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AVOIDING TECHNOLOGICAL MONOCULTURES AND DEVELOPING OPEN OUTCOMES SUPPORTING LIFELONG LEARNING LITERACIES

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Approval of Dissertation

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Dedication

To every young person who is given the impression or advised that education is not a path they should take, and roadblocks put in your way – ignore and overcome them. The technologies and resources are available to chart your own course. Set goals, find people who can help you and work hard. Why take the conventional route? The true adventures of life are down the side roads.

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Thank you.

Abstract

This study of students in an Ontario College sought to describe and assess the emergence of lifelong learning literacies and whether these are constrained by the learning management system (LMS) and the outcomes-based education (OBE) model. I hypothesize that these limit students' control, restrict choice and self-directed learning during a program of study and lead to more instrumental approaches to learning. I employed a descriptive analysis methodology using an online survey to gather quantitative and qualitative data. The survey received responses from 618 participants and sought to reveal the range of, and attitudes towards student and institutional use of digital technologies, technology and learning, and the development of digital skills.

A number of conclusions are extended. First, the presence of essential lifelong learning skills is not restricted by the top-down OBE and LMS centered online instructional environment but developing these requires institutional support and that self-directed learning behaviours were present, but students did not organize these activities in personal learning environments. Secondly, students were seeking support in digital tools they expected to use in the workplace yet look for on-demand, audio-visual guidance with tools they can use to help organize from learning support services. I also find that the ability for students to construct their own learning goals and outcomes are not restrained in OBE models as students reported making decisions in seeking resources to support goals they value. The study also finds that the LMS does not place constraints on student choices in seeking supplementary resources outside the learning platform, yet the results do not indicate what prompts students to seek these additional resources. Lastly, OBE models and LMS-centered online learning environments encourage an instrumental approach to learning that emphasizes skills development directly related to future workplaces over learning that facilitates the development of lifelong learning literacies.

I make recommendations for future research into heutagogy centered online learning, support for students and instructors in online learning and to revisit assumptions of where and when learning takes place in an increasingly networked society along with the ramifications for the mode of education following the COVID-19 pandemic.

Keywords: Learning Management Systems, Lifelong Learning Literacies, Outcomes-Based Education, Self-Directed Learning, The Networked Society

Table of Contents

Approval of Dissertation ii
Dedication iii
Acknowledgements iv
Abstract v
Table of Contents vii
List of Tables xii
List of Figures xiv
Definition of Terms xvi
Chapter 1: Introduction 1
Overview 1
Walled Gardens and Monocultures 2
The Research Context 5
Rethinking Essential Skills Instruction in the Networked Society 7
A Technological Monoculture in Online Teaching and Learning 9
Characteristics of Digital Technologies Used by Educators. 14
Characteristics of Digital Technologies Used by Students. 18
Designing for Lifelong Learning in Online Courses: The Community of Inquiry Framework 19
Systems for Managing Online Learning 22
The Evolution of LMSs 25
MOOC Platforms. 26
Extending the Networked Learning System 27
Interoperability. 27
Learner Control. 28
Defining Learning Outcomes 30
Personalizing Learning 34
Communities of Practice. 37
A Current Student Learning System 39
Learning Theories and Their Association With Education Technologies 40
The Research Problem 43
Hypothesis 45
The Problem 45
Research Questions 46
Overview of Methodology 47
The Significance of the Study 47

The Organization of the Dissertation 49
Summary 50
Chapter 2: Literature Review 52
Overview 52
Identifying the Key Themes 53
The Provision of Online Learning in Ontario Colleges 54
Student Preparedness for Online Study 55
Outcomes-Based Education 56
Complexivist Approaches to Emergent Knowledge 59
Outcomes-based Education and LMS Constraints 61
Lifelong Learning and the Postsecondary Education System 63
Microcredentials. 66
Recognizing Prior Learning. 67
Choice and Control in Learning 68
Choice and Goal Setting. 69
Self-Directed Learning. 70
Control 71
Expectancy-Value, Goal-Setting, and Self-Regulation 73
The Workplaces of the Future 75
The Ramifications of Covid-19. 79
Lifelong Learning Literacies 82
Networked-Based Teaching and Learning 86
Connectivism. 87
Networks of Practice 90
Heutagogy 90
Emerging Applications of Educational Technologies 92
Enterprise Systems. 93
Blockchain in Registrar Functions. 93
Open Educational Resources. 94
Next Generation Digital Learning Environments 98
Proposed Solutions 103
Future Student Learning Systems. 103
The Role of the Institution in Facilitating Lifelong Learning. 104
Personal Learning Environments and Technologies 106
Data and Knowledge Gaps 108
Investigating the Problem 110
Prior use of the JISC Survey 112
Summary 113
Chapter 3: Methodology 116

