Learning	*"I think it's something, like maybe, I don't notice that I do in my head…"*
Work-readiness	*"I think it's getting harder every time to get a job…"*
Employability Skills	*"We live in such an advanced technology world it's important to keep up to date…"*
Learning Approaches	*"I question things a lot more than I used to…"*
Questioning Approaches	*"I used to just be that person that would just go to Google…"*
Public Health Role Preparedness	*"I learnt about the issues that exist and the areas that I can help'…"*
Pedagogy	*"I really enjoy going to my classes because I like them…"*
Aspirations and Eureka Moments	*"…into a job that I'm passionate about and working on building my own future…"*

The Individual Interview Narratives

In the following narrative, illustrative direct quotes (verbatim) from the interviewees will be shared. Each interviewee was accorded a code for the purposes of anonymity. For example, the code (II3) refers to capital letter 'I' for Individual, capital letter 'I' for Interview, and the

number three ‘3’ refers to the third interview that was conducted. For presentation purposes references using the code will also include an interviewee pseudonym as indicated below.

II1 Lee
II2 Eddie
II3 Ash
II4 Ray
II5 Nova

Parenthesis have been added by the researcher, and some comments truncated, but as far as possible, the vernacular as used by the interviewee is represented.

Engagement in Associate Degree in Health Sciences – *“It’s not a degree that you can just finish and then go into world and to make a change in…”*

One of the emerging themes which was prominent in both focus group and individual interviews was the persistence of all participants in their consciously articulated affirmations that the associate degree program was their pathway to something else. The vocational outcomes of the associate degree were not acknowledged as their motivation to study. This was a trend which was evident in the results of the *Deep Learning for 21st Century Skills in Public Health Education Questionnaire* also. A view about the short-term utility of their studies was also expressed by most interviewees. However, there was also an acknowledgement of opportunity, and future aspirations for which their learning experience could inform. For example, as shared by Ash-II3, “*I feel like this associate degree prepares you for like further, umm, like you need to further yourself. It’s not a degree that you can just finish and then go into world and to make a change in. You need to like decide, like, what kind of direction you want. It’s just like a stepping stone…okay…”.* A different perspective was shared by Ray-II4*, “I think it is definitely umm preparing us. I feel like, me personally, I won’t know how prepared I am until I dive into that world I guess, but I do feel like this course umm is providing us with the right tools to be successful whatever we pursue...”.*

The interviews also revealed that for all but one of them, the associate degree was being completed as a pathway program. For example, as indicated by Ash-II3, “… *I enrolled in the associate degree because I needed a pathway to go into higher ed and at that time I wasn’t really sure what I wanted to do so I thought oh this would be a good stepping stone in the right direction…”.* A different rationale was put forward by Ray-II4, for example, who had planned on working in the nutrition field*,“…as a pathway. yeah…that’s my main reason... but after doing this course I sort of realised…I’m more pulled towards, like, public health and stuff like that…”.* Pragmatics of the utility of completing the associate degree was expressed

by Nova-II5, when asked about what advice they would give to someone contemplating undertaking associate degree studies, *"Um. I think I would just tell that it's actually a good idea if you're not sure what you want to do in the long term because, I mean, you get a certificate out from this and you can start working or you can use this to get into a bachelors. Yeah. Because I like killed two birds with one stone…".*

However, the associate degree was not necessarily the interviewees' first choice enrolment due to the competitive nature of university offers, for example, as shared by Nova-II5 for their reason for enrolling in an associate degree, *"…I basically enrolled because, um, my ATAR wasn't good enough to get into a bachelor straight away. So I did it as a, like, a stepping stone, yeah, to get into bachelors, so, yeah basically, and um, like my bachelor I wanted to do was osteo, so I had to do something like in the health, um, side so that's why I picked this course…".*

The associate degree was also seen as an easier option to mitigate the risk of potential failure in higher level studies. In that respect, the associate degree is portrayed by the interviewees as a more certain outcome and preparing them for what they perceive to be more arduous programs. This sentiment was best articulated by Nova-II5, "*Um. Yeah. I think it was good that I did this um degree straight before going to the bachelors. Cause so I kinda of noticed things like because it's not as hard as a bachelors. I guess, like, I feel like if I did a bachelors straight away I would've, I don't know, gotten really stressed and probably fail [LAUGH]. But yeah I think this has kinda helped me get towards a bachelors and gave me the idea of how, I dunno, how hard a bachelors will be compared to this course. Yeah…".*

21st Century Skills – *"I do think some of it is maturity and growing up…"*

A focus on developing 21st century skills was a feature of the study influenced by local and global initiatives to prepare school graduates with skills to succeed. It was also obvious that the participants were products of 21st century compulsory schooling, and indeed within a few years all graduates of compulsory schooling would all have been born in the 21st century. 21st century skills are ways of thinking, ways of working and ways of living rather than specific subject knowledge (Assessment and Teaching of 21st Century Skills Project, 2012). Narrative covering aspects of growing up, maturing, wisening-up about the real-world was also communicated in the interviews. There was evidence of the interviewee transitioning from the familiar, such as leaving school through to shaping their learning in their current context.

Areas related to what is considered indicative of a 21st century disposition were shared, for example, as stated by Ray-II4, "…*in terms of communication and group work, like, university has helped me out with that but I do think some of it is maturity and growing up…and even outside of university being more social. It'll um contribute to the um confidence and stuff like that…".* A transitional perspective was shared by Nova-II5*, "…so like in high school I didn't really like, I didn't ask the teachers questions I just kinda like ask friends or just try to find something, yeah I guess in uni being in a smaller class it gives us, gives me like the opportunity to talk to the lecturer more, like asking questions, rather than being in a big class and just like leaving it…".*

There was also a sense of loss, a transition that was potentially bitter-sweet and inevitable, as reflected by Lee-II1, *"…you have to love what you do. The difficulty I've found this year um is finding what you really want to do…".*

All interviewees mentioned aspects of maturing or noting changes in themselves as an outcome of their learning. For example, as shared by Lee-II1, "…*Umm, interacting with people…working with a group and ah and actually coping … it kinda ah gave me the path of what I wanna be because from high school and the past few years I didn't really know what I wanted to do and … doing health science crosses out what I don't wanna do…ticks the things I like doing…".* Ray-II4 acknowledged the enormity of their experience, for example*, "… I would say last year … I stepped up a lot as opposed to when I started this course in 2015 when I was kind of like new to the uni and new to the course and new to the people and stuff like that… I wasn't as confident, but… being in my second year… I just built up a lot of confidence…".*

Deep Learning – *"I think it's something, like maybe, I don't notice that I do in my head…"*

In relation to the deep learning research question, the researcher sought commentary about deep learning in relation to 21st century skills, such as behaviours related to creativity, communication, critical thinking, collaboration, character, and citizenship. Of these, citizenship was poorly understood and articulated, and the researcher did not pursue it if the interviewee demurred in providing an opinion. However, there was some insight shared about the other areas. In relation to creativity there was acknowledgement that it did factor into their experience of learning, however interpreted, for example as an external locus or internal focus, especially practical aspects of being creative. As articulated by Ray-II4, "*I enjoy creativity when a teacher…comes in enthusiastic… I also actually quite enjoy when lecturers go into like their personal experience…".* An applied example of creativity was

shared, also by Ray-II4*, "Umm I think I worked on definitely like, how to be creative like it helps me learn…and stuff like that…".*

Communication was an oft-mentioned word in various nuanced contexts. The interviewees conveyed their views about communication in terms of a 21st century skill because the researcher posed the question for this purpose. Comments varied from helping society (a global view), its contribution to their personal development, and future aspirations. As shared by Eddie-II2, "*Ah… Communication is very important. If you don't have communication skills then you can't really help society in any way…".,* and from Ray-II4*, "Well this university in general has helped me open up…it's easy for me to communicate with people like coordinators, teachers, other students… would be an asset for me being able to talk to people…able to be a leader and organise will help me a lot with any direction I decide to go in…".*

Critical thinking was another area which several interviewees found challenging to discuss. During the interview, the researcher provided examples of evidence of their critical thinking, for example, about their reflective comments. One interview was pragmatic about the benefits of critical thinking for the community and for those working in a health-related area. It should be noted that all interviewees expressed intention to pursue professional careers in health. As shared by Ash-II3, "…c*ritical thinking is more relevant… it benefits the whole community… it is very important in healthcare work particularly because your decision plays a role in how the community is affected so maybe a health treatment is done than in like with the best person…or it could be changed...".* On the other hand, Nova-II5 indicated potential effort required for critical thinking, *"…um. I guess like* m*aybe it's like some subjects have an excess, like we have to research more about it, so you have to, like you really have to really read and think about it ourselves. Sort of. [LAUGH]…".* However, Eddie-II2 considered critical thinking as a normative process rather than always being a mindful behaviour, as stated*, "…Yeah…[LAUGH]…I think it's something, like maybe, I don't notice that I do in my head…[LAUGH]…".*

Collaboration was considered in discussion related to working with others especially in group projects. There was thoughtful reflection on the personal benefits of collaboration. As exemplar, from Ash-II3, "…*Yeah it allows you to have a further understanding of what, umm, some students' beliefs are and allows you to be sensitive towards that so you are more aware and adaptable to working..".* Practicalities of dealing with a challenging group conflict issue was shared by Nova-II5*, "…Um. We just try to find like a medium, like, idea that*

satisfied both sides, but besides that it wasn't anything like crazy like we all stopped working together…".

Character was expressed naturally in what the interviewees shared in terms of all the areas discussed during the interview, some providing objective responses in third person and others thoughtfully expressing deep beliefs about issues. The word 'enjoy' was used several times. For example, as shared by Ray-II4, "*I've enjoyed seeing how I have progressed since starting, leaving high school. Basically I've enjoyed seeing a good change in myself and that okay…".* Nova-II5 enjoyed other aspects, for example*, "I enjoy working with other people. I guess the different ideas and everything, like group projects and stuff. That's quite good. [LAUGH]. Yeah….".*

Citizenship, as stated previously was something the interviewees showed poor understanding about, despite their entire schooling preparing them to be citizens. However, the following examples related somewhat to citizen behaviours. As stated by Ash-II3, "*Um [citizenship] it allows you to be more empathetic towards the different cultures because Australia is so diverse and rich in cultures...",* and a different viewpoint from Lee-II1*, "I like different people… different views. That is what is good. I really like people who have different views who challenge you, because it makes you think outside the box and expands your views and what you do and use in your life…".*

Work-Readiness –*"I think it's getting harder every time to get a job…"*

The researcher explored the conception of work-readiness as a feature of the interviewees program of study. There was acknowledgement by all that they were pursuing a future in a health professional role and that it would involve more years of study beyond their current program. The discussion was guided more towards generic skills and their utility in both short-term and long-term aspirations. Some of the narrative was expressed in terms of a specific outcome, or an illustrative example, and others more philosophic in nature. As shared by Ray-II4, "…*well sometimes is can be just like knowledge, like, good knowledge, like, I learnt something new. Other times it makes me think like that, you know, I feel like I would enjoy that, maybe I should explore more what that career is about and stuff like that...yeah…".* A more specific example was provided by Nova-II5*, "…'Um… ah… interaction with your client or patient, I guess that's like in social skills basically…".*

Eddie-II2, encapsulated what they perceived as the reality of being in professional employment, "*Yeah. I think we have to be prepared like because like I think it's getting*

harder every time to get a job and people are being more preparated (sic) so you have to put effort into what you are studying right now…". However, there was also acknowledgement of certain success, based on their undertaking their current studies, even if not in the way they thought it would. As shared by Ray-114 (and in an earlier section), "*Yeah definitely it's helped me out and I like I think I'll do fine in terms of jobs and stuff like that, in terms of communication and group work, because, for the most part, like, university has helped me out with that but I do think some of it is maturity and growing up…and even outside of university being more social. It'll um contribute to the um confidence and stuff like that…".*

Eddie-II2 indicated that their parents discouraged them from studying for a career they wanted, medicine, because it would take too long, and to instead enrol in something with a shorter time-frame, "*Yeah well I wanted to study medicine like…… but my parents didn't let me because it was like a long career, yeah…and they said to me I think you have to find something like, like its… in a how you say? Short time. So I insisted in studying something in health because I wanted to help others and I really like to help all in that issues…"..* A parent was also influential with Nova-II5 in that they planned to follow in their father's footsteps, *"…probably because my dad did osteo, so probably maybe, let's say like 10 years' time, I'll probably be, like, working with my dad in his practice…".*

Employability Skills – *"We live in such an advanced technology world it's important to keep up to date…"*

Employability skills were not overtly recognised by interviewees even though they mentioned most of them in responding to the researcher prompts. For example, communication was cited as an important area that they had improved in, though none of them overtly acknowledged that their everyday communication, and indeed participating in an individual interview was communication in the milieu of living a 21st century life. The interviewees did imply understanding of teamwork issues and resolving problems that arose in relation to their group projects, and the inherent skills they demonstrated in planning and organising, for example, negotiating a time to be interviewed as contributing to their employability value.

Using technology was equated with using digital media rather than as all the tools and resources which enabled them to progress in the context of where they lived, worked, as well as played. All the interviewees demonstrated abilities in initiative and enterprise, for example, in describing how they stepped up in leadership roles and organised both themselves and members of their project team. Thereby was also evidence of self-management. That is, despite not always liking the situation, and what they knew needed to be done, they found

ways to meet commitments. Another area considered as an employability skill is learning. The next few paragraphs cover employability skills in more detail.

Interviewees shared insight into momentous personal learning. For example, as shared by Lee-II1, in relation to meeting inspirational people in their first year, *"... definitely um meeting ... people that actually like... umm ... what they are doing. …it kinda gave me the love of learning…'.* From a different perspective Ray-II4 stated*, "I like hearing about other people's learning and the different things they've experienced…",* and from Eddie-II2*, "...like help a person and like you might see all new views of points and everything …and I think other skills might be working in a group, of course…".*

In terms of teamwork, working in a group, the previous shared comment from Eddie-II2 refers to this as a skill. However, Nova-II5 expressed their enjoyment of the social aspects of working with others. "*I enjoy working with other people. I guess the different ideas and everything, like group projects and stuff. That's quite good*...". Interviewee Ray-II4 acknowledged development of their communication confidence, "*Well this university in general has helped me open up and I'm a lot more…um…it's easy for me to communicate with people like coordinators, teachers, other students…".*

Using technology was touched on, but as mentioned previously seemed to be considered as limited to using digital technology. However, in terms of employability skills keeping up to date is integral as was suggested by Ash-II3, "…*of course we live in such an advanced technology world it's important to keep up to date ...".*

In relation to self-management in the context of motivation to learn and attend on-campus classes, and meeting deadlines, interviewees showed contemplative mindsets and a can-do attitude, for example learning to organise themselves. For example, as shared by Ray-II4, "*I'm not sure what would make me like really energetic to learn because I think it just depends on, like, what's happening in your personal life. I've definitely had days where I come in and I'm just not as enthusiastic because the things that are happening outside of uni…yeah…so to me the classroom environment doesn't really phase me… personally…".* Eddie-II2 discussed dealing with pressure by learning to be organised*, "Mmm…I think also we have managing the pressure is something important I have learnt... maybe when they, like, tell you how to do an assignment, like you, you learn to organise yourself…".*

Ray-II4, provided an example of a contextualised employability skills, with the following commentary, "*I don't know if it counts but in like trying to fix my enrolment I had to deal with*

paperwork and stuff like that, dealing with... like, you know, someone that coordinates higher up. You know, I feel like I've had to like conversate (sic) in a way different than you would have to conversate (sic) with students…".

Learning Approaches – *"I question things a lot more than I used to…"*

The researcher encouraged comments which related to learning approaches applicable for their needs. This research reflected certain learning approaches, motivations, challenges, and strategies enacted to manage both opportunities and threats in their development. Interestingly there was diversity in the responses, perhaps reflecting the situational nuances impacting their situation at the time of the interview.

Two interviewees acknowledged development of leadership skills and personal and social responsibility, which also relate to 21st century skills. As stated by Lee-II1, "*It's like, I think the leader part for me… I've never really seen myself as a leader, I mean, rather than be a leader I pick people who think that they are a leader, because I feel like if you put a responsibility on people they will likely to do something about it. But in saying, oh I am a leader, do this and do that… play around with other people's emotions… that they could actually think that they're a leader so they have ownership of what they are doing…".* Leadership as enacted in terms of behaviours was expressed by Ray-II4*, "Yep. I think…I did participate more in leadership in group assessment. Like I have no problem organising people I guess…I don't try and be bossy but I do try to make sure everyone knows what they are doing, if they need help…they know that we should all be able to communicate…".*

Viewing the world through a more critical lens is relatable as a 21st century skill, however it also embodies a type of personal learning approach, one which was explained by Ash-II3, "*Personal Skills? Probably the way I look and analyse things is more critical…I question things a lot more than I used to..".* There were signs that interviewees acknowledged development of work-ready skills and personal attributes such as being organised, managing pressures, dealing with people, and that this is all okay, despite not always enjoying the reality of being a student. For example, as articulated by Eddie-II2, "…*like, maybe when they…tell you how to do an assignment…you learn to organise yourself…I think also…managing the pressure is something important I have learnt...like getting things done…".* Ash-II3 inclined towards affirming their progress with*, "…I just think in general that…sometimes I might not be that enthusiastic coming into class but being in class, coming to university, having a routine, dealing with people… with different situations, it's all definitely*

helped me. I've enjoyed seeing how I have progressed since starting, leaving high school. Basically, I've enjoyed seeing a good change in myself and that is okay…".

Lee-II1, explained their grounded view, as advice from someone, of being a full-time student, likening it to full-time work*, "I don't study at home. Never…Never! Well someone has told me, one of my lecturers, um if you're studying full-time make sure that all your time and effort Monday to Friday is there…if you study full-time. If you're studying part-time, um… you're working full time, that means you're working Monday to Friday. So you kind of relate if you study full time with working…".*

Questioning Approaches – *"I used to just be that person that would just go to Google…"*

Finding out about the questioning approaches used by participants posed some researcher reflexivity challenges. That is, was the researcher asking the right sort of questions? The assumption to be questioned here, was that asking questions is something people naturally know how to do. The researcher asked the interviewees about some did they, where they, and how they, sourced their information, and posed questions, given that they were seasoned university students familiar with the customary 'academic' conventions. The interviewees categorised their responses related to the context, for example, seeking answers to assist their learning versus personal help-seeking endeavours, as well as the setting most applicable and foremost in their frame of reference during the interview and perhaps reactionary to the way the researcher communicated with them. For example, in relation to difficulty in finding relevant information and acknowledging there was a tipping-point prompting behaviours in seeking further assistance, Nova-II5 shared, "*... sometimes I do ask when I really, like, don't know where to find the information or something, but besides that yeah it's alright…".*

Interviewees mentioned traditional sources, again, indicating their familiarity with 'academic' conventions and tools. Ash-II3 stated, "*Umm…if I can't get like the article that I specifically need it frustrates me... I go to the library and I go to the 'library ask' and I get them to help me…".* In terms of the type of question they might have and social norms related to asking, this was also admitted, as shared by Eddie-II2, "…m*mm…like when it's personal I like it……but when it's in class I don't really like it… in the classroom…".* Information seeking was also considered a learning experience, not something that should be denied. As expressed by Lee-II1, "…*I don't want it [answers] being handed to my face. I obviously need to work for it. Because if you're already given the information… [shake head] you gotta be able to actually look for it…".*

The first point of search, generally suggested by all the interviewees, seemed to be a 'primed' response. In explanation of what this means, is that all the interviewees seemed to provide a response to the question about where they first go to find information which would be considered something the researcher and educator would expect, that is, something like Google Scholar, then perhaps the library and/or databases, and certainly Google. As shared by Eddie-II2, "…*I think that it's I just use Google Scholar… and maybe like Google but I think it's like less official…so…".* Ray-II4 offered, *"…most of the time I tend to go to Google Scholar and, like, the uni library…"*

However, it was evident that their personal inclination was to do what is ubiquitous for anyone with access to a smartphone or internet accessible digital device and that is to do a web-based search, for example, Google, then progress to Google Scholar, and then University Library sources, and perhaps the lecturers as a last resort. For example, indicating overt honesty, as disclosed by Ray-II4, "…a*t the beginning I used to just be that person that would just go to Google, type in what I need and take information wherever…mmm… library not so much, to be completely honest, mainly Google Scholar and like PubMed….".* A similar sentiment was provided by Nova-II5, "…*um…well, first I would go to Google honestly [LAUGH]…yeah, and then I guess I type up what's kind of related on the articles and stuff that's about health, health related…seems better…".*

Two interviewees focused on the scholarship of information seeking and professional behaviours associated with researching relevant information in the academic domain. For example, Lee-II1 stated, "…*that's the hardest part in doing research... finding out if this reference is going to be reliable enough… because you know when people read it comes from somewhere you never heard before, people won't believe it…".* Ash-II3 showed a responsible attitude towards understanding of information, *"…if I wasn't sure of the context I would ask the lecturer first off to get a better understanding, and um, I would always make time with a lecturer and say can you go through this with me again but I go to the library and I look up the peer reviewed articles and I skim through it and see which ones are relevant to what I need to address…".*

Ash-II3, was reflective in their consideration of their insight about the complexity of our nuanced society, in relation to seeking answers to questions. "…*umm. It definitely like makes you question the way society is…like it's not all black and white. There's more to it. You have to look deeper…like the media only shows you, like, what they want you to see. You have to look deeper for answers. Yeah, and you can't believe everything you read…".*

Public Health Role Preparedness – *"I learnt about the issues that exist and the areas that I can help…"*

One of the prime reasons for conducting individual interviews was to get some insight into the student experience of learning and participating in a group project with a community focus related to a public health issue. All interviewees had completed their public health elective which included a public health group project. The group project addressed various learning outcomes but also generic employability skills. Interviewees engaged with this researcher question in relation to their situation and experience, and as will be noted, at times frustrating aspects of working with their peers. Please note that a catch-phrases of the unit was that '*public health is everywhere*' which was a variation on a theme from the Public Health Association of Australia (Public Health Association of Australia, 2015).

Ray-II4 gave a detailed response about what they had learned about public health and its personal impact, "…w*hen you start learning more about it [Public Health] you start seeing it everywhere. So I just see it everywhere… at shopping centres, on the train, think about it, you just, you know… and I see a lot of people sneezing on the train and I just think of all the germs flying in the air [LAUGH]. But I think it's important, um, for the future, and important - there's a lot of different things that I think need to be fixed…".* Ash-II3 related their experience about what would influence their working future*, "…it is probably public health is most relevant because it's everywhere. Everywhere you look there's always some issue facing society so it'll better equip me for when I actually do go into the workforce…".*

A different viewpoint was expressed about some specific areas related to public health, and helping with issues and concerns, for example, as shared by Eddie-II2*, "... there were many general things or stuff about health that I learnt, like, about disease, like about concerns that I wasn't aware of and now I know and yeah, I think it was more like I learnt about the issues that exist and the areas that I can help...".* The interviewees shared various highlights and lowlights of the experience of working with their group and the outcomes of their project in terms of what they perceived as being a success or not. The first comment shared is philosophical and stems from what Lee-II1 considered a poorly executed project attributable to group dynamic challenges, "*I did my bit and they did their bit. As a whole I was feeling that it could be better…but it's done and I've moved on…ownership's a big thing to whatever you're doing because if you don't have ownership on something you won't be interested or curious about it….because it doesn't fit you…".*

Eddie-II2, also had reservations about the group processes with a personal perspective that captures a group behaviour which can potentially de-rail a project, that is, someone else will do the work, "*.. when we are in a group, like you relax more and you like think everyone is like, the person is going to do their job so you don't put the same effort that you gonna do to say if you were like to work alone…".* There was also acknowledgement not everyone will agree, as an exemplar from Nova-II5 indicates, "…*like most of them [ideas for group project] were really good but then sometimes it's like we, ah, clash ideas to like maybe like three people or maybe two people will rather have this idea and someone says no I want this one. It's hard to please everyone basically…".*

However, there was evidence that some projects garnered positive personal outcomes despite team challenges, as shared by Nova-II5, "…*I felt actually, like, really glad from like everything turned out well. Like, um, me and the others thought oh everyone's gonna come and just leave straight away. But when we actually saw them and they asked us and talked to us we were just really like overwhelmed that we didn't think [they] would be interested...".* Another challenge, which was mentioned, related to the group dynamics being constrained by small class numbers, and not having options in group members, and of course, variable levels of motivation to achieve. As comment from Lee-II1 shows, *"…like, for this class you know working a group project is hard cause you want things to happen but they're not happening and, umm, interacting with people that doesn't have the same level of desire as you is quite difficult…".* And from Ash-II3*, "…if there was more, umm, peers in the class because then, like, you can bounce more ideas off each other. Sometimes a small cohort in class is hard, like, to, like, engage in it and your attention tends to draw in and draw out…".*

There was also resilience and acceptance of the reality of the situation and that there was personal growth in the experience, as reflected by Lee-II1, "… *working with a group and, ah, and actually coping, you know, and it kinda, ah, gave me the path of what I wanna be because from high school and the past few years I didn't really know what I wanted to do and, um, doing health science crosses out what I don't wanna do…feels like, ah…ticks the things I like doing…".*

Pedagogy – *"I really enjoy going to my classes because I like them…"*

Determining pedagogy approaches which would contribute to promoting deep learning for 21st century skills in public health education was apprised in some of the interview narrative. For example, interviewees shared areas of learning that they liked and/or enjoyed, also aspects of their learning which they found challenging. For the purpose of clarification, all the

interviewees had undertaken a certain elective stream (health promotion and public health area) which comprised four units, not necessarily including units they would have chosen. Interviewees indicated that they valued learning opportunities, for example, as articulated by Eddie-II2, "*..you should be open, like, to hearing about new ideas, of course, and learning new things every day and also, like, what other people other ways …like people think can also help you…".* Interviewees shared types of learning activities that they enjoyed or valued in some way, for example, as stated by Lee-II1*, "I really like writing a report. I think it's the best way of learning, writing reports, because your ideas… cause you can think outside the box and go crazy and you can, you know make these um ideas…work...".* Ray-II4 also enjoyed the writing components, *"…I personally enjoy writing so I've enjoyed, I enjoy, that side of assessments having to write everything out...".*

On the other hand, not all learning activities were enjoyed by Ray-II4, who provided an example, *"I've had this experience... umm, having to like research articles each week, summarise them, and bring them in, like, it feels very repetitive to me, like I feel like I'm not learning anything new...".* Ray-II4 also provided detail about their preference for learning*, "…umm…I think I'm the type of person… I definitely prefer conversation interaction in class as opposed to having to go home and read 10 pages of a chapter, summarise them, and that's it…".*

Eddie-II2 indicated they needed their program to have relevance as motivation to learn, for example, "…*and there was one [elective] that had nothing to do with my degree so I didn't feel like attached, or I didn't feel like I had the interest of going and learning something … although I know it's gonna help me, like, in my degree at some point, but it is nothing that I really, really like…"* Eddie-II2, also shared that*, "...like I really enjoy going to my classes because I like them…".*

Some interview time was devoted to what would be the ideal learning environment, and responses varied in terms of time and place and situation. For example, as shared by Ray-II4, they preferred some sort of routine*, "I think my best learning is in the morning, like, even if it's a class at 8:30. I think after lunch…like 1:30 or 2:30 or whenever and they go to like 5:30 … that's the worst time for me. I actually think I work better in my morning classes…".* At the other pole is Nova-II5 who disclosed*, "…well for the last two years normally if I have a morning lecture… I don't normally come because I am not a morning person. [LAUGH]. It's so, I dunno, hard work…I dunno I just don't normally come in…".* Nova-II5 also provided some information about learning material available to all students in the program, sharing,

"…*I mean like for me, like, if I don't come to uni I have to depend on the Blackboard* [Student Learning System] *but, yeah, I guess if you come to every class you might not look. Yeah….".*

While touched on in other areas, the sentiment about small class sizes and projects, resonated with the interviewees, and if they could, it would be something they would change about their course. For example, as shared by Ray-II4, "*Well the one thing that is, I wish I could've changed about this current course right now is that I just wish I had more people. Like it truly makes a difference, umm, how many people are in class because you can just get so much more discussion out of topics as opposed to most of my experience has been at this uni...which has been extremely small class…".* Lee-II1 contextualised their statement in relation to group dynamics, *"…like, for this class you know working a group project is hard cause you want things to happen but they're not happening and, umm, interacting with people that doesn't have the same level of desire as you are, is quite difficult…".* Eddie-II2 mentioned emotive issues, for example, about being a student, *"…umm… it's very stressful at times… umm… and frustrating but you get on with it and once you get your head around it then you're fine…".*

Aspirations and Eureka moments – *"[future]…into a job that I'm passionate about and working on building my own future…"*

Much of what was shared in interview went across all the areas of research. For example, in discussing their future aspirations and plans was evidence of deep learning, 21st century skills, work-readiness especially in a health-related role. Each interviewee was asked where they saw themselves in one year and then in five years. For example, Lee-II1 planned to be a medical doctor, but had a long term view beyond five years and described the vision of his aspiration, "…[five years] …s*tudying in med school or finishing it [LAUGH]. Yeah… I'm kinda like...how I picture myself, like I'm in a hospital…… treating patients…then being a GP in the country-side not the city…just having the smell of fresh air, rather than the hustle and bustle of the city…".* Eddie-II2 also had a long-term view beyond five years*, "I want to be like the head of the department [laugh]... like inventing a new medical equipment...at the hospital doing biomedical engineering…".*

Two other interviewees were specific about their timelines and plans, also for a career in health*. For example, Nova-II5 stated, "I think in five years' time probably just about finishing my Osteo [degree] and that, and probably just, like, working in a part time practise or something, like, trying out…".* Ash-II3, in addition, talked about specialisation beyond the basic degree, and making a difference in the community*, "Ah… five years I want to have*

completed my social work degree... …and I would have specialised hopefully in paediatrics…and hopefully working in the community and making a difference…". However, whilst Ray-II4 was also focused on the future, it was a more open-ended response*, "Um. I hope to be in a job that I am passionate about, um, who knows I might still be studying. I don't know how things are going to go after I finish this course...but I hope to be done with studying. That's my hope and into a job that I'm passionate about and working on building my own future…".*

There were some revelations shared which was probably a surprise for the students as they articulated them. For example, as shared by Ray-II4, "*I've enjoyed seeing how I have progressed since starting, leaving high school. Basically, I've enjoyed seeing a good change in myself and that is okay…"* Nova-II5 expressed humour but veiled in truth*, "I guess the downside [small classes] is, well, yeah...you have to actually pay attention. [Laugh]…". Eddie-II2* commented about a learning preference, "*Well first off I think to have to like what I am gonna...about to study…". And* Lee-II1 shared insight about working with people*, "I feel if you're, umm, a great person... the thing is you have to...to learn flexibility and be flexible in how you treat people...".* The final exemplar is a profoundly global pronouncement advanced by Ash-II3, *"Communication is very important. If you don't have communication skills then you can't really help society in any way…".*

Student Written Reflections

Student written reflections were existing documents. The original intention was for participants to keep a reflective journal; however, this was burdensome. A written reflection was an individually assessed part of a group project related to public health (the researcher was the only educator). It was a guided reflection and only pertained to their experience of collaborating in a group project (two parts). Information about reflective writing was provided as examples, and links to further guidance within the Institute library supports and services. Only 5% was allocated to the reflection, that is, if included the student got the full 5% grade. It should be noted that students needed a minimum of 50% to pass overall, and this was possible without needing to submit all the assessment tasks, therefore the reflection could be considered optional. The researcher sought permission to use written reflections. Written consent was provided by 11 students, which represented the entire class cohort. Not all students provided two reflections, and some students provided very brief reflections. All identifying details, such as names of team-members and project title were removed. There was about 7,600 words of Student Written Reflections to analyse. The reflections were coded as S for 'Student', R for 'Reflections', and a number from 1 to 11 with either an a) or b) appended if it was the first part or second part. So, an example of a code allocated is SR5a. In addition, a gender-neutral pseudonym will also be used as indicated below, so SR5a-Indy.

SR1	Ira
SR2	Nat
SR3	Sandy
SR4	Pat
SR5	Indy
SR6	Robin
SR7	Ari
SR8	Tory
SR9	Isi
SR10	Orion
SR11	Nico

If someone else is referred to in the reflection, they are named as XX. If reference has indicated gender, for example him, her, himself, herself, it will be replaced with a neutral term in parenthesis, for example, [their]. 'Student' will also be used instead of 'participant' as the data was from existing material written by students.

As the reflections were existing documents and written intentionally, they do not indicate emotional nuance in the same way as the recorded data. In addition, the common vernacular

was not so apparent. However, a nuanced content analysis of the student written reflections was undertaken in a similar way to focus group and individual interviews, by using word search strategies. The findings can be viewed in Appendix U: *Nuanced content table and graph for student written reflections*.

For ease of presenting the findings from the qualitative content analysis is guided by the cognitive, intrapersonal, and interpersonal competencies promoted in a seminal report published in 2012, *Education for Life and Work: Developing Transferable Knowledge and Skills in the 21st Century* (National Research Council, 2012). The key aspects of these competencies are the alignments with employability and work-readiness skills. For example, the cognitive referring to problem solving (critical thinking and reasoning), intrapersonal relating to the self-management and self-directedness (managing behaviours and emotions), and the interpersonal encompassing expression of ideas, communicating appropriately, and working with others (National Research Council, 2012).

Illustrative student written reflections can be viewed in Table 4.32*: Illustrative Student Written Reflections* which were identified during nuanced content analysis.

Table 4.32: *Illustrative Student Written Reflections*

Deeper Learning Competencies	Illustrative student written reflection
Cognitive Competence	*"…this personally helps me understand and learn better…"*
Intrapersonal Competence	*"…previously I have always been the one that looks for someone to tell me what to do…"*
Interpersonal Competence	*"…we've improved on our communication skills, as well as our love of learning…"*

The Student Written Reflections Narrative

Cognitive Competence – "…*this personally helps me understand and learn better…"*

There was reflective content which demonstrated evidence of the student's critical thinking and/or reasoning. For example, as shared by Nat-SR2b, "*...we were very confused onto what the assessment was about…who will do what tasks and questions, but with assistance and seeking further instruction from the teacher we had a clear idea of what we going to do…*". Ira-SR1a, reflected about addressing an issue of concern, an example of both personal responsibility and social accountability, "*Me and XX chose to work on a project which is a concerning issue within the ...university…an existing issue/real issue in order to get an aspect on how to plan this project if we were to put in real life scenario rather than make up an issue."*

Many students wrote in the collective, using 'we', however, there were some students who particularly wrote about their personal learning challenges in relation to some of the Public Health Group Project activities. As written by Indy-SR5a, "*I did not like the literature review piece as I struggled to find articles relevant to my project idea. I eventually managed to find something after hours of searching but I do not think it reflects how well I could do.".* There was also evidence that individual students valued their contributions as integral to the overall outcome of their project. As reflected by Ari-SR7a, "*One good thing I did and I improved on was keeping up with the workload with my group. I delivered on my part with attention to detail.".*

There was also some affirmation in written reflection that participating in a real-world authentic practical project (public health) not only furthered, but also bettered their learning. For example, as written by Sandy-SR3b, "*Having completed this semester of assignments helps me further understand the role of public health and its impact on the real world. This subject overall has definitely benefited me as assignments were more practical than just exams and tests as this personally helps me understand and learn better.".*

The student groups had worked together over two semesters and there was an acknowledgement about prior experience in the written reflection by Nico-SR11b, *"Reforming project is easier than I thought because of previous experience. Although we experienced some difficulties, however we still completed our the tasks at the limited timeframe.".* Sandy-SR3a also wrote about prior experience, and the pre-existing peer connection with the members of their group, *"As previously working with the 2 students before, I knew we wouldn't have much problems as we have completed tasks in subjects together last year and this year… I believe we work well together as we have known each other since the start of the course in 2016.".*

Robin-SR6b wrote about reflecting as a team, but also about what they personally learned in the process of participating in a group activity, *"When we all reflected together on the project as a team post event, we agreed on that one thing we would change about the project is the promotion and timing of the event… Throughout the project, as an individual reflecting on my own work, I learnt that time management and planning is always a crucial factor in developing a successful working project to implement…"*

Intrapersonal Competence - *"…previously I have always been the one that looks for someone to tell me what to do…"*

Participating in the Public Health Group Project was a challenge as indicated in written reflection, particularly collaboration. For example, as written by Ira-SR1b, "*Insofar as group dynamics went, I found working with XX in particular to be very challenging. I tried my best ... and there was a lot of misunderstandings. I am loathe to say this, but it really tested my patience."*

However, written reflection also revealed acceptance of risk with potential benefit, as written by Indy-SR5a, *"I had never worked on a group assignment before so I was not entirely sure if XX would be the type that likes to take control and do everything [their]self or the type of person that does not want to take responsibility. Collaborating with XX actually helped me be more responsible because previously I have always been the one that looks for someone to tell me what to do. XX and I both took initiative in this assignment.".* Orion-SR10b, wrote about resolving issues around organisation and scheduling as a team process, "*Some of the struggles we went through included organising when we should see each other to work together, but we figured it all out after working around our schedules".*

Written reflections also showed recognition of goal achievement despite stated less than ideal project outcomes, for example, as reflected by Robin-SR6b, "*Although the goals of the event were not fully met, we managed to achieve our learning goals of keeping organised as a group and staying communicated with the team at all times.".*

However, written reflections also revealed personal communication struggles which were perceived as impacting project activities, for example, as written by Indy-SR5b, *"… XX and I started off pretty well with our communication and got better as we went along. It was clear and we were on the same page. Towards the end of the project it died down especially on XXs end and that has definitely impacted a couple areas in our project."*

Pat-SR4b, acknowledged the enormity of the project in their written reflection and admitted what they perceived as shortcomings, though also affirming achievement; not at the time, but in recollection, "*In retrospect, our whole project seems to be a success. This is the first time myself and XX have undertaken a project of this magnitude. From hypotheticals to actually producing a physical product was a big step for us. Being our first time, we made plenty of mistakes. Time was such a valuable commodity and we probably didn't use it all to the best of our advantage.".*

Personal frustrations, but also some empathy for a fellow team member was expressed in the written reflection by Ira-SR1b, and impacted their experience negatively, *"I certainly appreciate my frustrations must have paled in comparison to what XX experienced, and I*

don't doubt for one minute [they] tried [their] best. However, coupled with looming deadlines and a lot of work to get through, it meant tension was very high among our group at the end of things. It was not a very enjoyable experience by the end, and our morale languished.".

Ira-SR1b reflected further about their overall experience in terms of personal impact, *"At the end of it all, there's a lot I would have done differently. I would have ensured there was a contingency plan in place and been more discretionary when it came to choosing group members. The work was not shared equally, and a lot of time was wasted repeatedly explaining simple concepts and redoing work that was not up to standard. I understand not everyone in a group project will academically be on the same level, and that a part of group work is helping one another out, but this task was well beyond my capabilities and has left me drained.".*

On the other hand, a more positive reflection was shared by Orion-SR10b, "*I believe the ending product of our work was worth a while, and it wasn't just as assignment, but teamwork that doesn't feel forced, or boring".*

Pat-SR4b also wrote commentary using terms derivative of work-ready skills of planning, completing, and evaluating 'a project', but also pride in achievement, "*...we were able to plan, complete and evaluate a project that we created which is an achievement to be proud of.".*

Interpersonal Competence – "*we've improved on our communication skills, as well as our love of learning"*

Students wrote about their communication, teamwork, and project outcomes in reflections. Ari-SR7b, also particularly referred to interpersonal skills, and potential for their experience to assist future endeavours, "*In this group project our interpersonal skills especially shined. Rather than just only focusing on the work, the mental stress the project placed on the group was also considered. We all learned valuable, subtle, and new intangible interpersonal skills that we can carry on to different group projects.".*

Tory-SR8a wrote about how their group organised their project activities, as individual tasks rather than sharing them, *"For the group section we actually divided up all of the questions, and I was set to complete the last 3 on the list…we met once at the…library in the early weeks of the assignment, in this time we organised who was doing what sections…".*

Ira-SR1a wrote about personally assisting a team member, in a mentor like capacity and being pleased with the outcome, *"We used a "divide and conquer" approach to divvying up the workload. My strengths are writing and editing; XX is very good at finding relevant studies and research….One of the problems we faced is that due to a language barrier, XX lacks confidence in public speaking…I have a lot of experience with public speaking, so I was happy to share my time in coaching XX to help [them] overcome [their] nerves about speaking. I was very proud of XX efforts – [they] did something that scared [them], and I believe XX did it well.".*

The Public Health Group Project as an assessment, in written reflection, had posed some planning as well as execution challenges. For example, as written by Sandy-SR3a, "*The assignment itself was definitely harder than previous assignments, as finding an effective idea that could be realistic in implementing into ... uni was very challenging, however we came up with an idea through brainstorming with each other as many ideas were thought of throughout the beginning of the assignment. I personally found this challenging as it required creativity.".*

Brainstorming and sharing ideas was written commentary by Isi-SR9b, "*The group project required a lot of brainstorming and planning and involved a lot of communication throughout the semester. Our group communicated by out of class meetings, online forums and messages and all group members felt that this was an effective method of communication.".*

However, the written reflections also revealed some difficulties with communication, planning, and meeting deadlines, as areas of improvement to consider, as written by Isi-SR9b, "*Different ways that we could have improved our assignment would be organisation and communication. This would enable us to complete tasks better and meet deadlines sooner. Another difficulty that we faced as a group was organizing and planning our promotion process. Out of all the stages in our assignment, this part was done least effectively."*

Ari-SR7b also wrote about the difficulties, as predicament, of some group processes, and offered some instructive advice, *"In a co-operative project, it is obvious that communication is key. However, communication between both the group members and the active supervisor (teacher) were stagnant during the beginning of the project. It sent us stakeholders in a momentary state of panic. This slight uproar was remedied through onsite and social media contact between the student party and the teachers. This predicament served as a reminder of the value of the communication.".*

Pat-SR4a, wrote about what the impact of choosing a topic area for their project, *"The most interesting part of the project was the idea itself...Exploring the topic and coming up with a project idea was a really good learning experience for me personally.".*

Sandy-SR3b also commented about ideas for the project and reflections about the project generally, whilst being enjoyed, was also acknowledged as a novel experience for the group, *"In general, this group project has been fun and entertaining as it has introduced the group into different situations that has never been encountered. A project like this was all new to us as we found it challenging at first. Ideas for the project came slow however planning was handled very efficiently.".*

Orion-SR10b reflected about what they most enjoyed about working as a team, for example, work ethics, team members themselves, and the social connections, "*Working together was enjoyable seeing as I found my team members quite enthusiastic, and charismatic. We've achieved a lot as a team, and saw a lot of great work ethics. It was fun to work together, and getting to know each other, as well as sharing ideas that we might, or might not have shared with each other about our assessment... Through this assessment, we've improved on our communication skills, as well as our love of learning.".*

Sandy-SR3a indicated awareness of a pedagogical strategy in writing, "*I have also realised why this assignment is last as it involves everything we have learnt throughout the semester.".*

Robin-SR6b reflected on a more global level in terms of the shared experience of working in a group, but also the potential experiential aspect for future employment, "*Reflecting after the project, the group found that we all enjoyed participating in group work and developing the project together. I found that this project gave us a sense of real responsibility, entitlement and made us feel a part of something like we would get in a real-life occupation.".*

Sandy-SR3a specifically wrote about public health in the real world, but also indicated a preference for learning by doing, "*Having completed this semester of assignments helps me further understand the role of public health and its impact on the real world. This subject overall has definitely benefited me as assignments were more practical than just exams and tests as this personally helps me understand and learn better.".*

Summary of Key Findings

The researcher created a graphic to depict a summary of research themes. Raskind (2019, p. 38) suggests reporting qualitative research, in particular could be aided by use of matrices and displays. Therefore, the following Figure 4.24: *Infographic of Key Findings*, shows key research findings as interpreted from qualitative inquiry and qualitative content analysis. (Larger image can be viewed as Appendix V: *Key Findings Infographic*). The infographic depicts the bounded case study research participant as typical profile associate degree in health science student, which was determined particularly from research participant responses in the ILSQ and DLQ. The typical profile of the student, as individual and as community, is in the centre framed by key findings about experience as determined from individual interview. The arrowed content pointing into the circle is the broader context of experience which was revealed in focus group narrative and placed as pertaining to the outcome of pedagogical practice. The curved content above the circle is contributed by the three focused content themes gleaned from Student Written Reflections.

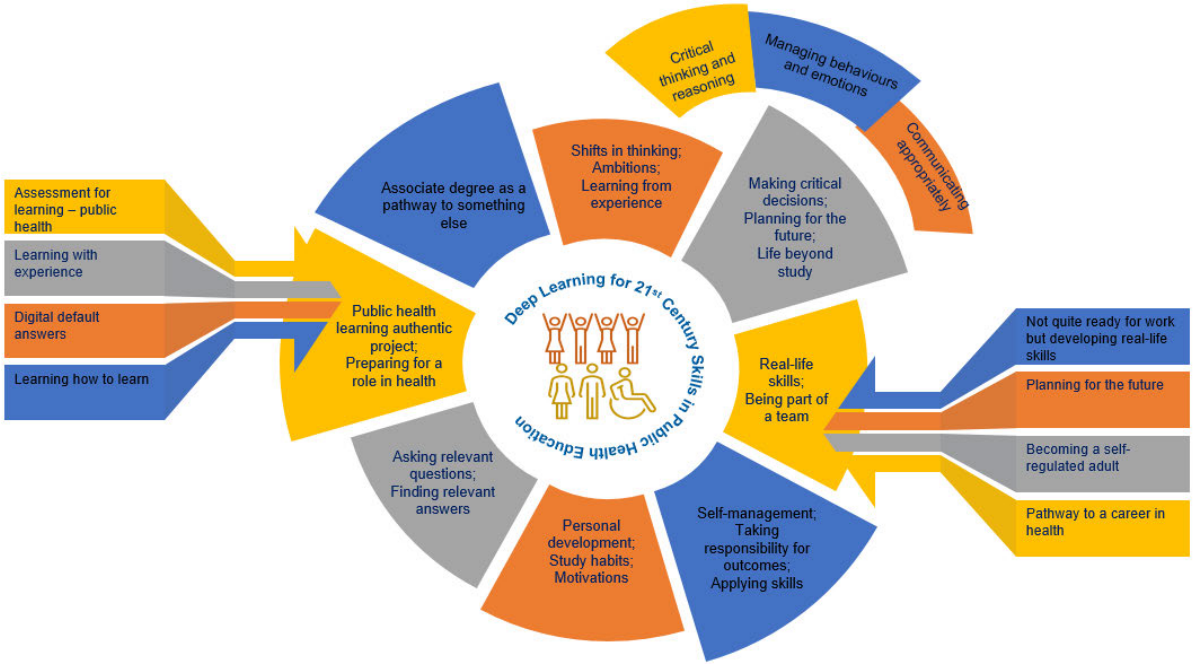


Figure 4.24: *Infographic of Key Findings*

Conclusion

Considerable data for interpretation was an outcome of the case study research, *Deep Learning for 21st Century Skills in Public Health Education.* The researcher provided detail about all methods and results in this chapter. Findings were described narratively with illustrative quotes in relation to the focus group interviews, individual interviews, and student written reflections. The narrative was organised into themed headings. The headings were determined through textual analysis activities which was supported through nuanced content analysis of written text. In addition, the quantitative data was analysed and where practicable illustrated in tables and/or graphs to assist with interpretation of trends. Foremost to note is that the quantitative data was in response to qualitative questions and never intended for measures of significance.

Key findings were demonstrated in Figure 4.24: *Infographic of Key Findings.* Of particular note was the finding that the associate degree was used as a pathway to something else, and whilst the students reported they were developing real-life skills, they were not quite ready for work in a health support role, for example, in public health.

Chapter 5: Discussion

Introduction

This chapter will present a discussion about how the case study findings addressed the research questions. The chapter is organised to first provide a summary of the case study parameters, and then discuss the profile of a typical student. The next section of the chapter will provide an overview of the collated findings under thematic headings, which will be critically discussed in relation to the research literature. Implications, limitations, and recommendations for further research are also presented. Exemplar participant quotes (truncated) will also contribute to the 'student story'. This chapter will also signpost how the findings from the research is situated paradigmatically and philosophically in a world view.

Summary of the case study research parameters

The bounded case study research sought to address the over-arching research question:

> *In what ways can Associate Degree in Health Science students engage in deep learning promoting 21st century skills to enable work-readiness at graduation?*

Other questions were utilised to delineate particular areas as related to the over-arching research question. These were:

- *What are the learning approaches used by Associate Degree in Health Science students?*
- *What pedagogical strategies support deep learning outcomes to promote generic and transferrable 21st Century skills?*
- *What questioning approaches do students use in an instructor facilitated Public Health Group Project?*

Bounded Case Study

The bounded case study research protocol enabled data to be gathered by several different methods; questionnaires, focus group interviews, individual interviews, and student written reflections. A global finding was that the typical participant was committed to an end-goal of working in the health industry, and despite the associate degree not being what they wanted to enrol into as a first preference, they did acknowledge the utility of the associate degree as a progressive pathway to higher level studies. However, they did not consider the program

as preparation for a work-ready role in health. They also did not overtly indicate in what ways their experiences in the program could enable and strengthen their capability in areas valued in any employment. There was reflective commentary related to transitions and adult independence, some of these challenging, for example, having to earn an income, and working with others, but some an affirmation of growing maturity in relation to critical thinking and making decisions.

The study explored terms associated with deeper learning competences and 21st century skills, and associated areas as applicable in public health, especially social responsibility, critical thinking and problem solving capacity, and effective communication abilities. These are areas which may not be explicitly stated in a unit learning outcome but may generically be expressed as a graduate attribute. Various reports and guidelines influenced the research direction especially in relation to skills for a work-role. These broadly incorporate the foundational (basics), technical (core and applied), and enterprise (transferable generic) level. The learning program the researcher, as educator, had developed for the public health group project was an assessment for learning design which developed not only core skills related to public health, but also the intangible 'soft skills' (enterprise) which are promoted in 21st century skills and deep learning literature.

Profile of the 'Typical' Student

Most of the students who participated in the research were on a trajectory to ultimately work in some sort of health-related capacity as a career choice.

About learning preference

One of the research agendas was to determine a profile of the typical student in relation to the case study research participants. Using data from the Index of Learning Style Questionnaire (ILSQ) (Felder & Soloman, nd-a) Learning Preference Domains the following picture emerges of the typical student. There is no suggestion that any numerical calculations that were used in the descriptive statistics imply significance and can only be suggestive in regard to participants who completed the ILSQ. Using raw data which indicate which preferences more often collectively arose in responses suggests that the typical student is a balanced Active/Reflective learning (59%) and 31% of them are moderate to strong in the Active domain versus preference towards the Reflective domain (11%). This is suggestive of preference to engage with learning material. There was also balance between the Sensing/Intuitive domains (45%), however in moderate to strong preference the trend was towards the Sensing domain (37% versus 17%). These findings suggest alignment

towards learning details and facts. In the Sequential versus Global domains there was balance across them in just over half (53%) of the ILSQ responders. However the trend in moderate to strong preference was towards the Sequential domain (37% versus 9%). This findings suggests a preference towards learning in stages. The standout finding of the ILSQ was that 68% of students showed a moderate to strong trend towards the Visual learning domain, as opposed to the Verbal with only 3%. However, 29% did show balance across the Visual and Verbal domains. These findings suggest that the typical student prefers a Visual learning style.

About Demographics

Items related to learning preferences as indicated above were included in the DLQ. Continuing with building a profile of the typical student, who completed the DLQ, the demographics, as can only relate to the participants who completed the DLQ was that there was a fair balance of gender, but marginally more females (56% of respondents). The typical student also mostly spoke English (75%) as their first language, and were 18 to 19 years of age (65%).

About Learning

They mostly agreed that they learnt best by doing (98%), and during whole of class discussions (84%), and with authentic case-studies (82%). An illustrative study participant quote which supports an authentic learning ideal was provided in response to the DLQ, Q 21: *My ideal learning environment would be…"One that constantly promotes discussions with both teachers and students, applying relevant information to real life incidences (or examples)" (DL37).*

On the other hand, the typical student also agreed that they learn best when attending class (78%), but also out of the class setting (67%). Learning with a social group (71%) was marginally preferred to learning with student peers (62%). There was agreement about using provided learning material independently (66%) and in their own time (64%). Barriers to learning, as indicated by the typical student were mostly other (unknown) factors which impacted their motivation (Ranked as Number 1 by 35% of DLQ respondents), followed by work and family commitments (Ranked as Number 1 by 22% of respondents), and least by social commitments (Ranked as Number 1 by 13% of respondents).

About 21st Century Skills

In relation to the DLQ results, as indicating 21st century skill alignment, the researcher depicts the typical student as agreeing that they are encouraged to be creative (67%),

collaborative (89%), responsible (89%), as well as developing practical skills (76%). In addition, the student agrees that the skills they are learning relate to real-world experience (75%) and will help them develop effective work habits to manage real-world problems in different contexts (84%). The types of assessments that students mostly agreed as to contribute to work-readiness mostly aligns with individual assessments (95%) and practical projects (95%), though there was also support for practical laboratory (89%), simulated activity (87%), group assignments (71%), oral presentations (71%), and written tasks (58%). For the typical student, there was a disinclination towards exams with less than half (42%) agreeing.

About deep learning and learning deeply

The typical student also mostly agreed that they were learning how to communicate effectively (82%), including asking effective questions (78%), being an effective team member (80%), as well as solve problems (76%); acknowledging the learning of new skills which could be used in any work setting (67%). In more focused profiling about asking questions related to the DLQ results, the typical student profile was agreement that questioning in class was encouraged (87%), and they were confident about how to get relevant information by asking effective questions (76%). In addition they agreed that intellectual skills were developing (78%) and critical thinking skills were promoted in their learning program (78%). The typical student considered motivation for learning was about expressing their character as an individual (Ranked Number 1 by 35% or respondents) and learning skills which could be used in other context (Ranked Number 1 by 35% of respondents). However, motivation was not particularly related to social responsibility (Ranked Number 1 by 13% of respondents), nor learning to become a responsible citizen of the world (Ranked Number 1 by 11% or respondents).

About questioning approaches and finding information

Questioning approaches was one of the research areas explored in the research, so the DLQ had several items which directly addressed this area. Extending the profile of the typical student from the previous paragraph, they agreed that in regard to finding answers for assignment questions that they were confident (78%), and also comfortable about asking questions (91%), and that these were effective questions (78%), and mostly preferred to ask questions via the internet (78%). In class there was a minor preference towards the teacher asking questions (71%) versus when students did (67%). Just over half of the respondents (55%) agreed that they used answers to questions that other people have already asked. The typical student indicated via their responses that they mostly sourced information to answer assignment questions using internet on their phone (96%). They also sought

information from their friends (82%), teacher (75%) and course-provided resources (87%). The typical student also used Google Scholar (67%), library resources (55%), and grey literature (67%). There was also some support for asking family (42%), and someone working in a relevant field (47%). The typical student did not typically use Wikipedia for information (33%).

About work-readiness

The DLQ also invited responses related to statements indicative of work-ready skills for a health-related role, with general agreement with all the statements. They indicated agreement that they were doing the course, and learning specific skills, to get a job in the health field (87%) and preferred to learn by getting experience in the field (87%). They agreed that what they were learning about human culture (89%), science (86%), and the physical world in relation to population health (89%) would help them get a job. The typical student expressed a future career aspiration related to a health (87%), the most common (about 55%) being for allied health areas, for example, in fields such as physiotherapy, chiropractic, social work, radiography, myotherapy, dietetics, and nursing-related (31%). However, there were almost 20% who were unsure.

About the Associate Degree as a Pathway

The typical student also indicated that the associate degree was not their preferred first enrolment (71%), and that they were doing it as a pathway into another program (73%) and if offered their preferred course option would leave (55%). The typical student also disclosed that if they were not enrolled in their current learning program of study they would be working or seeking work (42%), closely followed by a study-related response (31%), and about 13% uncertain about what they would be doing.

Summary of the Typical Student Profile compared to the Literature

Profiling the typical student was one of the outcomes of the case study. As discussed in the previous section, the typical student was drawn to Visual learning experiences and practical activities. The associate degree was a pathway to a career in the health field. They were typically in their late teens and English was their first language. They were confident in asking effective questions, finding information, and using tools such as Google Scholar and Library resources. They agreed that they were learning skills which supported their employability and work-readiness, for example, communicating effectively, collaborating with their peers, thinking critically and solving problems. There was less confidence in relation to the role of social responsibility and citizenship.

First year success in review research was found to be linked to student factors such social-emotional wellbeing and previous academic achievement, motivation and study skills, and learning environment factors such as critical thinking skills (van der Zanden, Denessen, Cillessen, & Meijer, 2018). Australian research shows that more than a third of students surveyed indicated withdrawal intentions related to detrimental effort-reward imbalances (Williams, Dziurawiec, & Heritage, 2018). Research about first year university student achievement shows that persistence, planning, and managing tasks is adaptive behaviour positively associated with engagement (Collie, Holliman, & Martin, 2017). Research from Germany shows that student perception about academic control, and either enjoying or being bored in the learning, was associated with achievement, and in second-year student directly linked with intention to withdraw (Respondek, Seufert, Stupnisky, & Nett, 2017). Other research determined pre-university reasons for enrolling into university, these being career, personal development, social norm, aspects related to the institution itself, by recommendation, and location, though these were not significantly predictive of first year retention (van Herpen, Meeuwisse, Hofman, Severiens, & Arends, 2017).

Deep Learning for 21st Century Skills - Discussion

Learning from experience

The study findings from both the ILSQ and DLQ responses indicated preference for learning by doing, as was discussed in the section about profiling the typical student earlier in this chapter. Qualitative content analysis from both Individual Interviews and Student Written Reflections, was suggestive of behaviours associated with both learning and applying generic skills in collaborative group projects. The Individual Interview narratives and Student Written Reflections were comprehensively presented in Chapter 4: Presentation of Results. Participation in the experiential capstone Public Health Group Project was variously described in behavioural terms. For example, as expressed by Eddie-II2: "… *you're gonna have like ah… always a teammate or partner that you have to get along and work things out…"* .

A reflection from Nat-SR2a also makes reference to prior experience, in relation to skills most suited for tasks in a group activity, for example, "…*both me and XX discussed what roles and duties that would best suit us onto how personal experiences to best achieve the allocated goals we chose…"*

Learning from experience approaches is also supported in the literature. For example, Australian research indicates that embedding work integrated learning in a university degree (pre-service teaching) enhances students' employability skills, particularly confidence) (Doolan, Piggot, Chapman, & Rycrof, 2019). In Ontario, Canada universities and colleges are encouraged to promote work-integrated learning by including experiences that promote adaptability, creativity, experiential learning, non-verbal communication, reflection, and teamwork (Stirling, Kerr, Banwell, McPherson, & Heron, 2016). On the other hand, Carson (2019) has questioned the sustainability of a 21st century education, arguing that there is a distinction between the knowledge economy (as pervasive in higher education) and knowledge ecology, the latter resistant to alienation of knowledge as a transactional good. Interestingly, Erikson and Erikson (2019) argue that the use of learning outcomes, favoured in higher education, can divert attention away from important goals, and limit student ambition.

Real-life skills

Responses in the DLQ, as presented in the discussion about the profile of the typical student, suggested a trend towards valuing means to develop real-life skills. Information from focus group and individual interview also supported learning for real-life, and support for activities to develop them in their study program. For example, a FG3 comment related to work placement, *"…I think…I think…it* [work placement] *would be more helpful for me to get a job in the future, instead of sitting in the class*…".

The research literature relevant to this finding, is that in two Australian Work-Integrated Learning (WIL) in the higher education sector reports (McKlennen & Keating, 2008; Patrick et al., 2008) was raised a number of issues related to WIL as mainstream, for example, how to maintain academic integrity and have consistency of assessment in context, and ongoing resourcing. Even so, other Australian report indicates that work-integrated learning does have an impact on work-readiness and contributes to employment capabilities, as do simulated activities (Smith, Ferns, Russell, & Cretchley, 2014). However, embedded and extra-curricular internships, and activities, are also stated to be important for improving employability, and rate better than work-integrated learning which were findings from a survey of Australian Business and Creative industry graduates (Jackson & Bridgstock, 2020).

Life beyond study

There were strong indications that most of the research participants were intending future careers in the health sector, as was presented in the section about the profile of the typical student, and that they were developing skills to work in a health-related role (80%). More in-depth views were shared about preparation for a health role in the Focus Group Interviews and Individual Interviews, and that, in fact, the associate degree did not prepare them for a recognised vocational role in health care. A FG2 comment illustrative of this finding being, "…*you still feel a bit, like, undercooked….like I'm not work ready yet*…". Another example, shared by Ash-II3, is, *"…I feel like this associate degree…It's not a degree that you can just finish and then go into world and to make a change in*".

The research literature shows that for health professional competence, there is a preference for programs which emphasise practical contents and interactive methods for learning, that is, the relevance to the job-role was more usefully served by learning by doing (Gil-Lacruz et al., 2019). Rowland et al (2019) discuss the values of efforts to engage generalist science students in activities that develop and expand broad skill sets which prepare them for various

future roles in the workplace. That is, they can gain skills from their industry and/or community work as a means for employment-related and work-relevant learning (Rowland et al., 2019). Business and Creative Industries graduates from three Australian universities were surveyed about the perceived value of activities for enhancing employability, with evidence that extra-curricular experiences were rated higher than work-integrated learning (Jackson & Bridgstock, 2020).

Associate degree as a pathway to something else

The study showed, in DLQ responses, that most of the research participants had not chosen to undertake the Associate Degree in Health Science as their first preference (71%). It was also evident that more than half of the DLQ research participants intended to transfer to another program if offered their preferred course of study (55%). The most common reason as pathway as the indicative reasons for enrolment was shown in DLQ, Q13: *I am doing this program as a pathway into another program* (73%), and as expressed by Ray-II4, "…*as a pathway…that's my main reason…*".

There was also a trend for the DLQ respondent (55%) to not continue with their program of study if offered a place in another program, though at least 27% would continue either by deferring the new program (18%) or not accepting the new offer (9%). From an educator perspective, these findings constitute a concern at the program level in regard to longer term sustainability and viability. The research literature, shows, for example, that in relation to attrition in Australian higher education, there were few options at undergraduate level for partial completion of programs to be formally recognised (Harvey & Szalkowicz, 2016). The literature shows that international students (China) choose programs such as an associate degree, especially in a dual sector (vocational/ higher education) institution in Australia as it affords them the opportunity to move from vocational to higher education using associate degree or diploma level studies as the articulation pathway (Cao & Tang, 2014). Norton, Cherastidtham and Mackey (2018a) reported that nearly a quarter of a million students would start a bachelor's degree in Australia in 2018, but more than 50,000 (20%) of them would leave university without getting a degree. Their report also indicated that many people who did not finish their course did found it interesting, learned useful skills, and made lasting friendships and connections, and believed that their enrolment brought more benefits than costs (Norton et al., 2018a).

Attrition rates of students in the university sector in Australia seems to range anywhere from 10 to just over 70% depending on the data used, and reporting and analysis mechanism

implemented, and whether reporting on attrition or graduation rates (age threshold stipulated as per the Organisation for Economic Co-operation and Development [OECD] data) (Australian Government, 2017, 2020; Organisation for Economic Cooperation and Development (OECD), 2020).

Motivations

There were mixed results, in the research, about the type of learning environment which suited the research participant, that is, working alone or in a group, individual assessment tasks versus shared group-based tasks, which was presented in the section about the profile of the typical student earlier in this chapter. Some of this was related to factors to do with motivation, and possibly a lack of interest in the study area, as a consequence of the program not being the preferred first enrolment. Determining if there was a link between enrolment and motivation was not explicitly determined in the study, though in individual interview at least one participant indicated motivational issues related to losing interest in the program, for example Eddie-II2, *"… there was one* [subject]…*I didn't feel…like I had the interest of going and learning something…".* A different perspective in regard to motivation relates to the challenges of unequal effort in collaborative endeavours. For example, as shared by Lee-II1, *"…I did my bit and they did their bit. As a whole I was feeling that it could be better…but it's done and I've moved on…".*

The research literature indicates linkage of student motivation for learning content as negatively affected in group learning (Costley & Lange, 2018). However, the literature also supports that positive feedback is expressed for experiential learning pedagogy as motivation to learn, as shown in research about helping students to adapt in volatile, uncertain, complex and ambiguous (VUCA) work environments, including active mentoring of students by faculty and external partners (Seow, Pan, & Koh, 2019).

Shifts in thinking

There was also evidence of transition challenges whilst the study participant was progressing through their associate degree. For example, about learning how to learn and managing self-directed behaviours that were focused and meaningful. These were findings most directly linked to Student Written Reflections. For example, from Sandy-SR3a, *"The assignment…was very challenging, however we came up with an idea through brainstorming…".* The study participants also expressed priorities that deflected from studies,

such as work commitments. As shared by a FG2 participant, "…*well I am gaining things out of uni but, like, I'm not earning anything…".*

Other emergent themes from Focus Group Interview, Individual Interview, and Student Written Reflections, was that some study participants struggled with collaborative task activities, particularly timing and scheduling meetings, variable team member motivations, and unequal work effort. To illustrate this in the student voice, the following is shared by Ira-SR1b, *"Insofar as group dynamics went, I found working with XX in particular to be very challenging…I am loathe to say this, but it really tested my patience…".*

The research participants also described the ways they dealt with dissonant factors, especially in group projects. Thematically, this aligns with certain deeper learning behaviours, for example, demonstrating effective negotiation skills, and applying creative solutions using social media and digital technologies (Matsushita, 2018; The William and Flora Hewlett Foundation, 2013) , and 21st century skill development (Martin, 2018).

Asking questions, finding answers

The study participants did gravitate towards directing information inquiries via convenient and easily accessible means, most notably, the internet search engines on their smart devices, as indicated in DLQ responses of 96% agreement, which was not a surprise finding. Smart device connectedness is ubiquitous globally (Taylor & Silver, 2019). For example, as disclosed by Ray-II4, *"Most of the time I tend to go to Google Scholar and…library not so much, to be completely honest, mainly Google Scholar…".* On the other hand, as expressed by Lee-II1, effort is part of the process in getting information, "*I don't want it being handed to my face. I obviously need to work for it…".*

The research literature suggests that as learners progress through a program of study, their searching strategies become more sophisticated (Nicholas, Huntington, Jamali, Rowlands, & Fieldhouse, 2009). The research literature provides further perspective about this topic, suggesting that technology enhanced, student-centred learning requires active interaction in the university community, teacher 'orchestration', actual technology, and collaborative learning (Hämäläinen et al., 2017). A focus on 21st century competencies such as hands-on digital literacies account for and enable the student to be active in design-based pedagogical practices (Hämäläinen et al., 2017). There is also systematic review evidence of a gap in research about social support in relation to 21st century digital skills for workers (van Laar et al., 2020).

Personal development

The study provided some insight into pedagogy which supported learning and also pedagogical approaches and activities that appeared to discourage, even demotivate students. For example, in individual interview and student written reflections, the individual student expressed the challenges of working collaboratively but valued the experience of an authentic community project. The following shared reflection from Indy-SR5a, in relation to participating in the collaborative Public Health Group Project, illustrates this finding, *"Overall I did enjoy this assignment…I did not like the literature review piece…I do not think it reflects how well I could do…".*

It was apparent that some study participants acknowledged shortcomings in themselves but also their peers but worked with them to progress their project objectives, that is, in articulated examples of gaining these skills. An example of this in the study is through a reflective story of their active involvement and experience in a collaborative group project by Isi-SR9a, *"Different ways that we could have improved our assignment would be organisation and communication…Another difficulty that we faced as a group was organizing and planning our promotion process…this part was done least effectively".*

Group social success is reflected in the research literature which shows that a sense of community (belonging) is linked with organization citizenship behaviours (Boyd, Liu, & Horissian, 2020). Civic skill development is linked with student participation in compulsory and/or volunteer community engagement in the higher education setting in Australia (Chung & Coates, 2018). The research literature also concurs, with student values tending to increasingly acquire more importance as they grow older (Hernando et al., 2018).

For some students who participated in the Public Health Group Project, the project objectives were not what affirmed success for them, rather their growth in maturity, mentorship, leadership, conflict resolution and social responsibility. For example, from FG2, *"I think we just needed to just focus and make sure of all our stuff…I think next time there's nothing we can do we if XX doesn't want to do their bit. We just needed to make sure we had our stuff ready".* Another perspective is shared by Orion-SR10b, *"… working together was enjoyable seeing as I found my team members quite enthusiastic, and charismatic…we've achieved a lot…it was fun to work together, and getting to know each other…the ending product of our work was worthwhile, and it wasn't just an assignment, but team work…we've improved on our communication skills, as well as our love of learning".*

The research literature affirms that cultivating employability skills is driven via innovative interdependent learning techniques (Younis, 2020). As suggested by Bennett (2018) graduates need to learn how to not only recognise their abilities but also be able to show testimony of them. Zhoc, Webster, King, Li, and King (2019) describe the development and testing of their *Higher Education Student Engagement Scale* (HESES), to basically determine student engagement as their level of involvement in the learning process.

Applying skills

Whilst the researcher does not claim that development of the DLQ constitutes a validated scale to measure deep learning in other jurisdictions, it may have capacity to be adapted to suit the context. The DLQ was informed by an extensive literature which was most particularly aligned with the conceptual framework utilised for research guidance (See Appendix H: *Literature Evidence Informing DLQ Development*. The focus of the DLQ was self-report and areas related to behaviours indicative of development of, and or application of deeper learning. However, finding out about deep learning in the case study population was not restricted to the DLQ. For example, the researcher sought commentary about creativity, and it was evident that participants did not necessarily recognise creativity in their efforts; limiting their understanding of the term as related to applied craft as learning by doing. As an example, Ray-II4 stated the following about creativity, "…*umm I think I worked on definitely like, how to be creative like it helps me learn, like when we have to put posters together and stuff like that…umm…".*

What the study findings infer is that educators in designing a learning program also lack creativity in the curriculum, for example, in enabling the student to be innovative and customise their learning experience to suit their learning preference, even though 67% of respondents in the DLQ implied that creativity was enabled in their program. The research literature also indicates that evidence implies that educators do not explicitly design their courses to facilitate student creativity (Jahnke & Liebscher, 2020), however, it is suggested that fostering creativity in higher education learning programs is enabled by using explicit teaching strategies (McMahon & Ewing, 2015), customizing the learning environments (Lin, Yeh, Hung, & Chang, 2013) and promoting an open-ended and '*fuzzy*' structure (Liu, Lin, Jian, & Liou, 2012, p. 178).

An alternate interpretation of applied skills in terms of the case study, is that of recognition by the study participant of short-comings or gaps in their said skillset and rationale for seeking

to improve, for example from Isi-SR9b, to *"…would enable us to complete tasks better and meet deadlines sooner…".*

The research literature indicates that measuring or assessing generic skills of university students, such as communication, critical thinking, leadership, and problem solving is a challenge (Chow et al., 2020). Geisinger (2016) in an introduction to a series of articles about how to measure 21st century skills, suggested it was possible, though complicated, and while the measures were reliable, the validity remained problematic. A detailed framework, the ACER [Australian Council for Educational Research] *Assessment of General Capabilities* (critical thinking, collaboration, creative thinking) for formative schooling years in Australia, is an evidence-informed, instructive guided in ways to measure capabilities, for example, via behavioural clues (Scoular et al., 2020). An example of terminology used in the collaboration capability is communicating in the group, regulation of own contributions, and resolving differences (Scoular et al., 2020).

Learning with experience

The researcher was also cognisant that they could not assume that a student knows how to study. Research participants indicated that they were not really 'readers' and preferred 'learning by doing' and 'real-life' case studies, which was discussed in the section about the profile of the typical student early in this chapter. An interview example, shared by Nova-II5, relates to effort involved in learning in a subject, *"…like we have to research more about it, so you have to, like you really have to really read and think about it ourselves…".* Other perspectives shared, firstly, for example, in FG3 and in response to a question about where they envision themselves five years in the future, *"…kind of like practising more than study…".* Secondly, as shared by Ira-SR1b*,* reflecting about group challenges, "*I understand not everyone in a group project will academically be on the same level, and that a part of group work is helping one another out…".*

There is evidence that a consideration of the learner centred approach, such as heutagogy (Hase, 2009; Hase & Kenyon, 2001) propositions that learning occurs in relation to the role of the learner in learning, and deeper learning related to complex neuronal interactions. Research from Saudi Arabia supports that students are more likely to study superficially if the learning objectives are minor, but more deeply for main learning objectives; this trend found across all levels of three year programs (Bsiso, Dolmans, & Alamro, 2019). Research into the learning preference of medical students revealed that while the majority mostly used deep and strategic learning approaches, there was a significant proportion of students who

applied the surface approach (Chonkar et al., 2018). Literature about deep versus surface learning approaches of life sciences students in Spanish universities showed trend towards a deeper approach to learning, which the researchers attribute to learning as focused on understanding the subject rather than the grade outcome (Leiva-Brondo et al., 2020).

Ambitions

There were behavioural clues as expressed in individual interview and student written reflections which indicated considerations of ambition, both short and long-term. That is, students self-disclosed development in the cognitive, intrapersonal, and interpersonal domains, and specified intention to apply these skills in their future endeavours. Illustrative examples which relate to this finding is shared by Sandy-SR3b, *"A project like this was all new to us as we found it challenging at first…This project ticked all boxes and fit in the assessment perfectly".* A different view is shared by Ari-SR7b, *"In this group project our interpersonal skills especially shined…We all learned valuable, subtle, and new intangible interpersonal skills that we can carry on to different group projects in the future".* There was indications in all research activities of ambition for something, for example, a particular career outcome, or a type of life-style or event; even fixing the world. For example, as shared by Ash-II3 about future plans that they would be, "…*hopefully working in the community and making a difference… yeah*…".

The research literature interestingly shows that deep learning is suggested to lead to construction of new knowledge and openness to varied perspectives (Lim et al., 2019). For example, Golding (2018) proposed a practical theoretical framework for identifying different ways of thinking because in higher education it is a challenge to discern thinking. The areas addressed within Golding's proposed framework for recognizing or informally assessing different ways of thinking is broadly across six areas: visibility, complexity, frequency, flexibility, independence, and complexity of application (Golding, 2018, p. 489). On the other hand, there is risk to mental health when there is misalignment with aspirations and expectations (Greenaway, Frye, & Cruwys, 2015).

Learning how to learn

A focus of the case study was also about readiness of graduates to enter a 21st century work environment. The students who participated in the Public Health Group Project and shared their Student Written Reflections articulated behaviours that aligned with both deeper

learning and 21st century skills. The perspicacity of some of their reflections was a revelation. They used terms such as communication, creativity, leadership, organisation, planning and indicated managing challenging collaborative situations, negotiating consensus for group goals, meeting deadlines, and mentoring peers. None of these 'skills' were specifically taught in the program. An example of this aspect of case study findings is presented in the following two student stories about their experience in the Public Health Group Project activities. Firstly from Sandy-SR3a, *"Having completed this semester of assignments helps me further understand the role of public health and its impact on the real world… has definitely benefited me as assignments were more practical than just exams and tests as this personally helps me understand and learn better".* Secondly, as shared by Robin-SR6b, *"Reflecting after the project…this project gave us a sense of real responsibility, entitlement and made us feel a part of something like we would get in a real-life occupation".*

In relation to self-regulation of learning, the research literature reveals that university students alter their learning approaches contingent on variable factors, such as assessment (García-Pérez, Fraile, & Panadero, 2020), and their approach to learning varies due to type of degree, age, gender, cultural context and learning approach (Leiva-Brondo et al., 2020).

Critical thinking and reasoning

Some students perceptively expressed insight about what they perceived as increased capacity and capability to self-regulate in choice and circumstance in other situations. Because they had made achievements that they acknowledged as personal successes in participating in the Public Health Group Project, they recognised that they could confidently expect other personal and professional successes moving forward. For example, as articulated in self-reflection by Isi-SR9b, *"It was a challenge that enabled each group member to take responsibility for different tasks and actions. It gave us all a sense of belonging and responsibility".* An alternate and insightful comment was shared by Sandy-SR3a*, "I have also realised why this assignment is last as it involves everything we have learnt throughout the semester".*

In the research literature, it is suggested that in order to improve studying effort in the students' own self-interests, educators should advise students about successful studying behaviours largely; that is, as demonstrated by the students' peer group, instead of highlighting what they (the educator) recommend (Eyink et al., 2020). Findings from a review support that a project-based approach used in first year university can improve critical thinking skills (Dimmitt, 2017). Cloete (2018) using an experimental and longitudinal

methodology found statistical differences in the experimental group, which was first year students completing an integrated assessment based on real world problems. The aim of the study just referenced was to see if integrated assessment enhanced critical thinking skills in an effort to have graduates better prepared for work environments (Cloete, 2018).

Managing behaviours and emotions

The study participants indicated challenges related to dealing with challenging situations with some of them expressing this in relation to the context and illustration terms such as such as angry, frustrated, confused, disappointed, pressured, regret, and demotivated. For example, as shared by II1 about their negative experiences in the Public Health Group Project, "*…people just settle for less rather than meeting their potential…and that's really hard for me, you know, to see and experience…".* On the other hand there was also use of positive terms such as enthusiastic, passionate, and success. For example, as shared by Pat-SR4b, *"In retrospect, our whole project seems to be a success…an achievement to be proud of…the learning process…is invaluable and something that will no doubt help us in our own further studies and lives".* Another perspective also celebrates success, as shared by Nova-II5, *"Yeah um I felt actually, like, really glad from, like, everything turned out well… I was really happy…we all put in…hard work and a lot of effort…we were just really proud of ourselves basically".*

There was also reference to time pressures and deadlines, and team members' efforts unequal in group tasks which was previously discussed. The research literature also shows that students in a higher education setting indicated that communication, self-management, teamwork and critical thinking is something they need to learn by themselves as these skills are not taught, and that the transition from graduate to employee is difficult because they lack practical experience (Ornellas et al., 2019). The authors of this research developed a theoretical framework, the Skill Up Taxonomy of Employability Skills, based on authentic learning approaches that enable students to develop employability skills in higher education contexts (Ornellas et al., 2019). The *Skill Up Taxonomy of Employability Skills* required for new graduates includes areas such as creative thinking, and learning to learn, and ability to cope with change (Ornellas et al., 2019). Other reported research examined first year university level students to distinguish those that do well and those that do not, and found that poor time management and limited time studying was mostly associated with poor performance (Beattie, Laliberte, Michaud-Leclerc, & Oreopoulos, 2019).

Planning for the future

Most of the study participants who completed the DLQ were in the demographic between millennial (born between 1981 and 1996) and Generation Z (born between 1997 and 2012) as described by Dimock (Pew Research Center) (2019). Generation Z are predicted to have about six careers in their lifetime, that is, about 18 jobs (McCrindle, Fell, Leung, & Chi 2020). Work-ready skills therefore need to be malleable for the different roles a person will likely have over their lifetime. A report released in 2017 suggested that by 2030 young people will likely be working in an era of smart learning, smart thinking, and smart doing (McPherson, 2017) and recommend that progressive education to prepare future workforce with educational experiences that go beyond the classroom, and include real-world, immersive projects. These reports align with long-term projects to skill-up future workers to meet, what is yet unknown, about societal and workforce needs, for example the OECD (2015) *Future of Education and Skills 2030* Project.

The case study did not directly address life-long learning as such but students who participated showed aspects which correlate with a life-long learning trajectory, for example making reference to future learning, from FG3, "…*health science…I feel like it is good program to become a pathways to a course you would like to do in the future".* A related viewpoint was shared by Ray-II4*, "…I definitely think I'll be possibly be back to studying next year, um, but even then hopefully something I'm passionate about…".*

In the research literature, use of the *Effective Lifelong Learning Inventory* (ELLI) with first year students, reported gains that were of significance statistically (Moore & Shaffer, 2017). Of interest was the language used in the actual *ELLI,* a validated tool measuring capability for lifelong learning, with the developers (Crick, Broadfoot, & Claxton, 2004) referring to dimensions of learning relationships, strategic awareness, creativity, changing and learning, resilience, meaning making, and critical curiosity

Becoming a self-regulated adult

One area of competency associated with a public health role preparation, and a feature of 21st century skill development is related to being a responsible citizen and having social accountability. This was an area which the researcher, as educator, sought to design into the Public Health Group Project. Responses in the DSQ suggested support for learning about social accountability and civic responsibilities as helpful for their future health-role, as discussed earlier in this chapter in narrative about the profile of the typical student. An

example of self-regulated behaviours is shared as student reflections about their participation in the Public Health Group Project, for example from Indy-SR5a, *"I had never worked on a group assignment before so I was not entirely sure if XX would be the type that likes to take control and do everything or the type of person that does not want to take responsibility. Collaborating with XX actually helped me be more responsible because previously I have always been the one that looks for someone to tell me what to do…".*

The perceived value of promoting social accountability and responsible citizen behaviours is discussed in the literature especially early this century via forums promoted by Non-Government Organizations (NGOs) such as the World Bank (The World Bank, 2007), and the Bill and Melinda Gates Foundation (Bill and Melinda Gates Foundation, nd) though NGOs are not without their critics; that is, losing sight of the original intention to progress global equity (Alawattage & Azure, 2019; Goddard, 2020; King, 2015). However, as pertinent to the research discussion, Saldivar (2015) writes about learning approaches relevant in fields which require positive civic values and suggests that team-based learning is a cooperative learning approach. Saldivar (2015, p. 147) expressed four essential elements of team-based learning: groups must be properly formed and managed; students are accountable for the quality (individual and group level); there must be timely feedback; and the team processes must be factored into the group assessment.

Self-management

There was evidence that study participants who had completed Public Health Group Project activities self-disclosed exemplars of addressing an identified community issue and executing a project from inception to evaluation in the context of meeting assessment requirements, as can be noted in previous exemplar quotes in this chapter. In Student Written Reflections it was apparent that some research participants valued the less tangible aspects of their team contributions such as the social connectedness, reciprocal appreciation and feedback from their peers, and acceptance of tenure of actual and potential consequences (positive and/or negative). An illustrative example is shared by Orion-SR10b, *"Some of the struggles we went through included organising when we should see each other to work together, but we figured it all out after working around our schedules. We stayed in contact through our WhatsApp, and Facebook messages to figure out who is doing what, and so on and so forth".* Another viewpoint is shared by Ari-SR7b*, "We were honest in regard to the communication with each other. In a co-operative project, it is obvious that communication is key…".*

In the literature Gill (2018) describes how a communication and media sector forum each year in Victoria encourages industry leaders and graduating students to interact directly, helpful in the transition to professional employability, for example, in areas such as networking, job application, time management, and effective work habits. The research literature also recommends that educational reform is needed to better address real-life situations and socio-ecological determinants of health, thereby adapting programs to function better while addressing community needs in global health crises (Parkes et al., 2020; Xie et al., 2020).

Asking relevant questions

One of the study areas addressed particularly in the DLQ was about making inquiries, or more specifically, the questioning approaches used by students as pertaining to the case study research. As discussed previously in the chapter in regard to the profile of the typical student, there was confidence in asking effective questions. Questioning approaches was also a commentary in Focus Group Interview. For example, in regard to study needs, FG1 shared, *"…I'll have questions, so before I even have to go to the lecturer I can ask the students…and it is very helpful to have that connection with them… well I mean it's the students that help me I guess…".*

The research literature does support inquiry-related activities in higher education. Acar and Tuncdogan (2018) explored the use of inquiry-based learning (IBL) to bridge the gap between higher education and relevance to real life problems in practice, with the long term view relevant to work-readiness. The researchers described different outcomes according to the types of inquiry-based learning (Acar & Tuncdogan, 2018). For example, team inquiry fosters workplace skills better than individual inquiry; for the generation of new solution and ideas, discovery-focused inquiry is preferred over information-focused inquiries; and to promote deeper engagement, students' who identify the problem themselves use open-inquiry, rather than closed inquiries (Acar & Tuncdogan, 2018). Other literature advocates that shared questions and answers raise awareness of common queries and supports students who are reluctant to engage in class discussions (Tan et al., 2020), for example via anonymous discussion forum. Morien (2019) recommends that the education sector apply some principles from supply chain management and be more agile and lean and mitigate for the time and efforts wasted in imposing traditional models of education.

Finding relevant answers

As discussed earlier in this chapter student responses in the DLQ indicated familiarity and comfort with seeking information via the mobile device search engine, and other information sources. In Focus Group Interview there was some commentary related to seeking information, for example, from FG1, *"…the internet...well I guess it mostly depends on what you decide to ask...type in key words in the search…".*

The immediacy and urgency in getting information is escalated in environments, such as current digital capacity affords, which supports just-in-time needs which has been linked with resilience and well-being (Costa et al., 2018; Taylor, 2017). It could be reasoned that the workforce needs to know how to get information quickly and then discern whether it is reliable and can be usefully applicable for the context. Not having a web-accessible digital device, such as a smartphone, seems to be the exception (Taylor & Silver, 2019). In the workplace there appears to be some degree of complicity between employers and employees about using devices for work-related research and information seeking, notwithstanding potential distractions related to personal usage (Barnes, Balnave, & Holland, 2018; Song, Wang, Chen, Benitez, & Hu, 2019; Vorderer et al., 2016). The research literature also shows that employees may be more productive in the work-place by being able to use their mobile device for personal reasons as contributing to their work-life balance, and more acceptance in a personal device being used for professional work-related practice (Neștian, Tiță, & Turnea, 2020).

Digital default answers

In the case study, DLQ responses implied that using internet search engines was a valued activity, as was previously discussed in this chapter in the section about the profile of the typical student. For example, 78% of respondents agreed that they used internet search engines to make inquiries, 96% used their mobile devices for searching for answers, and 55% used answers to questions that were already asked. As also discussed previously, study participants used Google Scholar and Google, as well as social media. For example, as shared in FG1, *"Firstly, mostly I use google…it depends on how you use social media…some connect for parties…and with people for learning purposes..".* Some instruction was shared in FG3 about using Google, *"…it's easy to use. You can put in one word …it's like a jumping board…".*

The research literature has indicated that social networking sites are used for informal learning, but they are mainly used for social interaction and integration (Wodzicki, Schwämmlein, & Moskaliuk, 2012), and just-in-time learning (Serembus, Hunt-Kada, Lenahan, & Lydon, 2020). However, despite the widespread personal use of social media, an extensive European survey of higher education teachers indicated that using social networking sites in their teaching practice was not widely utilized by educators, and largely depended on their personal interest in using such tools (Gaftandzhieva & Doneva, 2020). On the other hand, Lim, Shelley and Heo (2019) found that mobile devices are an important component in the learning process, especially associated with getting information easily. It appears, based on the findings of the study which related to regulation of learning, along with time, social media was found to be a regulator (Lim et al., 2019). Other research indicates that students like to go to Google because they can get their information quickly (Asher et al., 2013).

Being part of a team

Collaboration and teamwork were areas for student reflection in the case study particularly when telling stories about their experience of participating in the Public Health Group Project. For example, as shared by Robin-SR6a, *"…we also maintained social independence as we learnt new things and developed new ideas and concepts about…".* Another viewpoint is offered by Lee-II1*, "… interacting with people… working with a group and, ah, and actually coping…"*. There was some insight about sharing the load, for example, also from Lee-II1, *"… when we are in a group, like you relax more and you, like, think everyone is, like, the person is going to do their job so you don't put the same effort that you gonna do to say if you were, like, to work alone…".*

A movement known as *Bridge 21* (related to 21st century learning) is an approach where there is a shift in responsibility from educator to student in relation to who owns the learning (Lawlor, Conneely, Oldham, Marshall, & Tangney, 2018). Interestingly, Lawler and colleagues (2018) explain that *Bridge 21* is based on the World Scout Movement, because Scouts do best when they collaborate (in teams). Lawler and colleagues (2018) research about team-based learning was enlightening with focus group data implying that despite learning in a team environment being new and challenging for participants, they believed that what they learned in the experience would go with them into future work (Lawlor et al., 2018). The research just mentioned indicates that something always transpires in relation to learning, despite challenges. How students experience and learn through working on shared knowledge objects can be explicated (Damsa & Muukkonen, 2020). Collaborative, project-

based learning models (Vesikivi, Lakkala, Holvikivi, & Muukkonen, 2020) and sense of community (Boyd et al., 2020) contribute to improved retention rates beyond first year, and support student independence and satisfaction. Brown, Dunlop, and Scally (2018) found in their research related to community capability approaches in education that unanticipated (non-formal) learning in higher education is also evidence of achieving valued outcomes. For example, seeing different perspectives, gaining confidence, and negotiating relationships (Brown et al., 2018).

Communicating appropriately

The case study indirectly explored communication, as part of the skill sets related to deeper learning and 21st century skill development. Study participants commented about communication in terms of getting information, as discussed early in this chapter in describing the profile of the typical student. Communication in the team was a theme evident in the Student Written Reflections. For example, from Robin-SR6b, "*We met together and communicated face to face and online and this was in fact, in my opinion very effective for all the group members*". There was also commentary about the utility of smart devices and social media to progress communication, for example, from Ari-SR7b, *"…stayed in contact through social medias such as Facebook, and WhatsApp…".*

In the research literature promotion of social media platforms, as indicated by Abraham and Komattil (2017) supports a heutagogic approach to develop capable learners through the use of problem-based learning to nurture self-efficacy and capability as the student is challenged in relation to '*how to learn*' (p. 296). This supports aspects related to Connectivism Learning theory as attributed to Siemens (2005) for utilising the tools inherent in the digital age to progress learning. Utecht and Keller (2019) also contend that Connectivism Learning Theory is more than ever applicable in just-in-time information realities. Many of the tools available to access information have engineered data analytics logarithms and memory systems (Gandomi & Haider, 2015; Schroeder, 2014).

Assessment for learning: public health

The study showed that the research participants dealt with time management issues and demonstrated critical thinking and problem-solving abilities sufficient to justify the individual and group decisions they made and explicitly rationalised, to meet assessment requirements especially as expressed in the Student Written Reflections. These reflections were about

their participation in a Public Health Group Project, which was essentially capstone activity. The merit of the experiential project was not the focus of the research, rather the capacity for participation in the project as developing work-ready skills for a public health role and the inquiry processes utilised in project inception, through to evaluation and reflection. The research participants acknowledged the benefits of their experiences as contributing to the next step in their journey, for example being organised, meeting deadlines, seeing a project through from inception to evaluation, making socially collegiate connections that helped them personally, and collaborations which progressed their objectives to such an extent that some participants expressed pride in their achievements and contributions to the community. Shared reflections previously presented cover this area generally. However, the following comment from Sandy-SR3b illustrates aspects of meeting assessment deadlines, *"Assessment has been relatively smooth and easy in relation to working in groups…we have known each other throughout the duration of the health science course and have been able to get along…our group has been able to cope with all demands and work on assignments together".*

The research literature supports service-learning capstone projects (Chamely-Wiik et al., 2014; Firn, 2015; Fitzpatrick et al., 2016; Mackenzie et al., 2019), and found to be insightful for student understanding in public health projects (Dundas et al., 2017).

Critical thinking and reasoning

Critical thinking and reasoning as part of skill set for future work-roles is a feature of the deeper learning competencies (New Pedagogies for Deep Learning Global Partnership, nd; The William and Flora Hewlett Foundation, 2013) . The DLQ sought a response related to critical thinking as being promoted in their learning program with 78% of respondents agreeing with the statement. The study participants also reflected generally about these skills in Focus Group Interview and Individual Interview. For example, Ash-II3 compared the relative merits of creativity, character, and critical thinking, stating, "*Critical thinking is more relevant, so, um, in how you, your actions…it benefits the whole community".*

This type of reflection touches on applied service learning, which was an outcome of the Public Health Group Project as capstone activity. The value of service-learning public health capstone projects is documented, in the literature, for example, it was found that addressing population health issues related to the social determinants of health as aided by non-governmental social service organizations aligned with the skill sets of undergraduates (Mackenzie et al., 2019). Another reported study, found that students who engage in

community projects report positive benefits and contributions to address real-world issues (Ayres et al., 2016). This was also found in relation to integrated assessment to address real-world problems (Cloete, 2018), and problem-oriented public health scenario assessments promote critical thinking in undergraduates (Johnson, Kakar, & Walton, 2018). Other research has shown that student satisfaction is significant in relation to project-based learning (Garnjost & Lawter, 2019), and that project-based approaches support critical thinking skills (Dimmitt, 2017). Applying design thinking approaches is also used in education settings (Abookire et al., 2020; Lor, 2017; Scheer et al., 2012), for example public health (Abookire et al., 2020).

Preparing for a role in health

The study did have a public health education orientation as is indicated in the title, research questions, and the DLQ. The research participants were all enrolled in a program with an applied focus of health science, which included core subjects considered preparatory for generic entry-level health support roles. The research cannot confirm that any of the students who graduated from the program now work in a public health role. Relatedly the research cannot confirm that the program did prepare them for a public health role. Related evidence in the case study about preparedness is what is shared in Individual Interview and Student Written Reflections. For example, as disclosed by Ash-II3 in respect of preparation for a working role, "…*public health is most relevant because it's everywhere…it'll better equip me for when I actually do go into the workforce*". Another perspective was shared by Ray-II4, "…*after doing this course…I think now I'm more pulled towards, like, public health and stuff like that*…".

Public health workforce data in Australia that shows linkages with preparatory programs is not available. As a parallel example, evidence from the USA (Erwin et al., 2019) show that 1300 graduates of undergraduate public health programs (2014-2015 data) were mostly employed (75%), and 12% seeking further education. Interestingly, it is stated that there is no formal framework for the accreditation of undergraduate public health education in Australia (Luu et al., 2019). Indeed, a search strategy using the term *public health* on Seek.com.au conducted on 7 September 2020 instructive in, but not indicative of, public health role employment prospects. The search returned 8,570 hits but only the first 100 role titles were explored. The most often cited public health role vacancies broadly ranged from environmental health, customer service, monitoring, policy, regulation, evaluation, education, research, management, and coaching, and in both private and public sector areas.

Not quite ready for work but developing real-life skills

The study participants indicated agreement that they were developing real-life skills in their responses to DLQ items which was discussed earlier in the section about the profile of the typical student. However, there was commentary that the course provided incomplete preparation for a vocational role, for example, as stated by a FG3 participant "*Not much opportunity to get a job from this program"*. More detail about general skill development was also shared in Focus Group Interview, Individual Interview, and Student Written Reflections. For example, as shared by Ray-II4, "*Yeah. I think it is definitely umm preparing us. I feel like, me personally, I won't know how prepared I am until I dive into that world I guess, but I do feel like this course umm is providing us with the right tools to be successful whatever we pursue".* A more personal viewpoint was shared by Lee-II1*, "…it makes you think outside the box and expands your views and what you do and use in your life".*

Public Health Role-Readiness

The study participants could not confirm, based on any experience in a relevant public health role, if the program prepared them for such a role. DLQ responses indicated agreement with statements pertaining to learning about certain topic areas (science, cultures, natural and physical world as it relates to population health) would help them to be work-ready. This was discussed in detail earlier in the chapter in the section about the profile of the typical student. More general comments were made about the health science program. For example in a query about why they chose the program in the first place, FG2 commended, *"Health…this was the one that interested me the most. Yeah otherwise we wouldn't be doing this course…"*. And from FG3, *"Job opportunities…because of health care industry…a subject I have interest in…pathway for other programs I want to study in the future…".* Another view is shared by Eddie-II2*, "So I've always liked, like, health…and I found it really interesting".* A more pragmatic response was shared by Nova-II5*, "Um, I basically enrolled because, um, my ATAR wasn't good enough to get into a bachelor straight away…".* However, as discussed earlier in this chapter there was commentary that some students considered that they were not quite work-ready, for example, from FG2, *"Health. Depends what area you want to be working for in health. You still feel a bit like undercooked….like I'm not work ready yet…".*

Kiviniemi and Mackenzie (2017) reference undergraduate public health education as liberal education, which they suggest optimizes opportunities for future employment. In the context of their published paper, Kiviniemi and Mackenzie (2017) also note that the liberal education approach emphasises acquisition of transferable skills, but stress that they disagree with the

characterization of liberal learning as learning for learning's sake. In contrast, professional education is discipline specific. Three domains of public health (health improvement, health protection, health service quality improvement) is the basis for public health education in the UK at MPH level, as add-ons to core components (Thorpe et al., 2008). To gauge the various ways in which universities (47) in Australia and New Zealand implement undergraduate public health education, researchers performed a content analysis of online handbook information, with 45 found to offer some form of undergraduate coursework in public health (Luu et al., 2019). Of interest is literature evidence, which has highlighted the limitations in the published literature about the preparedness of health professional students to contribute to public health (Evashwick, Tao, Perkio, Grivna, & Harrison, 2020). Other research from the UK questions the utility of public health competency frameworks given that participants in their research revealed they were not used, indeed were not functionally applicable for practitioners of public health (Shickle, Stroud, Day, & Smith, 2019). This is a concern given the demands on the public health workforce, especially with the advent of a serious pandemic, and as expressed by Abuelezam (2020, p. 976) *"…public health affects almost every aspect of society and our lives*".

Summary

Assisting students to develop the employer valued graduate skills and attributes is crucial as per report of research which involved interviewing employers who expressed valued personal qualities in employees, such as enthusiasm, dedication, ambition, attitude, confidence and curiosity (Dicker, Garcia, Kelly, & Mulrooney, 2019). However, Rios, Ling, Pugh, Becker, and Bacall (2020) account critical 21st century skills expected from college graduates as advertised by employers is suggestive that many skills reported in the literature as being critical for workplace success are actually in low demand by employers. Oral and written communication, collaboration, and problem-solving skills, however, are in high demand (Rios et al., 2020). These are skills inherent in both deep learning (Alliance for Excellent Education, 2011; Deeper Learning Hub, 2020; Fullan & Scott, 2014; Warkentien, Charles, Knapp, Silver, & RTI International, 2017), and 21st century skills (ACER, 2013; Great Schools Partnership, 2016; Hämäläinen et al., 2017; Lamb et al., 2017; Martin, 2018; Partnership for 21st Century Skills Battelle for Kids, 2019; Scoular et al., 2020; Silber-Varod et al., 2019; van Laar et al., 2020) as outcome. Virtanen and Tynjälä (2018) explored the university students' experience of learning of generic skills, for example, how they are acquired, and how they are taught. Data was via a questionnaire with findings that collaborative and interactive educator practices were predictive of developing generic skills,

whereas traditional teaching approaches, for example lecture, and working alone, showed reduced generic skill development (Virtanen & Tynjälä, 2018).

In concluding this section, the following quote from a study participant Ash-II3, is exemplar of learning in the context of public health, *"It definitely, like, makes you question the way society is, like, it's not all black and white. There's more to it… You have to look deeper for answers*…".

The prevalent literature (circa 2015) implied 21st century skills as the panacea for preparing a future responsible citizen (Bernhardt, 2015; Binkley et al., 2012; Brown, 2009; Dwyer et al., 2014; McCardle, 2014). McCune and Entwistle (2011, p. 303) used terms such as '*understand deeply'*. Fullan (2013) indicated it was time to apply 21st century learning not just pay homage to them. Since then there is growth in other education approaches, such as personalised learning (Lim et al., 2020), and learning analytics (Arroway et al., 2016), and interest in adapting aspects of 'Agile' learning systems (López-Alcarria, Olivares-Vicente, & Poza-Vilches, 2019; Schneider et al., 2020; Sweetman & Conboy, 2018). The citizen science movement, for example, is trending towards an acknowledged equity in terms of shared global public health (Australian Citizen Science Association, 2020; Callaghan et al., 2019; Füchslin et al., 2019). Citizen science is also proposed to be a latent research frontier (Lukyanenko et al., 2019) with a potential for collaborative scientific research agendas (Provenzi & Barello, 2020).

Implications of the research

The case study information is informative to educators and policy makers in regard to meeting the needs of the associate degree student to achieve expressed learning goals. The students who participated in the various activities of the study are a testament to using the means and opportunities afforded by their enrolment in the Associate Degree in Health Science in achieving, if only as a pathway, their expressed career aspirations. The implications in describing, as a composite, the typical student profile, is also instructive as a consideration in other programs with a similar student demographic. There was a clear message that for the study participants, the perceived usefulness of the associate degree was that it afforded a pathway to another study program with an actual career outcome. Australian research related to graduate employability, suggests there is a need for educators of science, technology, engineering and mathematics (STEM) programs (for example, sciences) to consider the developing strategies which help commencing students establish meaning from the messages that proliferate around their graduate careers (Bennett et al., 2020).

Another implication of the study is that a recognised vocational outcome was not the reason for enrolment for the majority of study participants. Of those with intent to complete the associate degree program, and nearing completion, there was disclosure that the program did not make them work-ready for a recognised occupation, however, also acknowledged, in reflection, employability skill development. Whilst well into the 21st century timeline, there is continued report, based on stakeholder views, that both VET and HE sectors do not adequately prepare graduates in terms of their work readiness skills, particularly self-management, communication team-work, cognitive skills, system thinking and innovation and creativity (Prikshat et al., 2019). The Employment Service Report 2020 details the reality of the challenges Australian's face in getting the relevant skills to be employed (Commonwealth of Australia Department of Jobs and Small Business, 2018). Bennett (2018) advises that education of students should be for their employability for life, instead of employment in a set career.

The study supports that a collaborative project encourages development of general capabilities in a range of 'soft-skills' such as communication, teamwork, leadership, planning, and solving problems as evidenced through self-disclosure by participants. Therefore, another implication of the research is reliable testimony of personal experience of, and application of deep learning outcomes. Other researchers have suggested certain behaviours as indicative of a deeper learning approach. For example, students who want to learn from an activity use deeper learning methods such as seeking feedback (Leenknecht, Hompus, & van der Schaaf, 2019). In the case study some participants expressed terms that suggested learning approaches trending towards an achievement, rather than outcome orientation, even if the project deliverable was less than ideal. In the literature, academic failure is reported to be an important and personal event in the lives of university students in Australia with the researchers suggesting that the ways these students make sense of their experience of failure matters for their persistence with study (if they do) and future successes (Ajjawi, Dracup, et al., 2020).

As discussed in the previous chapter, the conceptual framework was used to signpost key areas which indicated development of foundation skills, such as critical thinking and reasoning, managing behaviours and emotions, and communicating appropriately. Deep learning referenced areas indicative of developing employability skills as planning for the future. Work-readiness related to development in areas pertaining to a support role in public health.

Limitations of the research

The research indicates some suggestion of positive pedagogical outcomes related to student articulated achievements as expressed in the individual interviews and reflected about in the Student Written Reflections. However in the research literature it is suggested that the provision of real-world and authentic learning experiences is pedagogically effective (Doolan et al., 2019). In addition, it is also inferred that the realm of what is perceived cognitively as authentic by the student may be valued, certainly in first year engineering students, over a physical reality (Roach et al., 2018).

Another limitation of the case study research was not seeking deeper understanding about motivations about career aspirations as the study showed that many study participants aspired to work in a health role. The research indirectly explored motivations and barriers to learning, especially in the interviews but also in some of the items in the DLQ. It was of interest to learn what motivated the students to persist into second year even in a course that they would not, and most did not, choose as their first preference. There was some indication that students would start again in a new course and considered that they had wasted their time learning areas of little interest to them. Therefore, a further limitation was not seeking information about personalised learning needs.

Another limitation, related to research design and time, was not being able to determine if any of the participants achieved their personal career goals. Whilst most of the study participants indicated intention to work in a health-related role, it was also evident that there was some ambivalence about the formative value of subjects undertaken in preparing them for further study.

A further limitation was not having data which revealed career choice influences, and therefore choice of program of study. In the research literature there is evidence that for East Asian students the influence of their family may drive them to study for the career path that is not their choice (Dos Santos, 2020). Australian research which asked commencing students from 15 Australian universities about their career goal show that many students have a poor understanding of the education-employment pathway they have enrolled into, and whilst they may have a career goal in mind, they reveal limited understanding of the career outcomes of their courses (Lock & Kelly, 2020).

One limitation of the study was not asking research participants, via the DLQ, about which elective stream (health promotion or health information management) that they were already

enrolled in, or intended to enrol in. The health promotion elective stream included collaborative project-based assessment, whereas the health information stream did not.

Conclusion

This chapter provided a comprehensive discussion about how the case study findings addressed the research questions. The chapter was organised to first provide a summary of the case study parameters, and then discussed the profile of a typical student. The next section of the chapter was an overview of the collated findings under thematic headings, critically discussed in relation to the research literature. Implications of the case study research and limitations of the case study research was also discussed. The case study findings are situated paradigmatically and philosophically in education and public health. There are also indications based on the findings that the study participants achieved outcomes of an applied nature in generic capabilities rather than a recognised vocational outcome. The findings related to participation in and experience of a collaborative Public Health Group Project, indicates achievement oriented outcomes and pedagogy within a liberal education framework.