Overview 116
Research Data Collection Context 116
Restatement of Problem 117
Hypothesis 118
The Problem 118
Ontological Concerns 119
Epistemological Concerns 120
Descriptive Analysis Research Methodology 123
Research Questions 126
Questions and Constructs 126
The Data Collection Tool. 128
Participant Sample. 130
Methods of Analysis 131
Quantitative Data Analysis. 131
Method for Quantitative Statistic Calculation 132
Qualitative Data Analysis. 133
Presentation of Data. 135
Limitations. 136
A Discussion of Bias 137
Summary 137
Chapter 4: Research Process 139
The COVID-19 Research Context 139
Research Timelines 140
Data Collection Method 142
Demographic Data 142
Survey Response Rate 144
Research Assistant Activities 145
Practical and Ethical Considerations 147
Informed Consent 148
Data Protection and Storage 148
Summary 149
Chapter 5: Results 150
Overview 150
The Research Focus 150
Results 159
Self-Directedness: You and Your Technology 159
Outcomes-Based Education: Technology at Your Organization 161
Walled-Garden Digital Environments: Technology in Your Learning 166

Lifelong Learning Literacies: Developing Your Digital Skills 178
Summary 192
Chapter 6: Discussion and Implications 194
Overview of Research 194
Restatement of the Research Questions 195
Exploring the Hypothesis 196
Overview of Results 196
Discussion 197
Themes Related to Outcomes-Based Education 198
Self-directed Students 198
Support With Digital Technologies 201
Student Control and Choice 207
Themes Related to Technological Monocultures 211
Student Perceptions of Their Digital Learning Environment 212
Student use of Digital Technologies 216
Instructor Promotion of Digital Resources 219
Student Comments on Improving Digital Teaching and Learning 220
Independent and Digitally Literate Learners 224
Facilitating Independence in Students 228
Combining the Leading Themes Emerging From the Data 234
Implications 239
Summary 242
Chapter 7: Conclusions and Recommendations 244
The Research Context 244
Key Themes of the Study 245
Method of Inquiry 246
The Research Purpose 247
Summary of Implications 249
Conclusions 249
Conclusion 1 252
Conclusion 2 252
Conclusion 3 253
Summary of Conclusions in Relation to the Hypothesis and Research Questions 254
The Significance of the Conclusions 255
Limitations of the Study 258
Timing of the Survey 258
Participant Sample Programs of Study 259
Recommendations for Research and Practice 260

Recommendation 1: Assess Student Organizational and Learning Activities in Relation to the Heutagogy Networked Learning Model ... 261
Recommendation 2: Conduct Research Into Emerging Instructional Environments. ... 261
Recommendation 3: Transform the Notion of Where Learning Takes Place in Online Courses ... 262
Recommendation 4: Post-Pandemic Institutional Support for College Teaching and Learning ... 263
Summary ... 264
References ... 266
Appendix A: JISC Survey Privacy Notice ... 286
Appendix B: Student Information Letter ... 287
Appendix C: Student Recruitment Email ... 290
Appendix D: Online Informed Consent Text ... 292
Appendix E: Ethics Approval - Athabasca University ... 294
Appendix F: Ethics Approval - Humber College ... 296
Appendix G: Samples of Substantive Comments from Qualitative Short Answer Questions ... 297
Appendix H: Copy of Survey Questions ... 298

List of Tables

Table 1. Essential Employability Skills……………………………………………………….83

Table 2. An Overview of the Interacting Features Investigated by the Survey Themes……….111

Table 3. Descriptive Research Key Elements, Attendant Steps and Activities in This Research Project…………………………………………………………………………..125

Table 4. Constructs, Operational Definitions, and Points for Clarification in the Research Question…………………………………………………………………………...127

Table 5. A Comparison of the Student Insights Survey Themes with my Research Themes….129

Table 6. Research Timeline…………………………………………………………………141

Table 7. Map of Research Themes to JISC Insights Survey Questions………………………..152

Table 8. Access to Digital Resources.………………………………………………………162

Table 9. Activities Within the LMS…………………………………………..………..…164

Table 10. The Quality of the Institutions Digital Provision…………………………………….166

Table 11. Activities Students Find Most Useful for Learning…………………..………..…170

Table 12. The Quality of Digital Teaching and Learning……………………………..……..175

Table 13. The quality of Support in Developing Digital Skills……………………….………..182

Table 14. Cross Tabulation of Questions 1 and 36.1…………………………………………...200

Table 15. Cross Tabulation of Questions 3 and 36.2…………………………………………...201

Table 16. Comparing the Extent to Which Students can Assess Their Digital Skills With Those Who Report Creating a Portfolio of Their Learning…………………………………….206

Table 17. Comparing the Extent to Which Participants Report Feeling Confident in Planning Their Own Learning with the Creation of a Digital Portfolio of Their Learning…….209

Table 18. Cross Tabulation Comparing the Extent to Which Participants Report Feeling Confident in Planning Their Own Learning With Who supported them in Using Digital Technologies………………………………………………………………………………214