Chapter 6: Conclusion

In 2013 that the World Health Organization made an impassioned case for growth in the public health workforce globally (World Health Organization, 2013) building this impetus into a 21st century context with a goal to strengthen the global health workforce looking ahead to 2030 (World Health Organization, 2016). On a parallel timeline but with relatable imperatives the Organisation for Economic Development (2015) launched the Future of Education and Skills 2030 initiative aiming to support education systems determine what students require to prosper in and shape their future. Within a decade this 2030 milestone will be reached, and more than ever global well-being is being challenged on many fronts. We are well into the first quarter of the 21st century, and most of the traditional graduates of undergraduate programs henceforth will have been born this century. Yet, there is still a call for real-world public health education, as both urgent and imperative for anyone interested in a health role (Abuelezam, 2020; Fifolt & McCormick, 2019; Moradian et al., 2020; Stephen, 2020). Indeed, as stated by Stephen (2020, p. 154) *"[N]either surprises nor pandemics can be eradicated*".

It cannot be overstated, especially in 2020 and 2021, that public health is important for everyone, and everywhere. Learning about public health is also an imperative for health and health support occupations. The following quote about public health was shared during one of the individual interviews and exemplifies the vista that opens when inducted into a community of learning related to public health. The study participant had completed the public health subject and participated in Public Health Group Project activities in the semester prior to the interview.

> *"I think it is important and I, um, think you are right when you said at the beginning of the course that when you start learning more about it you start seeing it everywhere. So, I just see it everywhere... at shopping centres, on the train... think about it…you just…you know...*" Ray-(II4).

Answer to the Research Question

In what ways can Associate Degree in Health Science students engage in deep learning promoting 21st century skills to enable work-readiness at graduation?

Finding out about deep learning for 21st century skills in public health education was important for future public health workforce preparation. The researcher considered intangible skills developed in both formal and informal learning situations, such as critical thinking, self-regulation, communicating with effect, and collaboration, was a product of

participation and learning by, and learning with experience. Therefore, the research questions addressed areas which aligned with these skills. The conceptual framework, which integrated areas aligned with a foundation level of skill development (21st century skills, deep learning pedagogy, and learning by design), progressing development in general employability (deeper learning competencies and learning for 2030), and approaching work-readiness, as pertained to public health learning outcomes, reflected the areas explored in the case study research.

A key finding of the case study research was that the study participant, was not quite ready for work, but developing real-life skills. Another key finding was that the study participant, as per the typical student profile, indicated that they were using the associate degree as a pathway program to a more desirable program, such as a bachelor level health professional vocation. A third key finding was that study participants expressed achievement outcomes, and skill development in generic capabilities as disclosed in reflections about participation in a collaborative Public Health Group Project. A fourth finding is that overall, the information from all aspects of the case study implied a future-focused work ethic, that is, their program of study was foremost the means to achieve an eventual career aspiration and not in and of-itself subsumed to a liberal education endeavour. A fifth key finding, relates to support for the applied program as liberal learning in that study participants expressed achieved outcomes were related in terms of preparation for work, meeting civic responsibilities, and learning lessons about themselves and life in general. A surprising finding was the reflections which implied resilience and pragmatism in dealing with challenging experiences, contemplatively conceding that they could repurpose some of this learned experience to negotiate future study and/or career opportunities.

What are the learning approaches used by Associate Degree in Health Science students?
The case study showed that participants used learning approaches to meet their personal learning needs in relation to revealing preference towards visual style, learning by doing, and in stages. Both individual and group learning and assessment strategies was valued, particularly practical ones. Reflections and interview narrative about participation in collaborative projects indicated insight into using general capability skills in applied ways, especially in ways of thinking, and tools for working to achieve outcomes. Other areas enabling progress in learning was implied in reflective and interview narrative which expressed skill development in communication, problem solving, self-regulation, and achievement oriented goal setting.

What pedagogical strategies support deep learning outcomes to promote generic and transferrable 21st Century skills?

The bounded case study was specific to a health science topic area in an associate degree level program which suited pedagogical approaches to meet learning styles congruent with constructivist and experiential components. This was indicated in self-disclosure by study participants in agreement with approaches which facilitated learning with and from experience, and in expressed behavioural clues valuing development of general capabilities (communication, critical thinking, creativity), especially in reflective writing about participation in collaborative projects.

What questioning approaches do students use in an instructor facilitated Public Health Group Project?

The study participants used strategies that they were experienced with, such as digital tools and search-engines such as Google and Google Scholar. Other information seeking behaviours were also revealed in relation to primarily using support networks of student peers, especially in collaborative endeavours. Research for its own learning potential was not highly valued and deemed an effort, for example, in a part of the project requirement for literature review to support evidence-informed practice.

Recommendations for further research

The case study indicated that the associate degree was not valued particularly on its merit of a vocational outcome, but was rather considered a default position, a pathway, and temporary at best. The onus, therefore, and a recommendation for further research and scrutiny, that arises from the study is that educationists of this level of program design, market, and support the associate degree as a first preference program. That is, a program that would ideally meet the needs for pre-service preparation into entry-level (health support) roles.

Another area that could benefit from further research relates to determining the impact of ATAR on long-term career and/or occupation direction, especially for associate degree level programs in Australia. Some study participants were doing the Associate Degree in Health Science program because their ATAR was not high enough to get them into their preferred course. Getting a university offer in Australia is a competitive process for most school-leavers. For example, the type of vocational aspiration the participants in the study desired required an ATAR score before an offer be made, that is, the individual as ranked against all others of their age group (VTAC, 2020). The ATAR is not necessarily congruent with student

aptitude or motivation for a certain vocational outcome is a recommended testable hypothesis for research.

As a follow-on from the prior recommendation is to then explore factors which encourage enrolment and persistence and success in a program such as an associate degree, despite low ATAR or other entry requirement impediments. In literature from the USA it was found that teaching rigorously, which included classroom practices and assignments that require students to engage in deep learning and demonstrate cognitive complexity, is positively associated with self-motivated learning at the end of first year of college, especially for those with lower enter scores (Culver et al., 2019). This trend was found to continue through their studies (Culver et al., 2019).

The researcher, prior to developing the research protocols hypothesised that the art of asking a question was not an innate ability, and in present social environments which promote digital communication and 'just-in-time' information making relevant inquiries to address 'academic' needs needed constructive support. In the study, it was of interest to note that the research participants implied by agreeing with pertinent statements, that they felt comfortable and confident about asking questions in a variety of contexts and means and working both collaboratively and independently to achieve their learning goals. Further research is recommended in the area of the student information inquiry approaches used in associate degree level programs.

As a recommendation for further research, it would be of benefit to explore the perceived value of asking relevant questions from a potential employer perspective. The rationale for this suggestion is the urgency of communication in certain situations, for example, in a health role, where effective questioning could contribute to preserving life. This rationale extends to the tools used for inquiry processes as engineered for purpose.

Social connections were also valued for intrinsic motivations and persistence in collective learning contexts despite the challenge of disparate and occasional discordant personalities as disclosed in Student Written Reflections. Being a student is complex and influenced by many factors, such as resources, networks, and survival within what Gibson, Grace, O'Sullivan, and Pritchard (2018, p. 831) suggest is the "*neoliberal society need for graduates*". There is evidence that students in Australian universities are struggling with mental health issues related particularly to, personal issues, being away from home, and the focus on grades rather than preparation for the work-force (Usher, 2019). Other Australian research has indicated that university students most frequently turn to friends and people for

social connections and a sense of belonging (van Gijn-Grosvenor & Huisman, 2019). Further research is recommended to explore social, economic, diversity, ecological, geographic, health, and well-being factors that impact completion rates of students enrolled in associate degree level programs in Australia with intent to develop risk mitigation policy and practice.

The Deep Learning for 21st Century Skills in Public Health Education Questionnaire (DLQ) was developed as a research tool for the case study and never intended to provide psychometric indications or scale measures of deep learning *per se*. However, as a recommendation for further research, the DLQ could be refined and tested for reliability and validity across different target population groups in the higher education sector.

Another recommended area for further research is related to citizen science and how it might be integrated into a public health research experience framework as entry level exploration of public health population level issues from an 'outside looking in' perspective.

Thesis Summary

The case study topic was deep learning for 21st century skills in public health education, which is also the title of the thesis. The researcher was curious about deep learning and work-readiness and whether these were demonstrable in some way in a cohort of students undertaking associate degree level studies. As an educator, the researcher was anecdotally aware that many students enrolled into the associate degree as a pathway into higher studies, these usually related to a regulated health-professional role. The researcher specifically wanted to know about work-readiness, learning approaches used, pedagogical strategies which supported development of 21st century skills, and collaborative inquiry processes within a public health group project. The public health group project was essentially capstone activity for students enrolled in the elective stream related to promoting health.

As the research was being conducted in the purview of an educational setting and as educational research, it inherently embodies conventions of theoretical underpinnings. The researcher, as an educator, was philosophically inclined towards constructivism, and particularly as related to transformational theory, and via authentic and experiential learning designs and approaches. The educator, as the researcher, was confounded by the conflicting body of knowledge, some of which critically deconstructed education canon that they had observed over the years. Consequently, the researcher chose guidance for the frame of reference for the case study with an amalgam of theories, frameworks, and

educational movements which were about preparing the learners to deal with future anything.

At the outset the research was always only about the student experience, and this was a pragmatic choice. The researcher acknowledges that the effect of the educators on the students in the program could not be discounted as influencing certain responses, however, this was beyond the bounded case study parameters. The researcher expected the research to generate a deeper insight about how the associate degree student is learning which enables them to achieve their aspirations. This is an important contribution to the field of knowledge of education, and to public health education, as future workforce is shaped by what shapes them.

The active phase of the case study was conducted when little information was available about associate degree level programs in Australia, especially in the higher education sector. Extant literature suggested pathway to further study was its main attraction and this was borne out in the case study population. Given the nature of the case study research, the researcher factored in certain limitations, for example, that longitudinal design was not compatible with PhD timelines. And in due course, other limitations were identified and gaps in information arose, for example, course elective direction of interest. On the other hand, the case study research enabled a varied perspective exploration of the population of associate degree students undertaking certain studies, with uncertain expectations, for a future career which was dependent on them achieving academic success. The study was not intended to determine if skill mastery in a particular vocation was achieved but did uncover that participants in the qualitative inquiry recognised and acknowledged key experiences and activities as contributing to their future career aspirations.

Thesis Chapter's - Summary

In Chapter 1: Introduction, the researcher expressed an overview of the research area and questions guiding the inquiry. In addition, the researcher explained the rationale for choosing case study methodology supported with methods of both quantitative and qualitative activities. Research ontology and epistemology was neither inclined to realism nor relativism, but a more eclectic 'all things possible' and multiple realities conceivable. As an educator the researcher inclined towards subjective constructivism, and the notion of heutagogy and learner-centred and assessment for learning approaches. As a socially accountable and responsible citizen the researcher also sought to model behaviours resonant of 21st century ways of living and working and, conscientious about contributing usefully with their research

endeavours. This latter ambition was influenced by the researcher's background as a health professional and adherent of public health principles especially in the context of socio-ecological determinants of health and well-being.

Chapter 2: Literature Review, was a comprehensive critical appraisal of published report on areas related to the research. For example, work-readiness of graduates, preparing public health future workforce, deep learning for 21st century skills, pedagogy, learner engagement, and other areas inherent in educational and applied learning contexts, for example, technology. Questioning approaches was explored from the perspective of teacher-centred or learner-centred or shared inquiry. How students access and use information was examined in the context of digital technologies, and then extended to the practice, utility, and ethical concerns in the expansive growth in learning analytics. An holistic picture emerged of undergraduate public health education gaining momentum, especially in the USA as offered in community college. Public health workforce was described as diverse and preparation to practice equally varied. The work-readiness and employability of graduates in both vocational practice but also generic skills areas is reported as needing to be improved, though the vocationalism of universities was also critiqued, as was the rise of neoliberalism. Undergraduate life is a challenge, and knowing how to learn and what to learn, and why, is also revealed in the review. However, there are multiple methodologies and approaches recommended and or critiqued. For example, learning style preference discounted on the one hand as lacking conclusive empirical evidence and on the other recommended as contributing to personal learning. The rise of citizen science was also explored, as potential future directions to explore in relation to public health workforce preparation. The associate degree was also explored, especially in local context, but also from other jurisdictions around the world, and it was apparent that limited report about this level of program is available in Australia.

Chapter 3: Methodology, comprehensively presented how the research would be conducted, including scope of the research. Ethical issues and ethical approvals and researcher reflexivity were discussed. Detailed rationale about why the methodology and methods was determined to best address the research questions, as bounded case study. A primarily qualitative inquiry was proposed and eventually executed. Thorough detail was provided about all research activities, and tools utilised in the research. The researcher described the instrument developed for the research, the *Deep Learning for 21st Century Skills in Public Health Questionnaire*, which was administered along with the *Index of Learning Style Questionnaire* which is a validated tool developed by Felder and Soloman (nd-a). The quantitative aspects were analysed, and frequencies and percentages used for descriptive

purposes where applicable, to contribute to the qualitative narrative. Where possible, information was summarised and presented in tables or infographic format. Focus group interviews and individual interviews were also conducted and transcribed verbatim into written text and subjected to qualitative content analysis for emergent themes and findings to be shared using the participant voice illustratively. Student written reflections also contributed valuable personal viewpoints about collaborative experiences of executing a community public health project.

Chapter 4: Presentation of Results provided information of the findings of the case study as explored and analysed using the methods described in Chapter 3: Methodology. The qualitative narrative text was content analysed but the richer description was provided as product of the participant's own voice wherever possible. Emergent themes were that associate degree study was a pathway to something else, most likely a bachelor's degree to prepare for a health professional role. In addition, the typical student was most likely to prefer to learn by doing and inclined towards visual, practical, and experiential, real-world experience. A thought-provoking finding was that in relation to the associate degree, there was perception that it would not quite make them ready for work, but they were developing real-life skills.

Chapter 5: Discussion, was included to integrate the research and discuss the information in relation to the published literature. This was presented under main research emergent themed headings. The researcher showed that areas that emerged from the research aligned with published report and/or added more richness to what is known about the undergraduate experience of collaborative public health community projects, as well as contributing new information about associate degree level student experience in Australia.

Concluding Comments

The Associate Degree in Health Science student research participants appreciated authentic learning experiences and hands-on practical opportunities even if they did not particularly enjoy the journey to get there. An encouraging finding was that, through shared reflective narrative, the student participant showed resilience and pragmatism in dealing with challenging experiences, and thoughtfully expressing ways that these experiences could be opportunistic growth opportunities in areas of life and work and further study. There was evidence of some of the study participants being able to recognise their achievements and positively express these, despite a disconnect with the study program, at times, and their expectations of the said program, as well as testing collaborative relationships, and occasional discouraging outcomes.

In this thesis, the researcher has provided information to contribute to the body of knowledge in the area of associate degree level student experience and pedagogy. In addition, the research has provided rich data about embodied deep learning behaviours disclosed by undergraduate associate degree students in their own voice.

In terms of contribution to practice the research highlights information gaps related to associate degree level program vocational outcomes and expectations as areas for continuous improvement. Knowing the preferences and aspirations generally, of a representative cohort can direct change to better meet needs. Stakeholders in the institution may use the information to market programs which appeal to the typical student requirements, for more hands-on learning opportunities and defined vocational outcomes and guaranteed pathways.

Generally, since the research was conducted there has arisen a greater community awareness about work-readiness for support roles in public health contexts. Approaches to foster deeper learning and future forward prospects of transfer of abilities into other contexts and roles could usefully inform similar program areas and contexts. Potential public health workforce is facilitated with educational introductory programs which promote authentic, experiential applied practice with collaborative projects which address real community issues.

Students graduating higher education programs need skills not just in core subjects but also in ways of living and working in the world, and applying what they know to new situations, which align with deep learning for 21st century ideals as responsible and thriving citizens of the future. This case study research provided information about how students engaged in authentic and collaborative experiential learning for entry-level support roles in public health, as revealed in report of participant perception primarily through qualitative enquiry, as well as contribute information about the associate degree student experience in Australia. As well as describing the 'typical' student profile in relation to the case study, a key finding was that participants expressed personal objectives to eventually work in a recognised health-role but identified that while the associate degree helped them develop work-ready skills, they were not quite ready for work, especially for a role in public health. The associate degree, in Australia, is reported to be used mostly as a pathway to further study in the higher education sector. There is limited reported evidence about associate degree experience in Australian universities, especially in relation to public health education and this research contributes to the body of knowledge.

References

.idCommunity. (2016a). Greater Melbourne Education Institution Attending. Retrieved from https://profile.id.com.au/australia/education?WebID=260

.idCommunity. (2016b). Greater Melbourne language spoken at home. Retrieved from https://profile.id.com.au/australia/language?WebID=260

Abdel Meguid, E., & Collins, M. (2017). Students' perceptions of lecturing approaches: traditional versus interactive teaching. *Advances in Medical Education and Practice, 8*, 229-241. doi:10.2147/AMEP.S131851

Abookire, S., Plover, C., Frasso, R., & Ku, B. (2020). Health design thinking: An innovative approach in public health to defining problems and finding solutions. *Frontiers in Public Health, 8*(Article 459), 1-6. doi:10.3389/fpubh.2020.00459

Abraham, R. R., & Komattil, R. (2017). Heutagogic approach to developing capable learners. *Medical Teacher, 39*(3), 295-299. doi:10.1080/0142159X.2017.1270433

Abreu, M., Koster, S., & Venhorst, V. A. (2014). Transitions and location choice: Analysing the decisions of students and recent graduates. *Spatial Economic Analysis, 9*(4), 349-354. doi:10.1080/17421772.2014.965552

Abuelezam, N. N. (2020). Teaching Public Health will never be the same. *American Journal of Public Health, 110*(7), 976-977. doi:10.2105/AJPH.2020.305710

Acar, O. A., & Tuncdogan, A. (2018). Using the inquiry-based learning approach to enhance student innovativeness: a conceptual model. *Teaching in Higher Education, 24*(7), 895-909. doi:10.1080/13562517.2018.1516636

ACER. (2013). Using data to enhance 21st century skill development in VET Discussion paper for the Summit on Data for Quality Improvement in VET. Retrieved from https://research.acer.edu.au/transitions_misc/19/

Adams, N. E. (2015). Asking a great question: A Librarian teaches questioning skills to first-year medical students. *Medical Reference Services Quarterly, 34*(4), 418-427. doi:10.1080/02763869.2015.1052691

Addo-Atuah, J. (2014). Making a case for a public health orientation in global pharmacy education and practice in the context of the Millennium Development Goals (MDGs). *Currents in Pharmacy Teaching and Learning, 6*(5), 723-729. doi:10.1016/j.cptl.2014.05.019

Agostinho, S., Lockyer, L., & Bennett, S. (2018). Identifying the characteristics of support Australian University teachers use in their design work: Implications for the learning design field. *Australasian Journal of Educational Technology, 34*(2), 1-15.

Agrawal, A., & Rajapakse, D. C. (2018). Perceptions and practice of peer assessments: an empirical investigation. *International Journal of Educational Management, 32*(6), 975-989. doi:10.1108/ijem-05-2016-0085

Ahola-Launonen, J. (2015). The evolving idea of social responsibility in bioethics. *Cambridge Quarterly of Healthcare Ethics, 24*, 201-213. doi:10.1017/S0963180114000516

Ajjawi, R., Dracup, M., Zacharias, N., Bennett, S., & Boud, D. (2020). Persisting students' explanation of and emotional responses to academic failure. *Higher Education Research & Development, 39*(2), 185-199. doi:10.1080/07294360.2019.1664999

Ajjawi, R., Tai, J., Huu Nghia, T., Boud, D., Johnson, L., & Patrick, C. (2020). Aligning assessment with the needs of work-integrated learning: the challenges of authentic assessment in a complex context. *Assessment & Evaluation in Higher Education, 45*(2), 304-316. doi:10.1080/02602938.2019.1639613

Al-Shorbaji, N., Atun, R., Car, J., Majeed, A., & Wheeler, E. (2015). *eLearning for Undergraduate Health Professional education.* Retrieved from Imperial College London and World Health Organization, Geneva: http://www.who.int/hrh/documents/14126-eLearningReport.pdf

Alawattage, C., & Azure, J. (2019). Behind the World Bank's ringing declaration of "Social Accountability": Ghana's public financial management reform. *Critical Perspectives on Accounting*(14 February).

Allen, K., Quinn, J., Hollingworth, S., & Rose, S. (2013). Becoming employable students and "ideal" creative workers: exclusion and inequality in higher education work placements. *British Journal of Sociology of Education, 34*(3), 431-452.

Alliance for Excellent Education. (2011). A time for Deeper Learning: Preparing students for a changing world. Policy Brief. Retrieved from http://all4ed.org/

Alliance for Excellent Education. (2014). Beyond High School: Efforts to improve Postsecondary transition through Linked Learning. Retrieved from http://all4ed.org/

Almeida, P. A., Teixeira-Dias, J. J., Martinho, M., & Balasooriya, C. D. (2011). The interplay between students' perceptions of context and approaches to learning. *Research Papers in Education, 26*(2), 149-169. doi:10.1080/02671522.2011.561975

Alt, D. (2015). Assessing the contribution of a constructivist learning environment to academic self-efficacy in higher education. *Learning Environments Research, 18*(1), 47-67. doi:10.1007/s10984-015-9174-5

Alton, S. (2016). Learning how to learn: Meta-learning strategies for the challenges of learning pharmacology. *Nurse Education Today, 38*(March), 2-4. doi:10.1016/j.nedt.2016.01.003

American Psychological Association. (n.d.). APA Style Sixth Edition Resources. Retrieved from https://apastyle.apa.org/6th-edition-resources

Ananiadou, K., & Claro, M. (2009). *21st Century Skills and Competencies for New Millennium Learners in OECD Countries*. (1993-9019). OECD Publishing.

Anderman, E. M., & Koenka, A. C. (2017). The relation between academic motivation and cheating. *Theory into Practice, 56*(2), 95-102. doi:10.1080/00405841.2017.1308172

Anderton, R. S. (2017). Identifying factors that contribute to academic success in first year allied health and science degrees at an Australian University. *Australian Journal of Education, 61*(2), 184-199. doi:10.1177/0004944117713321

Araz, O., & Jehn, M. (2013). Improving public health emergency preparedness through enhanced decision-making environments: A simulation and survey based evaluation. *Technological*

Forecasting & Social Change, 80(9), 1775-1781. doi:http://dx.doi.org/10.1016/j.techfore.2012.09.018

Arnold, L., Embry, E., & Fox, C. (2015). Advising undergraduate Public Health students: A phased approach. *Public Health Reports, 130*(4), 415-420.

Arroway, P., Morgan, G., O'Keefe, M., & Yanosky, R. (2016). *Learning Analytics in Higher Education*. Retrieved from https://library.educause.edu/~/media/files/library/2016/2/ers1504la

Aschbacher, P., Li, E., & Roth, E. (2010). Is science me? High school students' identities, participation and aspirations in science, engineering, and medicine. *Journal of Research in Science Teaching, 47*(5), 564-582. doi:10.1002/tea.20353

Asher, A., Duke, L., & Wilson, S. (2013). Paths of discovery: Comparing the search effectiveness of EBSCO Discovery Service, Summon, Google Scholar, and conventional library resources. *College and Research Libraries, 74*(5), 464-488. doi:https://doi.org/10.5860/crl-374

Asikainen, H., & Gijbels, D. (2017). Do students develop towards more deep approaches to learning during studies? A Systematic Review on the development of students' deep and surface approaches to learning in Higher Education. *Educational Psychology Review, 29*(2), 1-30. doi:10.1007/s10648-017-9406-6

Asmodee Digital. (2019). Pandemic. Retrieved from https://www.asmodee-digital.com/en/pandemic/

Aspin, D. (2007). *Philosophical Perspectives on Lifelong Learning* (Vol. 11). The Netherlands: Springer.

Assessment and Teaching of 21st Century Skills Project. (2012). *21st Century Skills*. Retrieved from http://www.atc21s.org/.

Association of American Colleges and Universities. (2015). Employer priorities for most important college learning outcomes. Retrieved from https://www.aacu.org/leap/public-opinion-research/2015-employer-priorities

Association of American Colleges and Universities. (2018). *Fulfilling the American Dream: Liberal Education and the Future of Work*. Retrieved from https://www.aacu.org/research/2018-future-of-work.

Association of Schools & Programs of Public Health. (2011). Undergraduate Public Health Learning Outcomes Model - Version 1.0. Retrieved from http://www.aspph.org/educate/models/undergraduate-learning-outcomes/

Association of Schools & Programs of Public Health. (2014). Framing the Future: Community Colleges and Public Health Project Final Report. Retrieved from http://www.aspph.org/educate/framing-the-future/

Ata, R., & Adnan, M. (2016). Cyberbullying sensitivity and awareness among entry-level university students. *Journal of Human Sciences, 13*(3), 4258-4267. doi:10.14687/jhs.v13i3.4153

Attia, M., & Edge, J. (2017). Be(com)ing a reflexive researcher: a developmental approach to research methodology. *Open Review of Educational Research, 4*(1), 33-45. doi:10.1080/23265507.2017.1300068

Australian Citizen Science Association. (2020). Citizen Science and COVID-19. Retrieved from https://citizenscience.org.au/2020/04/20/citizen-science-and-covid-19/

Australian Government. (2013). *Core Skills for Work Developmental Framework - Overview*. Canberra: Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education; and Department of Education, Employment and Workplace Relations Retrieved from https://docs.education.gov.au/system/files/doc/other/1._csfw_framework_0.pdf.

Australian Government. (2017). *Characteristics of Australian higher education providers and their relation to first-year student attrition*. Retrieved from https://www.teqsa.gov.au/sites/default/files/attrition-report-june-2017-19dec2017.pdf?v=1513650539.

Australian Government. (2020). *Selected Higher Education Statistics – 2018 Student data*. Retrieved from https://www.education.gov.au/selected-higher-education-statistics-2018-student-data.

Australian Government, & European Commission. (2016). *Comparative Analysis of the Australian Qualifications Framework and the European Qualifications Framework for Lifelong Learning: Joint Technical Report.* Retrieved from https://internationaleducation.gov.au/.

Australian Government Department of Health. (2013). *Review of Australian Government Health Workforce Programs*. Retrieved from https://www1.health.gov.au/internet/publications/publishing.nsf/Content/work-review-australian-government-health-workforce-programs-toc.

Australian Government Department of Health. (2016). Public Health Medicine 2016 Factsheet. Retrieved from https://hwd.health.gov.au/publications.html

Australian Government Department of Home Affairs. (nd). Subclass 190 Skilled Nominated visa. Retrieved from https://immi.homeaffairs.gov.au/visas/getting-a-visa/visa-listing/skilled-nominated-190

Australian Government Study Assist. (2021). Scholarships. Retrieved from https://www.studyassist.gov.au/you-study/scholarships

Australian Government Study Australia. (2021). Dictionary. Retrieved from https://www.studyaustralia.gov.au/Dictionary.aspx?FirstLetter=c

Australian Qualifications Framework Council. (2013). *Australian Qualifications Framework 2nd Edition*. Retrieved from https://www.aqf.edu.au/sites/aqf/files/aqf-2nd-edition-january-2013.pdf.

Ayres, R., Stevens, S., & Regan de Bere, S. (2016). Getting real in the community: Evaluating the "making a difference" interdisciplinary social engagement project. *MedEdPublish, 5*(2). doi:10.15694/mep.2016.000081

Baeten, M., Dochy, F., Struyven, K., Parmentier, E., & Vanderbruggen, A. (2016). Student-centred learning environments: An investigation into student teachers' instructional preferences and approaches to learning. *Learning Environments Research, 19*(1), 43-62. doi:10.1007/s10984-015-9190-5

Baik, C., Naylor, R., & Arkoudis, S. (2015). *The first year experience in Australian Universities: Findings from two decades, 1994-2014*. The University of Melbourne Retrieved from https://melbourne-cshe.unimelb.edu.au/__data/assets/pdf_file/0016/1513123/FYE-2014-FULL-report-FINAL-web.pdf.

Baird, A., & Parayitam, S. (2019). Employers'ratings of importance of skills and competencies college graduates need to get hired: evidence from the New England region of USA. *Education + Training, 61*(5), 622-634.

Balasooriya, C. D., Tetik, C., & Harris, P. (2011). Why is my design not working? The role of student factors. *Research Papers in Education, 26*(2), 191-206. doi:10.1080/02671522.2011.561978

Banfield, J., & Wilkerson, B. (2014). Increasing student intrinsic motivation and self-efficacy through gamification pedagogy. *Contemporary Issues in Education Research, 7*(4), 291-298.

Barajas, E., Vela, C., & Huerta, J. (2016). Exploring university teacher perceptions about out-of-class teamwork. *Profile Issues in Teachers' Professional Development, 18*(2), 29-45. doi:10.15446/profile.v18n2.53364

Barger, M., Perez, T., Canelas, D., & Linnenbrink-Garcia, L. (2018). Constructivism and personal epistemology development in undergraduatechemistry students. *Learning and Individual Differences, 63*, 89-101. doi:10.1016/j.Indif.2018.03.006

Barnes, A., Balnave, N., & Holland, P. (2018). 'Utterly Disgraceful': Social Media and the workplace. *Australian Journal of Public Administration, 77*(3), 492-499. doi:10.1111/1467-8500.12314

Bashan, B., & Holsblat, R. (2017). Reflective journals as a research tool: The case of student teachers' development of teamwork. *Cogent Education, 4*(1), 1374234. doi:10.1080/2331186X.2017.1374234

Bashkin, O., & Tulchinsky, T. H. (2017). Establishing undergraduate public health education: Process, challenges, and achievements in a case study in Israel. *Public Health Reviews, 38*, 11. doi:10.1186/s40985-017-0057-4

Bass, S., Guttmacher, S., & Nezami, E. (2008). Who will keep the public healthy? The case for undergraduate public health education: a review of three programs. *Journal of Public Health Management and Practice, 14*(1), 6-14. doi:org/10.1097/01.PHH.0000303407.81732.02

Baum, E. (2013). Augmenting guided-inquiry learning with a blended classroom approach. *Journal of College Science Teaching, 42*(6), 27-33.

Baxter, P., & Jack, S. (2008). Qualitative case study methodology: Study design and implementation for novice researchers. *The Qualitative Report, 13*(4), 544-559.

Bazeley, P. (2012). Integrative analysis strategies for mixed data sources. *American Behavioral Scientist, 56*(6), 814-828. doi:10.1177/0002764211426330

Beattie, G., Laliberte, J., Michaud-Leclerc, C., & Oreopoulos, P. (2019). What sets college thrivers and divers apart? A contrast in study habits, attitutes, and mental health. *Economics Letters, 178*, 50-53. doi:10.1016/j.econlet.2018.12.026

Beck, A., Meit, M., Heffernan, M., & Boulton, M. (2015). Application of a taxonomy to characterize the public health workforce. *Journal of Public Health Management and Practice, 21*(6 Supp), S36-S45.

Bedek, M., Seitlinger, P., Kopeinik, S., & Alber, D. (2012). Inferring a learner's cognitive, motivational and emotional state in a digital educational game. *Electronic Journal of e-Learning, 10*(2), 172-184.

Bell, J., & Waters, S. (2014). *Doing your Research Project: A Guide for First-Time Researchers* (6 ed.). Glasgow: McGraw Hill Education.

Bennett, D. (2018). Graduate employability and higher education: Past, present and future. *HERDSA Review of Higher Education,* (5), 31-61. Retrieved from www.herdsa.org.au/herdsa-review-higher-education-vol-5/31-61

Bennett, D., Knight, E., & Bell, K. (2020). Graduate employability and the career thinking of university STEMM students. *Teaching in Higher Education, 25*(6), 750-765. doi:10.1080/13562517.2020.1759529

Bennett, D., Richardson, S., & MacKinnon, P. (2016). *Enacting strategies for graduate employability: How universities can best support students to develop generic skills. Final Report (Part A)*. Australian Government Office for Learning and Teaching. Department of Education and Training. Canberra, ACT Retrieved from http://graduateemployability.curtin.edu.au.

Benson, R., Heagney, M., Hewitt, L., Crosling, G., & Devos, A. (2014). Diversity and achievement: Is success in higher education a transformational experience? *Australian Journal of Adult Learning, 54*(2), 8-31.

Bernhardt, P. (2015). 21st century learning: Professional development and practice. *The Qualitative Report, 20*(1), 1-19.

Bernstein, J., Friedman, C., Jacobson, P., & Rubin, J. (2015). Ensuring public health's future in a national-scale learning health system. *American Journal of Preventive Medicine, 48*(4), 480-487. doi:10.1016/j.amepre.2014.11.013. Epub 2015 Feb 18

Better Education. (2018). ATAR Cutoffs - Nursing - 2018. Retrieved from https://bettereducation.com.au/university/atarCutoffs.aspx?course=Nursing

Bhatt, I., & MacKenzie, A. (2019). Just Google it! Digital literacy and the epistemology of ignorance. *Teaching in Higher Education, 24*(3), 302-317. doi:10.1080/13562517.2018.1547276

Bhavsar, V. M., Dypiangco, C. M., & Moreau, R. (2016). “Fifty Questions”: Encouraging students to ask questions and evaluate information. *Natural Sciences Education, 45*(1). doi:10.4195/nse2015.0029

Bianco, V., Berchicci, M., Quinzi, F., Perri, R., Spinelli, D., & DiRusso, F. (2020). Females are more proactive, males are more reactive: Neural basis of the gender-related speed/accuracy trade-off in visuo-motor tasks. *Brain Structure and Function, 225*(1), 187-201. doi:10.1007/s00429-019

Biggs, J. (2012). What the student does: Teaching for enhanced learning. *Higher Education Research & Development, 31*(1), 39-55. doi:10.1080/07294360.2012.642839

Biggs, J. (2014). Constructive alignment in university teaching. *HERDSA Review of Higher Education, 1*, 5-22. Retrieved from http://www.herdsa.org.au/herdsa-review-higher-education-vol-1/5-22

Biggs, J., & Tang, C. (2007). *Teaching for Quality Learning at University: What the student does.* (3 ed.). Maidenhead: SRHE & Open University Press.

Biggs, J., & Tang, C. (2009). *Applying constructive alignment to outcomes-based teaching and learning*. Retrieved from tudelft.nl.

Bill and Melinda Gates Foundation. (nd). Who We Are. Retrieved from https://www.gatesfoundation.org/Who-We-Are

Binkley, M., Erstad, O., Herman, J., Raizen, S., Ripley, M., Miller-Ricci, M., & Rumble, M. (2012). Defining Twenty-First Century Skills. In P. Griffin, B. McGaw, & E. Care (Eds.), *Assessment and Teaching of 21st Century Skills* (10.1007/978-94-007-2324-5_2pp. 17-66): Springer Netherlands.

Binkley, M., Erstad, O., Herman, J., Raizen, S., Ripley, M., & Rumble, M. (2009). *Draft White Paper 1: Defining 21st Century Skills*. Retrieved from https://www.researchgate.net/publication/242717633_Draft_White_Paper_1_Defining_21st_century_skills/link/540460360cf2bba34c1c7a17/download.

Bjerkvik, L. K., & Hilli, Y. (2019). Reflective writing in undergraduate clinical nursing education: A literature review. *Nurse Education in Practice, 35*, 32-41. doi:10.1016/j.nepr.2018.11.013

Blakely, G., Skirton, H., Cooper, S., Allum, P., & Nelmes, P. (2009). Educational gaming in the health sciences: systematic review. *Journal of Advanced Nursing, 65*(2), 259-269. doi:10.1111/j.1365-2648.2008.04843.x

Blaschke, L., & Hase, S. (2021). Heutagogy and Work. In S. Hase & L. Blaschke (Eds.), *Unleashing the Power of Learner Agency*: EdTech Books.

Boelen, C., & Woollard, R. (2011). Social accountability: The extra leap to excellence for educational institutions. *Medical Teacher, 33*, 614-619. doi:10.3109/0142159X.2011.590248

Boelens, R., De Wever, B., Rosseel, Y., Verstraete, A. G., & Derese, A. (2015). What are the most important tasks of tutors during the tutorials in hybrid problem-based learning curricula? *BMC Medical Education, 15*(1), 84. doi:10.1186/s12909-015-0368-4

Bolden, E. C., Oestreich, T. M., Kenney, M. J., & Yuhnke, B. T. (2019). Location, location, location: A comparison of student experience in a lecture hall to a small classroom using similar techniques. *Active Learning in Higher Education, 20*(2), 139-152. doi:10.1177/1469787417742018

Borun, M., Schaller, D. T., Chambers, M. B., & Allison-Bunnell, S. (2010). Implications of learning style, age group, and gender for developing online learning activities. *Visitor Studies, 13*(2), 145-159. doi:10.1080/10645571003621513

Boud, D. (1985). Problem-based learning in perspective. In D. Boud (Ed.), *Problem-based Learning in Education for the Professions*. Sydney: Higher Educationa Research and Development Society of Australasia.

Boud, D., & Associates. (2010). *Assessment 2020: Seven propositions for assessment reform in higher education* University of Technology Sydney: Australian Learning & Teaching Council Retrieved from https://www.uts.edu.au/sites/default/files/Assessment-2020_propositions_final.pdf.

Boud, D., & Solomon, N. (2007). Work-Based Learning, Graduate Attributes and Lifelong Learning. In P. Hager & S. Holland (Eds.), *Graduate Attributes, Learning and Employability* (10.1007/1-4020-5342-8_11pp. 207-220). Dordrecht: Springer.

Boud, D., & Solomon, N. (Eds.). (2001). *Work-based Learning: A New Higher Education?* Philadelphia: Society for Research into Higher Education & Open University Press.

Bouvier, P., Lavoue, E., & Sehaba, K. (2014). Defining engagement and characterizing engaged-behaviors in digital gaming. *Simulation & Gaming, 45*(4-5), 491-507. doi:10.1177/1046878114553571

Bovijn, J., Kajee, N., Esterhuizen, T. M., & Van Schalkwyk, S. C. (2017). Research involvement among undergraduate health sciences students: a cross-sectional study. *BMC Medical Education, 17*(1), 186. doi:10.1186/s12909-017-1025-x

Bowden, M., Abhayawansa, S., & Bahtsevanoglou, J. (2015). Overconfidence of vocational education students when entering higher education. *Education + Training, 57*(4), 429-447. doi:10.1108/ET-02-20-2014-0012

Bowering, E., Mills, J., & Merritt, A. (2017). Learning how to learn: A student success course for at-risk students. *The Canadian Journal for the Scholarship of Teaching and Learning, 8*(3), Article 12. Retrieved from https://files.eric.ed.gov/fulltext/EJ1162951.pdf

Bowker, M. (2010). Teaching students to ask questions instead of answering them. *Thought & Action, Fall 2010*, 127-134.

Boyd, N., Liu, X., & Horissian, K. (2020). Impact of community experiences on student retention perceptions and satisfaction in higher education. *Journal of College Student Retention: Research, Theory & Practice,* 10.1177/1521025120916433. doi:10.1177/1521025120916433

Boydell, V., McMullen, H., Cordero, J., Steyn, P., & Kiare, J. (2019). Studying social accountability in the context of health system strengthening: Innovations and considerations for future work. *Health Research Policy and Systems, 17*(34), 1-6. doi:10.1186/s12961-019-0438-x

Bradley, D., Noonan, P., Nugent, H., & Scales, B. (2008). *Review of Australian higher education: final report [Bradley Review]*. (9780642778048). Canberra: DEEWR.

Bradshaw, C., Atkinson, S., & Doody, O. (2017). Employing a qualitative description approach in health care research. *Global Qualitative Nursing Research, 4*, 1-8. doi:10.1177/2333393617742282

Bragg, D., & Ruud, C. (2011). *The Adult Learner and the Applied Baccalaureate: Lessons from six states*. Urbana-Champaign: University of Illinois.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77-101. doi:10.1191/1478088706qp063oa

Braun, V., & Clarke, V. (2016). (Mis)conceptualising themes, thematic analysis, and other problems with Fugard and Potts (2015) sample-size tool for thematic analysis. *International Journal of Social Research Methodology, 19*(6), 739-743. doi:10.1080/13645579.2016.1195588

Brent, R., & Felder, R. (nd). Resources for Teaching and Learning STEM. Retrieved from https://educationdesignsinc.com/index-of-learning-styles/

Bretag, T., Harper, R., Rundle, K., Newton, P. M., Ellis, C., Sonia, . . . van Haeringen, K. (2020). Contract cheating in Australian higher education: a comparison of non-university higher education providers and universities. *Assessment & Evaluation in Higher Education, 45*(1), 125-139. doi:10.1080/02602938.2019.1614146

Brett, J., Brimhall, J., Healey, D., Pfeifer, J., & Prenguber, M. (2013). Competencies for public health and interprofessional education in accreditation standards of complementary and alternative medicine disciplines. *Explore (NY), 9*(5), 314-320. doi:10.1016/j.explore.2013.06.001

Brewer, G., & Robinson, S. (2018). 'I like being a lab Rat': Student experiences of research participation. *Journal of Further and Higher Education, 42*(7), 986-997. doi:10.1080/0309877X.2017.1332357

Brooks, R., te Riele, K., & Maguire, M. (2014). *Ethics and Education Research*. Los Angeles: SAGE.

Brown, B. (2014). Public health education using pop culture and media. *Frontiers in Public Health, 2*, 231. doi:10.3389/fpubh.2014.00231

Brown, E. J., Dunlop, L., & Scally, J. (2018). 'It's about not achieving the outcomes that you necessarily expected': Non-formal learning in higher education. *Teaching in Higher Education, 25*(1), 52-67. doi:10.1080/13562517.2018.1541880

Brown, K. (2009). Questions for the 21st-Century Learner. *Knowledge Quest, 38*(1), 24-29.

Brown, K. M., Elliott, S. J., Leatherdale, S. T., & Robertson-Wilson, J. (2015). Searching for rigour in the reporting of mixed methods population health research: a methodological review. *Health Education Research, 30*(6), 811-839. doi:10.1093/her/cyv046

Brown, S., White, S., Wakeling, L., & Naiker, M. (2015). Approaches and Study Skills Inventory for Students (ASSIST) in an introductory course in chemistry. *Journal of University Teaching & Learning Practice, 12*(3). Retrieved from https://ro.uow.edu.au/jutlp/vol12/iss3/6/

Brown, T., Zoghi, M., Williams, B., Jaberzadeh, S., Roller, L., Palermo, C., . . . Holt, T. (2009). Are learning style preferences of health science students predictive of their attitude towards e-learning? *Australasian Journal of Educational Technology, 25*(4), 524-543.

Brown, W. (2019). Guiding the path: Identified skills for educating the next generation of workers. *Journal of Education for Business, 94*(6), 400-407. doi:10.1080/08832323.2018.1541854

Brownie, S., Bahnisch, M., & Thomas, J. (2011). *Competency-based Education and Competency based Career Frameworks: Informing Australian health workforce development. Report on NHPRC Projects 4 and 5 regarding frameworks for competency-based education, training and health career frameworks*. University of Queensland Node of the Australian Health Workforce Institute in Partnership with Health Workforce Australia, Adelaide, Australia. Retrieved from https://researchoutput.csu.edu.au/ws/portalfiles/portal/13364556/12131508_published_report.pdf.

Brugha, R., & Varvasovszky, Z. (2000). Stakeholder analysis: a review. *Health Policy and Planning, 15*(3), 239-246. doi:10.1093/heapol/15.3.239

Bsiso, M., Dolmans, D., & Alamro, A. (2019). Students' perceptions of problem-based learning tutors, topics, and examinations and their hindrance or promption of deep and surface learning: A mixed-methods study. *Saudi Journal of Health Science, 8*, 69-74. Retrieved from www.saudijhealthsci.org/text.asp?2019/8/2/69/264679

Burgoon, J. (2018). What type of learner are your students? Preferred learning styles of undergraduate gross anatomy students according to the Index of Learning Styles Questionnaire. *Anatomical Sciences Education, 11*(4), 358-365. doi:10.1002/asa.1748

Burke, E. M., & Biberman, D. A. (2017). Student practicum as a bridge to governmental public health practice. *Public Health Reports, 132*(1), 110-114. doi:10.1177/0033354916680610

Burke, T. A., Cascio, W. E., Costa, D. L., Deener, K., Fontaine, T. D., Fulk, F. A., . . . Zartarian, V. G. (2017). Rethinking Environmental Protection: Meeting the Challenges of a Changing World. *Environmental Health Perspectives, 125*(3), A43-A49. doi:10.1289/EHP1465

Business Council of Australia. (2016). *Being Work Ready: A Guide to What Employers Want.* Retrieved from http://www.bca.com.au/publications/being-work-ready-a-guide-to-what-employers-want.

Butler, D. (2015). Conversation: Worldviews paradigms governance and civics and citizenship and connecting as transforming learning and societies. *The Social Educator, 33*(2), 49-59.

Callaghan, C., Rowley, J., Cornwell, W., Poore, A., & Major, R. (2019). Improving big citizen science data: Moving beyond haphazard sampling. *PLoS Biology, 17*(6), e3000357. doi:10.1371/journal.pbio.3000357

Calleja, C. (2014). Jack Mezirow's conceptualisation of adult transformative learning: A review. *Journal of Adult and Continuing Education, 20*(1), 117-136. doi:org/10.7227/JACE.20.1.8

Cameron, R. (2009). *The use of mixed methods research in VET research. 12th AVETRA Annual Conference 15-17 April*. Sydney: Southern Cross University e-Publications Retrieved from http://avetra.org.au/publications/conferences-archives.

Cameron, R. (2010). Mixed methods in VET research: Usage and quality. *International Journal of Training Research, 8*(1), 25-39.

Campbell, D. M., & Moore, G. (2018). Increasing the use of research in population health policies and programs: a rapid review. *Public Health Research and Practice, 28*(3). doi:10.17061/phrp2831816

Cao, L., & Tang, L. (2014). Pathway from vocational education and associate degree to higher education: Chinese international students in Australia. *Asia Pacific Journal of Education,* 10.1080/02188791.2014.881318, 1-16. doi:10.1080/02188791.2014.881318

Care, E., Scoular, C., & Griffen, P. (2016). Assessment of collaborative problem solving in education environments. *Applied Measurement in Education, 29*(4), 250-264. doi:10.1080/08957347.2016.1209204

Carey, M., & Asbury, J. (2016). *Focus Group Research*. London: Routledge.

Caron, R. M. (2016). The educated citizen and global public-health issues: One model for integration into the undergraduate curriculum. *Frontiers in Public Health, 4*, 35. doi:10.3389/fpubh.2016.00035

Carroll, J., Sankupellay, M., Newcomb, M., Rodgers, J., & Cook, R. (2018). GoSoapBox in public health tertiary education: A student response system for improving learning experiences and outcomes. *Australasian Journal of Educational Technology, 34*(5), 58-71.

Carson, J. T. (2019). Blueprints of distress?: Why quality assurance frameworks and disciplinary education cannot sustain a 21st-century education. *Teaching in Higher Education, 24*(8), 1014-1023. doi:10.1080/13562517.2019.1602762

Cashman, S., & Seifer, S. (2008). Service-learning: an integral part of undergraduate public health. *American Journal of Preventive Medicine, 35*(3), 273-278. doi:https://doi:10.1016/j.amepre.2008.06.012

Casner-Lotto, J. (2006). Are they really ready to work? Employers' perspectives on the basic knowledge and applied skills of new entrants to the 21st century U.S. workforce. Retrieved from https://files.eric.ed.gov/fulltext/ED519465.pdf

Castleberry, A., Payakachat, N., Ashby, S., Nolen, A., Carle, M., Neill, K., & Franks, A. (2016). Qualitative analysis of written reflections during a teaching certificate program. *American Journal of Pharmaceutical Education, 80*(1), Article 10.

Catterall, J., Davis, J., & Yang, D. F. (2013). Facilitating the learning journey from vocational education and training to higher education. *Higher Education Research & Development, 33*(2), 242-255. doi:10.1080/07294360.2013.832156

Cavanagh, J., Burston, M., Southcombe, A., & Bartram, T. (2015). Contributing to a graduate-centred understanding of work readiness: An exploratory study of Australian undergraduate students' perceptions of their employability. *The International Journal of Management Education, 13*(3), 278-288. doi:10.1016/j.ijme.2015.07.002

Cetin, B. (2016). Approaches to learning and age in predicting college students' academic achievement. *Journal of College Teaching & Learning, 13*(1), 21-28.

Chacko, T. (2018). Emerging pedagogies for effective adult learning: From Andragogy to Heutagogy. *Archives of Medicine and Health Sciences, 6*(2), 278-283.

Chalapati, N., Leung, R., & Chalapati, S. (2018). Exploring factors affecting first-year students' learning experiences: A case study of a private university in Taiwan. *Student Success, 9*(4), 25-39. doi:10.5204/ssj.v9i4.651

Chamely-Wiik, D., Dunn, K., Heydet-Kirsch, P., Holman, M., Meeroff, D., & Peluso, J. (2014). Scaffolding the development of students' research skills for capstone projects: A multidisciplinary approach. *CUR Quarterly, 34*(4), 18-25.

Chan, A. (2017). Reflection, reflexivity, reconceptualisation: Life story inquiry and the complex positionings of a researcher. *Reconceptualizing Educational Research Methodology, 8*(1), 27-39.

Chan, S., Ngai, G., & Kwan, K.-p. (2019). Mandatory service learning at university: Do less-inclined students learn from it? *Active Learning in Higher Education, 20*(3), 189-202. doi:10.1177/1469787417742019

Chen, B. H., & Chiou, H. (2012). Learning style, sense of community and learning effectiveness in hybrid learning environment. *Interactive Learning Environments, 22*(4), 485-496. doi:10.1080/10494820.2012.680971

Chen, C.-T., Chen, C.-F., Hu, J.-L., & Wang, C.-C. (2013). A Study on the Influence of self-concept, social support and academic achievement on occupational choice intention. *The Asia-Pacific Education Researcher, 24*(1), 1-11. doi:10.1007/s40299-013-0153-2

Cheng, B., Wang, M., Morch, A., Chen, N.-S., Kinshuk, & Spector, J. M. (2014). Research on e-learning in the workplace 2000-2012: A bibliometric analysis of the literature. *Educational Research Review, 11*, 56-72. doi:10.1016/j.edurev.2014.01.001

Cherrstrom, C. A., Zarestky, J., & Deer, S. (2017). “This group is vital”: Adult peers in community for support and learning. *Adult Learning, 29*(2), 43-52. doi:10.1177/1045159517739701

Cheruvalath, R. (2017). Does attending classes help foster human values in college students? *Active Learning in Higher Education, 18*(2), 143-155. doi:10.1177/1469787417707616

Choi, Y. (2014). Debt and college students' life transitions: The effect of educational debt on career choices in America. *Journal of Student Financial Aid, 44*(1 Article 3), 24-41 Retrieved from https://ir.library.louisville.edu/jsfa/vol44/iss1/3/

Chonkar, S. P., Ha, T. C., Chu, S. S. H., Ng, A. X., Lim, M. L. S., Ee, T. X., . . . Tan, K. H. (2018). The predominant learning approaches of medical students. *BMC Medical Education, 18*(1), 17. doi:10.1186/s12909-018-1122-5

Chow, J., Tse, A., & Armatas, C. (2020). Assessing the university student perceived learning gains in generic skills. *Journal of Applied Research in Higher Education, ahead-of-print*. doi:10.1108/jarhe-05-2019-0130

Choy, S., Billett, S., & Kelly, A. (2013). Engaging in continuing education and training: Learning preferences of worker-learners in the health and community services Industry. *Australian Journal of Adult Learning, 53*(1), 68-89.

Chu, S., & Kennedy, D. (2011). Using online collaborative tools for groups to co-construct knowledge. *Online Information Review, 35*(4). doi:10.1108/14684521111161945

Chung, E., & Coates, H. (2018). Student community engagement: Insight from Australia. *International Journal of Service Management and Sustainability, 3*(1), 29-53.

Chung, E., Turnbull, D., & Chur-Hansen, A. (2017). Differences in resilience between ‘traditional’ and ‘non-traditional’ university students. *Active Learning in Higher Education, 18*(1), 77-87. doi:10.1177/1469787417693493

Cinamon, R. (2016). Integrating work and study among young adults: Testing an empirical model. *Journal of Career Assessment, 24*(3), 527-542. doi:10.1177/1069072715599404

City of Melbourne. (2016). City of Melbourne Tertiary Student and Education Profile. Retrieved from https://www.melbourne.vic.gov.au/SiteCollectionDocuments/tertirary-student-education-profile.pdf

Clapper, T. C. (2014). Situational interest and instructional design: A guide for simulation facilitators. *Simulation & Gaming, 45*(2), 167-182. doi:10.1177/1046878113518482

Clar, C., Dyakova, M., Curtis, K., Dawson, C., Donnelly, P., Knifton, L., & Clarke, A. (2014). Just telling and selling: Current limitations in the use of digital media in public health: A scoping review. *Public Health, 128*(1), 1066-1075. doi:10.1016/j.puhe.2014.09.009

Clark, R., Kirschner, P., & Sweller, J. (2012). Putting students on the path to learning: The case for fully guided instruction. *American Educator, Spring*, 6-11.

Clarke, M. (2017). Rethinking graduate employability: the role of capital, individual attributes and context. *Studies in Higher Education, 43*(11), 1923-1937. doi:10.1080/03075079.2017.1294152

Clarke, V., & Braun, V. (2017). Thematic analysis. *The Journal of Positive Psychology, 12*(3), 297-298. doi:10.1080/17439760.2016.1262613

Clayton, K. (2013). Looking beneath the surface: a critical reflection on ethical issues and reflexivity in a practitioner inquiry. *Reflective Practice: International and Multidisciplinary Perspectives, 14*(4), 506-518. doi:10.1080/14623943.2013.808180

Clinton, V., & Kelly, A. E. (2020). Student attitudes toward group discussions. *Active Learning in Higher Education, 21*(2), 154-164. doi:10.1177/1469787417740277

Cloete, M. (2018). The impact of an integrated assessment on the critical thinking skills of first-year university students. *Accounting Education, 27*(5), 479-494. doi:10.1080/09639284.2018.1501717

Coates, H. (2011). *Working on a dream: Educational returns from off-campus paid work. Research briefing. Australian Survey of Student Engagement. Volume 8*. Australian Council for Educational Research Retrieved from https://www.acer.org/files/AUSSE_Research_Briefing_Vol8.pdf.

Coates, H., & Ransom, L. (2011). *Dropout DNA, and the genetics of effective support. Research briefing. Australian Survey of Student Engagement. Volume 11*. Australian Council for Educational Research Retrieved from https://www.acer.org/files/AUSSE_Research_Briefing_Vol11.pdf.

Coates, H., & Richardson, S. (2010). *Getting first-year students engaged. Research briefings. Australian Survey of Student Engagement. Volume 6*. Australian Council for Educational Research Retrieved from https://www.acer.org/files/AUSSE_Research_Briefing_Vol6.pdf.

Coates, K. (2015). *Career ready: towards a national strategy for the mobilization of Canadian potential*. Canadian Council of Chief Executives, Ottawa Retrieved from http://www.ceocouncil.ca/wp-content/uploads/2015/03/Career-Ready-Ken-Coates-final-March-251.pdf.

Cole, K., Sim, F., & Hogan, H. (2011). The evolution of public health education and training in the United Kingdom. *Public Health Reviews, 33*(1), 87-104.

Collie, R. J., Holliman, A. J., & Martin, A. J. (2017). Adaptability, engagement and academic achievement at university. *Educational Psychology, 37*(5), 632-647. doi:10.1080/01443410.2016.1231296

Colomer, J., Serra, T., Cañabate, D., & Bubnys, R. (2020). Reflective learning in higher education: Active methodologies for transformative practices. *Sustainability, 12*(9). doi:10.3390/su12093827

Colthorpe, K., Sharifirad, T., Ainscough, L., Anderson, S., & Zimbardi, K. (2018). Prompting undergraduate students' metacognition of learning: implementing 'meta-learning' assessment tasks in the biomedical sciences. *Assessment & Evaluation in Higher Education, 43*(2), 272-285. doi:10.1080/02602938.2017.1334872

Commonwealth of Australia Department of Jobs and Small Business. (2018). *I want to work. Employment Services Report 2020*. Retrieved from https://apo.org.au/node/210776.

Community Colleges and Public Health Leadership Group. (2014). *Community Colleges and Public Health Report: Final Report*. Retrieved from https://www.league.org/sites/default/files/private_data/imported/league_books/CCPHFinalReport.pdf.

Cook-Chennault, K., & Villaneuva, I. (2019). An initial exploration of the perspectives and experiences of diverse learners' acceptance of online educational engineering games as learning tools in the classroom *IEEE Frontiers in Education,* (January). Retrieved from https://par.nsf.gov/servlets/purl/10162063

Cooperrider, D. (nd). What is Appreciative Inquiry. Retrieved from https://www.davidcooperrider.com/ai-process/

Coronado, F., Koo, D., & Gebbie, K. (2014). The Public Health Workforce ["Public health in the 21st century"]. *American Journal of Preventive Medicine, 47*(5 Supplement 3), S275-S394.

Costa, C., Murphy, M., Pereira, A., & Taylor, Y. (2018). Higher education students' experiences of digital learning and (dis)empowerment. *Australasian Journal of Educational Technology, 34*(3), 140-152.

Costley, C., Elliott, G. C., & Gibbs, P. (2010). *Doing Work Based Research : Approaches to Enquiry for Insider-Researchers*. London, UK: SAGE Publications.

Costley, J., & Lange, C. (2018). The moderating effects of group work on the relationship between motivation and cognitive load. *International Review of Research in Open and Distributed Learning, 19*(1), 68-90.

Cothran, T. (2011). Google Scholar acceptance and use among graduate students: A quantitative study. *Library & Information Science Research, 33*(4), 293-301. doi:10.1016/j.lisr.2011.02.001

Cotton, C. (2011). Real-world and active: The benefits of problem-based learning. *Teacher, 219*, 20-24.

Council of Academic Public Health Institutes of Australia (CAPHIA). (2016a). *Foundation Competencies for Public Health Graduates in Australia: 2nd Edition*. Retrieved from http://caphia.com.au/foundation-competencies-for-public-health-graduates/.

Council of Academic Public Health Institutes of Australia (CAPHIA). (2016b). *Public Health Key Messages -Final*. Retrieved from http://caphia.com.au/advocacy-and-public-policy/.

Craig, S. D., Sullins, J., Witherspoon, A., & Gholson, B. (2006). The deep-level-reasoning-question effect: The role of dialogue and deep-level-reasoning questions during vicarious learning. *Cognition and Instruction, 24*(4), 565-591. doi:10.1207/s1532690xci2404_4

Creswell, J. (2007). *Qualitative Inquiry & Research Design: Choosing Among Five Approaches* (2 ed.). Thousand Oaks: SAGE Publications.

Creswell, J. (2014). *Research Design* (4 ed.). Lincoln: SAGE.

Creswell, J. (2015). *A Concise Introduction to Mixed Methods Research*. Los Angeles: SAGE.

Crick, R., Broadfoot, P., & Claxton, G. (2004). Developing an Effective Lifelong Learning Inventory: The ELLI Project. *Assessment in Education: Principles, Policy & Practice, 11*(3), 247-272. doi:10.1080/0969594042000304582

Culver, K., Braxton, J., & Pascarella, E. (2019). Does teaching rigorously really enhance undergraduates' intellectual development? The relationship of academic rigor with critical thinking skills and lifelong learning motivations. *Higher Education, 78*, 611-627. doi:10.1007/s10734-019-00361-2

Czabanowska, K., Moust, J., Meijer, A., Schroder-Back, P., & Roebertsen, H. (2012). Problem-based learning revisited: Introduction of active and self-directed learning to reduce fatigue among students. *Journal of University Teaching and Learning Practice, 9*(1).

Czabanowska, K., Rethmeier, K. A., Lueddeke, G., Smith, T., Malho, A., Otok, R., & Stankunas, M. (2014). Public health in the 21st century: working differently means leading and learning differently. *European Journal of Public Health, 24*(6), 1047-1052. doi:10.1093/eurpub/cku043

D'Agostino. (2018). Public health education: Teaching epidemiology in high school classrooms. *American Journal of Public Health, 108*(3), 324-328. doi:10.2105/AJPH.2017.304216. Epub 2018 Jan 18

Dabbagh, N., & Dass, S. (2013). Case problems for problem-based pedagogical approaches: A comparative analysis. *Computers & Education, 64*, 161-174. doi:10.1016/j.compedu.2012.10.007

Dabbagh, N., & Kitsantas, A. (2012). Personal learning environment, social media, and self-regulated learning: A natural formula for connecting formal and informal learning. *The Internet and Higher Education, 15*(1), 3-8. doi:10.1016/j.iheduc.2011.06.002

Dalla Lana School of Public Health. (2020). Introduction to Mixed Methods Research for Public Health: University of Toronto, Toronto, Canada. Retrieved from https://www.dlsph.utoronto.ca/course/directed-reading-introduction-to-mixed-methods-research-for-public-health/

Damassa, D., & Sitko, T. (2010). Simulation technologies in higher education: Uses, trends and implications. *EDUCAUSE Center for Applied Research, Research Bulletin*(3).

Damsa, C., & Muukkonen, H. (2020). Conceptualising pedagogical designs for learning through object-oriented collaboration in higher education. *Research Papers in Education, 35*(1), 82-104. doi:10.1080/02671522.2019.1677751

Databasic. (nd). Word Counter. Retrieved from https://www.databasic.io/en/wordcounter/

Davidson, P. (2020). Is nursing a STEM discipline – Does it matter and what can we do about it? *Journal of Advanced Nursing, 76*(1), 1-3. doi:10.1111/jan.14212

Dawson, P., & Sutherland-Smith, W. (2018). Can markers detect contract cheating? Results from a pilot study. *Assessment & Evaluation in Higher Education, 43*(2), 286-293. doi:10.1080/02602938.2017.1336746

De Gagne, J., Park, H., Hall, K., Woodward, A., Yamane, S., & Kim, S. (2019). Microlearning in Health Professions Education: Scoping Review. *JMIR Medical Education, 5*(2), e13997. doi:10.2196/13997

Deeley, S. J. (2013). Summative co-assessment: A deep learning approach to enhancing employability skills and attributes. *Active Learning in Higher Education, 15*(1), 39-51. doi:10.1177/1469787413514649

Deeper Learning Hub. (2020). What is Deeper Learning? Retrieved from www.deeper-learning.org

Delgado, Á. H. d. A., Almeida, J. P. R., Mendes, L. S. B., Oliveira, I. N. d., Ezequiel, O. d. S., Lucchetti, A. L. G., & Lucchetti, G. (2018). Are surface and deep learning approaches associated with study patterns and choices among medical students? A cross-sectional study. *Sao Paulo Medical Journal, 136*, 414-420.

Deloitte. (2016). *The 2016 Deloitte Millenial Survey*. Retrieved from https://www2.deloitte.com/content/dam/Deloitte/global/Documents/About-Deloitte/gx-millenial-survey-2016-exec-summary.pdf

Demirbilek, M., & Talan, T. (2018). The effect of social media multitasking on classroom performance. *Active Learning in Higher Education, 19*(2), 117-129. doi:10.1177/1469787417721382

Demircioglu, T., & Ucar, S. (2015). Investigating the effect of Argument-Driven Inquiry in laboratory instruction. *Educational Sciences: Theory & Practice, 15*(1), 267-283. doi:10.12738/estp.2015.1.2324

Derounian, J. G. (2020). Mobiles in class? *Active Learning in Higher Education, 21*(2), 142-153. doi:10.1177/1469787417745214

Dewey, J. (1938). *Experience and Education*. New York: Simon & Schuster.

Dicker, R., Garcia, M., Kelly, A., & Mulrooney, H. (2019). What does 'quality' in higher education mean? Perceptions of staff, students and employers. *Studies in Higher Education, 44*(8), 1425-1441. doi:10.1080/03075079.2018.1445987

dictionary.university. (2021). Credit Points. Retrieved from https://dictionary.university/Credit%20points

Dimmitt, N. (2017). The Power of Project Based Learning: Experiential Education to Develop Critical Thinking Skills for University Students. *CBU International Conference Proceedings, 5*, 575-579. doi:10.12955/cbup.v5.988

Dimock, M. (2019). *Defining generations: Where Millennials end and Generation Z begins*. Pew Research Center Retrieved from https://www.pewresearch.org/.

DiVall, M., Edward, R., Stevens, C., Zilberman, E., Watanabe, M., & Kirwin, J. (2013). Student perceptions about developing an evidence-based public health program directed toward a vulnerable population. *Currents in Pharmacy Teaching and Learning, 5*(2), 76-84. doi:10.1016/j.cptl.2012.09.004

Donnison, S., & Penn-Edwards, S. (2012). Focusing on first year assessment: Surface or deep approaches to learning? *The International Journal of the First Year in Higher Education, 3*(2). doi:10.5204/intjfyhe.v3i2.127

Doolan, M., Piggot, B., Chapman, S., & Rycrof, P. (2019). The benefits and challenges of embedding work integrated learning: A case study in a university education degree program. *Australian Journal of Teacher Education, 44*(6), 91-108. Retrieved from https://ro.edu.edu.au/ajte/vol44/iss6/6

Dos Santos, L. M. (2020). I am a nursing student but hate nursing: The East Asian perspectives between social expectation and social context. *International Journal of Environmental Research and Public Health, 17*(7). doi:10.3390/ijerph17072608

Dumitrache, A., & Almăşan, B. (2014). Educative valences of using educational games in virtual classrooms. *Procedia - Social and Behavioral Sciences, 142*, 769-773. doi:10.1016/j.sbspro.2014.07.613

Dundas, K. J., Hansen, V., Outram, S., & James, E. L. (2017). A "Light Bulb Moment" in understanding public health for undergraduate students: Evaluation of the Experiential "This Is Public Health" photo essay task. *Frontiers in Public Health, 5*, 116. doi:10.3389/fpubh.2017.00116

Dwyer, C. P., Hogan, M. J., & Stewart, I. (2014). An integrated critical thinking framework for the 21st century. *Thinking Skills and Creativity, 12*, 43-52. doi:10.1016/j.tsc.2013.12.004

Edington, D., Schultz, A., Pitts, J., & Camilleri, A. (2016). The future of health promotion in the 21st century: A focus on the working population. *American Journal of Lifestyle Medicine, 10*(4), 242-252. doi:https://doi.org/10.1177%2F1559827615605789

Edwards, R. A., Venugopal, S., Navedo, D., & Ramani, S. (2019). Addressing needs of diverse stakeholders: Twelve tips for leaders of health professions education programs. *Medical Teacher, 41*(1), 17-23. doi:10.1080/0142159X.2017.1396307

Edwards, T., Chapper, J., Wouters, A., Nethercote, L., Mason, R., Lewis, R., & Edmeades, R. (2013). *Transformational learning in the 'helping professions' as best practice Final Report*. Victoria: Office for Learning and Teaching Retrieved from https://www.education.gov.au/learning-and-teaching.

Egbert, J., & Sanden, S. (2014). *Foundations of Education Research: Understanding Theoretical Components*. New York: Routledge.

Elder, A. (2013). College students' cell phone use, beliefs, and effects on their learning. *College Student Journal, 47*(4), 585-592.

Elffers, L., & Oort, F. J. (2012). Great expectations: students' educational attitudes upon the transition to post-secondary vocational education. *Social Psychology of Education, 16*(1), 1-22. doi:10.1007/s11218-012-9192-4

Ellis, C., van Haeringen, K., Harper, R., Bretag, T., Zucker, I., McBride, S., . . . Saddiqui, S. (2020). Does authentic assessment assure academic integrity? Evidence from contract cheating data. *Higher Education Research & Development, 39*(3), 454-469. doi:10.1080/07294360.2019.1680956

Ellis, R. (2014). University Student Experiences of Inquiry and Technologies. In M. Gosper & D. Ifenthaler (Eds.), *Curriculum Models for the 21st Century* (10.1007/978-1-4614-7366-4_19pp. 371-388): Springer New York.

Ellis, R. A. (2016). Qualitatively different university student experiences of inquiry: Associations among approaches to inquiry, technologies and perceptions of the learning environment. *Active Learning in Higher Education, 17*(1), 13-23. doi:10.1177/1469787415616721

Ellis, R. A., & Bliuc, A. (2016). An exploration into first-year university students' approaches to inquiry and online learning technologies in blended environments. *British Journal of Educational Technology, 47*(5), 970-980. doi:10.1111/bjet.12385

Elrod, S. (2014). Quantitative reasoning: The next "Across the Curriculum" movement. *Peer Review, 16*(3), 1-9. Retrieved from www.aacu.org/peerreview/2014/summer/elrod

Entwistle, N., McCune, V., & Hounsell, J. (2002). *Approaches to studying and perceptions of university teaching-learning environments: Concepts, measures and preliminary findings. Occasional Report 1*. Retrieved from

Entwistle, N., & Smith, C. (2002). Personal understanding and target understanding: Mapping influences on the outcomes of learning. *The British Journal of Educational Psychology, 72*, 321-342 doi:10.1348/000709902320634528

Entwistle, N., & Tait, H. (2013). Approaches and Study Skills Inventory for Students (ASSIST) (incorporating the Revised Approaches to Studying Inventory - RASI). Retrieved from https://www.researchgate.net/publication/260291730_Approaches_and_Study_Skills_Inventory_for_Students_ASSIST_incorporating_the_Revised_Approaches_to_Studying_Inventory_-_RASI

Erikson, M. G., & Erikson, M. (2019). Learning outcomes and critical thinking - good intentions in conflict. *Studies in Higher Education, 44*(12), 2293-2303. doi:10.1080/03075079.2018.1486813

Erwin, P. C., Beck, A. J., Yeager, V. A., & Leider, J. P. (2019). Public health undergraduates in the workforce: A trickle, soon a wave? *American Journal of Public Health, 109*(5), 685-687. doi:10.2105/AJPH.2019.305004

Espinoza-Poves, J., Miranda-Vílchez, W., & Chafloque-Céspedes, R. (2019). The Vark Learning Styles in university students of business schools. *Propósitos y Representaciones, 7*(2), 384-414. doi:10.20511/pyr2019.v7n2.254

Essa, M. M., Subramanian, K. P., & Jayasuriya, H. P. (2020). COVID-19 Impact on undergraduate education: Academicians' perspective. *Journal of Health and Allied Sciences, 10*(03), 138-140. doi:10.1055/s-0040-1718609

Evashwick, C., Tao, D., & Arnold, L. (2014). The peer-reviewed literature on undergraduate education for public health in the United States, 2004–2014. *Frontiers in Public Health, 2*(Article 223), 1-5. doi:10.3389/fpubh.2014.00223

Evashwick, C., Tao, D., Perkio, M., Grivna, M., & Harrison, R. (2020). A scoping review of studies evaluating the education of health professional students about public health. *Public Health, 178*, 105-111. doi:10.1016/j.puhe.2019.08.019

Everaert, P., Opdecam, E., & Maussen, S. (2017). The relationship between motivation, learning approaches, academic performance and time spent. *Accounting Education, 26*(1), 78-107. doi:10.1080/09639284.2016.1274911

Eyink, J., Motz, B., Heltzel, G., & Liddell, T. (2020). Self-regulated studying behavior, and the social norms that influence it. *Journal of Applied Social Psychology, 50*, 10-21. doi:10.1111/jasp.12637

Fabito, B., Rodriguez, R., Diloy, M., Trillanes, A., Macato, L., & Octaviano, M. (2018). Exploring mobile game addiction, cyberbullying, and its effects on academic performance among tertiary students in one university in the Philippines. *TENCON 2018 - 2018 IEEE Region 10 Conference, Jeju, Korea (South),* 10.1109/TENCON.2018.8650251, 1859-1864 doi:10.1109/TENCON.2018.8650251

Fanghanel, J., Pritchard, J., Potter, J., & Wisker, G. (2016). *Defining and supporting the scholarship of teaching and learning (SoTL): A sector-wide study. Executive Summary*. United Kingdom: Higher Education Academy Retrieved from https://www.advance-he.ac.uk/knowledge-hub/defining-and-supporting-scholarship-teaching-and-learning-sotl-sector-wide-study.

Far, P. (2018). Challenges of recruitment and retention of university students as research participants: Lessons learned from a pilot study. *Journal of the Australian Library and Information Association, 67*(3), 278-292. doi:10.1080/24750158.2018.1500436

Farr-Wharton, B., Charles, M. B., Keast, R., Woolcott, G., & Chamberlain, D. (2018). Why lecturers still matter: the impact of lecturer-student exchange on student engagement and intention to leave university prematurely. *Higher Education, 75*(1), 167-185. doi:10.1007/s10734-017-0190-5

Fee, E., & Bu, L. (2007). Models of public health education: choices for the future? *Bulletin of the World Health Organization, 85*(12), 977-979. doi:10.2471/blt.07.044883

Felder, R. (2002). Authors Preface for Felder, R., & Silverman, L. (1988) Learning and teaching styles in engineering education. *Engineering Education. 78*(7): 674-681. Retrieved from https://www.researchgate.net/publication/257431200_Learning_and_Teaching_Styles_in_Engineering_Education

Felder, R., & Brent, R. (2005). Understanding student differences. *Journal of Engineering Education, 94*(1), 57-72.

Felder, R., & Silverman, L. (1988). Learning and teaching styles in engineering education. *Engineering Education, 78*(7), 674-681.

Felder, R., & Soloman, B. (nd-a). Index of Learning Styles Questionnaire. Retrieved from https://www.engr.ncsu.edu/learningstyles/ilsweb.html

Felder, R., & Soloman, B. (nd-b). Learning Styles and Strategies. Retrieved from http://www4.ncsu.edu/unity/lockers/users/f/felder/public/ILSdir/styles.htm

Felder, R., & Spurlin, J. (2005). Applications, reliability and validity of the Index of Learning Styles. *International Journal of Engineering Education, 21*(1), 103-112.

Feldman, J., Monteserin, A., & Amandi, A. (2015). Automatic detection of learning styles: state of the art. *Artificial Intelligence Review, 44*(2), 157-186. doi:10.1007/s10462-014-9422-6

Fenton-Smith, B. (2012). Facilitating self-directed learning amongst international students of health sciences: the dual discourse of self-efficacy. *Journal of Academic Language and Learning, 6*(1), A64-A76.

Ferreira, P. C., Simão, A. M. V., & da Silva, A. L. (2014). Does training in how to regulate one's learning affect how students report self-regulated learning in diary tasks? *Metacognition and Learning, 10*(2), 199-230. doi:10.1007/s11409-014-9121-3

Fifolt, M., & McCormick, L. C. (2019). Advancing public health education through place-based learning: “On the road in the Deep South”. *Pedagogy in Health Promotion, 6*(2), 102-112. doi:10.1177/2373379919839076

Filsecker, M., & Kerres, M. (2014). Engagement as a volitional construct: A framework for evidence-based research on educational games. *Simulation & Gaming, 45*(4-5), 450-470. doi:10.1177/1046878114553569

Firn, J. (2015). 'Capping off' the development of graduate capabilities in the final semester unit for biological science students: Review and recommendations. *Journal of University Teaching and Learning Practice, 12*(3/Art.3), 18. Retrieved from http://ro.uow.edu.au/jutlp/vol12/iss3/3

Fitzpatrick, V. E., Mayer, C., & Sherman, B. R. (2016). Undergraduate public health capstone course: Teaching evidence-based public health. *Frontiers in Public Health, 4*, 70. doi:10.3389/fpubh.2016.00070

Fleming, N. (2012). The case against learning styles: "There is no evidence...". Retrieved from https://vark-learn.com/wp-content/uploads/2014/08/The-Case-Against-Learning-Styles.pdf

Fleming, N. (nd). VARK A guide to learning styles. Retrieved from http://vark-learn.com/home/

Flores, M. A., Veiga Simão, A. M., Barros, A., & Pereira, D. (2015). Perceptions of effectiveness, fairness and feedback of assessment methods: A study in higher education. *Studies in Higher Education, 40*(9), 1523-1534. doi:10.1080/03075079.2014.881348

Fosnacht, K., Sarraf, S., Howe, E., & Peck, L. (2017). How important are high response rates for college surveys? *The Review of Higher Education, 40*(2), 245-265.

Fowler, C. (2017). *The boundaries and connections between the VET and higher education sectors: 'Confused, contested and collaborative'*. NCVER: Adelaide Retrieved from https://www.ncver.edu.au/__data/assets/pdf_file/0027/158706/Boundaries_-and-_connections_between_VET_-and-_higher_ed_sectors.pdf.

Francis, R. A., Millington, J. D. A., & Cederlöf, G. (2019). Undergraduate student perceptions of assessment and feedback practice: fostering agency and dialogue. *Journal of Geography in Higher Education, 43*(4), 468-485. doi:10.1080/03098265.2019.1660867

Freeman, S., Theobald, R., Crowe, A. J., & Wenderoth, M. P. (2017). Likes attract: Students self-sort in a classroom by gender, demography, and academic characteristics. *Active Learning in Higher Education, 18*(2), 115-126. doi:10.1177/1469787417707614

Fried, L. (2015). Innovating for 21st century public health education: A case for seizing the moment. *American Journal of Public Health, 105*(Supplement 1), s5-s7. doi:10.2105/AJPH.2014.302549

Frieden, T. (2015). Shattuck Lecture: The future of public health. *The New England Journal of Medicine, 373*(18), 1748-1754. Retrieved from https://www.nejm.org/doi/pdf/10.1056/NEJMsa1511248

Friedman, L., & Lee, J. (2015). Undergraduate public health education: is there an ideal curriculum? *Frontiers in Public Health, 3*(Article 16), 1-16. doi:https://doi.org/10.3389/fpubh.2015.00016

Füchslin, T., Schäfer, M., & Metag, J. (2019). Who wants to be a citizen scientist? Identifying the potential of citizen science and target segments in Switzerland. . *Public Understanding of Science, 28*(6), 652-668. doi:10.1177/0963662519852020

Fullan, M. (2013). Commentary The New Pedagogy: Students and Teachers as learning partners. *LEARNing Landscapes, 6*(2), 23-29.

Fullan, M., & Langworthy, M. (2013). *Towards a new end: New pedagogies for deep learning*. Washington, USA: Collaborative Impact Retrieved from www.newpedagogies.org.

Fullan, M., & Langworthy, M. (2014). *A Rich Seam: How New Pedagogies Find Deep Learning*. London: Pearson.

Fullan, M., & Scott, G. (2014). *New Pedagogies for Deep Learning Whitepaper: Education PLUS*. Washington: Collaborative Impact Retrieved from http://www.michaelfullan.ca/wp-content/uploads/2014/09/Education-Plus-A-Whitepaper-July-2014-1.pdf.

Gadassi, R., & Gati, I. (2009). The effect of gender stereotypes on explicit and implicit career preferences. *Counseling Psychologist, 37*, 902-922. doi:10.1177/0011000009334093

Gaftandzhieva, S., & Doneva, R. (2020). The attitude towards and the use of social networking in European higher education. *International Journal of Virtual and Personal Learning Environments, 10*(1), 51-69. doi:10.4018/ijvple.2020010104

Gale, T., Hodge, S., Parker, S., Rawolle, S., Charlton, E., Rodd, P., . . . Molla, T. (2013). *VET providers, associate and bachelor degrees and disadvantaged learners*. Deakin University, Victoria Retrieved from https://www.deakin.edu.au/__data/assets/pdf_file/0005/365198/disadvantaged-learners.pdf.

Gallardo-Echenique, E., Bullen, M., & Marques-Molias, L. (2016). Student communication and study habits of first-year university students in the digital era. *Canadian Journal of Learning and Technology, 42*(1), 1-21.

Gandomi, A., & Haider, M. (2015). Beyond the hype: Big data concepts, methods, and analytics. *International Journal of Information Management, 35*, 137-144. doi:10.1016/j.ijinfomgt.2014.10.007

García-Almeida, D. J., & Cabrera-Nuez, M. T. (2020). The influence of knowledge recipients' proactivity on knowledge construction in cooperative learning experiences. *Active Learning in Higher Education, 21*(1), 79-92. doi:10.1177/1469787418754569

García-Pérez, D., Fraile, J., & Panadero, E. (2020). Learning strategies and self-regulation in context: how higher education students approach different courses, assessments, and challenges. *European Journal of Psychology in Education,* 10.1007/s10212-020-00488-z. doi:10.1007/s10212-020-00488-z

Gardner, J., Ronzio, C., & Snelling, A. (2018). Transformational learning in undergraduate public health education: Course design for generation Z. *Pedagogy in Health Promotion, 4*(2), 95-100. doi:10.1177/2373379917721722

Garnjost, P., & Lawter, L. (2019). Undergraduates' satisfaction and perceptions of learning outcomes across teacher - and learner-focused pedagogies. *The International Journal of Management Education, 17*(2), 267-275. doi:10.1016/j.ijme.2019.03.004

Garrison, D. R., & Akyol, Z. (2013). Toward the development of a metacognition construct for communities of inquiry. *The Internet and Higher Education, 17*, 84-89. doi:10.1016/j.iheduc.2012.11.005

Geertshuis, S. A. (2019). Slaves to our emotions: Examining the predictive relationship between emotional well-being and academic outcomes. *Active Learning in Higher Education, 20*(2), 153-166. doi:10.1177/1469787418808932

Geisinger, K. F. (2016). 21st century skills: What are they and how do we assess them? *Applied Measurement in Education, 29*(4), 245-249. doi:10.1080/08957347.2016.1209207

Gentry, L. (2015). Teaching with questions. *Baylor University Medical Center. Proceedings, 28*(1), 118-119.

Gerrish, K., & Lathlean, J. (Eds.). (2015). *The quantitative-qualitative continuum* (7th ed.). Oxford, UK: Wiley Blackwell.

Geyer, P. D. (2018). Adjustment-seeking behavior: The role of political skill and self-efficacy in training students to be more actively engaged in their studies. *Active Learning in Higher Education, 19*(3), 225-237. doi:10.1177/1469787417721993

Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P., & Trow, M. (1994). *The New Production of Knowledge*. Los Angeles: SAGE.

Gibbs, L., Davis, E., & Crouch, S. (2016). Health of children: The right to thrive. In P. Liamputtong (Ed.), *Public Health: Local & Global Perspectives*. Melbourne: Cambridge University Press.

Gibson, S., Grace, A., O'Sullivan, C., & Pritchard, C. (2018). Exploring transitions into the undergraduate university world using a student-centred framework. *Teaching in Higher Education, 24*(7), 819-833. doi:10.1080/13562517.2018.1511538

Gil-Lacruz, M., Gracia-Perez, M. L., & Gil-Lacruz, A. I. (2019). Learning by doing and training satisfaction: An evaluation by health care professionals. *International Journal of Environmental Research and Public Health, 16*(8). doi:10.3390/ijerph16081397

Gill, R. (2018). Building employability skills for higher education students: An Australian example. *Journal of Teaching and Learning for Graduate Employability, 9*(1), 84-92.

Gillam, S., Yates, J., & Badrinath, P. (Eds.). (2007). *Essential Public Health: Theory and Practice*. Cambridge: Cambridge University Press.

Glass, A. L., & Kang, M. (2018). Dividing attention in the classroom reduces exam performance. *Educational Psychology, 39*(3), 395-408. doi:10.1080/01443410.2018.1489046

Goddard, A. (2020). Accountability and accounting in the NGO field comprising the UK and Africa – A Bordieusian analysis. *Critical Perspectives on Accounting,* 10.1016/j.cpa.2020.102200, 102200. doi:10.1016/j.cpa.2020.102200

Godwin, H., & Heymann, S. J. (2015). A call to action: training public health students to be effective agents for social change. *American Journal of Public Health, 105 Suppl 1*, S34-37. doi:10.2105/AJPH.2014.302356

Gogus, A. (2008). *Learning to learn in higher education*. Paper presented at the IADIS International Conference on Cognition and Exploratory Learning in Digital Age, CELDA.

Goh, K. (2014). What good teachers do to promote effective student learning in a problem-based learning environment. *Australian Journal of Educational and Developmental Psychology, 14*, 159-166.

Golding, C. (2011a). Educating for critical thinking: thought-encouraging questions in a community of inquiry. *Higher Education Research & Development, 30*(3), 357-370. doi:10.1080/07294360.2010.499144

Golding, C. (2011b). The many faces of constructivist discussion. *Educational Philosophy and Theory, 43*(5), 467-483.

Golding, C. (2018). Discerning student thinking: a practical theoretical framework for recognising or informally assessing different ways of thinking. *Teaching in Higher Education, 24*(4), 478-492. doi:10.1080/13562517.2018.1491024

Gonski, D., Arcus, T., Boston, K., Gould, V., Johnson, V., O'Brien, L., . . . Roberts, M. (2018). *Through Growth to Achievement. Report of the Review to Achieve Educational Excellence in Australian Schools*. Canberra Retrieved from https://docs.education.gov.au/system/files/doc/other/662684_tgta_accessible_final_0.pdf.

Good, J., Ramos, D., & D'Amore, D. (2013). Learning style preferences and academic success of preclinical allied health students. *Journal of Allied Health, 42*(4), e81-91.

Government of Canada. (2017). Educational Programs in Public Health. Retrieved from https://www.canada.ca/en/public-health/services/public-health-practice/educational-programs-public-health.html

Government of Western Australia. (nd). What is STEM? Retrieved from https://www.education.wa.edu.au/what-is-stem

Graf, S., Viola, S., Leo, T., & Kinshuk. (2007). In-depth analysis of the Felder-Silverman Learning Style Dimensions. *Journal of Research on Technology in Education, 40*(1), 79-93.

Graneheim, U., Lindgren, B., & Lundman, B. (2017). Methodological challenges in qualitative content analysis: A discussion paper. *Nurse Education Today, 56*, 29-34. doi:10.1016/j.nedt.2017.06.002

Gray, K. (2016). Public health platforms: An emerging informatics approach to health professional learning and development. *Journal of Public Health Research, 5*(665), 10-13.

Gray, S. F., & Evans, D. (2018). Developing the public health workforce: training and recognizing specialists in public health from backgrounds other than medicine: experience in the UK. *Public Health Reviews, 39*, 14. doi:10.1186/s40985-018-0091-x

Great Schools Partnership. (2013). *Authentic Learning*. The Glossary of Education Reform (Update 16/09/2013) Retrieved from https://www.edglossary.org/authentic-learning/.

Great Schools Partnership. (2016). *21st Century Skills*. The Glossary of Education Reform (Updated 25/08/2016) Retrieved from https://www.edglossary.org/21st-century-skills/.

Greenaway, K. H., Frye, M., & Cruwys, T. (2015). When aspirations exceed expectations: Quixotic hope increases depression among students. *PLoS One, 10*(9), e0135477. doi:10.1371/journal.pone.0135477

Greenhalgh, T., Bidewell, J., Crisp, E., Lambros, A., & Warland, J. (2020). *Understanding Research Methods for Evidence-based Practice in Health* (2 ed.). Australia: John Wiley & Sons.

Griffiths, S. M., Li, L. M., Tang, J. L., Ma, X., Hu, Y. H., Meng, Q. Y., & Fu, H. (2010). The challenges of public health education with a particular reference to China. *Public Health, 124*(4), 218-224. doi:10.1016/j.puhe.2010.02.009

Grosemans, K., Hannes, K., Neyens, J., & Kyndt, E. (2020). Emerging adults embarking on their careers: Job and identity explorations in the transition to work. *Youth and Society, 52*(5), 795-819. doi:10.1177/0044118x18772695

Guerin, C., Xafis, V., Doda, D. V., Gillam, M. H., Larg, A. J., Luckner, H., . . . Xu, C. (2013). Diversity in collaborative research communities: a multicultural, multidisciplinary thesis writing group in public health. *Studies in Continuing Education, 35*(1), 65-81. doi:10.1080/0158037x.2012.684375

Guest, G. (2012). Describing mixed methods research: An alternative to typologies. *Journal of Mixed Methods Research, 7*(2), 141-151. doi:10.1177/1558689812461179

Gustin, M. P., Abbiati, M., Bonvin, R., Gerbase, M. W., & Baroffio, A. (2018). Integrated problem-based learning versus lectures: a path analysis modelling of the relationships between educational context and learning approaches. *Medical Education Online, 23*(1), 1489690. doi:10.1080/10872981.2018.1489690

Hämäläinen, R., Kiili, C., & Smith, B. E. (2017). Orchestrating 21st century learning in higher education: A perspective on student voice. *British Journal of Educational Technology, 48*(5), 1106-1118. doi:10.1111/bjet.12533

Hamilton, L. (2011). *Case studies in educational research, British Research Association on-line resource.* Retrieved from https://www.bera.ac.uk/researchers-resources/publications/case-studies-in-educational-research

Handler, A., Issel, M., & Turnock, B. (2001). A conceptual framework to measure performance of the Public Health System. *American Journal of Public Health, 91*, 1235-1239. doi:10.2105/ajph.91.8.1235

Harper, E., Castrucci, B. C., Bharthapudi, K., & Sellers, K. (2015). Job satisfaction: A critical, understudied facet of workforce development in public health. *Journal of Public Health Management Practice, 21 Suppl 6*, S46-55. doi:10.1097/PHH.0000000000000296

Harris, R. (2009). Two worlds?: Higher education and post-school VET in Australia and the movement of learners between them. *European Journal of Vocational Training CEDEFOP*(46), pp.66-88.

Harrison, H., Birks, M., Franklin, R., & Mills, J. (2017). Case study research: Foundations and methodological orientations. *Forum Qualitative Sozialforschung /Forum: Qualitative Social Research, 18*(1), Article 19. doi:10.17169/fqs-18.1.2655

Hart Research Associates. (2015). *Falling short? College learning and career success.* Washington DC: Hart Research Associates Retrieved from https://www.aacu.org/sites/default/files/files/LEAP/2015employerstudentsurvey.pdf.

Harvey, A., & Szalkowicz, G. (2016). Developing multiple exit pathways within undergraduate courses. *International Studies in Widening Participation, 3*(1), 52-67.

Hase, S. (2009). Heutagogy and e-learning in the workplace: Some challenges and opportunities. *Journal of Applied Research in Workplace E-Learning, 1*(1), 43-52. doi:10.5043/impact.13

Hase, S., & Kenyon, C. (2001). *Moving from androgogy to heutagogy: Implications for VET*. Paper presented at the Proceedings of Research to Reality: Putting VET Research to Work, Adelaide. https://www.researchgate.net/publication/37357847_Moving_from_andragogy_to_heutagogy_implications_for_VET

Hattie, J. (2012). *Visible Learning for Teachers: Maximizing Impact on Learning*. Oxon: Routledge.

Hattie, J. A. C., & Donoghue, G. M. (2016). Learning strategies: a synthesis and conceptual model. *Nature Partner Journals Science of Learning, 1*(1). doi:10.1038/npjscilearn.2016.13

Heale, R., & Twycross, A. (2018). What is a case study? *Evidence-Based Nursing, 21*(1), 7-8. doi:10.1136/eb-2017-102845

Heenaye, M., Gobin, B., & Khan, N. (2012). Analysis of Felder-Solomon Index of Learning Styles of students from management and engineering at the University of Mauritius. *Journal of Education and Vocational Research, 3*(8), 244-249.

Henderson, M., Selwyn, N., & Aston, R. (2015). What works and why? Student perceptions of 'useful' digital technology in university teaching and learning. *Studies in Higher Education,* 10.1080/03075079.2015.1007946, 1-13. doi:10.1080/03075079.2015.1007946

Hendry, D., Frommer, M., & Walker, R. (1999). Constructivism and problem-based learning. *Journal of Further and Higher Education, 23*(3), 369-371. doi:10.1080/0309877990230306

Hernando, A., Diez-Vega, I., Lopez Del Hierro, M., Martinez-Alsina, N., Diaz-Meco, R., Busto, M. J., . . . Gonzalez-Cuevas, G. (2018). Ethical values in college education: A mixed-methods pilot study to assess health sciences students' perceptions. *BMC Medical Education, 18*(1), 289. doi:10.1186/s12909-018-1396-7

Herrington, J. (nd). *Nine Elements of Authentic Learning*. Retrieved from http://authenticlearning.info/AuthenticLearning/Home.html.

Hewett, K. J. E., Zeng, G., & Pletcher, B. C. (2020). The acquisition of 21st-century skills through video games: Minecraft design process models and their web of class roles. *Simulation & Gaming, 51*(3), 336-364. doi:10.1177/1046878120904976

Hill, M. R., Goicochea, S., & Merlo, L. J. (2018). In their own words: stressors facing medical students in the millennial generation. *Medical Education Online, 23*(1), 1530558. doi:10.1080/10872981.2018.1530558

Horney, J., & Heath, A. (2020). Undergraduate and graduate public health programs need changes to teach the public health workforce of the future. *Delaware Journal of Public Health, 6*(1), Article 8. Retrieved from https://djph.org/wp-content/uploads/2020/04/EDU008.pdf

Horney, J. A., Carbone, E. G., Lynch, M., Wang, Z. J., Jones, T., & Rose, D. A. (2017). How Health Department contextual factors affect public health preparedness (PHP) and perceptions of the 15 PHP Capabilities. *American Journal of Public Health, 107*(S2), S153-S160. doi:10.2105/AJPH.2017.303955

Howard, S. W., Scharff, D. P., & Loux, T. M. (2017). Flipping classrooms in a school of public health. *Frontiers in Public Health, 5*, 73. doi:10.3389/fpubh.2017.00073

Howie, P., & Bagnall, R. (2013). A critique of the deep and surface approaches to learning model. *Teaching in Higher Education, 18*(4), 389-400. doi:10.1080/13562517.2012.733689

Howie, P., & Bagnall, R. (2015). A critical comparison of transformation and deep approach theories of learning. *International Journal of Lifelong Education, 34*(3), 348-365. doi:10.1080/02601370.2014.1000409

Hsu, J., Hamilton, K., & Wang, J. (2015). Guided independent learning: a teaching and learning approach for adult learners. *International Journal of Innovation and Learning, 17*(1), 111-133.

Hu-Au, E., & Okita, S. (2020). *Exploring Differences in Student Learning and Behavior between Real-Life and Virtual Reality Chemistry Laboratory Experiments.* Paper presented at the The Interdisciplinarity of the Learning Sciences, 14th International Conference of the Learning Sciences (ICLS) 2020, Nashville, Tennessee: International Society of the Learning Sciences.

Huband, S., Parkin, E., Gibson, D., & Ifenthaler, D. (2019). *Improving return on investment in higher education retention: Leveraging data analytics insights.* Paper presented at the Personalised Learning, Diverse Goals, One Health. 36th International Conference of Innovation, Practice and Research in the Use of Educational, Technologies in Tertiary Education, Singapore.

Hughes, K. (2017). Transition pedagogies and the neoliberal episteme: What do academics think? *Student Success, 8*(2), 21. doi:10.5204/ssj.v8i2.378

Hultberg, P., Calonge, D., & Lee, E. (2018). Promoting long-lasting learning through instructional design. *Journal of the Scholarship of Teaching and Learning, 18*(3), 26-43. doi:10.14434/josotl.v18i3.23179

Hung, L., Phinney, A., Chaudhury, H., Rodney, P., Tabamo, J., & Bohl, D. (2018). Appreciative Inquiry. *International Journal of Qualitative Methods, 17*(1). doi:10.1177/1609406918769444

Hunt, S. L., & Bakker, C. J. (2018). A qualitative analysis of the information science needs of public health researchers in an academic setting. *Journal of the Medical Library Association, 106*(2), 184-197. doi:10.5195/jmla.2018.316

Hyett, N., Kenny, A., & Dickson-Swift, V. (2014). Methodology or method? A critical review of qualitative case study reports. *International Journal of Qualitative Studies on Health and Well-being, 9*, 23606. doi:10.3402/qhw.v9.23606

Ifenthaler, D., & Schumacher, C. (2016). Student perceptions of privacy principles for learning analytics. *Educational Technology Research and Development, 64*(5), 923-938. doi:10.1007/s11423-016-9477-y

Illeris, K. (2003). Towards a contemporary and comprehensive theory of learning. *International Journal of Lifelong Education, 22*(4), 396-406. doi:10.1080/02601370304837

Imenda, S. (2014). Is there a conceptual difference between theoretical and conceptual frameworks? *Journal of Social Sciences, 38*(2), 185-195. doi:10.1080/09718923.2014.11893249

Institute of Medicine. (2000). *To Err is Human: Building a Safer Health System* (10.17226/9728). Washington DC: The National Academies Press.

Institute of Medicine. (2003). *Who will keep the public healthy? Education public health professionals for the 21st century*. Washington DC: The National Academies Press.

Ivanitskaya, L. V., Hanisko, K. A., Garrison, J. A., Janson, S. J., & Vibbert, D. (2012). Developing health information literacy: A needs analysis from the perspective of pre-professional health students. *Journal of the Medical Library Association, 100*(4), 277-283. doi:10.3163/1536-5050.100.4.009

Jabareen, Y. (2009). Building a Conceptual Framework: Philosophy, definitions, and procedure. *International Journal of Qualitative Methods, 8*(4), 49-62. doi:10.1177/160940690900800406

Jackson, D. (2016). Re-conceptualising graduate employability: The importance of pre-professional identity. *Higher Education Research & Development, 35*(5), 925-939. doi:10.1080/07294360.2016.1139551

Jackson, D., & Bridgstock, R. (2020). What actually works to enhance graduate employability? The relative value of curricular, co-curricular, and extra-curricular learning and paid work. *Higher Education,* 10.1007/s10734-020-00570-x. doi:10.1007/s10734-020-00570-x

Jahnke, I., & Liebscher, J. (2020). Three types of integrated course designs for using mobile technologies to support creativity in higher education. *Computers & Education, 146*, 103782. doi:10.1016/j.compedu.2019.103782

Jarmon, L., Traphagan, T., Mayrath, M., & Trivedi, A. (2009). Virtual world teaching, experiential learning, and assessment: An interdisciplinary communication course in Second Life. *Computers & Education, 53*(1), 169-182. doi:10.1016/j.compedu.2009.01.010

Jarvis, P. (2004). *Adult Education and Lifelong Learning: Theory and Practice* (3rd ed.). London: RoutledgeFalmer.

Jecklin, R. (2010). Online simulation of health care reform: Helping health educators learn and participate. *International Electronic Journal of Health Education, 13*, 90-99.

Jin, H., Dong, G., Zou, L., Shen, X., & Li, D. (2020). History and status quo of higher public health education in China. *Public Health Reviews, 41*(2), 1-16. doi:10.1186/s40985-020-00120-x

John Hopkins Bloomberg School of Public Health. (2020). Mixed Methods Research Training Program for the Health Sciences: John Hopkins University, Baltimore USA. Retrieved from https://www.jhsph.edu/academics/training-programs/mixed-methods-training-program-for-the-health-sciences/

Johnson, B. (2014). Transformation of online teaching practices through implementation of Appreciative Inquiry. Retrieved from https://files.eric.ed.gov/fulltext/EJ1043165.pdf

Johnson, D., Kakar, R., & Walton, P. (2018). Structured public health scenario analyses promote critical thinking in undergraduate students. *Pedagogy in Health Promotion, 5*(4), 261-267. doi:10.1177/2373379918814020

Johnson, L., Adams Becker, S., Cummins, M., Estrada, V., Freeman, A., & Ludgate, H. (2013). *NMC Horizon Report: 2013 Higher Education Edition*. Austin Texas: The New Media Consortium Retrieved from https://virtualeduca.org/documentos/2013/2013-horizon-report-he.pdf.

Johnston, B., Boyle, L., MacArthur, E., & Manion, B. (2013). The role of technology and digital gaming in nurse education. *Nursing Standard, 27*(28), 35-38.

Jones, A. (2016). Envisioning a global health partnership movement. *Global Health, 12*, 1. doi:10.1186/s12992-015-0138-4

Jones, H., Black, B., Green, J., Langton, P., Rutherford, S., Scott, J., & Brown, S. (2014). Indications of knowledge retention in the transition to higher education. *Journal of Biological Education, 49*(3), 261-273. doi:10.1080/00219266.2014.926960

Joo, M. (2017). Students' group work contribution: Influence of work preference, gender, and individual assessment. *Social Behavior and Personality: An International Journal, 45*(1), 19-28. doi:10.2224/sbp.5385

Joubert, M., & Wishart, J. (2012). Participatory practices: Lessons learnt from two initiatives using online digital technologies to build knowledge. *Computers & Education, 59*, 110-119. doi:10.1016/j.compedu.2011.09.024

Joyce, S. (2019). *Strengthening Skills. Expert Review of Australia's Vocational Education Training System*. Commonwealth of Australia Retrieved from https://www.pmc.gov.au/resource-centre/domestic-policy/vet-review/strengthening-skills-expert-review-australias-vocational-education-and-training-system.

Jupp, V. (2006). Progressive Focusing. In V. Jupp (Ed.), The SAGE Dictionary of Social Research Methods (10.4135/9780857020116.n159). doi:10.4135/9780857020116.n159

Kafai, Y. B., & Fields, D. A. (2009). Cheating in virtual worlds: Transgressive designs for learning. *On the Horizon, 17*(1), 12-20. doi:10.1108/10748120910936117

Kahu, E. R. (2013). Framing student engagement in higher education. *Studies in Higher Education, 38*(5), 758-773. doi:10.1080/03075079.2011.598505

Kalantzis, M. (2006a). Changing subjectivities, new Learning. *Pedagogies: An International Journal, 1*(1), 7-12.

Kalantzis, M. (2006b). The Radford Lecture, AARE, 2005. Elements of a science education. *The Australian Educational Researcher, 33*(2), 15-42.

Kalantzis, M., & Cope, B. (2010a). Learning by design. *E-Learning and Digital Media, 7*(3), 198-199. doi:10.2304/elea.2010.7.3.198

Kalantzis, M., & Cope, B. (2010b). The teacher as designer: Pedagogy in the new media age. *E-Learning and Digital Media, 7*(3), 200-222. doi:10.2304/elea.2010.7.3.200

Kalantzis, M., & Cope, B. (nd). *'Learning by Design' Knowledge Processes*. Retrieved from https://newlearningonline.com/.

Kalantzis, M., Cope, B., & Learning by Design Project Group. (2005). *Learning by Design*. Melbourne: Common Ground Publishing.

Karmel, T., & Lu, T. (2012). *Associate Degree or Advanced Diploma? A case study.* NCVER, Adelaide: NCVER Retrieved from https://www.ncver.edu.au/__data/assets/file/0015/4335/2523.docx.

Kaufman, K. (2013). 21 ways to 21st century skills: Why students need them and ideas for practical implementation. *Kappa Delta Pi Record, 49*(2), 78-83. doi:10.1080/00228958.2013.786594

Kaur, A., Noman, M., & Awang-Hashim, R. (2018). The role of goal orientations in students' perceptions of classroom assessment in higher education. *Assessment & Evaluation in Higher Education, 43*(3), 461-472. doi:10.1080/02602938.2017.1359818

Kaur, M. (2016). Application of mixed method approach in public health research. *Indian Journal of Community Medicine, 41*(2), 93-97. doi:10.4103/0970-0218.173495

Kennon, N., Howden, P., & Hartley, M. (2009). Who really matters? A stakeholder analysis tool. *Extension Farming Systems Journal, 5*(2), 9-17. doi:10.22004/ag.econ.294276

Kervin, L., Vialle, W., Herrington, J., & Okely, T. (2006). *Research for Educators*. Australia: Cengage Learning.

Kettunen, J. (2015). Stakeholder relationships in higher education. *Tertiary Education and Management, 21*(1), 56-65. doi:10.1080/13583883.2014.997277

Khan, M., Khan, N., & Gobin, B. (2012). Analysis of Felder-Solomon Index of Learning Styles of students from management and engineering at the University of Mauritius. *Journal of Education and Vocational Research, 3*(8), 224-249.

Kiener, M. (2009). Applying the Scholarship of Teaching and Learning: Pursuing a deeper understanding of how students learn. *InSight: A Journal of Scholarly Teaching, 4*, 21-27.

Kim, H., Sefcik, J. S., & Bradway, C. (2017). Characteristics of Qualitative Descriptive Studies: A Systematic Review. *Research in Nursing and Health, 40*(1), 23-42. doi:10.1002/nur.21768

King, S. (2015). Increasing the Power of the Poor? NGO-led Social Accountability Initiatives and Political Capabilities in Rural Uganda. *The European Journal of Development Research, 27*(5), 887-902. doi:10.1057/ejdr.2014.74

Kirkup, L. (2013). *Inquiry-oriented learning in science: Transforming practice through forging new partnerships and perspectives Final Report*. Office of Learning and Teaching Retrieved from https://altf.org/fellowships/inquiry-oriented-learning-in-science-transforming-practice-through-forging-new-partnerships-and-perspectives/.

Kirkwood, B., & Riegelman, R. (2011). Community colleges and public health. *American Journal of Preventive Medicine, 40*(2), 220-225.

Kirschner, P. A., Sweller, J., & Clark, R. E. (2006). Why minimal guidance during instruction does not work: An analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching. *Educational Psychologist, 41*(2), 75-86. doi:10.1207/s15326985ep4102_1

Kitsantas, A., & Chow, A. (2007). College students' perceived threat and preference for seeking help in traditional, distributed, and distance learning environments. *Computers & Education, 48*(3), 383-395. doi:10.1016/j.compedu.2005.01.008

Kitzinger, J. (2006). Focus Groups. In C. Pope & N. Mays (Eds.), *Qualitative Research in Health Care* (3rd ed., pp. 21-31). USA: John Wiley & Sons, Incorporated.

Kiviniemi, M., & Przybyla, S. (2019). Integrative approaches to the undergraduate public health major curriculum: Strengths, challenges, and examples *Frontiers in Public Health, 7*(Article 106), 1-10. doi:org/10.3389/fpubh.2019.00106

Kiviniemi, M. T., & Mackenzie, S. L. (2017). Framing undergraduate public health education as liberal education: Who are we training our students to be and how do we do that? *Frontiers in Public Health, 5*, 9. doi:10.3389/fpubh.2017.00009

Knifsend, C. A. (2020). Intensity of activity involvement and psychosocial well-being among students. *Active Learning in Higher Education, 21*(2), 116-127. doi:10.1177/1469787418760324

Knowles, M., Holton, E., & Swanson, R. (2005). *The Definitive Classic in Adult Eduction and Human Resource Development* (6th ed.). Burlington: Elsevier.

Kolb, A., & Kolb, D. (2005). Learning styles and learning spaces: Enhancing experiential learning in higher education. *Academy of Management Learning & Education, 4*(2), 193-212. doi:10.5465/AMLE.2005.17268566

Kolb, A., & Kolb, D. (2014). *The KOLB Learning Style Inventory Version 4.0*. In. Retrieved from https://learningfromexperience.com/index.html

Koo, D., & Miner, K. (2010). Outcome-based workforce development and education in public health. *Annual Review of Public Health, 31*, 253-269. doi:10.1146/annurev.publhealth.012809.103705

Krogh, L. (2000). *Lifelong learning in the new millenium-a shared responsibility approach*. Paper presented at the AVETRA 2000 Conference, Canberra. https://avetra.org.au/data/Conference_2000_pres./58_Lola_Krogh_paper.pdf

Kuhn, D. (2007). Is direct instruction an answer to the right question? *Educational Psychologist, 42*(2), 109-113.

Kumar, S. (2015). Study habits of undergraduate students. *International Journal of Education and Information Studies, 5*(1), 17-24.

Lahav, O., Talis, V., Cinamon, R., & Rizzo, A. (2020). Virtual interactive consulting agent to support freshman students in transition to higher education. *Journal of Computing in Higher Education, 32*(2), 330-364. doi:10.1007/s12528-019-09237-8

Laird, T., Seifert, T., Pascarella, E., Mayhew, M., & Blaich, C. (2014). Deeply afftecting first-year students' thinking: Deep approaches to learning and three dimensions of cognitive development. *The Journal of Higher Education, 85*(3), 402-432. doi:1:10.1353/jhe.2014.0017

Laird, Y., Manner, J., Baldwin, L., Hunter, R., McAteer, J., Rodgers, S., . . . Jepson, R. (2020). Stakeholders' experiences of the public health research process: time to change the system? *Health Research Policy and Systems, 18*(1), 83-83. doi:10.1186/s12961-020-00599-5

Lamb, S., Maire, Q., & Doecke, E. (2017). *Key skills for the 21st century: An evidence-basesd review. Future Frontiers Analytical Report for the NSW Government*. Victoria University and Centre for International Research on Education Systems Retrieved from http://vuir.vu.edu.au/35865/1/Key-Skills-for-the-21st-Century-Analytical-Report.pdf.

Langley, M. E., & Brown, S. T. (2010). Perceptions of the use of reflective learning journals in online graduate nursing education. *Nursing Education Perspectives, 31*(1), 12-17.

Larson, L., & Miller, T. (2011). 21st century skills: Prepare students for the future. *Kappa Delta Pi Record, 47*(3), 121-123. doi:10.1080/00228958.2011.10516575

Laughland-Booÿ, J., Mayall, M., & Skrbiš, Z. (2015). Whose choice? Young people, career choices and reflexivity re-examined. . *Current Sociology, 63*(4), 586-603. doi:10.1177/0011392114540671

Lave, J., & Wenger, E. (1991). *Situated Learning: Legitimate Peripheral Participation*. Cambridge: Cambridge University Press.

Law, A. S., & Stock, R. (2019). Learning approach and its relationship to type of media use and frequency of media-multitasking. *Active Learning in Higher Education, 20*(2), 127-138. doi:10.1177/1469787417735612

Lawlor, J., Conneely, C., Oldham, E., Marshall, K., & Tangney, B. (2018). Bridge21: teamwork, technology and learning. A pragmatic model for effective twenty-first-century team-based learning. *Technology, Pedagogy and Education, 27*(2), 211-232. doi:10.1080/1475939x.2017.1405066

Le, M. L. (2014). Information needs of public health students. *Health Information and Libraries Journal, 31*(4), 274-292. doi:10.1111/hir.12082

League for Innovation in the Community College. (nd). Community Colleges and Public Health. Retrieved from https://www.league.org/ccph

Lee, B., Yanicki, S., & Solowoniuk, J. (2011). Value of a health behavior change reflection assignment for health promotion learning. *Education for Health, 24*(2), 1-13. Retrieved from www.educationforhealth.net/

Lee, J. (2014). Career planning in public health. *Frontiers in Public Health, 2*(Article 250), 1-2. doi:10.3389/fpubh.2014.00250

Lee, L., & Zarowsky, C. (2015). Foundational values for public health. *Public Health Reviews, 36*(2), 1-9. doi:10.1186/s40985-015-0004-1

Leenknecht, M., Hompus, P., & van der Schaaf, M. (2019). Feedback seeking behaviour in higher education: The associatian with students' goal orientation and deep learning approach. *Assessment & Evaluation in Higher Education, 44*(7), 1069-1078. doi:10.1080/02602938.2019.1571161

Lehmann, W. (2009). University as vocational education: Working-class students' expectations for university. *British Journal of Sociology of Education, 30*(2), 137-149. doi:10.1080/01425690802700164

Lei, H., Cui, Y., & Zhou, W. (2018). Relationships between student engagement and academic achievement: A meta-analysis. *Social Behavior and Personality: An International Journal, 46*(3), 517-528. doi:10.2224/sbp.7054

Leider, J. P., Harper, E., Bharthapudi, K., & Castrucci, B. C. (2015). Educational attainment of the public health workforce and its implications for workforce development. *Journal of Public Health Management Practice, 21 Suppl 6*, S56-68. doi:10.1097/PHH.0000000000000306

Leiva-Brondo, M., Cebolla-Cornejo, J., Peiró, R., Andrés-Colás, N., Esteras, C., Ferriol, M., . . . Pérez-de-Castro, A. (2020). Study approaches of life science students using the revised Two-Factor Study Process Questionnaire (R-SPQ-2F). *Education Sciences, 10*(7). doi:10.3390/educsci10070173

Li, L. M., Tang, J. L., Lv, J., Jiang, Y., & Griffiths, S. M. (2011). The need for integration in health sciences sets the future direction for public health education. *Public Health, 125*(1), 20-24. doi:10.1016/j.puhe.2010.10.008

Liamputtong, P. (2016). Public health: An introduction to local and global contexts. In P. Liamputtong (Ed.), *Public Health Local & Global Perspectives*. Melbourne: Cambridge University Press.

Lightbody, P., & Durndell, A. (1996). Gendered Career Choice: is sex-stereotyping the cause or the consequence? *Educational Studies, 22*(2), 133-146. doi:10.1080/0305569960220201

Lim, G., Shelley, A., & Heo, D. (2019). The regulation of learning and co-creation of new knowledge in mobile learning. *Knowledge Management & E-Learning: An International Journal, 11*(4), 449-484. doi:10.34105/j.kmel.2019.11.024

Lim, L., Dawson, S., Gašević, D., Joksimović, S., Pardo, A., Fudge, A., & Gentili, S. (2020). Students' perceptions of, and emotional responses to, personalised learning analytics-based feedback: an exploratory study of four courses. *Assessment & Evaluation in Higher Education,* 10.1080/02602938.2020.1782831, 1-21. doi:10.1080/02602938.2020.1782831

Lin, C., Yeh, Y., Hung, Y., & Chang, R. (2013). Data mining for providing a personalized learning path in creativity. An application of decision trees. *Computers & Education, 68*, 199-210. doi:10.1016/j.compedu.2013.05.009

Ling, C., & Tran, L. (2015). Chinese international students in Australia: An insight into their help and information seeking manners. *The International Education Journal: Comparative Perspectives, 14*(1), 42-56.

Litchfield, A., Frawley, J., & Nettleton, S. (2010). Contextualising and integrating into the curriculum the learning and teaching of work-ready professional graduate attributes. *Higher Education Research & Development, 29*(5), 519-534. doi:10.1080/07294360.2010.502220

Litzinger, T., Lee, S., Wise, J., & Felder, R. (2005). *A study of reliability and validity of the Felder-Soloman Index of Learning Styles. Proceedings of the 2005* Paper presented at the American Society for Engineering Education Annual Conference and Exposition.

Liu, E., Lin, C., Jian, P., & Liou, P. (2012). The dynamics of motivation and learning strategy in a creativity-supporting learning environment in higher education. *The Turkish Online Journal of Educational Technology, 11*(1), 172-180.

Liu, E. Z., Cheng, S., & Lin, C. H. (2013). The effects of using online Q & A discussion forums with different characteristics as a learning resource. *The Asia-Pacific Education Researcher, 22*(4), 667-675. doi:10.1007/s40299-013-0072-2

Liu, Y., Salwi, S., & Drolet, B. C. (2020). Multivalue ethical framework for fair global allocation of a COVID-19 vaccine. *Journal of Medical Ethics, 46*(8), 499-501. doi:10.1136/medethics-2020-106516

Lloyd, T., Shaffer, M., Stetter, C., Widome, M., Repke, J., Weitekamp, M., . . . Paul, I. (2013). Health knowledge among the millennial generation. *Journal of Public Health Research, 2*(e8), 38-41.

Lock, E., & Kelly, K. (2020). Ignorance is risk: An exploratory investigation of Australian higher education students' perceptions of their education-employment pathways. *The Journal of*

Teaching and Learning for Graduate Employability, 11(1), 22-36. doi:10.21153/jtlge2020vol11no1art894

Loes, C. N., An, B. P., Saichaie, K., & Pascarella, E. T. (2017). Does collaborative learning influence persistence to the second year of college? *The Journal of Higher Education, 88*(1), 62-84. doi:10.1080/00221546.2016.1243942

Loke, S. (2015). How do virtual world experiences bring about learning? A critical review of theories. *Australasian Journal of Educational Technology, 31*(1), 112-122.

Lombardi, M. (2007). *Authentic learning for the 21st century: An overview*. Educause Learning Initiative Retrieved from https://www.researchgate.net/publication/220040581_Authentic_Learning_for_the_21st_Century_An_Overview.

López-Alcarria, A., Olivares-Vicente, A., & Poza-Vilches, F. (2019). A Systematic Review of the Use of Agile Methodologies in Education to Foster Sustainability Competencies. *Sustainability, 11*(10), 2915. doi:10.3390/su11102915

Lopez-Fernandez, O., & Molina-Azorin, J. (2011). The use of mixed methods research in interdisciplinary educational journals. *International Journal of Multiple Research Approaches, 5*(2), 269-283.

Lor, R. (2017). *Design Thinking in Education: A Critical Review of the Literature*. Paper presented at the International Academic Conference on Social Sciences and Management, and Asian Conference on Education and Psychology, Bangkok, Thailand.

Lorenzo-Alvarez, R., Rudolphi-Solero, T., Ruiz-Gomez, M., & Sendra-Portero, F. (2020). Game-based learning in virtual worlds: A multiuser online game for medical undergraduate radiology education within Second Life. *Anatomical Sciences Education, 13*(5), 602-617. doi:10.1002/ase.1927

Louw, A., Turner, A., & Wolvaardt, L. (2018). A case study of the use of a special interest group to enhance interest in public health among undergraduate health science students. *Public Health Reviews, 39*, 11. doi:10.1186/s40985-018-0089-4

Love, L. M., Haggar, F. L., McBrien, S. B., Buzalko, R. J., Hartman, T. L., Shope, R. J., & Beck Dallaghan, G. L. (2018). Supporting the Professional Identity of Medical Science Educators: Understanding Faculty Motivations for Quality Improvement in Teaching. *Medical Science Educator, 28*(4), 655-665. doi:10.1007/s40670-018-0609-3

Lucey, T. A., & Grant, M. M. (2009). Ethical issues in instructional technology: An exploratory framework. *Multicultural Education & Technology Journal, 3*(3), 196-212. doi:10.1108/17504970910984871

Lukens, S., Jay DePasse, J., Rosenfeld, R., Ghedin, E., Mochan, E., Brown, S., . . . Clermont, G. (2014). A large-scale immuno-epidemiological simulation of influenza A epidemics. *BMC Public Health, 14*(1019), 1-15.

Lukyanenko, R., Wiggins, A., & Rosser, H. (2019). Citizen science: An information quality research frontier. *Information Systems Frontiers, 22*(4), 961-983. doi:10.1007/s10796-019-09915-z

Luu, X., Dundas, K., & James, E. L. (2019). Opportunities and challenges for undergraduate public health education in Australia and New Zealand. *Pedagogy in Health Promotion, 5*(3), 199-207. doi:10.1177/2373379919861399

Lwande, C., Muchemi, L., & Oboko, R. (2021). Identifying learning styles and cognitive traits in a learning management system. *Heliyon, 7*(8), e07701. doi:10.1016/j.heliyon.2021.e07701

Lynam, S., & Cachia, M. (2018). Students' perceptions of the role of assessments at higher education. *Assessment & Evaluation in Higher Education, 43*(2), 223-234. doi:10.1080/02602938.2017.1329928

Lyon, A. K., Hothersall, E. J., & Gillam, S. (2016). Teaching public health in UK medical schools: 'Things have improved: Teaching no longer feels like an expensive hobby'. *Journal of Public Health, 38*(3), e309-e315. doi:10.1093/pubmed/fdv127

Machida, K., Chin, M., & Johnson, K. A. (2018). The provision of partial notes is not associated with improved student attention in lectures or subsequent understanding of the lecture material. *Active Learning in Higher Education, 19*(2), 101-115. doi:10.1177/1469787417723241

Mackenzie, S. L. C., Hinchey, D. M., & Cornforth, K. P. (2019). A public health service-learning capstone: Ideal for students, academia and community. *Frontiers in Public Health, 7*(Article 10), 10. doi:10.3389/fpubh.2019.00010

Mager, N., & Farris, K. (2016). The importance of public health in pharmacy education and research. *American Journal of Pharmaceutical Education, 8*(2 (Article 18)).

Marriott, L., Lipus, A., Choate, L., Smith, J., Coppola, L., Cameron, W., & Shannon, J. (2015). Experiential learning through participatory action research in public health supports community-based training of future health professionals. *Pedagogy in Health Promotion, 1*(4). doi:10.1177/2373379915601119

Marshall, A. (2014). Sensemaking in Second Life. *Procedia Technology, 13*, 107-111. doi:10.1016/j.protcy.2014.02.014

Martin, J. (2018). *Skills for the 21st century: Findings and policy lessons from the OECD survey of adult skills: OECD Education Working Paper 166*. Retrieved from https://www.oecd-ilibrary.org/education/skills-for-the-21st-century_96e69229-en.

Martin Jr, S. (2014). Significance of population health knowledge in the education of the undergraduate workforce for careers in the health care sector. *Frontiers in Public Health, 2*(Article 212), 1-2. doi:10.3389/fpubh.2014.00212

Marton, F., & Saljo, R. (1976). On qualitative differences in learning: 1. Outcome and process. *British Journal of Educational Psychology, 46*(1), 4-11. doi:10.1111/j.2044-8279.1976.tb02980.x

Massey, M. G., Kim, S.-H., & Mitchell, C. (2011). A study of the learning styles of undergraduate social work students. *Journal of Evidence-Based Social Work, 8*(3), 294-303. doi:10.1080/15433714.2011.557977

Matsushita, K. (Ed.) (2018). *Deep Active Learning : Toward Greater Depth in University Education*. Singapore: Springer.

Maxwell, J. (2005). Conceptual framework: What do you think is going on? In *Qualitative Research Design: An Interactive Approach* (pp. 33-64). California: Sage Publications.

Maxwell, J. (2016). Expanding the history and range of mixed methods research. *Journal of Mixed Methods Research, 10*(1), 12-27.

McCann, C., Beddoe, E., McCormick, K., Huggard, P., Kedge, S., Adamson, C., & Huggard, J. (2013). Resilience in the health professions: A review of recent literature. *International Journal of Wellbeing, 3*(1), 60-81. doi:10.5502/ijw.v3i1.4

McCardle, L. (2014). Better school-to-work links urged. *Children and Young People Now,* (March 4th-17th). Retrieved from http://socialwelfare.bl.uk/welfare-reform-digest/2014/april/vocationaleducationandtraining/index.aspx

McCarthy, M. (2016). Experiential learning theory: From theory to practice. *Journal of Business and Economics Research, 14*(3), 91-99.

McCrindle, M., Fell, A., Leung, K., & Chi , P. (2020). *Understanding the future consumer: Generational insights to inform future strategies towards 2030*. McCrindle Research Pty Ltd, NSW Retrieved from https://mccrindle.com.au/wp-content/uploads/reports/Analyse-Australia-2020-Understanding-the-Future-Consumer.pdf.

McCune, V., & Entwistle, N. (2011). Cultivating the disposition to understand in 21 st century university education. *Learning and Individual Differences, 21*, 303-310. doi:10.1016/j.lindif.2010.11.017

McGaw, B. (2013). *Developing 21st Century Competencies through Disciplines of Knowledge*. Paper presented at the International Symposium of Education and 21st Century Competencies, Muscat, Oman. https://docs.acara.edu.au/resources/Developing_21st_century_competencies_Prof_Barry_McGaw.pdf

McIntire, R. K., & DiVito, B. M. (2017). An experiential service-learning project on observed smoking behavior to teach practical epidemiologic skills to MPH students, Philadelphia, 2015. *Public Health Reports, 132*(3), 392-396. doi:10.1177/0033354917698115

McIntosh, E. A. (2019). Working in partnership: The role of peer assisted study sessions in engaging the citizen scholar. *Active Learning in Higher Education, 20*(3), 233-248. doi:10.1177/1469787417735608

McKlennen, B., & Keating, S. (2008). *Work-integrated learning (WIL) in Australian universities: The challenges of mainstreaming WIL*. Paper presented at the National Symposium on Career Development Learning: Maximising the Contribution of Work-integrated Learning (WIL) to the Student Experience, Melbourne.

McLaughlin, M. (2019). Careers of the future: Public Health. Insider Guides. Retrieved from insiderguides.com.au/careers-of-the-future-public-health/

McLaughlin, P., Mills, A., Davis, P., Saha, S., & Hardie, M. (2013). *Clearing the pathway: Improving the transition for students moving between AQF 5, 6, and 7. Final Report.*: RMIT University, University of Western Sydney, Curtin University, Deakin University Retrieved from http://www.olt.gov.au/system/files/resources/ID11_1946_RMIT_McLaughlin_Report_2013.pdf.

McLoughlin, C. (1999). The implications of the research literature on learning styles for the design of instructional material. *Australian Journal of Educational Technology, 15*(3), 222-241.

McMahon, M., & Ewing, A. (2015). Promoting creativity through explicit teaching strategies. *eCulture, 7*(1), Article 1. Retrieved from http://ro.ecu.edu.au/eculture/vol7/iss1/1

McMurray, A., Pace, R., & Scott, D. (2004). *Reasearch: A commonsense approach*. Victoria: Thompson Social Sciences Press.

McNamara, D. S. (2011). Measuring deep, reflective comprehension and learning strategies: challenges and successes. *Metacognition and Learning, 6*(2), 195-203. doi:10.1007/s11409-011-9082-8

McPherson, S. (2017). Australia is failing to prepare young people for work, and now we're going to punish them for it? Foundation for Young Australians [Press release]. Retrieved from https://www.fya.org.au/2017/02/08/australia-is-failing-to-prepare-young-people-for-work-and-now-were-going-to-punish-them-for-it/

McPherson, S. (2019). Australia investing $91 billion in education but still not equipped with the skills for the future. Foundation for Young Australians [Press release]. Retrieved from https://www.fya.org.au/2019/01/30/media-release-australia-investing-91-billion-in-education-but-still-not-equipped-with-the-skills-for-the-future/

Mehta, J., & Fine, S. (2012). Teaching differently...learning deeply. *Kappan Magazine, 94*(2), 31-35.

Menchen-Trevino, E., & Hargittai, E. (2011). Young adults' credibility assessment of Wikipedia. *Information, Communication & Society, 14*(1), 24-51. doi:10.1080/13691181003695173

Merga, M. (2016). Gaps in work readiness of graduate health professionals and impact on early practice: Possibilities for future interprofessional learning. *Focus on Health Professional Education: A Multi-Disciplinary Journal, 17*(3), 14-29.

Merril, M., & Gilbert, C. (2008). Effective peer interaction in a problem-centred instructional strategy. *Distance Education, 29*(2), 199-207. doi:10.1080/01587910802154996

Mertes, S., & Hoover, R. (2014). Predictors of first-year retention in a community college. *Community College Journal of Research and Practice, 38*(7). doi:10.1080/10668926.2012.711143

Merzel, C., Halkitis, P., & Healton, C. (2017). Pedagogical scholarship in public health: A call for cultivating learning communities to support evidence-based education. *Public Health Reports, 132*(6), 679-683. doi:10.1177/0033354917733745

Metzinger, C., & Berg, C. (2015). Work readiness tools for young adults with chronic conditions. *Work, 52*(3), 605-615. doi:10.3233/WOR-152185

Mezirow, J. (1997a). Transformation Theory out of context. *Adult Education Quarterly, 48*(1), 60-67. doi:org/10.1/77/074171369704800105

Mezirow, J. (1997b). Transformative learning: Theory to practice. In P. Cranton (Ed.), *New directions for adult and continuing education: No. 74. Transformative learning in action: Insights from practice* (pp. 5-12). San Francisco: Jossey-Bass.

Mezirow, J. (2000). Learning to think like an adult: Core concepts of transformation theory. In J. Mezirow & Associates (Eds.), *Learning as transformation: Critical perspectives on a theory in progress* (pp. 3-34). San Francisco: Jossey-Bass.

Mezirow, J. (2003). Transformative learning as discourse. *Journal of Transformative Education, 1*(1), 58-63. doi:10.1177/1541344603252172

Millery, M., Hall, M., Eisman, J., & Murrman, M. (2014). Using innovative instructional technology to meet training needs in public health: a design process. *Health Promotion Practice, 15*(1 Suppl), 39S-47S. doi:10.1177/1524839913509272

Mills, A., Durepos, G., & Wiebe, E. (2009). Naturalistic generalization. In A. Mills, G. Durepos, & E. Wiebe (Eds.), *Encyclopedia of Case Study Research* (Vol. 1, pp. 600-601): SAGE Publications.

Mirza, M., & Khurshid, K. (2020). Impact of VARK Learning Model at tertiary level education. *International Journal of Educational and Pedagogical Sciences, 14*(5), 354-361.

Moates, A. (2011). *Simulation and Nurse Education in the Vocational and Education Training Sector*. Master of Education Thesis. Monash University.

Monash University Public Health and Preventative Medicine. (2020). Mixed Methods Research: Monash University, Victoria, Australia. Retrieved from https://www.monash.edu/medicine/sphpm/units/registry-science-and-research/mixed-methods-research

Moore, M., McKee, M., Borisch, B., & Ricciardi, W. (2016). The Global Charter for the Public's Health. *European Journal of Public Health, 26*(2), 207. doi:10.1093/eurpub/ckw013

Moore, R. (2020a). Developing lifelong learning with heutagogy: contexts, critiques, and challenges. *Distance Education, 41*(3), 381-401. doi:10.1080/01587919.2020.1766949

Moore, T. (2020b). The degrading of university education. *Australian Universities Review, 62*(2), 98-104.

Moore, T., & Shaffer, S. (2017). Awakening the learner within: Purposeful prompts and lifelong learning measures in a first-year composition course. *Journal of the Scholarship of Teaching and Learning, 17*(4), 67-82. doi:10.14434/josotl.v17i4.21899

Moradian, N., Ochs, H. D., Sedikies, C., Hamblin, M. R., Camargo, C. A., Jr., Martinez, J. A., . . . Rezaei, N. (2020). The urgent need for integrated science to fight COVID-19 pandemic and beyond. *Journal of Translational Medicine, 18*(1), 205. doi:10.1186/s12967-020-02364-2

Moreno-Ger, P., Burgos, D., Martinez-Ortiz, I., Sierra, J., & Fernandez-Manjon, B. (2008). Educational game design for online education. *Computers in Human Behavior, 24*(6), 2530-2540.

Moreno, M., Grant, A., Kacvinsky, L., Moreno, P., & Fleming, M. (2012). Older adolescents' views regarding participation in facebook research. *Journal of Adolescent Health, 51*, 439-444. doi:10.1016/j.jadohealth.2012.02.001

Morgan, A., & Beaty, L. (2005). The world of the learner. In F. Marton, D. Hounsell, & N. Entwistle (Eds.), The Experience of Learning: Implications for Teaching and Studying in Higher Education (pp. 217-237). Edinburgh: University of Edinburgh.

Morgan, S., Gelbgiser, D., & Weeden, K. (2013). Feeding the pipeline: Gender, occupational plans, and college major selection. *Social Science Research, 42*(4), 989-1005. doi:10.1016/j.ssresearch.2013.03.008

Morien, R. (2019). Leagility in Pedagogy: Applying Logistics and Supply Chain Management Thinking to Higher Education, Teacher Education in the 21st Century. In Reginald Botshabeng Monyai (Ed.), IntechOpen (10.5772/intechopen.85264). Retrieved from

https://www.intechopen.com/books/teacher-education-in-the-21st-century/leagility-in-pedagogy-applying-logistics-and-supply-chain-management-thinking-to-higher-education. doi:10.5772/intechopen.85264

Mosalanejad, L., Shahsavari, S., Sobhanian, S., & Dastpak, M. (2012). The effect of virtual versus traditional learning in achieving competency-based skills. *Turkish Online Journal of Distance Education, 13*(2), 69-75.

Muhammad, T., Shafiq Ur, R., Khalid, M., & Ghulam, M. (2018). Online Information Searching Skills of Business Students. *Pakistan Journal of Library & Information Science, 20*, 39-59.

Muldner, K., Burleson, W., Van de Sande, B., & VanLehn, K. (2011). An analysis of students' gaming behaviors in an intelligent tutoring system: predictors and impacts. *User Modeling and User-Adapted Interaction, 21*(1-2), 99-135. doi:10.1007/s11257-010-9086-0

Munro, L. (2011). 'It's a lot of hard work': The experiences of student-workers in university term-time. *Australian Bulletin of Labour, 37*(4), 33-50.

Murillo-Zamorano, L. R., López Sánchez, J. Á., & Godoy-Caballero, A. L. (2019). How the flipped classroom affects knowledge, skills, and engagement in higher education: Effects on students' satisfaction. *Computers & Education, 141*. doi:10.1016/j.compedu.2019.103608

Nagarajan, S., & Edwards, J. (2014). Is the Graduate Attributes Approach sufficient to develop work ready graduates? *Journal of Teaching and Learning for Graduate Employability, 5*(1), 12-28.

Nakajima, M., Dembo, M., & Mossler, R. (2012). Student persistence in community colleges. *Community College Journal of Research and Practice, 36*(8), 591-613.

Narayan, V., Herrington, J., & Cochrane, T. (2019). Design principles for heutagogical learning: Implementing student-determined learning with mobile and social media tools. *Australasian Journal of Educational Technology, 35*(3), 86-101. doi:10.14742/ajet.3941

National Academies of Sciences Engineering and Medicine. (2018). *Learning through citizen science: Enhancing opportunities by design*. Washington, DC: The National Academies Press. .

National Research Council. (2012). *Education for Life and Work: Developing Transferable Knowledge and Skills in the 21st Century* (10.17226/13398). Washington DC: The National Academies Press.

National Student Clearinghouse Research Center. (2017). *Snapshot Report: Certificate and Associate Degree Pathways*. Retrieved from https://nscresearchcenter.org/wp-content/uploads/SnapshotReport29.pdf.

Naylor, R., Baik, C., & Arkoudis, S. (2018). Identifying attrition risk based on the first year experience. *Higher Education Research & Development, 37*(2), 328-342. doi:10.1080/07294360.2017.1370438

Neiterman, E., & Zaza, C. (2019). A mixed blessing? Students' and instructors' perspectives about off-task technology use in the academic classroom. *The Canadian Journal for the Scholarship of Teaching and Learning, 10*(1). doi:10.5206/cjsotl-rcacea.2019.1.8002

Nelson-Hurwitz, D., & Tagorda, M. (2015). Developing an undergraduate applied learning experience. *Frontiers in Public Health, 3*(Article 1), 1-4. doi:10.3389/fpubh.2015.00002

Nelson-Hurwitz, D., Tagorda, M., Kehl, L., Buchthal, O., & Braun, K. (2018). Developing an undergraduate public health introductory core course series. *Frontiers in Public Health, 6*, 155. doi:10.3389/fpubh.2018.00155

Nelson, K., & Clarke, J. (2014). The first year experience: Looking back to inform the future. *HERDSA Review of Higher Education, 1*, 23-45. Retrieved from http://www.herdsa.org.au/herdsa-review-higher-education-vol-1/23-45

Neștian, S., Tiță, S., & Turnea, E. (2020). Using mobile phones at work in personal and professional information processes. *Sustainability, 12*(965), 1-26. doi:10.3390/su12030965

New Learning. (nd). Pedagogy: New Learning Transforming Designs for Pedagogy and Assessment. Retrieved from http://newlearningonline.com/learning-by-desing/pedagogy

New Pedagogies for Deep Learning Global Partnership. (2019). *What we know about well-being: Connections to Deep Learning*. Retrieved from https://www.npdl.global/wp-content/uploads/2019/01/What-we-know-about-Wellbeing-connections-to-Deep-Learning-1.pdf.

New Pedagogies for Deep Learning Global Partnership. (nd). Deep Learning Advancing All Learners' Capacity to Flourish in a Complex World. Retrieved from http://www.newpedagogies.info/about/

New York University. (nd). STEM-eligible Program FAQ's. Retrieved from https://publichealth.nyu.edu/admissions-aid/stem-eligible-program-faqs

New Zealand Qualifications Authority. (2016). *New Zealand Qualifications Framework*. Retrieved from https://www.nzqa.govt.nz/studying-in-new-zealand/understand-nz-quals/nzqf/.

Newell, T. (2008). Examining information problem-solving, knowledge, and application gains within two instructional methods: Problem-based and computer-mediated participatory simulation. *School Library Media Research, 11*, 1-24.

Newton, P. M. (2018). How common is commercial contract cheating in higher education and is it increasing? A Systematic Review. *Frontiers in Education, 3*(67). doi:10.3389/feduc.2018.00067

Nicholas, D., Huntington, P., Jamali, H., Rowlands, I., & Fieldhouse, M. (2009). Student digital information-seeking behaviour in context. *Journal of Documentation, 65*(1), 106-132. doi:10.1108/00220410910926149

Nietfeld, J. L., Shores, L. R., & Hoffmann, K. F. (2014). Self-regulation and gender within a game-based learning environment. *Journal of Educational Psychology, 106*(4), 961-973. doi:10.1037/a0037116

Niu, L., Behar-Horenstein, L. S., & Garvan, C. W. (2013). Do instructional interventions influence college students' critical thinking skills? A meta-analysis. *Educational Research Review, 9*, 114-128. doi:10.1016/j.edurev.2012.12.002

Nixon, A. (2016). Reflecting on learning analytics. *EDUCAUSE Review, September/October*, 62-63. Retrieved from https://er.educause.edu/-/media/files/articles/2016/8/erm1659.pdf

Norton, A., Cherastidtham, I., & Mackey, W. (2018a). *Dropping out: The benefits and costs of trying university.* Grattan Institute Retrieved from https://grattan.edu.au/wp-content/uploads/2018/04/904-dropping-out-the-benefits-and-costs-of-trying-university.pdf.

Norton, A., Cherastidtham, I., & Mackey, W. (2018b). *Mapping Australian Higher Education 2018*. Grattan Institute Retrieved from https://grattan.edu.au/wp-content/uploads/2018/09/907-Mapping-Australian-higher-education-2018.pdf.

Nowell, L., Norris, J., White, D., & Moules, N. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods, 16*, 1-13. doi:10.1177/1609406917733847

O'Brien, M., Troy, K., & Kirkpatrick, J. (2020). The Allied Health Work Readiness Study: Identifying personal characteristics signalling work readiness in allied health students *Internet Journal of Allied Health Science and Practice, 18*(1 Article 5), 1-14. Retrieved from https://nsuworks.nova.edu/ijahsp/vol18/iss1/5/

Ogunleye, T. (2018). The study of peer pressure and parental influence on the choice of career among secondary school students in Ogun State. *International Journal of Educational Research, 5*(1), 147-152.

Omar, N., Mohaffyza, M., & Paimin, A. (2015). Dimension of Learning Styles and students' academic achievement. *Procedia - Social and Behavioral Sciences, 204*, 172-182. doi:10.1016/j.sbspro.2015.08.130

Organisation for Economic Cooperation and Development. (2015). Future of Education and Skills 2030. Retrieved from http://www.oecd.org/education/2030-project/

Organisation for Economic Cooperation and Development (OECD). (2020). *Tertiary Graduation Rate (Indicator)*. Retrieved from https://data.oecd.org/students/tertiary-graduation-rate.htm.

Ornellas, A., Falkner, K., & Edman Stålbrandt, E. (2019). Enhancing graduates' employability skills through authentic learning approaches. *Higher Education, Skills and Work-Based Learning, 9*(1), 107-120. doi:10.1108/HESWBL-04-2018-0049

Orsini, C., Binnie, V. I., & Wilson, S. L. (2016). Determinants and outcomes of motivation in health professions education: a systematic review based on self-determination theory. *Journal of Educational Evaluation for Health Professions, 13*, 19. doi:10.3352/jeehp.2016.13.19

Osborne, K., Loveder, P., & Knight, G. (2019). *The student journey: Skilling for life*. NCVER: Adelaide, Retrieved from https://www.ncver.edu.au/research-and-statistics/publications/all-publications/the-student-journey-skilling-for-life.

Osseweijer, P. (2006). Letter. A new model for science communication that takes ethical considerations into account. The Three-E Model: Entertainment, Emotion and Education. *Science and Engineering Ethics, 12*(4), 591-593.

Ostoj, I. (2020). The Significance of motivations and selected effects of student employment in the course of studies: A case of an economics study program in Poland. *European Journal of Educational Research, 9*(1), 165-177. doi:10.12973/eu-jer.9.1.165

Otto, L., & Call, V. (1985). Parental influence on young peoples' career development. *Journal of Career Development, 12*(1), 65-69. doi:10.1177/089484538501299108

Outram, S., Dundas, K., & Johnson, N. (2014). The educated citizen: A case study and guide for teaching public health to undergraduates in Australian Universities. *Focus on Health Professional Education: A Multi-Disciplinary Journal, 15*(3), 32-40.

Padgett, D. (2012). *Qualitative and Mixed Methods in Public Health* (10.4135/9781483384511). Thousand Oaks CA: Sage Publications.

Padgett, J., Cristancho, S., Lingard, L., Cherry, R., & Haji, F. (2019). Engagement: what is it good for? The role of learner engagement in healthcare simulation contexts. *Advances in Health Sciences Education, 24*(4), 811-825. doi:10.1007/s10459-018-9865-7

Paludan, J. (2006). Personalised Learning 2025. In. Oganisation for Economic Cooperation and Development. Retrieved from https://www.oecd.org/site/schoolingfortomorrowknowledgebase/themes/demand/41176429.pdf.

Pang, K., & Ross, C. (2010). Assessing the integration of embedded metacognitive strategies in college subjects for improved learning outcomes: A new model of learning activity. *The Journal of Effective Teaching, 10*(1), 79-97.

Pariera, K. (2012). How college students use visual and textual clues to assess credibility on health websites. *Communications in Information Literacy, 6*(1), 34-48.

Parker, J., Maor, D., & Herrington, J. (2013). Authentic online learning: Aligning learner needs, pedagogy and technology. *Issues in Educational Research In Special issue: Teaching and learning in higher education: Western Australia's TL Forum., 23*(2), 227-241.

Parkes, M. W., Poland, B., Allison, S., Cole, D. C., Culbert, I., Gislason, M. K., . . . Waheed, F. (2020). Preparing for the future of public health: ecological determinants of health and the call for an eco-social approach to public health education. *Canadian Journal of Public Health, 111*(1), 60-64. doi:10.17269/s41997-019-00263-8

Parsell, M., Ambler, T., & Jacenyik-Trawoger, C. (2014). Ethics in higher education research. *Studies in Higher Education, 39*(1), 166-179. doi:10.1080/03075079.2011.647766

Partnership for 21st Century Skills Battelle for Kids. (2019). *Framework for 21st Century Learning*. Retrieved from http://static.battelleforkids.org/documents/p21/P21_Framework_Brief.pdf.

Pashler, H., McDaniel, M., Rohrer, D., & Bjork, R. (2009). Learning styles concepts and evidence. *Psychological Science in the Public Interest, 9*(3), 103-119.

Pastore, R. (2015). Using time-compression to make multimedia learning more efficient: Current research and practice. *TechTrends, 59*(2), 66-74.

Patrick, C., Peach, D., Pochnee, C., Webb, F., Fletcher, M., & Pretto, G. (2008). *The WIL Report: Work Integrated Learning: A National Scoping Study*. Retrieved from https://www.researchgate.net/publication/279477734_The_WIL_Work_Integrated_Learning_report_a_national_scoping_study_Final_Report.

Pearson, J. (2020). Engaging a belief in learning styles to encourage a growth mindset. *Performance Improvement, 59*(7), 19-24. doi:epdf/10.1002/pfi.21927

Peel, K. (2020). A beginner's guide to applied educational research using thematic analysis. *Practical Assessment, Research, and Evaluation, 25*(2), Article 2. doi:10.7275/ryr5-k983

Pegrum, M., Bartle, E., & Longnecker, N. (2014). Can creative podcasting promote deep learning? The use of podcasting for learning content in an undergraduate science unit. *British Journal of Educational Technology, 46*, 142-152. doi:10.1111/bjet.12133

Peng, H., Ma, S., & Spector, J. M. (2019). Personalized adaptive learning: An emerging pedagogical approach enabled by a smart learning environment. *Smart Learning Environments, 6*(1). doi:10.1186/s40561-019-0089-y

Penman, J., & Thalluri, J. (2014). Addressing diversity in health science students by enhancing flexibility through e-learning. *The Electronic Journal of e-Learning, 12*(12), 89-100. Retrieved from http://www.ejel.org/issue/download.html?idArticle=270

Pepper, C. (2010). "There's a lot of learning going on but NOT much teaching!": Student perceptions of problem-based learning in science. *Higher Education Research & Development, 29*(6), 693-707.

Petersen, D., Albertine, S., Plepys, C., & Calhoun, J. (2013). Developing an educated citizenry: The undergraduate public health learning outcomes project. *Public Health Reports, 128*, 425-430.

Petrovic-Dzerdz, M., & Trépanier, A. (2018). Online hunting, gathering and sharing-a return to experiential learning in a digital age. *International Review of Research in Open and Distributed Learning, 19*(12), 271-281.

Pfeiffer, J., Beschta, J., Hohl, S., Gloyd, S., Hagopian, A., & Judith Wasserheit, J. (2013). Competency-based curricula to transform global health: Redesign with the end in mind. *Academic Medicine: Journal of the Association of American Medical Colleges, 88*(1), 131–136. doi:10.1097/ACM.0b013e318276bdf4

Phan, N., Dou, D., Wang, H., Kil, D., & Piniewski, B. (2017). Ontology-based deep learning for human behaviour predictions with explanations in health science networks. *Information Sciences, 384*, 298-313. doi:org/10.1016/j.ins.2016.08.038

Phillips KPA. (2010). *Tertiary education advice for growth areas. Project No. 3198*. Richmond, Victoria: Victorian Planning Authority Retrieved from https://vpa-web.s3.amazonaws.com/wp-content/uploads/2016/10/Phillips-KPA-Report.pdf.

Picton, C., Kahu, E. R., & Nelson, K. (2018). 'Hardworking, determined and happy': First-year students' understanding and experience of success. *Higher Education Research & Development, 37*(6), 1260-1273. doi:10.1080/07294360.2018.1478803

Pilkington, P. (2008). Improving access to and provision of public health education and training in the UK. *Public Health, 122*(10), 1047-1050. doi:10.1016/j.puhe.2008.03.008

Pinantoan, A. (2013). Instructional scaffolding: A definitive guide*20 March*. Retrieved from https://www.opencolleges.edu.au/informed/teacher-resources/scaffolding-in-education-a-definitive-guide/

Pitard, J. (2017). A journey to the centre of self: Positioning the researcher in Autoethnography . *Forum Qualitative Sozialforshung/Forum: Qualitative Social Research, 18*(3), Art. 10 [27 paragraphs]. doi:10.17169/fqs-18.3.2764

Pitt, A., Oprescu, F., Tapia, G., & Gray, M. (2018). An exploratory study of students' weekly stress levels and sources of stress during the semester. *Active Learning in Higher Education, 19*(1), 61-75. doi:10.1177/1469787417731194

Ponce, O., & Pagán-Maldonado, N. (2015). Mixed methods research in education: Capturing the complexity of the profession. *International Journal of Educational Excellence, 1*(1), 111-135.

Pope, C., Ziebland, S., & Mays, N. (2006). Analysing qualitative data. In C. Pope & N. Mays (Eds.), *Qualitative Research in Health Care* (3rd ed., pp. 63-81). USA: John Wiley & Sons, Incorporated.

Porter, S. (2008). *First Steps in Research: A Pocketbook for Healthcare Students*. Edinburgh: Churchill Livingstone Elsevier.

Prikshat, V., Montague, A., Connell, J., & Burgess, J. (2019). Australian graduates' work readiness – deficiencies, causes and potential solutions. *Higher Education, Skills and Work-Based Learning, 10*(2), 369-386. doi:10.1108/heswbl-02-2019-0025

Primeau, L. (2003). Reflections on self in qualitative research: Stories of family. *The American Journal of Occupational Therapy, 57*, 9-16.

Prinsley, R., & Baranyai, K. (2015). *STEM skills in the workforce: What do employers want?* Retrieved from https://www.chiefscientist.gov.au/sites/default/files/OPS09_02Mar2015_Web.pdf.

Provenzi, L., & Barello, S. (2020). The science of the future: Establishing a citizen-scientist collaborative agenda after Covid-19. *Frontiers in Public Health, 8*, 282. doi:10.3389/fpubh.2020.00282

Public Health Association of Australia (Producer). (2015). YouTube *Public Health - it's everyone, it's everywhere.* . Retrieved from https://www.youtube.com/watch?v=LiB7In2o4BQ

Public Health Association of Australia. (2018). Careers in Public Health Factsheet. Retrieved from https://www.phaa.net.au/documents/item/2755

Purdy, J. P. (2012). Why first-year college students select online research resources as their favorite. *First Monday,* 10.5210/fm.v0i0.4088. Retrieved from https://journals.uic.edu/ojs/index.php/fm/article/view/4088 doi:10.5210/fm.v0i0.4088

Pychyl, T., Morin, R., & Salmon, B. (2000). Procrastination and the planning fallacy: An examination of the study habits of university students. *Journal of Social Behavior and Personality, 15*(5), 135-150.

Rahim, F. F., Maideen, S. F. K., Rashid, A., & Abdulrahman, S. (2019). The preferred public health medicine learning styles among medical students. *International Journal of Learning, Teaching and Educational Research, 18*(6), 128-146. doi:10.26803/ijlter.18.6.8

Raskind, I. G., Shelton, R. C., Comeau, D. L., Cooper, H. L. F., Griffith, D. M., & Kegler, M. C. (2019). A review of qualitative data analysis practices in health education and health behavior research. *Health Education and Behavior, 46*(1), 32-39. doi:10.1177/1090198118795019

Rastegar, M., Tavana, M., Meraj, A., & Mina, H. (2021). An inventory-location optimization model for equitable influenza vaccine distribution in developing countries during the COVID-19 pandemic. *Vaccine, 15*(39(3)), 495-504. doi:10.1016/j.vaccine.2020.12.022

Reavley, N., Bassilios, B., Ryan, S., Schlichthorst, M., & Nicholas, A. (2015). *Interventions to Build Resilience Among Young People*. Victorian Health Promotion Foundation Melbourne.

Reed-Denahay, D. (2017). Bourdieu and Critical Autoethnography: Implications for research, writing and teaching. *International Journal of Multicultural Education, 19*(1), 144-154.

Reisoğlu, İ., Toksoy, S., & Erenler, S. (2020). An analysis of the online information searching strategies and metacognitive skills exhibited by university students during argumentation activities. *Library and Information Science Research, 42*, 1-13. doi:10.1016/j.lisr.2020.101019

Resnick, B., Selig, S., & Riegelman, R. (2017). An examination of the growing US undergraduate public health movement. *Public Health Reviews, 38*, 4. doi:10.1186/s40985-016-0048-x

Respondek, L., Seufert, T., Stupnisky, R., & Nett, U. E. (2017). Perceived academic control and academic emotions predict undergraduate university student success: Examining effects on dropout intention and achievement. *Frontiers in Psychology, 8*(243). doi:10.3389/fpsyg.2017.00243

Reyes, J. (2015). The skinny on big data in education: Learning analytics simplified. *TechTrends, 59*(2), 75-80.

Richard Felder's Legacy Website. (nd). Retrieved from https://www.engr.ncsu.edu/stem-resources/legacy-site/

Richards, D., & Dignum, V. (2019). Supporting and challenging learners through pedagogical agents: Addressing ethical issues through designing for values. *British Journal of Educational Technology, 50*(6), 2885-2901. doi:10.1111/bjet.12863

Rickwood, D., Telford, N., O'Sullivan, S., Crisp, D., & Magyar, R. (2016). *National Tertiary Student Wellbeing Survey 2016*. Headspace. Retrieved from https://headspace.org.au/assets/Uploads/headspace-NUS-Publication-Digital.pdf.

Riegelman, R., Albertine, S., & Wykoff, R. (2015). A history of undergraduate education for public health: From behind the scenes to center stage. *Frontiers in Public Health, 3*(Article 70), 1-5. doi:10.3389/fpubh.2015.00070

Rimfeld, K., Ayorech, Z., Dale, P. S., Kovas, Y., & Plomin, R. (2016). Genetics affects choice of academic subjects as well as achievement. *Scientific Reports, 6*, 26373. doi:10.1038/srep26373

Rios, J. A., Ling, G., Pugh, R., Becker, D., & Bacall, A. (2020). Identifying critical 21st-century skills for workplace success: A content analysis of job advertisements. *Educational Researcher, 49*(2), 80-89. doi:10.3102/0013189x19890600

Roach, K., Tilley, E., & Mitchell, J. (2018). How authentic does authentic learning have to be? *Higher Education Pedagogies, 3*(1), 495-509. doi:10.1080/23752696.2018.1462099

Roberts, D. (2019). Higher education lectures: From passive to active learning via imagery? *Active Learning in Higher Education, 20*(1), 63-77. doi:10.1177/1469787417731198

Roberts, L. D., & Allen, P. J. (2013). A brief measure of student perceptions of the educational value of research participation. *Australian Journal of Psychology, 65*(1), 22-29. doi:10.1111/ajpy.12007

Roberts, L. D., & Allen, P. J. (2015). Exploring ethical issues associated with using online surveys in educational research. *Educational Research and Evaluation, 21*(2), 95-108. doi:10.1080/13803611.2015.1024421

Robinson, S. (2013). Student response to risk in classroom learning games. *Academy of Educational Leadership Journal, 17*(4), 1-12.

Rogers, G. (2011). Constructivism and the pedagogy of teacher education: Reflections on practice. In J. Adams, M. Cochrane, & L. Dunne (Eds.), *Applying Theory to Educational Research: An Introductory Approach with Case Studies* (10.1002/9781119950844pp. 175-188). Hoboken: Wiley.

Rogowsky, B., Calhoun, B., & Tallal, P. (2015). Matching learning style to instructional method: Effects on comprehension. *Journal of Educational Psychology, 107*(1), 64-78.

Rooks, R., & Rael, C. (2013). Enhancing curriculum through service learning in the social determinants of health course. *Journal of the Scholarship of Teaching and Learning, 13*(2), 84-100.

Rooney, D., Hopwood, N., Boud, D., & Kelly, M. (2015). The role of simulation in pedagogies of higher education for the health professions: Through a practice-based lens. *Vocations and Learning, 8*, 269-285. doi:10.1007/s12186-015-9138-z

Rosenthal, M. (2016). Qualitative research methods: Why, when, and how to conduct interviews and focus groups in pharmacy research. *Currents in Pharmacy Teaching and Learning, 8*(4), 509-516. doi:https://doi.org/10.1016/j.cptl.2016.03.021

Rothwell, A., Herbert, I., & Rothwell, F. (2008). Self-perceived employability: Construction and initial validation of a scale for university students. *Journal of Vocational Behavior, 73*(1), 1-12. doi:10.1016/j.jvb.2007.12.001

Roudsari, R. (2019). Qualitative Description: A less sophisticated approach for junior qualitative researchers. *Journal of Midwifery and Reproductive Health, 7*(4), 1856-1857. doi:10.22038/jmrh.2019.13927

Rourke, J. (2006). Social accountability in theory and practice. *Annals of Family Medicine, 4 Suppl 1*, S45-48; discussion S58-60. doi:10.1370/afm.559

Rowland, S., Gannaway, D., Pedwell, R., Adams, P., Evans, R., Bonner, H., & Wong, K. S. (2019). Legitimising transgression: Design and delivery of a science Work Integrated Learning program that draws on students' extant work in diverse, non-science fields. *Higher Education Research & Development, 39*(2), 318-331. doi:10.1080/07294360.2019.1668364

Rozier, M., & Scharff, D. (2013). The value of liberal arts and practice in an undergraduate public health curriculum. *Public Health Reports, 128*(September-October), 416-421.

Ryan, S. F., Adamson, N. L., Aktipis, A., Andersen, L. K., Austin, R., Barnes, L., . . . Dunn, R. R. (2018). The role of citizen science in addressing grand challenges in food and agriculture research. *Proceedings of the Royal Society Biological Sciences, 285*(1891). doi:10.1098/rspb.2018.1977

Saldivar, K. (2015). Team-based learning: A model for democratic and culturally competent 21st century public administrators. *Journal of Public Affairs Education, 21*(2), 143-164.

Sampson, V., Grooms, J., & Walker, J. P. (2010). Argument-driven Inquiry. *The Science Teacher, November*, 42-47.

Sampson, V., Grooms, J., & Walker, J. P. (2011). Argument-Driven Inquiry as a way to help students learn how to participate in scientific argumentation and craft written arguments: An exploratory study. *Science Education, 95*(2), 217-257. doi:10.1002/sce.20421

Saville, B., Bureau, A., Eckencrode, C., & Maley, M. (2018). Passion and burnout in college students. *College Student Journal, 52*(1), 105-117.

Savin-Baden, M. (2008). From cognitive capability to social reform? Shifting perceptions of learning in immersive virtual worlds. *Alt-J, 16*(3), 151-161. doi:10.1080/09687760802526731

Sawleshwarkar, S., & Negin, J. (2017). A Review of global health competencies for postgraduate public health education. *Frontiers in Public Health, 5*, 46. doi:10.3389/fpubh.2017.00046

Scanlon, E., McAndrew, P., & O'Shea, T. (2015). Designing for educational technology to enhance the experience of learners in distance education: How open educational resources, learning design and MOOCS are influencing learning. *Journal of Interactive Media in Education, 1*(Article 6), 1-9. doi:10.5334/jime.al

Scheer, A., Noweski, C., & Meinel, C. (2012). Transforming constructivist learning into action: Design thinking in education. *Design and Technology Education, 17*(3), 8-19.

Schmidt, H., Loyens, S., van Gog, T., & Pass, F. (2007). Problem based learning is compatible with human cognitive architecture: Commentary on Kirschner Sweller and Clark (2006). *Educational Psychologist, 42*(2), 91-97.

Schneider, J.-G., Eklund, P. W., Lee, K., Chen, F., Cain, A., & Abdelrazek, M. (2020). Adopting industry agile practices in large-scale capstone education. 10.1145/3377814.3381715, 119-129. doi:10.1145/3377814.3381715

Schroeder, R. (2014). Does Google shape what we know? *Prometheus, 32*(2), 145-160. doi:10.1080/08109028.2014.984469

Schumacher, P. (2009). A new global style for architecture and urban design. *Digital Cities, 79*(4).

Schumacher, P. (2016). *Parametricism 2.0: Rethinking Architecture's Agenda for the 21st Century*. In. Retrieved from https://ebookcentral.proquest.com/lib/vu/detail.action?docID=4658587

Schut, S., van Tartwijk, J., Driessen, E., van der Vleuten, C., & Heeneman, S. (2020). Understanding the influence of teacher-learner relationships on learners' assessment perception. *Advances in Health Sciences Education, 25*(2), 441-456. doi:10.1007/s10459-019-09935-z

Schuttpelz-Brauns, K., Hecht, M., Hardt, K., Karay, Y., Zupanic, M., & Kammer, J. E. (2020). Institutional strategies related to test-taking behavior in low stakes assessment. *Advances in Health Sciences Education, 25*(2), 321-335. doi:10.1007/s10459-019-09928-y

Scoular, C., Ramalingam, D., Duckwork, D., & Heard, J. (2020). *Assessment of general capabilities: Skills for the 21st century learner. Final report.* The Australian Council for Educational Research (ACER) Retrieved from https://research.acer.edu.au/ar_misc/47.

Sedden, M., & Clark, K. (2016). Motivating students in the 21st century. *Radiologic Technology, 87*(6), 609-616.

Seidel, E., & Kutieleh, S. (2017). Using predictive analytics to target and improve first year student attrition. *Australian Journal of Education, 61*(2), 200-218. doi:10.1177/0004944117712310

Sellers, K., Leider, J. P., Harper, E., Castrucci, B. C., Bharthapudi, K., Liss-Levinson, R., . . . Hunter, E. L. (2015). The Public Health Workforce Interests and Needs Survey: The first national survey of State health agency employees. *Journal of Public Health Management Practice, 21 Suppl 6*, S13-27. doi:10.1097/PHH.0000000000000331

Seow, P., Pan, G., & Koh, G. (2019). Examining an experiential learning approach to prepare students for the volatile, uncertain, complex and ambiguous (VUCA) work environment. *The International Journal of Management Education, 17*(1), 62-76. doi:10.1016/j.ijme.2018.12.001

Serembus, J. F., Hunt-Kada, P., Lenahan, K., & Lydon, A. (2020). Internet, Apps, and Tweets: Enhancing clinical learning through just-in-time training. *Nursing Education Perspectives, 41*(5), E33-E34. doi:10.1097/01.nep.0000000000000486

Servant-Miklos, V. F. C. (2019). Problem solving skills versus knowledge acquisition: The historical dispute that split problem-based learning into two camps. *Advances in Health Sciences Education, 24*(3), 619-635. doi:10.1007/s10459-018-9835-0

Shamoo, A., & Khin-Maung-Gyi, F. (2002). *Ethics of the Use of Human Subjects in Research*. London: Garland Science.

Shapiro, D., Dundar, A., Wakhungu, P., Yuan, X., Nathan, A., & Hwang, Y. (2016). Time to degree: A national view of the time enrolled and elapsed for associate and bachelor's degree earners (Signature Report No. 11): Herndon, VA. *National Student Clearinghouse Research Center*.

Sharp, J. (2012). *Success with your Education Research Project* (2 ed.). Los Angeles: SAFE.

Shaw, L., Conti, G., & Shaw, B. (2013). Youth in transition: Are they adult learners? *Journal of Adult Education, 42*(4), 34-54.

Shean, M. (2015). *Current theories relating to resilience and young people: A literature review*. Retrieved from Victorian Health Promotion Foundation Melbourne:

Shi, L. (2006). Students as research participants or as learners? *Journal of Academic Ethics, 4*(1-4), 205-220. doi:10.1007/s10805-006-9028-y

Shickle, D., Stroud, L., Day, M., & Smith, K. (2019). The applicability of the UK Public Health Skills and Knowledge Framework to the practitioner workforce: Lessons for competency framework development. *Journal of Public Health, 41*(1), e109-e117. doi:10.1093/pubmed/fdy097

Shikalepo, E. (2020). Defining a conceptual framework in educational research. *Research Gate,* 10.13140/RG.2.2.26293.09447. doi:10.13140/RG.2.2.26293.09447

Sibbald, S. L., Speechley, M., & Thind, A. (2016). Adapting to the needs of the public health workforce: An integrated case-based training program. *Frontiers in Public Health, 4*, 221. doi:10.3389/fpubh.2016.00221

Siemens, G. (2005). Connectivism: A learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning, 2*(1). Retrieved from http://www.itdl.org/Journal/Jan_05/article01.htm

Silber-Varod, V., Eshet-Alkalai, Y., & Geri, N. (2019). Tracing research trends of 21st-century learning skills. *British Journal of Educational Technology, 50*(6), 3099-3118. doi:10.1111/bjet.12753

Sim, J., & Waterfield, J. (2019). Focus group methodology: some ethical challenges. *Quality & Quantity, 53*, 3003-3022. doi:10.1007/s11135-019-00914-5

Simpson, R. (2013). Explainer: What is citizen science? . *The Conversation,* (15 August). Retrieved from http://theconversation.com/explainer-what-is-citizen-science-16487

Smith, C., Ferns, S., Russell, L., & Cretchley, P. (2014). *The impact of work-integrated learning on student work-readiness. Final Report.* Australian Government Office for Learning and Teaching.

Smith, C., & Worsfold, K. (2015). Unpacking the learning–work nexus: 'priming' as lever for high-quality learning outcomes in work-integrated learning curricula. *Studies in Higher Education, 40*(1), 22-42. doi:10.1080/03075079.2013.806456

Smith, H. (2013). *Associate Degrees in Australia: A work in progress*. (9781921916199). East Sydney: Australian Government Office of Learning and Teaching Retrieved from https://ltr.edu.au/resources/Smith_report_RMIT_2013.pdf.

Smith, J., & Osborn, M. (2003). Interpretive Phenomenological Analysis. In J. Smith (Ed.), *Qualitative Psychology: A Practical Guide to Research* (pp. 51-80). London: SAGE.

Smith, J. F., & Skrbiš, Z. (2017). A social inequality of motivation? The relationship between beliefs about academic success and young people's educational attainment. *British Educational Research Journal, 43*(3), 441-465. doi:10.1002/berj.3272

Smith, M., & Cook, K. (2012). Attendance and achievement in problem-based learning: The value of scaffolding. *Interdisciplinary Journal of Problem-Based Learning, 6*(1). doi:10.7771/1541-5015.1315

Smith, T., & Lambert, R. (2014). A systematic review investigating the use of Twitter and Facebook in university-based healthcare education. *Health Education, 114*(5), 347-366. doi:10.1108/he-07-2013-0030

Soetanto, D., & MacDonald, M. (2017). Group work and the change of obstacles over time: The influence of learning style and group composition. *Active Learning in Higher Education, 18*(2), 99-113. doi:10.1177/1469787417707613

Solbes-Canales, I., Valverde-Montesino, S., & Herranz-Hernández, P. (2020). Socialization of gender stereotypes related to attributes and professions among young Spanish school-aged children. *Frontiers in Psychology, 11*(609). doi:10.3389/fpsyg.2020.00609

Song, Q., Wang, Y., Chen, Y., Benitez, J., & Hu, J. (2019). Impact of the usage of social media in the workplace on team and employee performance. *Information & Management, 56*(8), 103160. doi:10.1016/j.im.2019.04.003

South, J., White, J., Branney, P., & Kinsella, K. (2013). Public health skills for a lay workforce: Findings on skills and attributes from a qualitative study of lay health worker roles. *Public Health, 127*(5), 419-426. doi:10.1016/j.puhe.2013.02.014

Spector, J. M. (2014). Conceptualizing the emerging field of smart learning environments. *Smart Learning Environments, 1*(1). doi:10.1186/s40561-014-0002-7

Spencer, G. (2019). Promoting the attainment-to-transfer pathway: Effects of transfer associate degree policies across States. *The Review of Higher Education, 43*(2), 553-580.

Sprague Martinez, L., Bowers, E., Reich, A. J., Ndulue, U. J., Le, A. A., & Peréa, F. C. (2016). Engaging youth of color in applied science education and public health promotion. *International Journal of Science Education, 38*(4), 688-699. doi:10.1080/09500693.2015.1134850

Stake, R. (1981). *The art of progressive focusing*. Paper presented at the Annual Meetingofthe American Educational Research Association, Los Angeles.

Stappenbelt, B. (2010). The influence of action learning on student perception and performance. *Australasian Journal of Engineering Education, 16*(1), 1-12.

Stehlik, T. P. (2011). Launching a career or reflecting on life? Reasons, issues and outcomes for candidates undertaking PhD studies mid-career or after retirement compared to the traditional early career pathway. *Australian Journal of Adult Learning, 51*(Special Edition, December), 150-169.

Stehlik, T. P. (2013). Higher degree studies in mid to late career : reasons, reflections, realities: National Conference of the Canadian Association for the Study of Adult Education Victoria, British Columbia. In (pp. 576-584). Canada: Canadian Association for the Study of Adult Education.

Steketee, C., & Bate, F. (2013). Using educational design research to inform teaching and learning in the health professions. *Issues in Educational Research, 23*(2), 269-282.

Stephen, C. (2020). Rethinking pandemic preparedness in the Anthropocene. *Healthcare Management Forum, 33*(4), 153-157. doi:10.1177/0840470419867347

Stichler, J. (2014). The ethics of research, writing, and publication. *Health Environments Research & Design Journal, 8*(1), 15-19.

Stirling, A., Kerr, G., Banwell, J., McPherson, E., & Heron, A. (2016). *A Practical Guide for Work-Integrated Learning*. Higher Education Quality Council of Ontario: Queen's Printer for Ontario.

Stoots, J., Wykoff, R., Khoury, A., & Pack, R. (2015). An undergraduate curriculum in public health benchmarked to the needs of the workforce. *Frontiers in Public Health, 3*(Article 12), 1-2. doi:10.3389/fpubh.2015.00012

Stoszkowski, J., & McCarthy, L. (2019). Students' perceptions of the learner attributes required for (and resulting from) heutagogical learning. *Journal of Learning Development in Higher Education, 14*(April), 1-12. Retrieved from https://journal.aldinhe.ac.uk/index.php/jldhe/article/view/458/pdf

Strader, M., & Katz, B. (1990). Effects of a persuasive communication on beliefs, attitudes, and career choice. *The Journal of Social Psychology, 130*(2), 141-150. doi:https://doi.org/10.1080/00224545.1990.9924564

Strand, M. A., & Miller, D. R. (2014). Pharmacy and public health: a pathway forward. *Journal of the American Pharmacists Association, 54*(2), 193-197. doi:10.1331/JAPhA.2014.13145

Strobel, J., Wang, J., Weber, N. R., & Dyehouse, M. (2013). The role of authenticity in design-based learning environments: The case of engineering education. *Computers & Education, 64*, 143-152. doi:10.1016/j.compedu.2012.11.026

StudyLink. (2020). Public Health Degrees in the UK. Retrieved from https://studylink.com/study/degrees/public-health/uk

Stynes, M., Murphy, T., McNamara, G., & O'Hara, J. (2018). Reflection-on-action in qualitative research: A critical self-appraisal rubric for deconstructing research. *Issues in Educational Research, 28*(1), 153-167.

Suhonen, T. (2014). Field-of-study choice in higher education: Does distance matter? *Spatial Economic Analysis, 9*(4), 355-375. doi:10.1080/17421772.2014.961533

Sumuer, E. (2018). Factors related to college students' self-directed learning with technology. *Australasian Journal of Educational Technology, 34*(4), 29-43.

Swanson, E., McCulley, L. V., Osman, D. J., Scammacca Lewis, N., & Solis, M. (2019). The effect of team-based learning on content knowledge: A meta-analysis. *Active Learning in Higher Education, 20*(1), 39-50. doi:10.1177/1469787417731201

Sweetman, R., & Conboy, K. (2018). Portfolios of Agile Projects. *Project Management Journal, 49*(6), 18-38. doi:10.1177/8756972818802712

Symon, G., & Cassell, C. (2012). Assessing Qualitative Research. In G. Symon & C. Cassell (Eds.), *Qualitative Organizational Research* (pp. 211): SAGE.

Tan, E., Small, A., & Lewis, P. (2020). Have a question? Just ask it: using an anonymous mobile discussion platform for student engagement and peer interaction to support large group teaching. *Research in Learning Technology, 28*(0). doi:10.25304/rlt.v28.2323

Tangen, R. (2013). Balancing Ethics and Quality in Educational Research—the Ethical Matrix Method. *Scandinavian Journal of Educational Research, 58*(6), 678-694. doi:10.1080/00313831.2013.821089

Tauginienė, L., Butkevičienė, E., Vohland, K., Heinisch, B., Daskolia, M., Suškevičs, M., . . . Prūse, B. (2020). Citizen science in the social sciences and humanities: the power of interdisciplinarity. *Palgrave Communications, 6*(1), 89. doi:10.1057/s41599-020-0471-y

Taylor, B., Kermode, S., & Roberts, K. (2011). *Research in Nursing* (4th ed.). Australia: Cengage Learning.

Taylor, D. (2017). A chronicle of just-in-time information: The secret to building first year university student wellbeing and resilience based on a three year initiative. *Student Success, 8*, 35+.

Taylor, K., & Silver, L. (2019). *Smartphone ownership if growing rapidly around the world, but not always equally*. Pew Research Center Retrieved from https://www.pewresearch.org/global/2019/02/05/smartphone-ownership-is-growing-rapidly-around-the-world-but-not-always-equally/.

Taylor, T. (2014). Changing pedagogy for modern learners- lessons learned from an educator's journey of self-reflection. *Educational Technology & Society, 17*(1), 79-88.

Techopedia. (2020). *IoT: Internet of things*. Retrieved from https://www.techopedia.com/it-terms/i.

Techtarget Network. (nd). What is Appreciative Inquiry - AI? Retrieved from https://whatis.techtarget.com/definition/Appreciative-inquiry-AI

Teo, E. (2020). Integrating open and citizen science into active learning approaches in higher education In E. Triantafyllou (Ed.), State-of-the-art analysis of the pedagogical underpinnings

in open science, citizen science and open innovation activities: INOS Consortium. Retrieved from https://inos-project.eu/wp-content/uploads/2020/03/INOS_O2A1_SOTA_V1.pdf.

Teo, P. (2019). Teaching for the 21st century: A case for dialogic pedagogy. *Learning, Culture and Social Interaction, 21*, 170-178. doi:10.1016/j.lcsi.2019.03.009

The Center for Appreciative Inquiry. (nda). What is Appreciate Inquiry (AI)? Retrieved from https://www.centerforappreciativeinquiry.net/more-on-ai/what-is-appreciative-inquiry-ai/

The Center for Appreciative Inquiry. (ndb). The Generic Processes of Appreciative Inquiry. Retrieved from https://www.centerforappreciativeinquiry.net/resources/the-generic-processes-of-appreciative-inquiry/

The Good Universities Guide. (2021a). Associate Degree in Public Health - Specialisation CQUniversity Australia. Retrieved from https://www.gooduniversitiesguide.com.au/course-provider/cquniversity-australia/courses/associate-degree-in-public-health-specialisation

The Good Universities Guide. (2021b). Should I study at a private college? Retrieved from https://www.gooduniversitiesguide.com.au/study-information/types-of-institutions/private-providers

The William and Flora Hewlett Foundation. (2013). *Deeper learning defined: Deeper learning competencies*. Retrieved from http://www.hewlett.org.

The World Bank. (2007). *Social Accountability Sourcebook*. Washington DC: The World Bank.

Thompson, P. (2017). Communication technology use and study skills. *Active Learning in Higher Education, 18*(3), 257-270. doi:10.1177/1469787417715204

Thorne, S. (2016). *Interpretive Description: Qualitative Research for Applied Practice* (2 ed.). New York: Taylor & Francis Group.

Thorpe, A., Griffiths, S., Jewell, T., & Adshead, F. (2008). The three domains of public health: an internationally relevant basis for public health education? *Public Health, 122*(2), 201-210. doi:10.1016/j.puhe.2007.05.013

Tian, X. (2012). Applying the alignment model for sustaining student motivation and active learning in a multi-cultural context. *ERGO, 2*(3), 19-25.

Tiffany, J., & Hoglund, B. (2014). Teaching/learning in second life: Perspectives of future nurse-education. *Clinical Simulation in Nursing, 10*(1), e19-e24. doi:10.1016/j.ecns.2013.06.006

Timans, R., Wouters, P., & Heilbron, J. (2019). Mixed methods research: what it is and what it could be. *Theory and Society, 48*(2), 193-216. doi:10.1007/s11186-019-09345-5

Tofade, T., Elsner, J., & Haines, S. T. (2013). Best practice strategies for effective use of questions as a teaching tool. *American Journal of Pharmaceutical Education, 77*(7), 155. doi:10.5688/ajpe777155

Tollit, M., McDonald, M., Borschmann, R., Bennett, K., Sabler, M., & Patton, G. (2015). *Epidemiological evidence relating to resilience and young people: A literature Review*. Retrieved from

Tomaszewski, R., & MacDonald, K. (2016). A study of citations to Wikipedia in scholarly publications. *Science & Technology Libraries, 35*(3), 246-261. doi:10.1080/0194262x.2016.1206052

Tsai, Y.-S., Whitelock-Wainwright, A., & Gašević, D. (2020). *The privacy paradox and its implications for learning analytics*. Paper presented at the Proceedings of the Tenth International Conference on Learning Analytics & Knowledge, Frankfurt, Germany. https://dl.acm.org/doi/10.1145/3375462.3375536

Tulloch, R. (2014). Reconceptualising gamification: Play and pedagogy. *Digital Culture & Education, 6*(4), 317-333.

Tümen Akyıldız, S. (2019). Do 21st century teachers know about Heutagogy or do they still adhere to traditional Pedagogy and Andragogy? *International Journal of Progressive Education, 15*(6), 151-169. doi:10.29329/ijpe.2019.215.10

Turki, F. J., Jdaitawi, M., & Sheta, H. (2018). Fostering positive adjustment behaviour: Social connectedness, achievement motivation and emotional-social learning among male and female university students. *Active Learning in Higher Education, 19*(2), 145-158. doi:10.1177/1469787417731202

Uffler, S., Bartier, J. C., & Pelaccia, T. (2017). Are health sciences students who sit at the back of the lecture hall not motivated? *PLoS One, 12*(3), e0174947. doi:10.1371/journal.pone.0174947

Universities Australia. (2021). How Universities are funded. Retrieved from https://www.universitiesaustralia.edu.au/policy-submissions/teaching-learning-funding/how-universities-are-funded/

University Reviews. (2021a). ATAR Course Entry Scores: 2021 cut offs. Retrieved from https://universityreviews.com.au/atar-course-entry-scores/

University Reviews. (2021b). List of universities in Australia. Retrieved from https://universityreviews.com.au/list-of-universities/

Usher, W. (2019). Living in quiet desperation: The mental health epidemic in Australia's higher education. *Health Education Journal, 79*(2), 138-151. doi:10.1177/0017896919867438

Utecht, J., & Keller, D. (2019). Becoming relevant again: Applying Connectivism Learning Theory to today's classrooms. *Critical Questions in Education, 10*(2), 107-119.

Vaismoradi, M., & Snelgrove, S. (2019). Theme in Qualitative Content Analysis and Thematic Analysis. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research, 20*(3), Article 23. doi:10.17169/fqs-20.3.3376

Vamos, S., & Hayos, J. (2010). Putting health education on the public health map in Canada-the role of higher education. *American Journal of Health Education, 41*(5), 310-318.

van der Vleuten, C. P. M., & Schuwirth, L. W. T. (2019). Assessment in the context of problem-based learning. *Advances in Health Sciences Education, 24*(5), 903-914. doi:10.1007/s10459-019-09909-1

van der Zanden, P. J. A. C., Denessen, E., Cillessen, A. H. N., & Meijer, P. C. (2018). Domains and predictors of first-year student success: A systematic review. *Educational Research Review, 23*, 57-77. doi:https://doi.org/10.1016/j.edurev.2018.01.001

Van Doorn, J. R., & Van Doorn, J. D. (2014). The quest for knowledge transfer efficacy: blended teaching, online and in-class, with consideration of learning typologies for non-traditional and traditional students. *Frontiers in Psychology, 5*, 324. doi:10.3389/fpsyg.2014.00324

van Gijn-Grosvenor, E. L., & Huisman, P. (2019). A sense of belonging among Australian university students. *Higher Education Research & Development, 39*(2), 376-389. doi:10.1080/07294360.2019.1666256

van Herpen, S. G. A., Meeuwisse, M., Hofman, W. H. A., Severiens, S. E., & Arends, L. R. (2017). Early predictors of first-year academic success at university: pre-university effort, pre-university self-efficacy, and pre-university reasons for attending university. *Educational Research and Evaluation, 23*(1-2), 52-72. doi:10.1080/13803611.2017.1301261

van Laar, E., van Deursen, A. J. A. M., van Dijk, J. A. G. M., & de Haan, J. (2020). Determinants of 21st-century skills and 21st-century digital skills for workers: A systematic literature review. *SAGE Open, 10*(1). doi:10.1177/2158244019900176

van Merriënboer, J. J. G. (2013). Perspectives on problem solving and instruction. *Computers & Education, 64*, 153-160. doi:10.1016/j.compedu.2012.11.025

Van Schalkcwyk, S., Hafler, J., Brewer, T., Maley, M., Margolis, C., McNamee, L., . . . Davies, D. (2019). Transformative learning as pedagogy for the health professions. *Medical Education, 53*(6), 547-558. doi:10.1111/medu.13804

van Velzen, J. H. (2015). Are students intentionally using self-reflection to improve how they learn? Conceptualising self-induced self-reflective thinking. *Reflective Practice, 16*(4), 522-533. doi:10.1080/14623943.2015.1064378

Vandercruysse, S., Vandewaetere, M., Cornillie, F., & Clarebout, G. (2013). Competition and students' perceptions in a game-based language learning environment. *Educational Technology Research and Development, 61*(6), 927-950. doi:10.1007/s11423-013-9314-5

Ventres, W., Boelen, C., & Haq, C. (2018). Time for action: key considerations for implementing social accountability in the education of health professionals. *Advances in Health Sciences Education, 23*(4), 853-862. doi:10.1007/s10459-017-9792-z

Vesikivi, P., Lakkala, M., Holvikivi, J., & Muukkonen, H. (2020). The impact of project-based learning curriculum on first-year retention, study experiences, and knowledge work competence. *Research Papers in Education, 35*(1), 64-81. doi:10.1080/02671522.2019.1677755

Virtanen, A., & Tynjälä, P. (2018). Factors explaining the learning of generic skills: a study of university students' experiences. *Teaching in Higher Education, 24*(7), 880-894. doi:10.1080/13562517.2018.1515195

VOCEDplus. (2021). Getting to know VET. Overview. VET Funding. Retrieved from https://www.voced.edu.au/vet-knowledge-bank-getting-know-vet-overviews-vet-funding

Vogel, J., Greenwood-Ericksen, A., Cannon-Bowers, J., & Bowers, C. (2006). Using virtual reality with and without gaming attributes for academic achievement. *Journal of Research on Technology in Education, 39*(111), 105-118.

Vorderer, P., Krömer, N., & Schneider, F. (2016). Permanently online – Permanently connected: Explorations into university students' use of social media and mobile smart devices. *Computers in Human Behavior, 63*, 694-703. doi:10.1016/j.chb.2016.05.085

VTAC. (2020). The ATAR Explained. Retrieved from https://www.vtac.edu.au/results-offers/atar-explained.html

VTAC. (2021). Results and the ATAR. Retrieved from https://www.vtac.edu.au/atar.html#explainer

Vu, T., Tran, V., & Kirwan, M. (2015). *Using assessment to promote students' ability to critically analyse a health promotion intervention*. Paper presented at the Australian Association for Research in Education.

Vyas, A., Rodrigues, V. C., Ayres, R., Myles, P. R., Hothersall, E. J., & Thomas, H. (2017). Public health matters: Innovative approaches for engaging medical students. *Medical Teacher, 39*(4), 402-408. doi:10.1080/0142159X.2017.1294753

Walker, A., & Doyle-Baker, P. (2019). Promoting and strengthening public health through undergraduate education. *Canadian Journal of Public Health, 110*, 327-330. doi:10.17269/s41997-019-00217-0

Walker, E. R., Lang, D. L., Caruso, B. A., & Salas-Hernandez, L. (2020). Role of team dynamics in the learning process: a mixed-methods evaluation of a modified team-based learning approach in a behavioral research methods course. *Advances in Health Sciences Education, 25*(2), 383-399. doi:10.1007/s10459-019-09931-3

Wang, C. (2015). Mapping or tracing? Rethinking curriculum mapping in higher education. *Studies in Higher Education, 40*(9), 1550-1559. doi:10.1080/03075079.2014.899343

Wang, J., & Mendori, T. (2015). The Reliability and Validity of Felder- Silverman Index of Learning Styles in Mandarin Version. *International Journal of Information Engineering Express, 1*, 1-8.

Wang, X., & Hu, Q. (2012). Research into the improvement of college students' life-long learning ability. *Creative Education, 3*(Supplement), 69-72. doi:10.4236/ce.2012.37B017

Wang, X., Su, Y., Cheung, S., Wong, E., & Kwong, T. (2013). An exploration of Biggs' constructive alignment in course design and its impact on students' learning approaches. *Assessment & Evaluation in Higher Education, 38*(4), 477-491. doi:10.1080/02602938.2012.658018

Wanner, T., & Palmer, E. (2015). Personalising learning: Exploring student and teacher perceptions about flexible learning and assessment in a flipped university course. *Computers & Education, 88*, 254-369. doi:10.1016/j.compedu.2015.07.008

Warden, D., & Myers, C. (2017). Nonintellective variables and nontraditional college students: A domain-based investigation of academic achievement. *College Student Journal, 51*(3), 380-390.

Warkentien, S., Charles, K., Knapp, L., Silver, D., & RTI International. (2017). *Charting the Progress of the Hewlett Foundation's Deeper Learning Strategy 2010 - 2015*. Retrieved from https://hewlett.org/wp-content/uploads/2017/04/Deeper-Learning_2017_RTI-.pdf.

Warmerdam, A., Lewis, I., & Banks, T. (2015). Gen Y recruitment. *Education + Training, 57*(5), 560-574. doi:10.1108/et-12-2013-0133

Wegener, C. (2013). A situated approach to VET students' reflection processes across boundaries. *Journal of Education and Work, 27*(4), 454-473. doi:10.1080/13639080.2012.758358

Wei, F.-Y. F., Lundy, A., & Wilson, C. (2019). A new method of using student self-assessment: Bridging gaps between teaching content and student learning. *Communication Teacher, 33*(4), 315-328. doi:10.1080/17404622.2019.1575436

Werder, C., Thibou, S., Simkins, S., Hornsby, K., Legg, K., & Franklin, T. (2016). Co-inquiry with students: When shared questions lead the way. *Teaching & Learning Inquiry, 4*(2), 1-15. doi:10.20343/teachlearninqu.4.2.4

Westhoff, W. W., Cohen, C. F., Cooper, E. E., Corvin, J., & McDermott, R. J. (2014). Cooperation or competition: Does Game Theory have relevance for public health? *American Journal of Health Education, 43*(3), 175-183. doi:10.1080/19325037.2012.10872089

White, C., Bradley, E., Martindale, J., Roy, P., Patel, K., Yoon, M., & Worden, M. K. (2014). Why are medical students 'checking out' of active learning in a new curriculum? *Medical Education, 48*(3), 315-324. doi:10.1111/medu.12356

White, F. (2013). The imperative of public health education: A global perspective. *Medical Principles and Practice, 22*(6), 515-529. doi:10.1159/000354198

Whitney, D., & Trosten-Bloom, A. (2003). *The Power of Appreciative Inquiry: A Practical Guide to Positive Change.* San Francisco, California: Berrett-Koehler Publishers.

Wiggins, A., & Wilbanks, J. (2019). The rise of citizen science in health and biomedical research. *American Journal of Bioethics, 19*(8), 3-14. doi:10.1080/15265161.2019.1619859

Wiggins, N., & Perez, A. (2017). Using popular education with health promotion students in the USA. *Health Promotion International, 32*(4), 660-670. doi:10.1093/heapro/dav121

Wildemeersch, D., & Stroobants, V. (2009). Transitional learning and reflexive facilitation. In K. Illeris (Ed.), *Contemporary Theories of Learning: Learning Theorists...In Their Own Words* (1st ed., pp. 221-232). Hoboken: Taylor and Francis.

Wilkinson, R., & Marmot, M. (Eds.). (2003). *Social Determinants of Health: The Solid Facts* (2 ed.). Denmark: World Health Organization.

Williams, B., Brown, T., & Etherington, J. (2012). Learning style preferences of undergraduate social work students. *Social Work Education, 32*(8), 972-990. doi:10.1080/02615479.2012.730142

Williams, C. J., Dziurawiec, S., & Heritage, B. (2018). More pain than gain: Effort–reward imbalance, burnout, and withdrawal intentions within a university student population. *Journal of Educational Psychology, 110*(3), 378-394. doi:10.1037/edu0000212

Willis, J., Campbell, J., & Pistilli, M. (2013). Ethics, big data, and analytics: A model for application. *EDUCAUSE Review*. Retrieved from https://www.researchgate.net/publication/289148870_Ethics_Big_Data_and_Analytics_A_Model_for_Application

Wilson, C., & Riegelman, R. (2015). A place for community colleges in public health education: Two curricular frameworks. *Community College Journal of Research and Practice, 40*(6), 554-557. doi:10.1080/10668926.2015.1078265

Wilson, J., Blewitt, J., & Moody, D. (2005). Reconfiguring higher education: the case of foundation degrees. *Education + Training, 47*(2), 112-123.

Wilson, L., Callender, B., Hall, T. L., Jogerst, K., Torres, H., & Velji, A. (2014). Identifying global health competencies to prepare 21st century global health professionals: Report from the Global Health Competency Subcommittee of the Consortium of Universities for Global Health. *The Journal of Law, Medicine & Ethics, 42*(2_suppl), 26-31. doi:10.1111/jlme.12184

Winskell, K., Evans, D., Stephenson, R., Del Rio, C., & Curran, J. (2014). Incorporating global health competencies into the public health curriculum. *Public Health Reports, 129*(2), 203-208.

Winslow, C.-E. A. (1920). The untilled fields of public health. *Science, 51*(1306), 23-33. doi:10.1126/science.51.1306.23

Wodzicki, K., Schwämmlein, E., & Moskaliuk, J. (2012). "Actually, I wanted to learn". Study-related knowledge exchange on social networking sites. *The Internet and Higher Education, 15*(1), 9-14. doi:10.1016/j.iheduc.2011.05.008

Wong, B., & Chiu, Y.-L. T. (2019). Let me entertain you: the ambivalent role of university lecturers as educators and performers. *Educational Review, 71*(2), 218-233. doi:10.1080/00131911.2017.1363718

Wong, H., Mo, H., Potenza, M., Chan, M., Lau, W., Chui, T., . . . Lin, C. (2020). Relationships between severity of Internet Gaming Disorder, severity of problematic social media use, sleep quality and psychological distress. *International Journal of Environmental Research and Public Health, 17*(6). doi:10.3390/ijerph17061879

Wood, A. (2016). Learning, assessment and professional identity development in public health training. *Medical Teacher, 38*, 594-598. doi:10.3109/0142159X.2015.1073242

World Health Organization. (2013). *Transforming and scaling up health professionals' education and training: Guidelines 2013*. Geneva: WHO Retrieved from https://www.who.int/hrh/resources/transf_scaling_hpet/en/.

World Health Organization. (2016). *Health Workforce 2030 A Global Strategy on Human Resources for Health*. Retrieved from http://www.who.int/hrh/resources/pub_globstrathrh-2030/en/.

World Health Organization. (2020). Rolling Update on Coronavirus Diseases (COVID-19). Retrieved from https://www.who.int/emergencies/diseases/novel-coronavirus-2019/events-as-they-happen

Wouters, P., & van Oostendorp, H. (2013). A meta-analytic review of the role of instructional support in game-based learning. *Computers & Education, 60*(1), 412-425. doi:10.1016/j.compedu.2012.07.018

Wu, R. (2019). Learning What to Learn Across the Life Span: From Objects to Real-World Skills. *Current Directions in Psychological Science, 28*(4), 392-397. doi:10.1177/0963721419847994

Wykoff, R., Khoury, A., Stoots, J., & Pack, R. (2015). Undergraduate training in public health should prepare graduates for the workforce. *Frontiers in Public Health, 2*(Article 285), 1-3. doi:10.3389/fpubh.2014.00285

Wykoff, R., Petersen, D., & Weist, E. (2013). The recommended critical component elements of an undergraduate major in public health. *Public Health Reports, 128*(5), 421-424. doi:10.1177/003335491312800516

Xie, B., He, D., Mercer, T., Wang, Y., Wu, D., Fleischmann, K. R., . . . Lee, M. K. (2020). Global health crises are also information crises: A call to action. *Journal of Association for Information Science and Technology,* 10.1002/asi.24357. doi:10.1002/asi.24357

Yang, J. (2021). 5 alternative entry pathways into Uni if you don't get the ATAR you need. Retrieved from https://artofsmart.com.au/university/alternative-university-entry-pathways/

Yazan, B. (2015). Three approaches to case study methods in education: Yin, Merriam, and Stake. *The Qualitative Report, 20*(2), 134-152. Retrieved from https://nsuworks.nova.edu/tqr/vol20/iss2/12/

Yeatts, K. B. (2014). Active learning by design: An undergraduate introductory public health course. *Frontiers in Public Health, 2*, 284. doi:10.3389/fpubh.2014.00284

Yelland, N., Cope, B., & Kalantzis, M. (2008). Learning by Design: Creating pedagogical frameworks for knowledge building in the twenty-first century. *Asia-Pacific Journal of Teacher Education, 36*(3), 197-213. doi:10.1080/13598660802232597

Yin, R. (2014). *Case Study Research Designs and Methods* (5 ed.). Los Angeles: SAGE.

Younis, Z. (2020). Multiple tools for innovative interdependent learning techniques in higher education to foster employability skills. In A. Al-Masri & Y. Al-Assaf (Eds.), *Sustainable Development and Social Responsibility* (Vol. 2, pp. 133-141). Cham: Springer.

Youth Central. (2021). VCE-The Victorian Certificate of Education. Retrieved from https://www.youthcentral.vic.gov.au/study-and-training/high-school/vce-the-victorian-certificate-of-education

Yu, H., Glanzer, P. L., Johnson, B. R., Sriram, R., & Moore, B. (2018). Why college students cheat: A Conceptual Model of five factors. *The Review of Higher Education, 41*(4), 549-576. doi:10.1353/rhe.2018.0025

Zhang, Y., Dong, S., Fang, W., Chai, X., Mei, J., & Fan, X. (2018). Self-efficacy for self-regulation and fear of failure as mediators between self-esteem and academic procrastination among undergraduates in health professions. *Advances in Health Sciences Education, 23*, 817-830. doi:10.1007/s10459-018-9832-3

Zhoc, K., Webster, B., King, R., Li, J., & Chung, T. (2019). Higher Education Student Engagement Scale (HESES): Development and psychometric evidence. *Research in Higher Education, 60*, 219-244. doi:10.1007/s11162-018-9510-6

Zodpey, S. P., Evashwick, C. J., Grivna, M., Harrison, R. A., & Finnegan, J. R. (2017). Editorial: Educating the global workforce for Public Health. *Frontiers in Public Health, 5*, 364. doi:10.3389/fpubh.2017.00364

Zoghi, M., Brown, T., Williams, B., Roller, L., Jaberzadeh, S., Palermo, C., . . . Holt, T.-A. (2010). Learning style preferences of Australian Health Science Students. *Journal of Allied Health, 39*(2), 95-103.

Zusho, A. (2017). Toward an integrated model of student learning in the college classroom. *Educational Psychology Review, 29*(2), 301-324. doi:10.1007/s10648-017-9408-4

Appendices

Contents

		Page
Appendix A:	Email Communications: Endorsing the Research Project - (Part a) Key University Stakeholders Endorsing the Research Project - (Part b) Endorsement Encouraging Research Participation	278
Appendix B:	Ethical Approvals to Conduct Research	284
Appendix C:	Information to Participants Involved in Research (Explanatory Statement)	286
Appendix D:	Example of Recruitment Contact to Potential Research Participants	288
Appendix E:	Consent Forms used in the Research	289
Appendix F:	Copy of the ILSQ	293
Appendix G:	Copy of the DLQ	298
Appendix H:	Literature Evidence Informing DLQ Development	306
Appendix I:	Example of ILSQ Learning Styles – Results	307
Appendix J:	Focus Group Interview Guided Topics	308
Appendix K:	Example Excerpt of Transcription – Focus Group Interview	309
Appendix L:	Individual Interview Guided Topics	313
Appendix M:	Example Excerpt of Transcription – Individual Interview	314
Appendix N:	Example Excerpts of Student Written Reflections	318
Appendix O:	All ILSQ Item Responses	322
Appendix P:	Respondent ILSQ Learning Style Dimension Scores	327
Appendix Q:	All DLQ Results Tabulated	330
Appendix R:	All DLQ Q1-Q8 Data Responses Tabulated	338
Appendix S:	Nuanced Content Table and Graph for Focus Group Interviews	343
Appendix T:	Nuanced Content Table and Graph for Individual Interviews	345
Appendix U:	Nuanced Content Table and Graph for Student Written Reflections	347
Appendix V:	Key Findings Infographic	349

Appendix A: Email Communications

Endorsing the Research Project – (Part a) – Key University Stakeholders

Excerpts from email endorsement (*Identifying information redacted*)

[redacted]

Anne Moates <anne.moates[redacted].edu.au>

Fwd: Seeking consent to conduct research at[redacted] university

2 messages

[redacted].edu.au> 21 October 2015 at 18:53
To: Anne Moates <anne.moates[redacted].edu.au>
Cc: [redacted].edu.au>

Hi Anne,
I have followed up with the[redacted] the Executive Director of the Research Office and who is responsible for research governance matters.
It appears that your proposal is acceptable in principle within this framework.
He suggest we simply talk to you about the details of how you plan to gather the information from students.
As long as it is not an unreasonable imposition on students and does not require access to[redacted] student databases etc that it would be fine.

I suggest you set up a time to chat with me or[redacted] about the details and we can move on from there.

Regards,
[redacted]

---------- Forwarded message ----------
From: [redacted].edu.au>
Date: 16 October 2015 at 05:10
Subject: Re: Seeking consent to conduct research at[redacted] university
To: [redacted].edu.au>
Cc: [redacted].edu.au>

Hi[redacted]
It good to hear from you.
We get requests like this from time to time and our position is to be generally supportive as long as all of the required approvals are gained and that the activity is not disruptive or detrimental to[redacted] operations or the student experience. It is normal practice for the student to gain ethics approval from the university at which they are enrolled (VicUni) and locality or site approval from the place were they want to conduct the research (us). If this is happening in your school then I would think that it would be appropriate for you to give approval. Sometimes[redacted] or I will give approval if it is university-wide. If they want to use[redacted] data or access systems (such as Blackboard or email) then we suggest they gain approval from the data or system owner depending on what they want to do. In this case my reading of it is that the student is following correct process and it looks straightforward. In giving approval to this we might want to ask some questions around the exact process of contacting and recruiting students.
I hope this helps.
Regards,
[redacted]

On 15/10/2015, at 4:50 pm, [redacted]edu.au> wrote:

Hi[redacted],
I thought you may be able to assist me with this questions.
One of our casual staff members is undertaking a PhD with victoria Uni and wishes to collect data from some of our students.
She teaches in the Associate degree in Health Sciences.

Do you have any advice on whether this can be approved? As you know my School does not undertake research, has no-one who could supervise or sponsor this work in any way.
I would very much appreciate your thoughts

[redacted]

---------- Forwarded message ----------
From: **Anne Moates** <anne.moates@live.vu.edu.au>
Date: 14 October 2015 at 09:31
Subject: Re: Seeking consent to conduct research at [redacted] university
To: [redacted]

From: [redacted].edu.au>
Sent: Monday, October 12, 2015 12:03 PM
To: Anne Moates; [redacted]
Subject: Re: Seeking consent to conduct research at [redacted] university

HI Anne

I have included [redacted] in my response as I think she will be best placed to guide us in the right direction

Thanks [redacted]

[redacted]

Anne Moates <anne.moates[redacted].edu.au>

Fwd: Seeking consent to conduct research at [redacted] university

2 messages

[redacted].edu.au> 21 October 2015 at 18:53
To: Anne Moates <anne.moates[redacted].edu.au>
Cc: [redacted].edu.au>

Hi Anne,
I have followed up with the [redacted] the Executive Director of the Research Office and who is responsible for research governance matters.
It appears that your proposal is acceptable in principle within this framework.
He suggest we simply talk to you about the details of how you plan to gather the information from students.
As long as it is not an unreasonable imposition on students and does not require access to [redacted] student databases etc that it would be fine.

I suggest you set up a time to chat with me or [redacted] about the details and we can move on from there.

Regards,
[redacted]

---------- Forwarded message ----------
From: [redacted].edu.au>
Date: 16 October 2015 at 05:10
Subject: Re: Seeking consent to conduct research at [redacted] university
To: [redacted].edu.au>
Cc: [redacted].edu.au>

Hi [redacted],
It good to hear from you.
We get requests like this from time to time and our position is to be generally supportive as long as all of the required approvals are gained and that the activity is not disruptive or detrimental to [redacted] operations or the student experience. It is normal practice for the student to gain ethics approval from the university at which they are enrolled (VicUni) and locality or site approval from the place were they want to conduct the research (us). If this is happening in your school then I would think that it would be appropriate for you to give approval. Sometimes [redacted] or I will give approval if it is university-wide. If they want to use [redacted] data or access systems (such as Blackboard or email) then we suggest they gain approval from the data or system owner depending on what they want to do. In this case my reading of it is that the student is following correct process and it looks straightforward. In giving approval to this we might want to ask some questions around the exact process of contacting and recruiting students.
I hope this helps.
Regards,
[redacted]

On 15/10/2015, at 4:50 pm, [redacted]edu.au> wrote:

Hi [redacted],
I thought you may be able to assist me with this questions.
One of our casual staff members is undertaking a PhD with victoria Uni and wishes to collect data from some of our students.
She teaches in the Associate degree in Health Sciences.

Anne Moates <anne.moates@[redacted]edu.au>

Support for Research Project

4 messages

[redacted].edu.au> 26 April 2016 at 15:27
To: [redacted].edu.au>
Cc: Anne Moates <anne.moates[redacted].edu.au>

Dear [redacted],
Ann Moates is a teacher in our Associate Degree in Health Sciences. She is also enrolled in a PhD with Vic Uni.

Her project is highly relevant to the [redacted] Strategy - being focussed on the development of work ready skills for these students. She has received Ethis approval through Vic Uni and the project is considered low risk. the project involves surveys, focus groups and interviews.

I am attaching an email from [redacted] supporting this type of research and the involvement of students as participants in this type of the research project.

I plan to recommend support of this project to [redacted] the Executive Dean of the School.

Ann would, of course, like to contact students of the Associate Degree through [redacted] email or through BlackBoard. Can you advise whether ARG needs to support this activity before she uses [redacted] email or BlackBoard, or whether other approal is required.

She does not intend to use any student enrolment information. I am attaching the Ethics approval and the email from [redacted]

Regards,
[redacted]

--
[redacted]
Head, Health and Sciences,
School of Vocational [redacted] Health and Sciences
[redacted]

3 attachments

Anne Moates proposed research at [redacted]
344K

Moates ETHICS APPROVAL VICTORIA UNIVERSITY Quest Ethics Notification - Application Process Finalised - A...pdf
96K

[redacted] Communication RE research.pdf
200K

Dr [redacted]
Deputy Director, Academic Policy and Governance
Academic Registrar's Group
[redacted]niversity
[redacted]

Member, Association for Tertiary Education Management
Associate Member, Group Relations Australia

[Quoted text hidden]

[redacted]edu.au> 17 May 2016 at 15:43
To: [redacted]edu.au>
Cc: Anne Moates <anne.moates[redacted].edu.au>

Thanks [redacted]
[redacted]

[Quoted text hidden]

Endorsing the Research Project – (Part b) Endorsement Encouraging Research Participation

Excerpts from email endorsement (*Identifying information redacted*)

Research Project

1 message

23 August 2016 at 18:44

To: [redacted]@list.student.
Cc: Anne Moates <anne.moates@[redacted]

Dear Health Science students,

"On behalf of [redacted] I encourage you to take part in a research study, *Deep Learning for 21st Century Skills in Public Health Education*, being conducted by Anne Moates who is a teacher in the [redacted] Associate Degree [redacted]. Anne is undertaking this research as part of Higher Degree study at Victoria University.

The aim of the research study is to find out how students undertaking the Associate Degree in Health Science [redacted] learn; not just core subjects but also skills they develop by analysing information, thinking critically, making decisions, applying knowledge to new situations, solving problems and working collaboratively; which are acknowledged as 21st century skills.

The findings from the research study could provide useful information about how best to meet the learning and work-ready needs of future Associate Degree in Health Science students.

Anne will contact you several times by email and/or in class over the next few months. Participation is voluntary but I do encourage you to take part. You may find the research project interesting and enjoy talking about your learning.

For more information please read the Explanatory Statement attached.

This research project has Ethical Approvals from the Victoria University Human Research Ethics Committee (VUHREC) and the [redacted] Ethics Advisory [redacted]

Regards

Associate Dean
School of [redacted]

Explanatory Statement.pdf
125K

Appendix B: Ethical Approvals to Conduct Research

Victoria University Ethical Approval

Quest Ethics Notification - Application Process Finalised - Application Approved

quest.noreply@vu.edu.au

Thu 4/7/2016 3:12 PM

To: nicola.yelland@vu.edu.au <nicola.yelland@vu.edu.au>;

Cc: Anne Moates <anne.moates@live.vu.edu.au>; john.martino@vu.edu.au <john.martino@vu.edu.au>;

Dear PROF NICOLA YELLAND,

Your ethics application has been formally reviewed and finalised.

» Application ID: HRE16-026
» Chief Investigator: PROF NICOLA YELLAND
» Other Investigators: MS Anne Moates, DR JOHN MARTINO
» Application Title: Deep Learning for 21st Century Skills in Public Health Education
» Form Version: 13-07

The application has been accepted and deemed to meet the requirements of the National Health and Medical Research Council (NHMRC) 'National Statement on Ethical Conduct in Human Research (2007)' by the Victoria University Human Research Ethics Committee. Approval has been granted for two (2) years from the approval date; 07/04/2016.

Continued approval of this research project by the Victoria University Human Research Ethics Committee (VUHREC) is conditional upon the provision of a report within 12 months of the above approval date or upon the completion of the project (if earlier). A report proforma may be downloaded from the Office for Research website at: http://research.vu.edu.au/hrec.php.

Please note that the Human Research Ethics Committee must be informed of the following: any changes to the approved research protocol, project timelines, any serious events or adverse and/or unforeseen events that may affect continued ethical acceptability of the project. In these unlikely events, researchers must immediately cease all data collection until the Committee has approved the changes. Researchers are also reminded of the need to notify the approving HREC of changes to personnel in research projects via a request for a minor amendment. It should also be noted that it is the Chief Investigators' responsibility to ensure the research project is conducted in line with the recommendations outlined in the National Health and Medical Research Council (NHMRC) 'National Statement on Ethical Conduct in Human Research (2007).'

On behalf of the Committee, I wish you all the best for the conduct of the project.

Secretary, Human Research Ethics Committee
Phone: 9919 4781 or 9919 4461
Email: researchethics@vu.edu.au

This is an automated email from an unattended email address. Do not reply to this address.

Excerpts from Ethical Approval from university where study conducted

(*Identifying information redacted*)

16 June 2016

Mrs Anne Moates
School of [redacted]
College of [redacted]
[redacted] University

Dear Mrs Moates

[redacted] **MOATES Deep learning for 21st century skills in public health education**

The [redacted] Ethics Advisory [redacted] of [redacted] University thank you for providing a full copy of your approved Human Research Ethics application together with a complete copy of the Victoria University Human Research Ethics Committee approval documentation for your research project titled: ***Deep learning for 21st century skills in public health education***.

The approving human ethics committee will remain responsible for the oversight of the project and in the case or your research it is noted that the Victoria University Human Research Ethics Committee is the committee responsible for the oversight of your project and has the primary ethical duty of care over the research participants.

Your Victoria University approved Human Research Ethics application has been **accepted** by the [redacted].

The [redacted] Ethics Advisory would like to wish you every success with your project

Yours sincerely

Chair, [redacted]
[redacted] **Ethics Advisory** [redacted]

Cc Supervisor/s: Prof Nicola Yelland, College of Education, Victoria University

Appendix C: Information to Participants involved in research (Explanatory Statement)

(Identifying information redacted)

VICTORIA UNIVERSITY
MELBOURNE AUSTRALIA

INFORMATION TO PARTICIPANTS INVOLVED IN RESEARCH

You are invited to participate in a research project entitled *Deep Learning for 21st Century Skills in Public Health Education*

This project is being conducted by student researcher Anne Moates as part of a Higher Degree study project under the supervision of Professor Nicola Yelland from the College of Education, Victoria University.

Project explanation

Students need skills not just in core subjects but also in analysing information, thinking critically, making decisions, applying knowledge to new situations, solving problems and working collaboratively, which align with 21st century skills and deep learning processes. Information will be collected and used to answer the research question, *in what ways can Associate Degree in Health Science students engage in deep learning promoting 21st century skills to enable work-readiness at graduation?* This research project aims to investigate the learning experiences of students in an Associate Degree in Health Science program in Australia. A secondary aim of the research project is to investigate which student learning experiences develop 21st Century Skills; and which skills demonstrate work-readiness, particularly in a public health role. The research could provide useful information about how best to meet the learning and work ready needs of future Associate Degree in Health Science students.

What will I be asked to do?

All students enrolled in AD019 Associate Degree in Health Science at XXXXXXXX University are invited to:

- Complete an anonymous ~~on-line~~ questionnaire about your learning experiences.
- Complete the *Index of Learning Style Questionnaire* (Felder & Soloman, nd).
- Participate in a focus group interview about how you learn and ask questions in your course. Your written consent will be required prior to the focus group interview. The interview is expected to last no longer than one hour and is a one-off event.

All students enrolled in or completed the XXXXXXXXX Public Health elective at XXXXXXX University in 2016 are invited, in addition to the above, to:

- Complete a reflective journal about their participation in a Group Health and Wellbeing Project. Your written consent will be required prior to participating.
- Participate in an individual interview about learning and skill development. Your written consent will be required prior to the individual interview. The interview will be conducted <u>after</u> you have completed all course requirements, and is expected to last no longer than one hour and is a one-off event.

What will I gain from participating?

Your participation in this study is voluntary. You may find the project interesting and enjoy answering questions about the learning experience in the Associate Degree in Health Science. Once the study is finished it could provide information about how best to meet the needs of future students, which is useful to education providers.

How will the information I give be used?

If you agree to take part, your name will not be recorded on the questionnaires, and all other data collected will be de-identified.

The information collected from your participation will be analysed and used to answer the research question. The processes, procedures, analysis and reporting of the research project will be collated into a written publication called a Thesis, and potentially reported in article form in peer-reviewed academic journals.

What are the potential risks of participating in this project?

Participants must be over 18 years of age. Participation is voluntary. Participants may withdraw at any stage of the research. It could be that you are not comfortable talking about your student experience and the things you do to learn.

How will this project be conducted?

Participants

- Students, over 18 years of age, enrolled in the Associate Degree in Health Science program at [redacted] University.

Research Design

- The principal design is Case Study with both quantitative (questionnaires) and qualitative (focus group/individual interviews and reflective journals) data collected.

Instrumentation/Tools

- Questionnaire about Learning Experiences developed by the researcher.
- *Index of Learning Style Questionnaire* (Felder & Soloman, nd).

Procedures

- See **What I will be asked to do** on the previous page.
- All data will be collected on-site at [redacted] Campus at a time convenient to you.

Treatment of Data

- All data will be de-identified and permanently anonymised prior to analysis and reporting.
- The quantitative data will be reported using descriptive statistics and will be used to support findings from thematic analysis of the qualitative data.
- All data will be securely protected.

Who is conducting the study?

Victoria University with the approval of [redacted] University Ethics Advisory.

Professor Nicola Yelland, Chief Investigator
nicola.yelland@vu.edu.au
03 9919 4904

Anne Moates, Student Researcher
anne.moates@live.vu.edu.au

Any queries about your participation in this project may be directed to the Chief Investigator listed above.
If you have any queries or complaints about the way you have been treated, you may contact the Ethics Secretary, Victoria University Human Research Ethics Committee, Office for Research, Victoria University, PO Box 14428, Melbourne, VIC, 8001, email researchethics@vu.edu.au or phone (03) 9919 4781 or 4461.

Appendix D: Example of Recruitment contact to Potential Research Participants

a. Example excerpt of Recruitment Flier – all students. *(Identifying information redacted)*

Associate Degree in Health Science Students

Opportunity to participate in a Research Project in 2016

Dear Associate Degree in Health Science Student,

My name is Anne Moates. I am doing research about **deep learning** and **21st Century Skills** development in Associate Degree students. This research is part of Higher Degree studies at Victoria University. The research will potentially assist future students undertaking Associate Degree studies.

The research is supported by XXXX University. If you volunteer to participate you will be asked to complete two anonymous questionnaires, which will take about half an hour to complete. You are also invited to participate in a Focus Group Interview, of about one hour, with other students completing the same semester studies as you.

Thank you!

Contact: Anne Moates

anne.moates@live.vu.edu.au

b. Example excerpt of Recruitment Flier – Public Health Elective students. *(Identifying information redacted)*

Opportunity to participate in a Research Project

Dear Student undertaking Public Health elective,

My name is Anne Moates. I am doing research about **deep learning** and **21st Century Skills** development in Associate Degree students. This research is part of Higher Degree studies at Victoria University. The research will potentially assist future students undertaking Associate Degree studies.

The research is supported by XXXX University. If you volunteer to participate you will be asked to maintain a reflective journal about your learning experiences for a few weeks during the semester. You are also invited to participate in an Individual Interview, of about one hour, at the end of the semester and after all assessment has been completed.

Thank you!

Contact: Anne Moates

anne.moates@live.vu.edu.au

Appendix E: Consent Forms

Focus Group Interview consent

(Identifying information redacted)

VICTORIA UNIVERSITY
MELBOURNE AUSTRALIA

CONSENT FORM FOR PARTICIPANTS INVOLVED IN RESEARCH

INFORMATION TO PARTICIPANTS:

We would like to invite you to be a part of a research study into Deep Learning for 21st Century Skills in Public Health Education.

The researcher is seeking information about how Associate Degree in Health Science students engage in learning that will prepare them to be work-ready when they graduate.

The aim of the proposed research study is to find out how students undertaking the Associate Degree in Health Science Program learn; not just core subjects but also skills they develop by analysing information, thinking critically, making decisions, applying knowledge to new situations, solving problems and working collaboratively; which are acknowledged as 21st century skills.

The findings from the research study could provide useful information about how best to meet the learning and work-ready needs of Associate Degree in Health Science students.

All Students enrolled in XXXX Associate Degree in Health Science in 20xx are invited to:

- Complete an anonymous ~~on-line~~ questionnaire about your current learning experiences.
- Complete the *Index of Learning Style Questionnaire* (Felder & Soloman, nd) and provide the de-identified report to the researcher.
- Participate in a focus group interview about your current learning experiences.

Participants must be over 18 years of age to participate. Participation is voluntary and you may withdraw at any time. All data collected will be de-identified.

The Head of the School of Vocational Engineering, Health and Science XXXXX University, supports this research study.

CERTIFICATION BY SUBJECT

I, ...
[Participant Name]
certify that I am at least 18 years old and that I am voluntarily giving my consent to participate in the study:
"Deep Learning for 21st Century Skills in Public Health Education" conducted at Victoria University by Professor Nicola Yelland (Chief Investigator) and Doctor John Martino (Associate Investigator).

I certify that the objectives of the study, together with any risks and safeguards associated with the procedures listed hereunder to be carried out in the research, have been fully explained to me by Anne Moates (PhD Student Researcher) and that I freely consent to participation involving the below mentioned procedures (tick all that apply):

Complete an anonymous ~~on-line~~ questionnaire about my current learning experiences (please note, completion of the anonymised questionnaire presumes consent).	
Complete the *Index of Learning Style Questionnaire* (Felder & Soloman, nd) and provide the de-identified report to the researcher.	
Participate in a focus group interview about my current learning experiences.	

I certify that I have had the opportunity to have any questions answered and that I understand that I can withdraw from this study at any time and that this withdrawal will not jeopardise me in any way.

I have been informed that the information I provide will be kept confidential.

Signed:

Date:

1 of 2

Any queries about your participation in this project may be directed to the researcher.
Professor Nicola Yelland
(03) 9919 4904

If you have any queries or complaints about the way you have been treated, you may contact the Ethics Secretary, Victoria University Human Research Ethics Committee, Office for Research, Victoria University, PO Box 14428, Melbourne, VIC, 8001, email Researchethics@vu.edu.au or phone (03) 9919 4781 or 4461.

Individual Interview Consent and Written Reflection Consent
(Identifying information redacted)

VICTORIA UNIVERSITY
MELBOURNE AUSTRALIA

CONSENT FORM FOR PARTICIPANTS INVOLVED IN RESEARCH

INFORMATION TO PARTICIPANTS:

We would like to invite you to be a part of a research study into Deep Learning for 21st Century Skills in Public Health Education.

The researcher is seeking information about how Associate Degree in Health Science students engage in learning that will prepare them to be work-ready when they graduate.

The aim of the proposed research study is to find out how students undertaking the Associate Degree in Health Science Program learn; not just core subjects but also skills they develop by analysing information, thinking critically, making decisions, applying knowledge to new situations, solving problems and working collaboratively; which are acknowledged as 21st century skills.

The findings from the research study could provide useful information about how best to meet the learning and public health role work-ready needs of Associate Degree in Health Science students.

Participants must be over 18 years of age to participate. Participation is voluntary and you may withdraw at any time. All data collected will be de-identified.

All Students enrolled in [redacted] Public Health in [redacted] are invited to:

- Participate in an individual interview about learning and skill development for public health roles
- Complete a reflective journal about their participation in a Group Public Health Project.

Participants must be over 18 years of age to participate. Participation is voluntary and you may withdraw at any time. All data collected will be de-identified.

The Head of the School [redacted] University, supports this research study.

CERTIFICATION BY SUBJECT

I, ... [Participant Name]
certify that I am at least 18 years old and that I am voluntarily giving my consent to participate in the study:
"Deep Learning for 21st Century Skills in Public Health Education" conducted at Victoria University by Professor Nicola Yelland (Chief Investigator) and Doctor John Martino (Associate Investigator).

I certify that the objectives of the study, together with any risks and safeguards associated with the procedures listed hereunder to be carried out in the research, have been fully explained to me by Anne Moates (PhD Student Researcher) and that I freely consent to participation involving the below mentioned procedures (tick all that apply):

Participate in an individual interview about my learning and skill development for a public health role.	
Complete a reflective journal about my participation in a Group Public Health Project.	

I certify that I have had the opportunity to have any questions answered and that I understand that I can withdraw from this study at any time and that this withdrawal will not jeopardise me in any way.

I have been informed that the information I provide will be kept confidential.

Signed:

Date:

Any queries about your participation in this project may be directed to the researcher
Professor Nicola Yelland
99194904

Any queries about your participation in this project may be directed to the researcher.
Professor Nicola Yelland
(03) 9919 4904

If you have any queries or complaints about the way you have been treated, you may contact the Ethics Secretary, Victoria University Human Research Ethics Committee, Office for Research, Victoria University, PO Box 14428, Melbourne, VIC, 8001, email Researchethics@vu.edu.au or phone (03) 9919 4781 or 4461.

Appendix F: Copy of the ILSQ

For each of the 44 questions below select either "a" or "b" to indicate your answer. Please choose only one answer for each question. If both "a" and "b" seem to apply to you, choose the one that applies more frequently.

1. I understand something better after I
(a) try it out.
(b) think it through.

2. I would rather be considered
(a) realistic.
(b) innovative.

3. When I think about what I did yesterday, I am most likely to get
(a) a picture.
(b) words.

4. I tend to
(a) understand details of a subject but may be fuzzy about its overall structure.
(b) understand the overall structure but may be fuzzy about details.

5. When I am learning something new, it helps me to
(a) talk about it.
(b) think about it.

6. If I were a teacher, I would rather teach a course
(a) that deals with facts and real life situations.
(b) that deals with ideas and theories.

7. I prefer to get new information in
(a) pictures, diagrams, graphs, or maps.
(b) written directions or verbal information.

8. Once I understand
(a) all the parts, I understand the whole thing.
(b) the whole thing, I see how the parts fit.

9. In a study group working on difficult material, I am more likely to
(a) jump in and contribute ideas.
(b) sit back and listen.

10. I find it easier
(a) to learn facts.
(b) to learn concepts.

11. In a book with lots of pictures and charts, I am likely to
(a) look over the pictures and charts carefully.
(b) focus on the written text.

12. When I solve math problems
(a) I usually work my way to the solutions one step at a time.
(b) I often just see the solutions but then have to struggle to figure out the steps to get to them.

13. In classes I have taken
(a) I have usually gotten to know many of the students.
(b) I have rarely gotten to know many of the students.

14. In reading nonfiction, I prefer
(a) something that teaches me new facts or tells me how to do something.
(b) something that gives me new ideas to think about.

15. I like teachers
(a) who put a lot of diagrams on the board.
(b) who spend a lot of time explaining.

16. When I'm analyzing a story or a novel
(a) I think of the incidents and try to put them together to figure out the themes.
(b) I just know what the themes are when I finish reading and then I have to go back and find the incidents that demonstrate them.

17. When I start a homework problem, I am more likely to
(a) start working on the solution immediately.
(b) try to fully understand the problem first.

18. I prefer the idea of
(a) certainty.
(b) theory.

19. I remember best
(a) what I see.
(b) what I hear.

20. It is more important to me that an instructor
(a) lay out the material in clear sequential steps.
(b) give me an overall picture and relate the material to other subjects.

21. I prefer to study
(a) in a study group.
(b) alone.

22. I am more likely to be considered
(a) careful about the details of my work.
(b) creative about how to do my work.

23. When I get directions to a new place, I prefer
(a) a map.
(b) written instructions.

24. I learn
(a) at a fairly regular pace. If I study hard, I'll "get it."
(b) in fits and starts. I'll be totally confused and then suddenly it all "clicks."

25. I would rather first
(a) try things out.
(b) think about how I'm going to do it.

26. When I am reading for enjoyment, I like writers to
(a) clearly say what they mean.
(b) say things in creative, interesting ways.

27. When I see a diagram or sketch in class, I am most likely to remember
(a) the picture.
(b) what the instructor said about it.

28. When considering a body of information, I am more likely to
(a) focus on details and miss the big picture.
(b) try to understand the big picture before getting into the details.

29. I more easily remember
(a) something I have done.
(b) something I have thought a lot about.

30. When I have to perform a task, I prefer to
(a) master one way of doing it.
(b) come up with new ways of doing it.

31. When someone is showing me data, I prefer
(a) charts or graphs.
(b) text summarizing the results.

32. When writing a paper, I am more likely to
(a) work on (think about or write) the beginning of the paper and progress forward.
(b) work on (think about or write) different parts of the paper and then order them.

33. When I have to work on a group project, I first want to
(a) have "group brainstorming" where everyone contributes ideas.
(b) brainstorm individually and then come together as a group to compare ideas.

34. I consider it higher praise to call someone
(a) sensible.
(b) imaginative.

35. When I meet people at a party, I am more likely to remember
(a) what they looked like.
(b) what they said about themselves.

36. When I am learning a new subject, I prefer to
(a) stay focused on that subject, learning as much about it as I can.
(b) try to make connections between that subject and related subjects.

37. I am more likely to be considered
(a) outgoing.
(b) reserved.

38. I prefer courses that emphasize
(a) concrete material (facts, data).
(b) abstract material (concepts, theories).

39. For entertainment, I would rather
(a) watch television.
(b) read a book.

40. Some teachers start their lectures with an outline of what they will cover. Such outlines are
(a) somewhat helpful to me.
(b) very helpful to me.

41. The idea of doing homework in groups, with one grade for the entire group,
(a) appeals to me.
(b) does not appeal to me.

42. When I am doing long calculations,
(a) I tend to repeat all my steps and check my work carefully.
(b) I find checking my work tiresome and have to force myself to do it.

43. I tend to picture places I have been
(a) easily and fairly accurately.
(b) with difficulty and without much detail.

44. When solving problems in a group, I would be more likely to
(a) think of the steps in the solution process.
(b) think of possible consequences or applications of the solution in a wide range of areas.

https://www.webtools.ncsu.edu/learningstyles/

Appendix G: Copy of the DLQ

Deep Learning for 21st Century Skills in Public Health Education Questionnaire

Thank you for participating in research about Public Health Education.
Completing this anonymous survey implies consent.
There are 21 broad items/questions in this survey questionnaire. Please complete/record a response for all items.

Q1. About my learning...	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
My learning program encourages me to be creative	❍	❍	❍	❍	❍	❍	❍
I have the opportunity to demonstrate personal responsibility in my learning program	❍	❍	❍	❍	❍	❍	❍
Collaboration with colleagues is enabled in my learning program	❍	❍	❍	❍	❍	❍	❍
I am learning skills which will help me to manage real-world problems	❍	❍	❍	❍	❍	❍	❍
The skills I am learning can be applied to different contexts	❍	❍	❍	❍	❍	❍	❍
Practical skill development is supported in my learning program	❍	❍	❍	❍	❍	❍	❍
My learning program presents me with authentic real-world experience	❍	❍	❍	❍	❍	❍	❍
My learning program is helping me to develop effective work habits	❍	❍	❍	❍	❍	❍	❍

Q2. My general employability skills...	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
I am learning how to communicate effectively	❍	❍	❍	❍	❍	❍	❍
Asking effective questions is a valued employability skill	❍	❍	❍	❍	❍	❍	❍
I am learning how to be an effective team member	❍	❍	❍	❍	❍	❍	❍
I am learning how to solve problems	❍	❍	❍	❍	❍	❍	❍
I am learning new skills which I can use in any work setting	❍	❍	❍	❍	❍	❍	❍

Page **1** of **8**
Deep Learning for 21st Century Skills in Public Health Education by A Moates Survey Questionnaire 2016

Q3. About asking questions...	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
I am encouraged to ask questions in class	❍	❍	❍	❍	❍	❍	❍
My Intellectual skills are being developed in my learning program	❍	❍	❍	❍	❍	❍	❍
My learning program promotes my critical thinking skills	❍	❍	❍	❍	❍	❍	❍
I am confident about how to ask effective questions to get relevant information	❍	❍	❍	❍	❍	❍	❍

Q4. About work-ready skills for a health-related role...	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
The science I am learning will help me get a job when I graduate	❍	❍	❍	❍	❍	❍	❍
Learning about human cultures will help me be work-ready for the health field	❍	❍	❍	❍	❍	❍	❍
I am learning specific skills to work in a health-related role	❍	❍	❍	❍	❍	❍	❍
Learning about the natural world as it relates to population health will prepare me to work in a health-related role	❍	❍	❍	❍	❍	❍	❍
I am doing this learning program to get a job in the health field	❍	❍	❍	❍	❍	❍	❍
To be work-ready in a health role I need to learn about the physical world in relation to population health	❍	❍	❍	❍	❍	❍	❍
I prefer to learn by getting real-world experience in the field	❍	❍	❍	❍	❍	❍	❍

Q5. My learning style preferences...	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
I learn best by doing	❍	❍	❍	❍	❍	❍	❍
I prefer to study alone	❍	❍	❍	❍	❍	❍	❍
I learn best by attending class	❍	❍	❍	❍	❍	❍	❍
I prefer to study with my student peers	❍	❍	❍	❍	❍	❍	❍
I prefer to work with authentic case-studies in class	❍	❍	❍	❍	❍	❍	❍
I prefer to learn with a social group	❍	❍	❍	❍	❍	❍	❍
I learn best outside of the class setting	❍	❍	❍	❍	❍	❍	❍
I do independent study outside of the program-related material provided	❍	❍	❍	❍	❍	❍	❍
I learn best during whole of class discussions	❍	❍	❍	❍	❍	❍	❍
I prefer to work through course material in my own time	❍	❍	❍	❍	❍	❍	❍

Q6. To find information to answer assignment questions I go to...	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
My student friends	❍	❍	❍	❍	❍	❍	❍
My teacher	❍	❍	❍	❍	❍	❍	❍
The internet on my mobile device	❍	❍	❍	❍	❍	❍	❍
The provided course-work resources	❍	❍	❍	❍	❍	❍	❍
Library text sources	❍	❍	❍	❍	❍	❍	❍
Library data-base peer-reviewed texts	❍	❍	❍	❍	❍	❍	❍
Wikipedia	❍	❍	❍	❍	❍	❍	❍
Google Scholar	❍	❍	❍	❍	❍	❍	❍
The gray literature (Government and non-Government websites)	❍	❍	❍	❍	❍	❍	❍
My family	❍	❍	❍	❍	❍	❍	❍
Someone working in the relevant field	❍	❍	❍	❍	❍	❍	❍

Q7. Making inquiries...	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
I am confident about where to find answers for assignment questions	❍	❍	❍	❍	❍	❍	❍
I am comfortable asking questions to get information for assignment tasks	❍	❍	❍	❍	❍	❍	❍
I prefer to ask my questions via an internet search engine	❍	❍	❍	❍	❍	❍	❍
I use answers to questions that other people have already asked	❍	❍	❍	❍	❍	❍	❍
I prefer it when teachers ask the questions in class	❍	❍	❍	❍	❍	❍	❍
I learn best when students ask questions in class	❍	❍	❍	❍	❍	❍	❍
I am learning to ask effective questions	❍	❍	❍	❍	❍	❍	❍

Q8. The type of assessment which helps to develop my work ready skills are...	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
Exams	❍	❍	❍	❍	❍	❍	❍
Written assignments such as essays	❍	❍	❍	❍	❍	❍	❍
Oral presentations	❍	❍	❍	❍	❍	❍	❍
Group assignments	❍	❍	❍	❍	❍	❍	❍
Individual assignments	❍	❍	❍	❍	❍	❍	❍
Practical projects	❍	❍	❍	❍	❍	❍	❍
Simulated activity	❍	❍	❍	❍	❍	❍	❍
Practical laboratory	❍	❍	❍	❍	❍	❍	❍

Q9. This learning program was my preferred first enrollment... (Tick most applicable to you)

- ❍ Yes
- ❍ No

Q10. I am... (Tick most applicable to you)

- ❍ Female
- ❍ Male
- ❍ Other

Q11. My first language is... (Write your answer below)

.....

Q12. My age last birthday was... (Write your answer below)

.....

Q13. I am doing this program as a pathway into another program... (Tick most applicable to you)

- ❍ Yes
- ❍ No
- ❍ Not sure

Q14. If I am offered a place in another program I will not continue with my current learning program... (Tick most applicable to you)

- ❍ Yes
- ❍ No
- ❍ Will defer and complete current program
- ❍ Not applicable

Q15. My current enrollment is best described as... (Tick most applicable to you)

- ❍ Year 1
- ❍ Year 2
- ❍ Repeating a course
- ❍ Completed

Q16. My plan for the future is to work in the career/profession of... (Write your response below)

.....

Q17. My motivation to learn is best described as... (RANK in order by putting 1 for most relevant for you item down to 4 for least relevant)

_____ Learning how to be a responsible citizen of the world
_____ Learning how to demonstrate social responsibility
_____ Learning how to express my character as an individual
_____ Learning how to use skills in other contexts

Q18. Barriers to my learning are... (RANK in order by putting 1 for most relevant for you item down to 4 for least relevant)

_____ My work commitments are a priority
_____ My family commitments are a priority
_____ My social commitments are a priority
_____ My motivation to study is effected by other factors

Q19. If I was not enrolled in my current learning program I would be doing .... (Write your response below)

.....

Q20. What skills I think Employers value... (Draw a line from the items on the left to the attributes on the right which you think apply to them)

Personal attributes most sought by employers	Loyalty
	Commitment
	Communication
	Honesty and integrity
	Enthusiasm
	Teamwork
	Reliability
	Personal presentation
	Problem solving
	Common sense
	Self-management
	Positive self-esteem
General employability skills	Planning and organising
	A sense of humour
	Using technology
	A balanced attitude to work and home life
	Learning
	Dealing with pressure
	Motivation
	Initiative and enterprise
	Adaptability

Q21. My ideal learning environment would be... (Write your response below)

.....

.....

Thank You for your participation.

Appendix H: Literature Evidence Informing DLQ Development

Literature informing item content for the Deep Learning for 21st Century Skills in Public Health Education Questionnaire (DLQ)

Theme	Literature	DLQ Item alignment
Associate degree	Cao & Tang (2014); Gale et al. (2013); Phillips KPA (2010); Smith (2013); Wheelahan, et al. (2009)	4.3; 4.5; 10; 13-14
21st century skills	ACER (2013); Ananiadou & Claro (2009); Assessment and Teaching of 21st Century Skills Project (2009); Binkley et al., (2012); Coronado, Koo, & Gebbie (2014); Fullan (2013); Fullan & Scott (2014); Great Schools Partnership (2016); Kaufman (2013); Larson & Miller (2011); McGaw (2013); Organisation for Economic Cooperation and Development (2015); Smith (2013)	1.2-1.8; 2.1-2.5; 3.1-3.3; 4.1-4.4; 6.1-6.9; 8.1-8.3; 8.6; 8.8; 16- 17.1; 17.3; 19
Deep learning, and civic life	Alliance for Excellent Education (2011); Biggs & Tang (2009); Mehta & Fine (2012); Outram, Dundas, & Johnson (2014); The William & Flora Hewlett Foundation (2013); Wang, Su, Cheung, Wong, & Kwong (2013)	1.1-1.8; 2.1; 2.3-2.5; 3.2-3.3; 4.1; 4.3; 4.5; 4.7; 5.5; 5.8; 7.1; 8.1-8.6; 15; 17.1; 17.3
Experiential, work-integrated learning, and authentic context	Allen, et al. (2013); Damassa & Sitko (2010); Great Schools Partnership (2013); Herrington (nd); Lombardi (2007); McKlennan & Keating (2008)	1.4; 1.6-1.8; 2.5; 4.4; 4.7; 5.1; 5.5; 5.7; 6.11; 8.6-8.8; 17.4; 20
Generic and graduate attributes, Work-readiness, and employability	Australian Qualifications Framework Council (2013) Casner-Lotto (2006); Coates (2015); Deeley (2013); Hart Research Associates (2015); Lehmann (2009); Litchfield, Frawley, & Nettleton (2010); Nagarajan & Edwards (2014); Patrick, Peach, & Pocknee (2008); Smith, Fearns, & Russell (2014)	1.3-1.6; 1.8; 2.1-2.5; 3.3; 4.1; 4.5; 5.5; 8.4; 9; 18.1-18.4; 20
Learning approaches and learning style preferences	Baeten et al. (2016); Brown et al. (2009); Choy, Billett, & Kelly (2013); Entwistle & Smith (2002); Whitney & Trosten-Bloom (2003); Zoghi, et al. (2010)	1.3; 4.7; 5.1-5.10; 6.1-6.2; 6.5-6.6; 7.6; 8.4; 10; 13; 21
Motivation, retention, and influences on student study	Aschbacher, Li, & Roth (2010); Biggs & Tang (2007); Cinamon (2016); Mertes & Hoover (2014); Morgan, Gelbgiser, & Weeden (2013); Munro (2011); Nakajima, Dembo & Mossler (2012); Shapiro et al. (2016); White et al. (2014)	1.1; 4.5; 5.1-5.2; 5.4; 9; 15; 18.1-18.4; 19
Questioning and inquiry approaches	Bowker (2010); Goh (2014); Golding (2011); Ivanitskaya, et al. (2012); Kitsantas & Chow (2007); Le (2014); Morgan & Beaty (2005); Nicholas, et al. (2009)	1.3; 2.2; 3.1; 3.4; 4.1-4.7; 5.8; 6.1-6.11; 7.1-7.7
Social, and group collaboration	Boud & Associates (2010); Care, Scoular, & Griffen (2016); Wanner & Palmer (2015); Wodzicki, Schwammlein, & Moskaliuk (2012)	2.1-2.4; 5.2; 5.4; 5.6; 5.9; 6.1; 6.10; 8.4; 8.6
Self-regulation (learning)	Dabbagh & Kitsantas (2012); McCune & Entwistle (2011); Parker, Maor, & Herrington (2013); Yelland, Cope, & Kalantzis (2008)	1.1-1.3; 1.5; 2.2; 2.4; 3.1-3.4; 4.7; 5.2-5.4; 5.8; 6.1-6.9; 17.2
Educational model and theory and deep learning	Edwards, et al. (2013); Howie & Bagnall (2013); Howie & Bagnall (2015)	1.5; 2.4-2.5; 3.1-3.2; 4.6; 5.5; 5.8; 7.1; 8.4; 16; 17.1; 19
Assessment for learning	Boud & Associates (2010); Flores, et al. (2015); Wanner & Palmer (2015)	8.1-8.8
Pedagogy – Learning with experience	Hattie (2012); Kalantzis & Cope (nd); Merrill & Gilbert (2008); Zoghi et al. (2010)	1.1; 1.3-1.4; 1.6-1.8; 2.4-2.5; 3.2-3.3; 4.1; 4.5; 5.4-5.5; 8.1-8.6; 17.3
Public health education	Association of Schools & Programs of Public Health (2011); Coronado, Koo, & Gebbie (2014); Petersen, et al. (2013); Pfeiffer, et al. (2013); Rooks & Rael (2013); World Health Organization (2013)	1.2; 1.4; 1.6; 4.1-4.7; 5.5; 17.1; 17.3

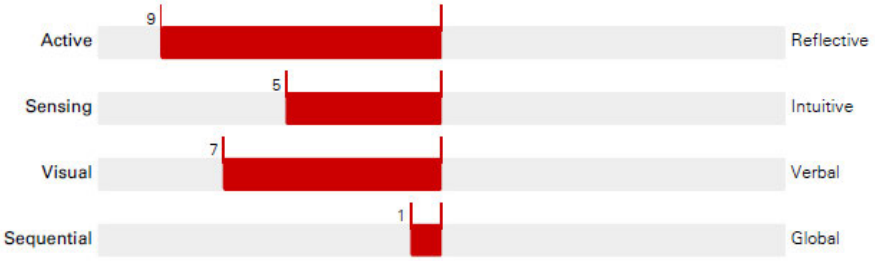
Appendix I: Example of ILSQ Learning Styles - Results

10/9/2017 Learning Styles – Results

NC State Home RESOURCES

Questionnaire Results for LS8:

› Active: 9 › Sensing: 5 › Visual: 7 › Sequential: 1



What do my results mean?

According to the model on which the ILS is based, there are four dimensions of learning style, with each dimension having two opposite categories (such as active and reflective). The reported score for a dimension indicates your preference for one category or the other.

If your score for a dimension is 1 or 3, you are fairly well balanced on the two categories of that dimension, with only a mild preference for one or the other.

If your score for a dimension is 5 or 7, you have a moderate preference for one category of that dimension. You may learn less easily in an environment that fails to address that preference at least some of the time than you would in a more balanced environment.

If your score for a dimension is 9 or 11, you have a strong preference for one category of that dimension. You may have difficulty learning in an environment that fails to address that preference at least some of the time.

Appendix J: Focus Group Interview Guided Topics

Focus Group Interview Guided Discussion Topics including Literature Informing Topic Areas

Guided discussion topics	Informed by evidence from:	Research areas explored
Reason for enrolling in an associate degree	Smith (2013)	Engagement with associate degree
Understanding about associate degree level program	Australian Qualifications Framework Council (2013)	Engagement with associate degree
Deep learning behaviours	Fullan & Scott (2014); The William & Flora Hewlett Foundation (2013)	Deep learning
Experience of 21st century skills	Partnership for 21st Century Skills (nd)	21st century skills
Work-readiness and employability skills	Cotton (2011); Hart Research Associates (2015); Nagarajan & Edwards (2014)	Work-readiness
Asking questions	Bowker (2010); Gentry (2015); Pilkington (2008)	Questioning approaches
Study habits	Choy, Billet, & Kelly (2013); Gallardo-Echenique, Bullen, & Marques-Molias (2016)	Learning approach
Experiences learning about public health	Li, et al. (2011)	Public health

Appendix K: Example Excerpt of Transcription – Focus Group Interview
First four pages of a Focus Group interview example *(Identifying information redacted)*

Name: Focus Group #1
Date: [redacted] 2017
Interviewer: Anne Moates
File Name: FOCUS GROUP 1_Starter Notebook
Date Transcribed: [redacted] 2017
Transcribed By: A

Notes: A = Anne Moates (As the interviewer) **S** = Students (Answering question). If transcription appears *in this format* it represents that the recording did not pick up all words said and the transcription is the best recorded from context and words that were clear. The numbers appearing in this format 12:34 represent the minute and the second respectively in the audio file indicated above.

Privacy: All names and personal information of the interviewees have been redacted in this transcription and shall be represented with a *****.

Interview Start. 1:21

A: I wanted to find out about, I guess the sort of experiences you think you can take from what you've learnt so far and maybe take to a job or to other courses. Can you think of anything?

S: *I'd say ah, definitely Teamwork.*

A: Teamwork yeah

S: *Working in groups (inaudible)*

…

S: *I'd say communication*

A: So communication yeah, in what way?

S: *Just like with the teacher or the lecturer you don't know some parts of what they say*

A: and how is communication used within the workplace? You know let's say when you finish the course, I'm sure some of you work already. Any others? Now I know you get lots of assignments, how do you about getting the information you need to answer the assignment questions? Where do go to get your information from?

S: [redacted] (Inaudible)

A: Sorry [redacted] what?

S: [redacted] *Space, Library*

A: And how you do access that? Or where do you access that from?

S: *Going online access in the library go into what you want and access it in the database*

A: So it's online? So where do you have to be to use that database?

S: *Anywhere*

A: Anywhere? So I am going to ask where do you use it, do you use it on campus or at home or anywhere?

S: *Anywhere really*

A: Have you used it anywhere?

S: *I use it on the train lots*

A: How did that work?

S: *Well when we go into tunnels it didn't really work connect well*

A: Who else do you get your information from?

S: *Internet*

A: Internet and? How do you ask the internet a question?

S: *Well I guess it mostly depends on what you decide to ask let's say it's like an essay or something (inaudible) how happiness leads to success psychology, happiness success.*

A: And where did you put it in? You obviously used a search engine so what sort of search engine did you use?

S: *Mostly I use google* (inaudible) *sometimes I go places like journal*

A: Journal, so you go straight to the journal. Are they free journals or do you have to pay for them?

S: *They're free*

A: Ok cool and is there anywhere else you'd get information from? Ok so I am going to ask you about your devices I know you all probably have mobile devices. How often would you use your mobile phone or whatever to do study stuff with?

S: *A lot*

A: And what about you guys?

S: *I don't*

A: You use your phone. You don't use your phone? I'm going to ask, this might sound silly but I know some students that do everything with their phone even write their assignments. How do you feel about that?

S: *It's not practical, some people get distracted using them*

A: What sort of distractions?

S: *Facebook, any social media*

A: So how do you think social media because it's a big part of people's lives now. Do you think knowing how to use or how you use social media is going to impact your future work career what do you reckon?

S: *I think it depends on how you use it some are more professional, connecting with people for learning purposes* (inaudible)

A: So, it's got a few different purposes by the sound of it connecting for learning purposes sounds like a way to go. Now I'm going to tell a little story I was in the lab I don't know which lab it was and one of the students in there had headphones on I can't remember the name of the student during the lab I wanted to know I ask this student what are you listening to and the student said they were listening to music and I said ok so how do you go about listening to music and paying attention in lab and this student said that they could do both, then it made me think about maybe how you learn and develop your skill when you know you do your study what do you need to help you learn? How studies at home? Can you describe your environment a little bit in terms of noise and people and distractions?

S: *I like to be alone, some music a little if the house is loud at the time I have to have music*

A: So not loud music, so with headphones?

S: *Yeah*

A: What else do other people have?
S: *Well with me I find study best when I am in natural lighting outside lighting, it doesn't distract me*

A: So this natural lighting is that something that you would look for say like on campus?

S: *Yeah*

A: How do you feel about the environment of your learning here?

S: *Some places are better than others* (inaudible)

A: In what way?

S: *Place like the library have good light*

...

A: So what else helps everyone study and learn at home, or what time of day?

S: *I always like 6 in the evening I don't know why, when I'm at home I just wanna get done as quickly as possible*

A: And when you say get everything done as quickly as possible what sort of things do you mean?

S: *I don't wanna leave anything to the last second, if the assignment has one day left I don't wanna panic on that day*

A: So this is for assessments?

S: *Yep*

A: And you know if you had an exam?

S: *Yeah I study, I wouldn't study on the last day before and exam*

A: Yeah ok, what about other people who likes, I know some people like to work in groups and some people like to study alone, what's your general impression about that?

S: *I don't like to study at home because I have distractions at home*

A: So what sort of distractions do you have at home?

S: *My dogs*

A: Your dogs? Interesting someone else had dogs

S: *You have to let them in and out*

A: Yeah

S: *If I have a lecture at 12:30 I will get here at 9 to get some study done before class*

A: Now it's good that you are here today for your lecture how important is um you know, I guess as a student group coming together as a learning group how do you feel about that?

S: *I mean I like to kinda be alone mostly but I do find that (inaudible) working in a support group (Inaudible) I don't really understand it sometimes (inaudible) I can ask other students (Inaudible*)

A: That's good I like how you said you ask other students, Um who else might you ask or who would you feel comfortable asking um questions to if you weren't sure?

S: *It's the students that help me*

A: Now I got to ask just generally, think of where you might be in 5 years' time, who's got plans in 5 years' time? If that too far way in the future what's your plans after you finish the course?

S: *Transferring to another uni I'd say*

Appendix L: Individual Interview Guided Topics

Individual Interview Guided Discussion Topics including Literature informing Topic Areas

Guided discussion topics	Informed by evidence from:	Research area explored
Reason for enrolling, and understanding about associate degree level program	Australian Qualifications Framework Council (2013); Smith (2013)	Associate degree demographic and learning approach; engagement and motivation
Deep learning behaviours and motivation, and influences on learning	Fullan & Scott (2014); The William & Flora Hewlett Foundation (2013)	Learning approach and preferences related to deep learning
Experience of 21st century skills	Binkley et al., (2012); Partnership for 21st Century Skills (nd)	21st century skills
Work-readiness related to associate degree program	Casner-Lotto (2006); Cotton (2011); Hart Research Associates (2015); Nagarajan & Edwards (2014)	Work-readiness on graduation
Inquiry and questioning approaches	Bowker (2010); Gentry (2015); Outram, Dundas, & Johnson (2014); Peterson, et al. (2013); Pilkington (2008)	Questioning approaches
Public health learning experiences in associate degree program	Association of Schools & Programs of Public Health (2014); Choy, Billet, & Kelly (2013); Coronado, Koo, & Gebbie (2014); Li, et al. (2011); Millery, et al. (2014); Nagarajan & Edwards (2014); Peterson, et al. (2013); Steketee & Bate (2013); Winskell, et al. (2014); Zoghi et al. (2010)	Public health group project experience
Ideal learning environment	Cetin (2016); Chen & Chiou (2012); Edwards et al. (2013);	Pedagogy
Future plans	Business Council of Australia, (2016); Outram, Dundas, & Johnson (2014)	Educated citizen

Appendix M: Example Excerpt of Transcription – Individual Interview

First four pages of an Individual Interview example (*Identifying information redacted*)

Name: Interview #4
Date: [redacted] 2017
Interviewer: Anne Moates
File Name: INTERVIEW 4_Starter Notebook Page 22
Date Transcribed: 17th August 2017
Transcribed By: A

Notes: A = Anne Moates (As the interviewer) **S** = Students (Answering question). If transcription appears *in this format* it represents that the recording did not pick up all words said and the transcription is the best recorded from context and words that were clear.

Privacy: All names and personal information of the interviewees have been redacted in this transcription

Interview Start

A: I'm really interested in why you originally enrolled into this particular program of study?

S: As a pathway, that's my main reason.

A: Pathway into?

S: Into originally was a bachelor [redacted] or something like that. But after doing this course I sort of realised that [redacted] isn't my laneway and I think now I'm more pulled towards public health stuff like that.

A: So I'm going to ask you a few things about. This comes from literature or research or theory related what they call deep learning and there is something called the 6 Cs of deep learning so it's Citizenship, Collaboration, Communication, Creativity, Character and Critical Thinking. Do you want to say anything about those in relation to your learning or your journey in the last year or so?

S: *I think I worked on how to be creative like it helps me learn, like when we have to put posters together and stuff like that, what were the other ones?*

A: One of them is Citizenship.

S: *What does it mean though?*

A: Citizenship is like you're a member of the community and you know citizens have obligations in the community formal or informal, like preparing for civic life as a Citizen.

S: *Well university in general has helped me open up and I'm a lot more, it's easy for me to communicate with people like coordinators, teachers, other students, I'm not shy when I have to ask for help even out in the courtyard if I don't know where a building is, before in high school I used to get anxiety thinking about having to ask someone something but now it's just helped me open up a lot more.*

A: So did you want to go a little bit further with that, as in terms of is that development of confidence, is that related to your experience do you think or part of maturing, just getting older?

S: *Both I think both I believe both. Yeah definitely it's helped me out and like I think I'll do fine in terms of jobs stuff like that, in terms of communication and group work. For the most part university has helped me out with that but I do think some of it is maturity and growing up, even outside of university being more social it'll contribute to the confidence and stuff like that.*

A: So there's something else called 21st century skills which is sort of linked with this idea of deep learning, you know learning at a level that is not superficial so that you can use what you learn in other ways and some of the terms that come up under 21st century skills are come under learning, come under literacy and come under life skills. So do you want to make a comment a little bit about because you basically talked about just before about learning skills what do you think about literacy skills, that's information literacy, media literacy and technology literacy?

S: *In terms of technology I'm not sure if I've excelled or not like, we've never been required to do anything that, out of what we used to do in high school, like everything has been basically a word document or a power point, essays though I've gotten a lot better, I personally enjoy writing so I've enjoyed that side of assessments having to write everything out. I used to be really bad at referencing, I'd fail every time now I've got the hang of it.*

A: In getting information where would you get your information from?

S: *Most of the time I like to go to google scholar and like the* [redacted] *library. At the beginning I used to be that person that would just go to google type in what I need and take information wherever. Library not so much to be completely honest, mainly google scholar like public.*

A: What about life skills this comes under 21st Century skill as well, things like being flexible, taking initiative, social skills which you've touched on, being productive and even taking leadership roles.

S: *I think I did participate more in group assessment like I have no problem. Organising people I guess I don't try and be bossy but I do try to make sure everyone knows what they are doing, if they need help like they should know we should all be able to communicate and most insistences when there is like a group assessment like I like to make sure we have a chat on Facebook where everyone knows that they can go to so there's no excuse for you know not having not done something because you didn't know. I think I quite enjoy being a leader.*

A: Can I ask you, when do you think these leadership skills developed?

S: *definitely in university probably in the last, I'd say last year was a big, like I stepped up a lot as a opposed as to when I started this course in 2015 when I was like new to the uni and new to the course and new to the people and stuff like that like I wasn't as confident, I think last year being in my second year, I just built up a lot of confidence.*

A: So this like a 3rd year for you?

S: *Yes it is actually.*

A: So which of those do you think? You said when you're interested in a public health career or something to do with public health which of or any of the skills, behaviours or anything you've learnt over the last 2 years that you think you can take with you into a public health role?

S: *I think definitely communication that would be an asset me being able to talk to people, being able to be a leader and organise will help me a lot with any direction I decide to go in.*

A: Anything really specific? Like you know communication can be quite general or generic so is there anything that you felt that you've learnt, either through form of process or just informally that would prepare you to be a citizen in a public health role?

S: *I don't know if it counts but trying to fix my enrolment I had to deal with paperwork and stuff like that, dealing with duty someone the coordinates higher up, I feel like I've had to (converse) in different way than you would have to (converse) with students. But yeah things like that fixing my enrolment having to fill out paperwork and stuff like that.*

A: Now according to the Australian Qualifications Framework, it says that a graduate of an Associate Degree can apply knowledge and skill to display autonomy, judgement and knowledge. Define responsibility so that's suggesting that you come out with a certain skill set that's like a vocational skill and skills and context are to change in broad parameters to provides specialist advice and function. So do you feel that this particular program of study that you have done has prepared or is preparing you to have that kind of specialist role.

S: *Yeah, I think it is definitely preparing us, I feel like me personally I won't know how prepare I am until I dive into that world I guess but I do feel like this course is providing us with the right tool to be successful whatever we do.*

A: Now I've asked you where you get your information from and you've already told me that you're confident about asking questions and things like that. What would you describe as an effective learning environment for you, if you could change things let's say at the start of the program say you were given the opportunity to make the learning environment just to suit you what sort of changes would request or what would be on your wish list?

S: *Well the one thing that I wish I could've of changed about this current course right now is that I just wished I had more people like it truly makes a difference how many people are in class cause you can just get so much more discussion out of topics as oppose to most of my experience is at* [redacted] *which is extremely small class.*

A: Can you say why you think you've had an extremely small class?

S: *Well partly because I was in mid-semester intake like I'll start cause a lot of the girls I was with have moved on into bachelors or whatever they were pursuing. I really do not find and I've had this experience this semester having to research articles each week summarise them and bring them in, it feels very repetitive to me I feel like I'm not learning anything new, so it's one more, I think I'm the type of person*

I would prefer conversation interaction in class as opposed to having to go home and read 10 pages of a chapter summarise them and that's it.

A: What else would you wish for?

S: *I enjoy creativity when a teacher comes in enthusiastic and is creative about, I also quite enjoy when lecturers go into like their personal experience like I have another teach who, well I've had several teacher over this course I think have their own business on the other side of things they do outside lecturing* [redacted] *and when they give like their knowledge of like an experiences or things that they've learnt through their own study I find them interesting. I like hearing about other people learn and things they've experienced.*

A: When you hear about other people's experiences how might you use them for your own purposes?

S: *well sometimes is can be just like knowledge, good knowledge like I learnt something new other times it makes me think that I feel like I would enjoy that maybe I should explore more of that see what that career is about stuff like that.*

A: Anything you want to talk about anything else that might deal with your learning environment even down to the physical spaces.

S: *I don't think like a classroom environment doesn't really phase me like it doesn't want to make me not come in, like it doesn't make me extremely excited to learn, I'm not sure what would make me like really energetic to learn cause I think depend on what's happening in your personal life, I've definitely had days where I can't come in and I'm just not as enthusiastic cause the things that are happening outside of uni so to me the classroom environment doesn't really phase me personally.*

...

A: So what's your general view this going very specific about public health, what is your general view about public health?

S: *I think it's important and I think you're when you said at the beginning of the course that when you start learning more about it you start seeing it everywhere so I just see it everywhere, shopping centres, on the train, think about you just you know, I see a lot of people sneezing on the train and I just think all the germs flying in the*

air. But I think it's important for the future, there's a lot of different things that I think need to be fixed, like I am not a huge fan of smoking and it bothers me when people smoke in my personal space.

A: Where do you see yourself in 5 years' time in relation to career or professional?

S: *I hope to be in a job that I am passionate about, who knows I might still be studying I don't know how thing are going to go after I finish this course in May or June. But I hope to be done with studying that's my hope and into a job I'm passionate about and working on building my own future.*

Appendix N: Example Excerpts of Student Written Reflections

One page excerpts from four Student Written Reflections *(Identifying information redacted)*

SR3a

Looking back at our idea to reduce mental illness at [redacted], our thoughts were evenly scattered throughout our program. Each student had their own ideas and concepts integrated into our program. As a group we discussed what each student would complete and then we would come back and put it all together. I believe each student contributed important aspects into the program.

The program was done with little complications and conflict as we were all eager to do well and finish the assignment before studying for exams. For me, the most challenging part of the assignment was picking the topic as both mental health and healthy choices were both in consideration for our topic. Having past assignments on mental health also helped this assignment as previous knowledge about the topic was useful.

As previously working with the 2 students before, I knew we wouldn't have much problems as we have completed tasks in subjects together last year and this year in the subject: understanding disease processes and treatment. I believe we work well together as we have known each other since the start of the course

The assignment itself was definitely harder than previous assignments, as finding an effective idea that could be realistic in implementing into [redacted] was very challenging, however we came up with an idea through brainstorming with each other as many ideas were thought of throughout the beginning of the assignment. I personally found this challenging as it required creativity. This assignment was also similar to an assignment in 2016 we completed were we had to think of an idea to something similar to this.

Having completed this semester of assignments helps me further understand the role of public health and its impact on the real world. This subject overall has definitely benefited me as assignments were more practical than just exams and tests as this personally helps me understand and learn better.

SR3b

It has been relatively smooth and easy in relation to working in groups, particularly because we have known each other throughout the duration of the health science course and have been able to get along. We have all shared and contributed ideas evenly and workloads have been distributed fairly. Although a times throughout the project communication between group members have been hard due to other commitments outside of university, for the vast majority, our group has been able to cope with all demands and work on assignments together.

This assessment in particular was quite hard, as we found many challenges on the way. We found that promotion in a project like this was the main factor in the success of the group and we later found that out when it was too late. As our main problem was participation we only have ourselves to blame.

SR5a

For this assignment I worked with [redacted]. I had never worked on a group assignment before so I was not entirely sure if [redacted] would be the type that likes to take control and do everything themself or the type of person that does not want to take responsibility. I did take a bit of charge but always asked for [redacted] input and we both tried to come up with the best and most efficient way to get all the relevant information we needed for our powerpoint presentation. We both decided it would be easiest to just divide things in half and share the work load. Instead of giving [redacted] all the harder questions or more information dense questions, they were divided up as equally as possible. If I needed help, [redacted] was there straight away to clear things up and I did my best to provide [redacted] with the same support. Collaborating with [redacted] actually helped me be more responsible because previously I have always been the one that looks for someone to tell me what to do. [redacted] and I both took initiative in this assignment.

I do not feel I expressed myself as well as I could have when writing up my information to present to the class. I felt like what I was trying to say just was not getting across because I did not know how to express it properly. However I did try my best to explain the amazing concept that we came up with.

I had suggested to [redacted] for us to do cultural diversity because I thought most people would either do health or mental health. We wanted to do something different so we could keep the audience interested and not bore them by hearing the exact same topic 4 times in a row.

SR5a

For this assignment I worked with [redacted]. I had never worked on a group assignment before so I was not entirely sure if [redacted] would be the type that likes to take control and do everything themself or the type of person that does not want to take responsibility. I did take a bit of charge but always asked for [redacted] input and we both tried to come up with the best and most efficient way to get all the relevant information we needed for our powerpoint presentation. We both decided it would be easiest to just divide things in half and share the work load. Instead of giving [redacted] all the harder questions or more information dense questions, they were divided up as equally as possible. If I needed help, [redacted] was there straight away to clear things up and I did my best to provide [redacted] with the same support. Collaborating with [redacted] actually helped me be more responsible because previously I have always been the one that looks for someone to tell me what to do. [redacted] and I both took initiative in this assignment.

I do not feel I expressed myself as well as I could have when writing up my information to present to the class. I felt like what I was trying to say just was not getting across because I did not know how to express it properly. However I did try my best to explain the amazing concept that we came up with.

I had suggested to [redacted] for us to do cultural diversity because I thought most people would either do health or mental health. We wanted to do something different so we could keep the audience interested and not bore them by hearing the exact same topic 4 times in a row.

SR6a

The aim of this assessment was to develop and manage action plans to determine solutions to reduce the incidence of communicable and non-communicable diseases, and it social and economic impaction and effects on the population. I worked with [redacted] and we both identified key stakeholders and engaged them into partnerships for our public health project of spreading awareness of good mental health among the students of [redacted].

The cooperation between our team of two members was working well as we interacted socially to ensure that our assessment was flowing. We also maintained social independence as we learnt new things and developed new ideas and concepts about mental health, wellbeing and wellness.

We decided to make out project statement simple to start off with, so if it was further developed within the [redacted] community, we could measure the risk and protection of the project better to develop the project further.

Ultimately I believe our partnership for this assessment has achieved an overall successful outcome within part 1 of the assessment. We used a Google DOC so we could work on our presentation and project ideas at the same time.

In relation to the literature review, I personally found it difficult to find the right reviews, most of the reviews don't have the full article unless you pay to read it, so it didn't have the full results in specifics so it was difficult to review and write about them.

SR6b

Reflecting after the project, the group found that we all enjoyed participating in group work and developing the project together. I found that his project gave us a sense of real responsibility, entitlement and made us feel a part of something like we would get in a real-life occupation.

Although it was challenging at times, I found that all the hard work we put in and the day of the event was rewarding as we worked and participated and had fun just like the key message of the project states. Overall, I found that we worked well as a group together especially in our communication with one another. One of the factors that worked well during the process of planning the project, was listening to each other's ideas and concepts. As a group, I believe everyone was accepting and took everyone's ideas on-board and considered each other's opinions at all times.

I think that a challenge that we faced as a group was getting in contact with any of the relevant stakeholders and parties. Initially in the beginning we had difficulty in booking a venue and getting a set date for the project event. But In the end, we overcame this obstacle by always communicating with one another and completing more research and work for the project. Although the goals of the event were not fully met, we managed to achieve our learning goals of keeping organised as a group and staying communicated with the team at all times.

The group managed to work together as one by being respectful of one another's thoughts and ideas for the project. We met together and communicated face to face and online and this was in fact, in my opinion very effective for all the group members. I believe we all worked extremely hard and had an even distribution of the work load throughout the group.

SR7a

For the group portion of the assessment I worked with one other classmate, [redacted]. We connected though school email. From there on we decided to do half and half on the project, judging from the recommended dot points, half/half.

Communication on the progress of the work was consistent. The teamwork and contribution were equal. As I completed the power-point presentation [redacted] completed the document containing the -fleshed-out details to be matched with the power-point through google documents.

In question with the completion time it was on time, however we could've finished earlier. Another factor we could've improved on were rehearsal for the speech. It could've been more polished and practiced.

One good thing I did and I improved on was keeping up with the workload with my group. I delivered on my part with attention to detail.

One good thing [redacted] did was take initiative on the google documents and find ways to more efficiently collate the work and keep up with the schedule.

As I reflected on the related group work, those were the things I thought.

SR7b

I had the pleasure of working in a group of 3 with [redacted] and [redacted]. We decided to do the project on a short message about anti-discrimination awareness that can be published on the [redacted] journal or Website. After a group discussion we concluded that all three of us were passionate of the subject and thought appropriate of being applied into the [redacted] University setting. We all compromised and agreed on a single topic.

To present a final product, as a group we mutually thought it would be best if we move toward a singular goal. We were honest in regard to the communication with each other. Throughout the project every member voiced their genuine opinions and through this we were able to a create a working environment that suited us both individually and interpersonally. This was our first step in being comfortable with each other.

In a co-operative project, it is obvious that communication is key. However, communication between both the group members and the active supervisor (teacher) were stagnant during the beginning of the project. It sent us stakeholders in a momentary state of panic. This slight uproar was remedied through onsite and social media contact between the student party and the teachers. This predicament served as a reminder of the value of the communication.

Throughout the project [redacted], [redacted], and I stayed in contact through social medias such as Facebook, and WhatsApp. Through this we kept each other up on the progress of the project. We reached out to each other whenever there was a progress or a notable development that was related to the project to keep each other in the loop. There was no communication breakdown from there on out. The response time from message to message was quick and consistent.

Appendix O: All ILSQ Item Responses

Item Number	Question	Response – Option a.	Number of Responses to a. [Percent	Response – Option b.	Number of Responses to b. [Percent
1	I understand something better after I	try it out	57 [76]	think it through	18 [24]
2	I would rather be considered	realistic	55 [73]	innovative	20 [27]
3	When I think about what I did yesterday, I am most likely to get	a picture	61 [81]	words	14 [19]
4	I tend to	understand details of a subject but may be fuzzy about its overall structure	25 [33]	understand the overall structure but may be fuzzy about details	50 [67]
5	When I am learning something new, it helps me to	talk about it	50 [67]	think about it	25 [33]
6	If I were a teacher, I would rather teach a course	that deals with facts and real-life situations	62 [83]	that deals with ideas and theories	13 [17]
7	I prefer to get new information in	pictures, diagrams, graphs, or maps	57 [76]	written directions or verbal information	18 [24]
8	Once I understand	all the parts, I understand the whole thing	44 [59]	the whole thing, I see how the parts fit	31 [41]
9	In a study group working on difficult material, I am more likely to	jump in and contribute ideas	50 [67]	sit back and listen	25 [33]
10	I find it easier	To learn facts	40 [53]	To learn concepts	35 [47]

Item Number	Question	Response – Option a.	Number of Responses to a. [Percent	Response – Option b.	Number of Responses to b. [Percent
11	In a book with lots of pictures and charts, I am likely to	Look over the pictures and charts carefully	57 [76]	Focus on the written text	18 [24]
12	When I solve math problems	I usually work my way to the solution one step at a time	61 [81]	I often just see the solutions but then have to struggle to figure out the steps to get to them	14 [19]
13	In classes I have taken	I have usually gotten to know many of the students	51 [68]	I have rarely gotten to know many of the students	24 [32]
14	In reading nonfiction, I prefer	Something that teaches me new facts or tells me how to do something	29 [39]	Something that gives me new ideas to think about	46 [61]
15	I like teachers	Who put a lot of diagrams on the board	29 [39]	Who spend a lot of time explaining	46 [61]
16	When I'm analyzing a story or a novel	I think of the incidents and try to put them together to figure out the themes	51 [68]	I just know what the themes are when I finish reading and then I have to go back and find the incidents that demonstrate them	24 [32]
17	When I start a homework problem, I am more likely to	Start working on the solution immediately	23 [31]	Try to fully understand the problem first	52 [69]
18	I prefer the idea of	Certainty	55 [73]	Theory	20 [27]
19	I remember best	What I see	64 [85]	What I hear	11 [15]
20	It is more important to me that an instructor	Lay out the material in clear sequential steps	51 [68]	Gives me an overall picture and relate the material to other subjects	24 [32]

Item Number	Question	Response – Option a.	Number of Responses to a. [Percent	Response – Option b.	Number of Responses to b. [Percent
21	I prefer to study	In a study group	28 [37]	Alone	47 [63]
22	I am more likely to be considered	Careful about the details of my work	46 [61]	Creative about how to do my work	29 [39]
23	When I get directions to a new place, I prefer	A map	56 [75]	Written instructions	19 [25]
24	I learn	At a fairly regular pace. If I study hard "I'll get it"	46 [61]	In fits and starts. I'll be totally confused and then suddenly it all "clicks"	29 [39]
25	I would rather first	Try things out	40 [53]	Think about how I'm going to do it	35 [47]
26	When I am reading for enjoyment, I like writers to	Clearly say what they mean	37 [49]	Says things in creative, interesting ways	38 [51]
27	When I see a diagram or sketch in class, I am most likely to remember	The picture	50 [67]	What the instructor said about it	25 [33]
28	When considering a body of information, I am more likely to	Focus on details and miss the big picture	27 [36]	Try to understand the big picture before getting into the details	48 [64]
29	I more easily remember	Something I have done	49 [65]	Something I have thought a lot about	26 [35]
30	When I have to perform a task, I prefer to	Master one way of doing it	40 [53]	Come up with new ways of doing it	35 [64]

Item Number	Question	Response – Option a.	Number of Responses to a. [Percent	Response – Option b.	Number of Responses to b. [Percent
31	When someone is showing me data, I prefer	Charts or graphs	53 [71]	Text summarizing the results	22 [29]
32	When writing a paper, I am more likely to	Work on (think about or write) the beginning of the paper and progress forward	44 [59]	Work on (think about or write) different parts of the paper and then order them	31 [41]
33	When I have to work on a group project, I first want to	Have "group brainstorming" where everyone contributes ideas	50 [67]	Brainstorm individually and then come together as a group to compare ideas	25 [33]
34	I consider it higher praise to call someone	Sensible	34 [45]	Imaginative	41 [55]
35	When I meet people at a party, I am more likely to remember	What they looked like	49 [65]	What they said about themselves	26 [35]
36	When I am learning a new subject, I prefer to	Stay focused on that subject, learning as much about it as I can	45 [60]	Try to make connections between the subject and related subjects	30 [40]
37	I am more likely to be considered	Outgoing	45 [60]	Reserved	30 [40]
38	I prefer courses that emphasize	Concrete material (facts, data)	51 [68]	Abstract material (concepts, theories)	24 [32]
39	For entertainment, I would rather	Watch television	59 [79]	Read a book	16 [21]

Item Number	Question	Response – Option a.	Number of Responses to a. [Percent	Response – Option b.	Number of Responses to b. [Percent
40	Some teachers start their lectures with an outline of what they will cover. Such outlines are	Somewhat helpful to me	43 [57]	Very helpful to me	32 [43]
41	The idea of doing homework in groups, with one grade for the entire group	Appeals to me	36 [48]	Does not appeal to me	39 [52]
42	When I am doing long calculations	I tend to repeat all my steps and check my work carefully	49 [65]	I find checking my work tiresome and have to force myself to do it	26 [35]
43	I tend to picture places I have been	Easily and fairly accurately	65 [87]	With difficulty and without much details	10 [13]
44	When solving problems in a group, I would be more likely to	Think of the steps in the solution processes	45 [60]	Think of possible consequences or applications of the solution in a wide range of areas	30 [40]

Appendix P: Respondent ILSQ Learning Style Dimension Scores

ID Code	Active	Reflective	Sensing	Intuitive	Visual	Verbal	Sequential	Global
1	3		3		7		7	
2	1			1	3		3	
3	9		3		11			1
4	3		3		3			5
5	5		9		5		3	
6	1		3		7			1
7	3		5			3	5	
8	9		5		7		1	
9		1	11		5		5	
10	7			9	1			9
11	5		7		9		5	
12	9			9	7		3	
13	3		5			3	9	
14	5		3		9			3
15		7		11		9		7
16	1		9		9			1
17		3	9		7		5	
18	1		3		9		7	
19		3	7		3		7	
20	5		11		7		1	
21	7			3	7			1
22		11	7		1		3	
23		5	7		5			1
24	3			9	7			7
25	5		9		9		5	

ID Code	Active	Reflective	Sensing	Intuitive	Visual	Verbal	Sequential	Global
26		1		1	9		3	
27	3		3		3			5
28		1	3		5		5	
29	1		3		7		3	
30	3			3	7		5	
31	5		9		9		7	
32	3		11		1		5	
33	1		3		5		1	
34	7		5		9			3
35	5		5			3		1
36	3		3		9		5	
37	9			3	3		7	
38	3		3			3	9	
39		1	3		5		9	
40		1	1			3	5	
41		1	1		1			1
42	5			1	11		1	
43		7	7		3			3
44	3			5	7			3
45	7			9	11		3	
46	1		11		9		5	
47	3		3		5			3
48	3			9	11		1	
49		3		1	7			5
50		5		9	5			5

ID Code	Active	Reflective	Sensing	Intuitive	Visual	Verbal	Sequential	Global
51		3		1	11			1
52	5		3		11			1
53		5	1		1		5	
54		3		7	1		1	
55	3		5		9			1
56		3		7	3			3
57	9		3		9		5	
58	9		7			3		1
59	1		5		5		5	
60	1		7			1	9	
61		5		5		5	3	
62		1	5		5		3	
63	9		1		7		9	
64		1	3		7			1
65	3		5		9		11	
66		5	3		5		1	
67	3			7	5			3
68	9			7	9			3
69	7		7		7		9	
70	1		3		9		3	
71	5		1		1		7	
72		1	7		5		7	
73	1		1		5		1	
74		3		3	5		1	
75		3	9		1		1	

Appendix Q: All DLQ Results Tabled

Q1	About my learning….	SA	A	SWA	N	SWD	D	SD	B
1.I1	My learning program encourages me to be creative	5	13	19	9	5	3	1	0
1.I2	I have the opportunity to demonstrate personal responsibility in my learning program	8	26	15	5	0	0	0	1
1.I3	Collaboration with colleagues is enabled in my learning program	11	25	13	3	1	2	0	0
1.I4	I am learning skills which will help me to manage real-world problems	9	10	22	9	3	0	2	0
1.I5	The skills I am learning can be applied to different contexts	7	17	22	5	4	0	0	0
1.I6	Practical skill development is supported in my learning program	8	17	17	9	2	2	0	0
1.I7	My learning program presents me with authentic real-world experience	5	8	20	15	5	1	0	1
1.I8	My learning program is helping me to develop effective work habits	5	17	14	11	4	4	0	0
Q2	**My general employability skills…**	**SA**	**A**	**SWA**	**N**	**SWD**	**D**	**SD**	**B**
2.I9	I am learning how to communicate effectively	6	21	18	6	3	1	0	0
2.I10	Asking effective questions is a valued employability skill	11	25	14	5	0	0	0	0
2.I11	I am learning how to be an effective team member	5	24	15	8	1	1	0	1
2.I12	I am learning how to solve problems	6	22	14	7	5	1	0	0
2.I13	I am learning new skills which I can use in any work setting	7	16	14	12	3	3	0	0
Q3	**About asking questions…**	**SA**	**A**	**SWA**	**N**	**SWD**	**D**	**SD**	**B**
3.I14	I am encouraged to ask questions in class	9	25	14	5	2	0	0	0
3.I15	My Intellectual skills are being developed in my learning program	8	17	18	8	2	2	0	0
3.I16	My learning program promotes my critical thinking skills	8	19	16	7	4	1	0	0
3.I17	I am confident about how to ask effective questions to get relevant information	7	21	14	7	3	3	0	0
Q4	**About work-ready skills for a health-related role…**	**SA**	**A**	**SWA**	**N**	**SWD**	**D**	**SD**	**B**
4.I18	The science I am learning will help me get a job when I graduate	3	14	30	4	2	2	0	0
4.I19	Learning about human cultures will help me be work-ready for the health field	7	24	18	4	1	1	0	0
4.I20	I am learning specific skills to work in a health-related role	7	22	15	3	5	3	0	0
4.I21	Learning about the natural world as it relates to population health will prepare me to work in a health-related role	7	18	18	6	5	0	1	0
4.I22	I am doing this learning program to get a job in the health field	19	19	10	3	3	1	0	0
4.I23	To be work-ready in a health role I need to learn about the physical world in relation to population health	13	27	9	3	1	1	1	0
4.I24	I prefer to learn by getting real-world experience in the field	21	22	5	4	2	1	0	0

Q5	My learning style preferences…	SA	A	SWA	N	SWD	D	SD	B
5.I25	I learn best by doing	22	25	7	1	0	0	0	0
5.I26	I prefer to study alone	12	14	15	11	1	2	0	0
5.I27	I learn best by attending class	11	18	14	10	1	0	0	1
5.I28	I prefer to study with my student peers	4	13	17	13	0	7	0	1
5.I29	I prefer to work with authentic case-studies in class	12	13	20	6	1	2	1	0
5.I30	I prefer to learn with a social group	5	17	17	8	5	5	0	0
5.I31	I learn best outside of the class setting	12	8	17	11	6	1	0	0
5.I32	I do independent study outside of the program-related material provided	12	8	16	13	4	1	1	0
5.I33	I learn best during whole of class discussions	10	19	17	4	4	1	0	0
5.I34	I prefer to work through course material in my own time	9	10	16	14	5	1	0	0
Q6	**To find information to answer assignment questions I go to…**	**SA**	**A**	**SWA**	**N**	**SWD**	**D**	**SD**	**B**
6.I35	My student friends	10	23	12	4	1	3	1	1
6.I36	My teacher	9	21	11	7	3	2	1	1
6.I37	The internet on my mobile device	17	26	10	2	0	0	0	0
6.I38	The provided course-work resources	18	23	7	7	0	0	0	0
6.I39	Library text sources	7	10	13	14	5	4	2	0
6.I40	Library data-base peer-reviewed texts	10	10	10	14	5	5	1	0
6.I41	Wikipedia	3	5	10	15	7	10	5	0
6.I42	Google Scholar	10	15	12	11	3	4	0	0
6.I43	The grey literature (Government and non-Government websites)	3	18	15	11	3	3	2	0
6.I44	My family	2	8	13	13	9	4	5	1
6.I45	Someone working in the relevant field	4	13	9	14	7	6	2	0
Q7	**Making inquiries…**	**SA**	**A**	**SWA**	**N**	**SWD**	**D**	**SD**	**B**
7.I46	I am confident about where to find answers for assignment questions	9	25	9	9	2	0	1	0
7.I47	I am comfortable asking questions to get information for assignment tasks	11	23	16	3	1	0	1	0
7.I48	I prefer to ask my questions via an internet search engine	11	15	17	7	3	0	2	0
7.I49	I use answers to questions that other people have already asked	6	12	12	18	3	2	2	0
7.I50	I prefer it when teachers ask the questions in class	5	14	20	13	1	1	1	0
7.I51	I learn best when students ask questions in class	4	18	15	16	0	1	1	0
7.I52	I am learning to ask effective questions	7	16	20	10	1	0	1	0

Q8	The type of assessment which helps to develop my work ready skills are…	SA	A	SWA	N	SWD	D	SD	B
8.I53	Exams	3	7	13	11	8	6	7	0
8.I54	Written assignments such as essays	2	11	19	9	9	3	2	0
8.I55	Oral presentations	9	10	20	5	4	2	5	0
8.I56	Group assignments	9	13	17	8	3	0	3	2
8.I57	Individual assignments	12	21	19	0	2	0	1	0
8.I58	Practical projects	17	22	13	0	2	0	1	0
8.I59	Simulated activity	13	23	12	6	0	0	1	0
8.I60	Practical laboratory	19	18	12	4	0	0	2	0

Q9.I61	This learning program was my preferred first enrolment…	Yes = 16; No = 39
Q10.I62	I am…	Female = 31; Male = 23; Other = 1
Q11.I63	My first language is…	English = 41; Dari = 3; Bisaya and Somali = 2; Cantonese, Chinese, French, Greek, Hindi, Kurdish, Spanish = 1
Q12.I64	My age last birthday…	16 = 1; 17 = 4; 18 = 18; 19 = 18; 20 = 6; 21 = 4; 22 = 1; 27 = 1; Blank = 1
Q13.I65	I am doing this program as a pathway into another program…	No = 6; Yes = 40; Not sure = 9
Q14.I66	If I am offered a place in another program I will not continue with my current learning program…	Yes = 30; Will defer and complete current program = 10; Not applicable = 10; No = 5
Q15.I67	My current enrolment is best described as…	Completed = 1; Year 1 = 32; Year 2 = 21; Blank = 1

Q16.I68 My plan for the future is to work in the career/profession of...	
Nursing, nurse, ICU nurse; paediatric nurse; nursing; nursing; [nurse]; nursing; nursing; nurse; nursing; nursing	12
Not sure yet, unsure, not sure; not sure yet; not sure; no idea; not sure; unsure; [unsure]; Unsure,	10
Physiotherapist; physio; physio; physio; [physiotherapy]; [physio]; [physio]	7
midwifery; midwifery [midwifery]; [midwife]	4
Chiropractic; chiropractor; [chiro]	3
Dietetics, dietician; [nutrition];	3
Chemist; pharmacy	2
Bachelor of occupational therapy; occupational therapist;	2
Health; health	2
Social worker (paediatrics); social work	2
Myotherapy, [myo…];	2
Osteopathy; [osteo]	2
Paramedic	1
Psychologist	1
[Chinese medicine]	1
Biomedical engineering	1
Medical administration/medical records	1
Dental Nurse	1
[sports science related]	1
LGBTQIA/ sex worker health	1
Exercise physiology	1
[Flight attendant]	1
Dentistry;	1
Radiography/ medical imaging	1
[Health promotion]	1
[pathway program]	1
Have a holiday	1
Look for work	1

Q17	My motivation to learn is best described as... (RANK in order by putting 1 for most relevant for you item down to 4 for least relevant)	Rank 1	Rank 2	Rank 3	Rank 4	BLANK
Q17.I69	Learning how to be a responsible citizen of the world	6	10	18	17	4
Q17.I70	Learning how to demonstrate social responsibility	7	15	20	9	4
Q17.I71	Learning how to express my character as an individual	19	14	5	13	4
Q17.I72	Learning how to use skills in other contexts	19	12	8	12	4

Q18	**Barriers to my learning are...** (RANK in order by putting 1 for most relevant for you item down to 4 for least relevant)	Rank 1	Rank 2	Rank 3	Rank 4	BLANK
Q18.I73	My work commitments are a priority	13	12	9	17	4
Q18.I74	My family commitments are a priority	12	9	23	7	4
Q18.I75	My social commitments are a priority	7	22	13	9	4
Q18.I76	My motivation to study is affected by other factors	19	8	6	18	4

Q19.177	If I was not enrolled in my current learning program I would be doing...(Write your response below)
Work at Coles	Nursing a Vic Uni
Medicine	Possible working full time
Continued work in my current field (Trampoline park) while attempting to enter a tafe for a similar (sic) program	Another course possible at a different university or working as a nanny on a station
Not sure	Gap year
Dental nursing course	Full time work or some other I.T. or health-based course
Full time work	Working
Bachelor of Biological science at La Trobe	Bachelor of Science
Working full time	Another course
Working	Nursing/ Midwifery
Looking for work	Another course similar to this at a different university
Studying somewhere else	Probably enter a business course
Social work	Physiotherapy
Freelance media writing & hospitality work	I don't know
Working	N/A
Working in retail	Full time job or another course
Studying elsewhere/ working full time	Not sure
Working and perhaps in another course	Bachelor's degree in health science
Nursing	Working full time
Another course	Another course
Full time work	Working
Working	Working full time
Art - designing, illustrations etc.	Not sure
Not sure	Working part time/ full time
I originally enrolled into an Ass Deg in Graphic Design at [redacted] but changed into health science midyear 2014. As my university involvement increased outside of my academic course, (volunteer roles) I feel as if I should of gone into Business admin/ events management/ HR something along those lines	

Q20	What skills I think Employers value... (Draw a line from the items on the left to the attributes on the right which you think apply to them)					
Q20.I78	Personal attributes most sought by employers					
Q20.I79	General employability skills					
Skill/ Attribute	**Personal Attribute**	**General Employability Skill**	**Not Matched**	**Blank**	***Total** (excluding Not Matched and Blank)	**Total (excluding Blank)**
Loyalty	34 (57%)	15 (26%)	9 (16%)	3	49	58
Commitment	36 (64%)	14 (25%)	6 (11%)	3	50	56
Communication	27 (45%)	26 (43%)	7 (12%)	3	53	60
Honesty and Integrity	31 (54%)	17 (30%)	9 (16%)	3	48	57
Enthusiasm	30 (55%)	14 (25%)	11 (20%)	3	44	55
Teamwork	25 (42%)	27 (46%)	7 (12%)	3	52	59
Reliability	27 (46%)	24 (41%)	8 (14%)	3	51	59
Personal Presentation	27 (47%)	18 (32%)	12 (21%)	3	45	57
Problem Solving	23 (41%)	28 (50%)	5 (9%)	3	51	56
Common Sense	16 (29%)	32 (57%)	8 (14%)	3	48	56
Self-management	26 (47%)	23 (42%)	6 (11%)	3	49	55
Positive Self-esteem	22 (39%)	21 (38%)	13 (23%)	3	43	56
Planning and Organising	21 (38%)	23 (41%)	12 (21%)	3	44	56
Sense of Humour	21 (40%)	14 (26%)	18 (34%)	3	35	53
Using Technology	15 (28%)	29 (54%)	10 (19%)	3	44	54
A Balanced Attitude to Work and Home Life	16 (29%)	24 (43%)	16 (29%)	3	40	56
Learning	12 (23%)	28 (53%)	13 (25%)	3	40	53
Dealing with Pressure	15 (28%)	31 (58%)	7 (13%)	3	46	53
Motivation	27 (48%)	18 (32%)	11 (20%)	3	45	56
Initiative and Enterprise	21 (40%)	19 (36%)	13 (25%)	3	40	53
Adaptability	17 (31%)	28 (51%)	10 (18%)	3	45	55

*NB: Some participants gave more than one response.(highlighted skill/attribute = general employability skills as per Victorian Government Department of Education (2006) Employability Skills Framework adapted from Department of Education, Science & Technology (2002) Employability Skills. https://www.education.vic.gov.au/Documents/school/teachers/teachingresources/careers/employabilityskills1.pdf

Q21.I80	My ideal learning environment would be... (Write your response below)
At home.
Hospital.
A motivating and interesting lecture setting.
Class.
Library with the other students because it motivates me when I lose interest. I see them work which makes me want to study as well.
Small classes/groups working through study questions together.
In a supportive class or by myself at library.
In a room where everyone participates, and everyone is enthusiastic about what they are doing.
At home.
In a group with other people who are as passionate and accepting as I am.
In a quite (sic) place where there is lots of natural light.
A small group of people who are of a similar intellectual level & motivated like me.
Desk people around me quietly learning.
At home/ online.
Practical/ hands on environment.
One on one or being asked questions on the spot.
Alone at a library, or a small quite (sic) class.
At home.
In an open class with lots of discussions.
In a classroom, or at home.
Practical - involvement - physical.
A quiet yet proactive class with discussions.
Quiet room, lots of natural sunlight - sometimes alone somethimes (sic)with others.
In a classroom setting or in an active field.
Firsthand in the field i.e. a hospital.
Candle lit dinner.
In the field of my aspired proffession (sic) (Physiotherapy).
Quite (sic).
In a classroom.
Quiet working environment.
Classroom.
One that constantly promotes discussions with both teachers and students, applying relevant information to real life incidences (or examples).
In a classroom, working with others & by yourself.
At home.
In the class with powerpoints and physical learning.
A quiet place.
One on one, with visuals, ask questions.
Bedroom.

Out in the field.
Out in the field.
In a classroom and also at home so have online classes. Would be a good balance.
Calm comfortable space with plenty breaks.
Small classrooms with interactive teachers, practical parts to really use what we are learning. Small review quizzes to not forget, keeping it in long term memory.
A quiet environment with people who can help with my learning.
Alone in a quite (sic) area.
Open discussion.
Study room without any interruptions.
Hands-on, interactive.
In my own time, referring to class/lectures online.
Similar aged collegues (sic), fun/family like atmosphere.

Appendix R: All DLQ Q1-Q8 Data Responses Tabulated

		Strongly Agree [%]	Agree [%]	Somewhat Agree [%]	AGREED TOTAL [%]	Neither Agree Nor Disagree [%]	Somewhat Disagree [%]	Disagree [%]	Strongly Disagree [%]	DISAGREED TOTAL [%]	Blank [%]
Q1	**About my learning….[21st Century Skills]**										
1.I1	My learning program encourages me to be creative	5 [9.1]	13 [23.6]	19 [34.5]	37 [67.3]	9 [16.3]	5 [9.1]	3 [5.5]	1 [1.8]	9 [16.4]	0 [0]
1.I2	I have the opportunity to demonstrate personal responsibility in my learning program	8 [14.5]	26 [47.3]	15 [27.3]	49 [89.1]	5 [9.1]	0 [0]	0 [0]	0 [0]	0 [0]	1 [1.8]
1.I3	Collaboration with colleagues is enabled in my learning program	11 [20.0]	25 [45.5]	13 [23.6]	49 [89.1]	3 [5.5]	1 [1.8]	2 [3.6]	0 [0]	3 [5.5]	0 [0]
1.I4	I am learning skills which will help me to manage real-world problems	9 [16.4]	10 [18.2]	22 [40.0]	41 [74.5]	9 [16.4]	3 [5.5]	0 [0]	2 [3.6]	5 [9.1]	0 [0]
1.I5	The skills I am learning can be applied to different contexts	7 [12.7]	17 [30.9]	22 [40.0]	46 [83.6]	5 [9.1]	4 [7.3]	0 [0]	0 [0]	4 [7.3]	0 [0]
1.I6	Practical skill development is supported in my learning program	8 [14.5]	17 [30.9]	17 [30.9]	42 [76.4]	9 [16.4]	2 [3.6]	2 [3.6]	0 [0]	4 [7.3]	0 [0]
1.I7	My learning program presents me with authentic real-world experience	5 [9.1]	8 [14.5]	20 [36.4]	33 [60.0]	15 [27.3]	5 [9.1]	1 [1.8]	0 [0]	6 [10.9]	1 [1.8]
1.I8	My learning program is helping me to develop effective work habits	5 [9.1]	17 [30.9]	14 [25.5]	36 [65.5]	11 [20.0]	4 [7.3]	4 [7.3]	0 [0]	8 [14.5]	0 [0]
Q2	**My general employability skills … [Employability Skills]**										
2.I9	I am learning how to communicate effectively	6 [10.9]	21 [38.2]	18 [32.7]	45 [81.8]	6 [10.9]	3 [5.5]	1 [1.8]	0 [0]	4 [7.3]	0 [0]
2.I10	Asking effective questions is a valued employability skill	11 [20.0]	25 [45.5]	14 [25.5]	50 [90.9]	5 [9.1]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
2.I11	I am learning how to be an effective team member	5 [9.1]	24 [43.6]	15 [27.3]	44 [80.0]	8 [14.5]	1 [1.8]	1 [1.8]	0 [0]	2 [3.6]	1 [1.8]
2.I12	I am learning how to solve problems	6 [10.9]	22 [40.0]	14 [25.5]	42 [76.4]	7 [12.7]	5 [9.1]	1 [1.8]	0 [0]	6 [10.9]	0 [0]
2.I13	I am learning new skills which I can use in any work setting	7 [12.7]	16 [29.1]	14 [25.5]	37 [67.3]	12 [21.8]	3 [5.5]	3 [5.5]	0 [0]	6 [10.9]	0 [0]

		Strongly Agree [%]	Agree [%]	Somewhat Agree [%]	AGREED TOTAL [%]	Neither Agree Nor Disagree [%]	Somewhat Disagree [%]	Disagree [%]	Strongly Disagree [%]	DISAGREED TOTAL [%]	Blank [%]
Q3	**About asking questions…[Questioning approach]**										
3.I14	I am encouraged to ask questions in class	9 [16.4]	25 [45.5]	14 [25.5]	48 [87.3]	5 [9.1]	2 [3.6]	0 [0]	0 [0]	2 [3.6]	0 [0]
3.I15	My Intellectual skills are being developed in my learning program	8 [14.5]	17 [30.9]	18 [32.7]	43 [78.2]	8 [14.5]	2 [3.6]	2 [3.6]	0 [0]	4 [7.3]	0 [0]
3.I16	My learning program promotes my critical thinking skills	8 [14.5]	19 [34.5]	16 [29.1]	43 [78.2]	7 [12.7]	4 [7.3]	1 [1.8]	0 [0]	5 [9.1]	0 [0]
3.I17	I am confident about how to ask effective questions to get relevant information	7 [12.7]	21 [38.2]	14 [14.5]	42 [76.4]	7 [12.7]	3 [5.5]	3 [5.5]	0 [0]	6 [10.9]	0 [0]
Q4	**About work-ready skills for a health-related role…[Work-Readiness]**										
4.I18	The science I am learning will help me get a job when I graduate	3 [5.5]	14 [25.5]	30 [54.5]	47 [85.5]	4 [7.3]	2 [3.6]	2 [3.6]	0 [0]	4 [7.3]	0 [0]
4.I19	Learning about human cultures will help me be work-ready for the health field	7 [12.7]	24 [43.6]	18 [32.7]	49 [89.1]	4 [7.3]	1 [1.8]	1 [1.8]	0 [0]	2 [3.6]	0 [0]
4.I20	I am learning specific skills to work in a health-related role	7 [12.7]	22 [40.0]	15 [27.3]	44 [80.0]	3 [5.5]	5 [9.1]	3 [5.5]	0 [0]	8 [14.5]	0 [0]
4.I21	Learning about the natural world as it relates to population health will prepare me to work in a health-related role	7 [12.7]	18 [32.7]	18 [32.7]	43 [78.2]	6 [10.9]	5 [9.1]	0 [0]	1 [1.8]	6 [10.9]	0 [0]
4.I22	I am doing this learning program to get a job in the health field	19 [34.5]	19 [34.5]	10 [18.2]	48 [87.3]	3 [5.5]	3 [5.5]	1 [1.8]	0 [0]	4 [7.3]	0 [0]
4.I23	To be work-ready in a health role I need to learn about the physical world in relation to population health	13 [23.6]	27 [49.1]	9 [16.4]	49 [89.1]	3 [5.5]	1 [1.8]	1 [1.8]	1 [1.8]	3 [5.5]	0 [0]
4.I24	I prefer to learn by getting real-world experience in the field	21 [38.2]	22 [40.0]	5 [9.1]	48 [87.3]	4 [7.3]	2 [3.6]	1 [1.8]	0 [0]	3 [5.5]	0 [0]

		Strongly Agree [%]	Agree [%]	Somewhat Agree [%]	AGREED TOTAL [%]	Neither Agree Nor Disagree [%]	Somewhat Disagree [%]	Disagree [%]	Strongly Disagree [%]	DISAGREED TOTAL [%]	Blank [%]
Q5	**My learning style preferences...[Learning style]**										
5.I25	I learn best by doing	22 [40.0]	25 [45.5]	7 [12.7]	54 [98.0]	1 [1.8]	0 [0]	0 [0]	0 [0]	O [0]	0 [0]
5.I26	I prefer to study alone	12 [21.8]	14 [25.5]	15 [27.3]	41 [74.5]	11 [20.0]	1 [1.8]	2 [3.6]	0 [0]	3 [5.5]	0 [0]
5.I27	I learn best by attending class	11 [20.0]	18 [32.7]	14 [25.5]	43 [78.2]	10 [18.2]	1 [1.8]	0 [0]	0 [0]	1 [1.8]	1 [1.8]
5.I28	I prefer to study with my student peers	4 [7.3]	13 [23.6]	17 [30.9]	34 [61.8]	13 [23.6]	0 [0]	7 [12.7]	0 [0]	7 [12.7]	1 [1.8]
5.I29	I prefer to work with authentic case-studies in class	12 [21.8]	13 [23.6]	20 [36.4]	45 [81.8]	6 [10.9]	1 [1.8]	2 [3.6]	1 [1.8]	4 [7.3]	0 [0]
5.I30	I prefer to learn with a social group	5 [9.1]	17 [30.9]	17 [30.9]	39 [70.9]	8 [14.5]	5 [9.1]	5 [9.1]	0 [0]	10 [18.2]	0 [0]
5.I31	I learn best outside of the class setting	12 [21.8]	8 [14.5]	17 [30.9]	37 [67.3]	11 [40.o]	6 [10.9]	1 [1.8]	0 [0]	7 [12.7]	0 [0]
5.I32	I do independent study outside of the program-related material provided	12 [21.8]	8 [14.5]	16 [29.1]	36 [65.5]	13 [23.6]	4 [7.3]	1 [1.8]	1 [1.8]	6 [10.9]	0 [0]
5.I33	I learn best during whole of class discussions	10 [18.2]	19 [34.5]	17 [30.9]	46 [83.6]	4 [7.3]	4 [7.3]	1 [1.8]	0 [0]	5 [9.1]	0 [0]
5.I34	I prefer to work through course material in my own time	9 [16.4]	10 [18.2]	16 [29.1]	35 [63.6]	14 [25.5]	5 [9.1]	1 [1.8]	0 [0]	6 [10.9]	0 [0]

		Strongly Agree [%]	Agree [%]	Somewhat Agree [%]	AGREED TOTAL [%]	Neither Agree Nor Disagree [%]	Somewhat Disagree [%]	Disagree [%]	Strongly Disagree [%]	DISAGREED TOTAL [%]	Blank [%]
Q6	**To find information to answer assignment questions I go to…[Questioning approach]**										
6.I35	My student friends	10 [18.2]	23 [41.8]	12 [21.8]	45 [81.8]	4 [7.3]	1 [1.8]	3 [5.5]	1 [1.8]	5 [9.1]	1 [1.8]
6.I36	My teacher	9 [16.4]	21 [38.2]	11 [20.0]	41 [74.5]	7 [12.7]	3 [5.5]	2 [3.6]	1 [1.8]	6 [10.9]	1 [1.8]
6.I37	The internet on my mobile device	17 [30.9]	26 [47.3]	10 [18.2]	53 [96.4]	2 [3.6]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
6.I38	The provided course-work resources	18 [32.7]	23 [41.8]	7 [12.7]	48 [87.3]	7 [12.7]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
6.I39	Library text sources	7 [12.7]	10 [18.2]	13 [23.6]	30 [54.5]	14 [25.5]	5 [9.1]	4 [7.3]	2 [3.6]	11 [20.0]	0 [0]
6.I40	Library data-base peer-reviewed texts	10 [18.2]	10 [18.2]	10 [18.2]	30 [54.5]	14 [25.5]	5 [9.1]	5 [9.1]	1 [1.8]	11 [20.0]	0 [0]
6.I41	Wikipedia	3 [5.5]	5 [9.1]	10 [18.2]	18 [32.7]	15 [27.3]	7 [12.7]	10 [18.2]	5 [9.1]	22 [20.0]	0 [0]
6.I42	Google Scholar	10 [18.2]	15 [27.3]	12 [21.8]	37 [67.3]	11 [20.0]	3 [5.5]	4 [7.3]	0 [0]	7 [12.7]	0 [0]
6.I43	The grey literature (Government and non-Government websites)	3 [5.5]	18 [32.7]	15 [27.3]	36 [65.5]	11 [20.0]	3 [5.5]	3 [5.5]	2 [3.6]	8 [14.5]	0 [0]
6.I44	My family	2 [3.6]	8 [14.5]	13 [23.6]	23 [41.8]	13 [23.6]	9 [16.4]	4 [7.3]	5 [9.1]	18 [32.7]	1 [1.8]
6.I45	Someone working in the relevant field	4 [7.3]	13 [23.6]	9 [16.4]	26 [47.3]	14 [25.5]	7 [12.7]	6 [10.9]	2 [3.6]	15 [25.5]	0 [0]

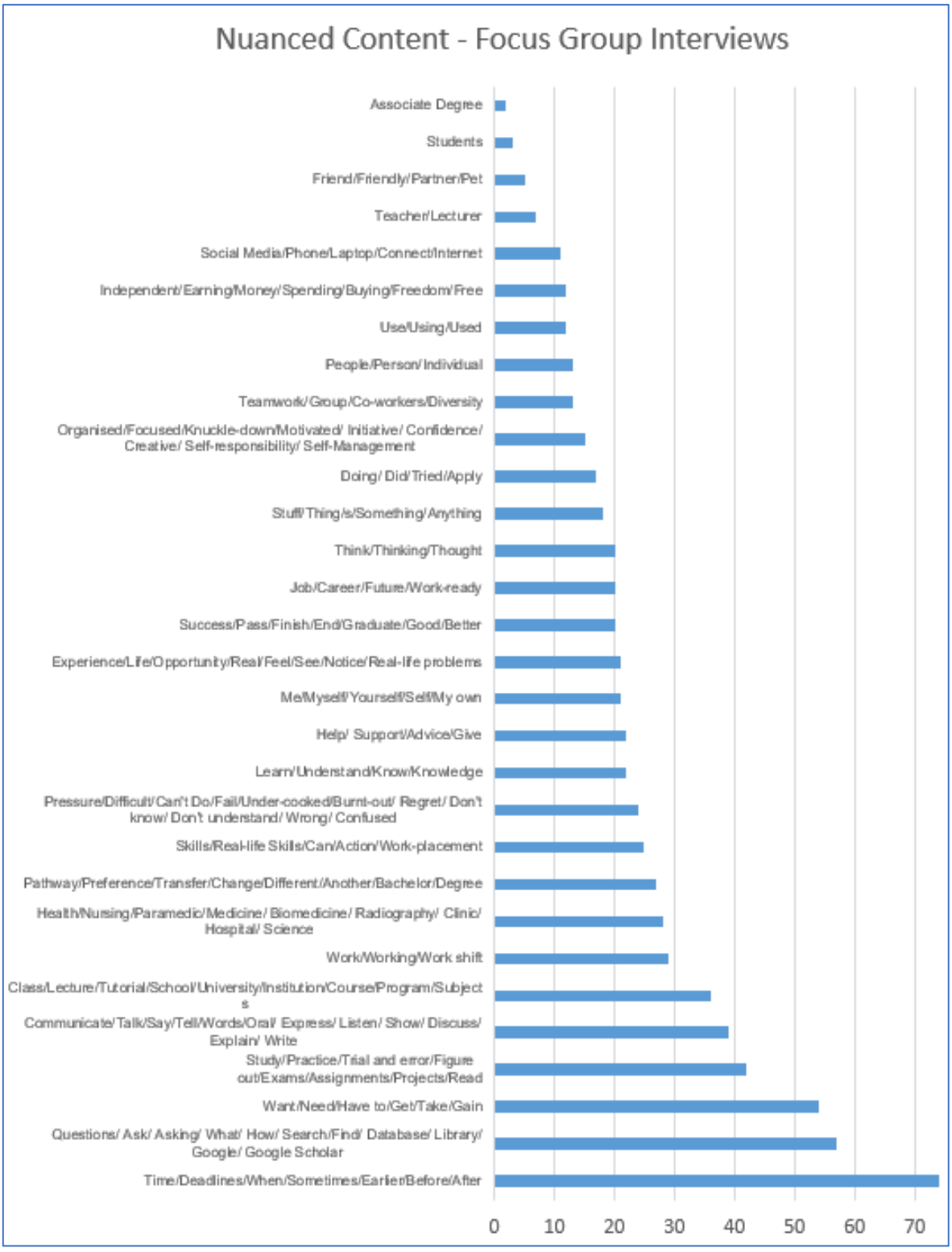
		Strongly Agree [%]	Agree [%]	Somewhat Agree [%]	AGREED TOTAL [%]	Neither Agree Nor Disagree [%]	Somewhat Disagree [%]	Disagree [%]	Strongly Disagree [%]	DISAGREED TOTAL [%]	Blank [%]
Q7	**Making inquiries…[Questioning approach]**										
7.I46	I am confident about where to find answers for assignment questions	9 [16.4]	25 [45.5]	9 [16.4]	43 [78.2]	9 [16.4]	2 [3.6]	0 [0]	1 [1.8]	3 [5.5]	0 [0]
7.I47	I am comfortable asking questions to get information for assignment tasks	11 [20.0]	23 [41.8]	16 [29.1]	50 [90.9]	3 [5.5]	1 [1.8]	0 [0]	1 [1.8]	2 [3.6]	0 [0]
7.I48	I prefer to ask my questions via an internet search engine	11 [20.0]	15 [27.3]	17 [30.9]	43 [78.2]	7 [12.7]	3 [5.5]	0 [0]	2 [3.6]	5 [9.1]	0 [0]
7.I49	I use answers to questions that other people have already asked	6 [10.9]	12 [21.8]	12 [21.8]	30 [54.5]	18 [32.7]	3 [5.5]	2 [3.6]	2 [3.6]	7 [12.7]	0 [0]
7.I50	I prefer it when teachers ask the questions in class	5 [9.1]	14 [25.5]	20 [36.4]	39 [70.9]	13 [23.6]	1 [1.8]	1 [1.8]	1 [1.8]	3 [5.5]	0 [0]
7.I51	I learn best when students ask questions in class	4 [7.3]	18 [32.7]	15 [27.3]	37 [67.3]	16 [29.1]	0 [0]	1 [1.8]	1 [1.8]	2 [3.6]	0 [0]
7.I52	I am learning to ask effective questions	7 [12.7]	16 [29.1]	20 [36.4]	43 [78.2]	10 [18.2]	1 [1.8]	0 [0]	1 [1.8]	2 [3.6]	0 [0]
Q8	**The type of assessment which helps to develop my work ready skills are…[Work-Readiness]**										
8.I53	Exams	3 [5.5]	7 [12.7]	13 [23.6]	23 [41.8]	11 [20.0]	8 [14.5]	6 [10.9]	7 [12.7]	21 [38.2]	0 [0]
8.I54	Written assignments such as essays	2 [3.6]	11 [20.0]	19 [34.5]	32 [58.2]	9 [16.4]	9 [16.4]	3 [5.5]	2 [3.6]	14 [25.5]	0 [0]
8.I55	Oral presentations	9 [16.4]	10 [18.2]	20 [36.4]	39 [70.9]	5 [9.1]]	4 [7.3]	2 [3.6]	5 [9.1]	11 [20.0]	0 [0]
8.I56	Group assignments	9 [16.4]	13 [23.6]	17 [30.9]	39 [70.9]	8 [14.5]	3 [5.5]	0 [0]	3 [5.5]	6 [10.9]	2 [3.6]
8.I57	Individual assignments	12 [21.8]	21 [38.2]	19 [34.5]	52 [94.5]	0 [0]	2 [3.6]	0 [0]	1 [1.8]	3 [5.5]	0 [0]
8.I58	Practical projects	17 [30.9]	22 [40.0]	13 [23.6]	52 [94.5]	0 [0]	2 [3.6]	0 [0]	1 [1.8]	2 [3.6]	0 [0]
8.I59	Simulated activity	13 [23.6]	23 [41.8]	12 [21.8]	48 [87.3]	6 [10.9]	0 [0]	0 [0]	1 [1.8]	1 [1.8]	0 [0]
8.I60	Practical laboratory	19 [34.5]	18 [32.7]	12 [21.8]	49 [89.1]	4 [7.3]	0 [0]	0 [0]	2 [3.6]	2 [3.6]	0 [0]

Appendix S: Nuanced Content Table and Graph for Focus Group Interviews

Table

Related to...	Count
Time/Deadlines/Last minute/Pace/Quickly/Smash it out/Now/Straight Away/When/Sometimes/Earlier/Before/After	74
Questions/Ask/Asking/What/How/Search/Find/Database/Library/Google/Google Scholar	57
Want/Need/Have to/Get/Take/Gain	54
Study/Practice/Trial and error/Figure out/Exams/Assignments/Projects/Read	42
Communicate/Talk/Say/Tell/Words/Oral/Express/Listen/Show/Discuss/Explain/Write	39
Class/Lecture/Tutorial/School/University/Institution/Course/Program/Subjects	36
Work/Working/Work shift	29
Health/Nursing/Paramedic/Medicine/Biomedicine/Radiography/Clinic/Hospital/Science	28
Pathway/Preference/Transfer/Change/Different/Another/Bachelor/Degree	27
Skills/Real-life Skills/Can/Action/Work-placement	25
Pressure/Difficult/Can't Do/Fail/Under-cooked/Burnt-out/Regret/Don't know/Don't understand/Wrong/Confused	24
Learn/Understand/Know/Knowledge	22
Help/ Support/Advice/Give	22
Me/Myself/Yourself/Self/My own	21
Experience/Life/Opportunity/Real/Feel/See/Notice/Real-life problems	21
Success/Pass/Finish/End/Graduate/Good/Better	20
Job/Career/Future/Work-ready	20
Think/Thinking/Thought	20
Stuff/Thing/s/Something/Anything	18
Doing/ Did/Tried/Apply	17
Organised/Focused/Knuckle-down/Motivated/Initiative/Confidence/Creative/Self-responsibility/Self-Management	15
Teamwork/Group/Co-workers/Diversity	13
People/Person/Individual	13
Use/Using/Used	12
Independent/Earning/Money/Spending/Buying/Freedom/Free	12
Social Media/Phone/Laptop/Connect/Internet	11
Teacher/Lecturer	7
Friend/Friendly/Partner/Pet	5
Students	3
Associate Degree	2

Graph


Nuanced Content - Focus Group Interviews
Associate Degree
Students
Friend/Friendly/Partner/Pet
Teacher/Lecturer
Social Media/Phone/Laptop/Connect/Internet
Independent/Earning/Money/Spending/Buying/Freedom/Free
Use/Using/Used
People/Person/Individual
Teamwork/Group/Co-workers/Diversity
Organised/Focused/Knuckle-down/Motivated/ Initiative/ Confidence/ Creative/ Self-responsibility/ Self-Management
Doing/ Did/Tried/Apply
Stuff/Thing/s/Something/Anything
Think/Thinking/Thought
Job/Career/Future/Work-ready
Success/Pass/Finish/End/Graduate/Good/Better
Experience/Life/Opportunity/Real/Feel/See/Notice/Real-life problems
Me/Myself/Yourself/Self/My own
Help/ Support/Advice/Give
Learn/Understand/Know/Knowledge
Pressure/Difficult/Can't Do/Fail/Under-cooked/Burnt-out/ Regret/ Don't know/ Don't understand/ Wrong/ Confused
Skills/Real-life Skills/Can/Action/Work-placement
Pathway/Preference/Transfer/Change/Different/Another/Bachelor/Degree
Health/Nursing/Paramedic/Medicine/ Biomedicine/ Radiography/ Clinic/ Hospital/ Science
Work/Working/Work shift
Class/Lecture/Tutorial/School/University/Institution/Course/Program/Subjects
Communicate/Talk/Say/Tell/Words/Oral/ Express/ Listen/ Show/ Discuss/ Explain/ Write
Study/Practice/Trial and error/Figure out/Exams/Assignments/Projects/Read
Want/Need/Have to/Get/Take/Gain
Questions/ Ask/ Asking/ What/ How/ Search/Find/ Database/ Library/ Google/ Google Scholar
Time/Deadlines/When/Sometimes/Earlier/Before/After
0
10
20
30
40
50
60
70

Appendix T: Nuanced Content Table and Graph for Individual Interviews

Table

Related to...	Count
People	115
Who, What, When, Why	115
Think	90
Learning	79
Class/course	76
My/ myself/ my own	57
Question/find	56
Time/ sometime	50
Work/ working	48
Communicate	48
Really	48
Future/ next/ finish	42
Stuff/ things	42
Know/ knowing	41
Need/ want	41
Jobs/ career/ health-role	40
Good/ better	40
Pathway/ degree/ bachelor	32
Participate/ together/ group/ team/ collaborate	32
Look/ see/ saw	31
Go/ going	29
Maybe/ probably	28
Experience/ skills	28
Study/ studying/ prepare	27
Guess	27
Get/ getting/ got	27
Something	26
Google, Google Scholar/ library/ information	26
Something	26
Would	25
Different	21
Feel/felt	21
Assessment	20
Public health	20
Make	18
Enthused/ passionate/ confident/ creative	18
Lecturers/ teachers/ coordinators	16
Actually	16
Community, society, world	14
Interest	13
Do/ doing	13
Social media, digital devices, technology	12
Challenge, difficult, hard, frustrating	12
Social/ friends	10
Steps	8
Problems/ issues/ concerns	7
Read	6
Hear, heard, listen	5
Apply	4
Opportunity/ chance	4
Write	2
Reflect	1

Graph

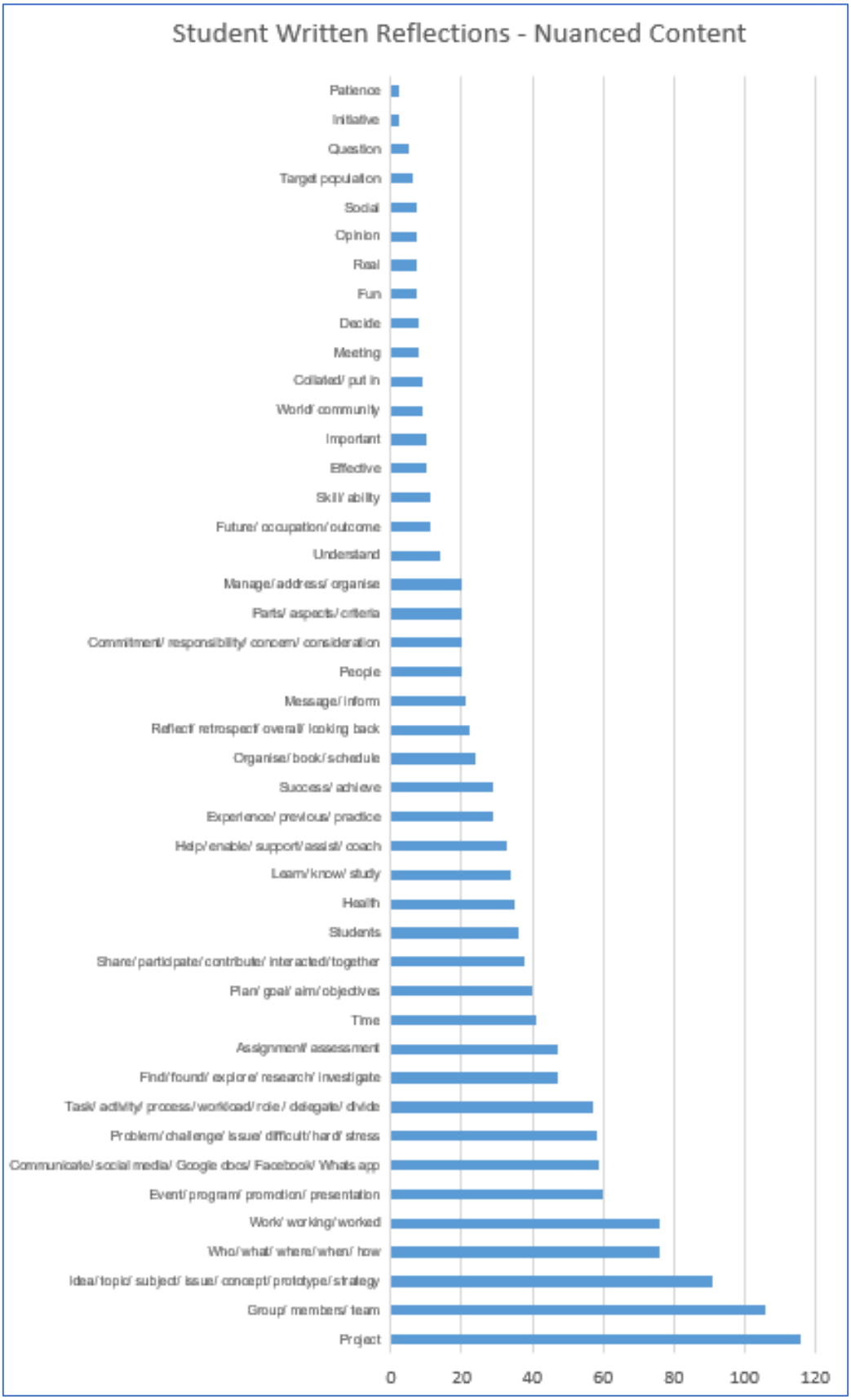

Nuanced Content - Individual Interviews
Reflect
Write
Opportunity/ chance
Apply
Hear, heard, listen
Read
Problems/ issues/ concerns
Steps
Social/ friends
Challenge, difficult, hard, frustrating
Social media, digital devices, technology
Do/ doing
Interest
Community, society, world
Actually
Lectures/ teachers/ coordinators
Enthused/ passionate/ confident/ creative
Make
Public health
Assessment
Feel/felt
Different
Would
Something
Google, Google Scholar/ library/ information
Something
Get/ getting/ got
Guess
Study/ studying/ prepare
Experience/ skills
Maybe/ probably
Go/ going
Look/ see/ saw
Participate/ together/ group/ team/ collaborate
Pathway/ degree/ bachelor
Good/ better
Jobs/ career/ health-role
Need/ want
Know/ knowing
Stuff/ things
Future/ next/ finish
Really
Communicate
Work/ working
Time/ sometime
Question/find
My/ my self/ my own
Class/course
Learning
Think
Who, What, When, Why
People
0
20
40
60
80
100
120

Appendix U: Nuanced Content Table and Graph for Student Written Reflections

Table

Related to...	Count
Project	116
Group/ members/ team	106
Idea/ topic/ subject/ issue/ concept/ prototype	90
Who/ what/ where/ when/ how	76
Work/ working/ worked	76
Event/ program/ promotion/ presentation	60
Communicate/ social media/ Google docs/ Facebook/ WhatsApp	59
Problem/ challenge/ issue/ difficult/ hard/ stress	58
Task/ activity/ process/ workload/ role/ delegate/ divide	57
Find/ found/ explore/ research/ investigate	47
Assignment/ assessment	47
Time	41
Plan/ goal/ aim/ objectives	40
Share/ participate/ contribute/ interacted/ together	38
Students	36
Health	35
Learn/ know/ study	34
Help/ enable/ support/ assist/ coach	33
Experience/ previous/ practice	29
Success/ achieve	29
Organise/ book/ schedule	24
Reflect/ retrospect/ overall/ looking back	22
Message/ inform	21
People	20
Commitment/ responsibility/ concern/ consideration	20
Parts/ aspects	20
Manage/ address	20
Understand	14
Future/ occupation/ outcome	11
Skill/ ability	11
Effective	10
Important	10
World/ community	9
Collated/ put in	9
Meeting	8
Decide	8
Design	8
Fun	7
Real	7
Opinion	7
Social/ friend	7
Target population	6
Question	5
Initiative	2
Patience	2

Graph


Student Written Reflections - Nuanced Content
Patience
Initiative
Question
Target population
Social
Opinion
Real
Fun
Decide
Meeting
Collated/ put in
World/ community
Important
Effective
Skill/ ability
Future/ occupation/ outcome
Understand
Manage/ address/ organise
Parts/ aspects/ criteria
Commitment/ responsibility/ concern/ consideration
People
Message/ inform
Reflect/ retrospect/ overall/ looking back
Organise/ book/ schedule
Success/ achieve
Experience/ previous/ practice
Help/ enable/ support/ assist/ coach
Learn/ know/ study
Health
Students
Share/ participate/ contribute/ interacted/ together
Plan/ goal/ aim/ objectives
Time
Assignment/ assessment
Find/ found/ explore/ research/ investigate
Task/ activity/ process/ workload/ role/ delegate/ divide
Problem/ challenge/ issue/ difficult/ hard/ stress
Communicate/ social media/ Google docs/ Facebook/ Whats app
Event/ program/ promotion/ presentation
Work/ working/ worked
Who/ what/ where/ when/ how
Idea/ topic/ subject/ issue/ concept/ prototype/ strategy
Group/ members/ team
Project
0
20
40
60
80
100
120

Appendix V: Key Findings Infographic