Table 19. Cross Tabulation Comparing Who Supports the Learner in Using Technology and the Extent to Which Respondents are Comfortable Planning Independent Learning……..215

Table 20. The Topics Emerging From the Survey Data Organized Into Themes and Larger Patterns and how These are Addressed in the Primary Research Question……………..235

List of Figures

Figure 1. A Detail of a Walled Garden at Lyme Hall, Cheshire, United Kingdom..................3

Figure 2. A Monoculture Landscape Managed for Sheep Farming in the Peak District, United Kingdom...4

Figure 3. Creating a Course Learning Outline Resource..11

Figure 4. LMS Market Share for US and Canadian Higher Education Markets....................24

Figure 5. Example of a Current Student Learning System..39

Figure 6. Core Themes Investigated...53

Figure 7. The Adult Education System in Ontario...64

Figure 8. Projected Skills Demand for all Occupations in Order of Descending Importance......78

Figure 9. Outlining the Elements Within a Possible Future Student Learning System............104

Figure 10. The Cyclical and Overlapping Phases of Inductive Data Analysis....................134

Figure 11. Participant Age Range...143

Figure 12. The Use of Assistive Technologies..143

Figure 13. Student Attitudes to Technology...160

Figure 14. Involvement in Decisions About Digital Services? 163

Figure 15. App and Platform Use Outside the LMS..164

Figure 16. Frequency of Use of Digital Tools...168

Figure 17. Support for Using Technology...168

Figure 18. The Use of Polls and Quizzes...171

Figure 19. Working Online With Other Students...171

Figure 20. Creating a Portfolio of Learning..172

Figure 21. Digital Feedback..172

Figure 22. Motivation in Using Technology..173

Figure 23. Improving Digital Teaching and Learning ……………….………………………….176

Figure 24. Skills the Organization Supports ……………………………………………...179

Figure 25. Guidance on Digital Skills...…………………………………………………...179

Figure 26. Assessing Digital Skills..……………………………………..……………..180

Figure 27. Information on Copyright and Plagiarism……………………………….…….180

Figure 28. Discussing Digital Skills………………………………………………………181

Figure 29. How the Organization Should Support Digital Skills…………..…………………183

Figure 30. Control in Organizing Learning………………………………………………185

Figure 31. Control in What and How to Learn……………………………….……...186

Figure 32. Planning Learning.………………………………………………………………186

Figure 33. Preparing Independent Students………………………………………………188

Figure 34. Useful Learning Resources...…………………………………………..…...191

Figure 35. Respondents by Institution Faculties...…………….……….…………………192

Figure 36. Digital Tools Students Find Useful for Learning…………………...……………218

Figure 37. Reported Themes to Improve the Quality of Teaching and Learning………………221

Figure 38. Reported Themes in Developing Your Digital Skills……………………………….224

Figure 39. Reported Themes in Support to be an Independent Learner………………………..229

Definition of Terms

- Learning management system (LMS): Institution-wide, cloud or server-based software designed to manage the delivery of course learning content, grades, and groups in specific courses. Facilitates instruction by employing multimedia and interactive modes.
- Lifelong learning literacies (LLLs): A set of reflective, selection and organization strategies sustained by the goal-setting and self-regulation to support the construction of knowledge in a self-directed learning experience for personal or professional needs.
- Outcomes-based education (OBE): An educational approach that requires each component of a student learning experience have pre-defined goals and outcomes the students are asked to achieve. These can be defined at a lesson, course, program, or institutional level. Student success is measured by the extent to which they meet these outcomes.
- Self-directed learning (SDL): Describes the way individuals are free to make choices about what, when, how and where they learn. In SDL students can take responsibility for defining their own assessment of their learning and to diagnose what to do next.
- The networked society: The post-industrial, social, political, economic, and cultural society that emerged alongside the development of networked, digital, and communications technologies

Chapter 1: Introduction

Overview

The purpose of this chapter is to provide a map of the territory within which this research project was conducted. The literature review in Chapter 2 will build on this to provide the case for why this research was relevant and necessary. I shall illuminate why expanding online learning outside of educational technologies that constrain the capabilities of networked-based learning and enabling students to have a voice in the construction of their learning outcomes is significant in a Canadian postsecondary college context where the current model of learning management systems (LMSs) is the primary technology used to provide online learning. I will outline concepts within the field of adult education, in particular notions of self-directed learning (SDL) and how strategies can be employed in postsecondary education to support the emergence of essential skills. I will then link this to the way top-down, outcomes-based education models can hinder SDL skill development. I then introduce approaches to understanding learning that explore networked-based learning spaces and outline the research problem and questions. I close the chapter with an overview of how I investigated the problem through my methodology and to illuminate the significance of the study for digitally enabled online learning environments. I begin this chapter by describing a walled garden metaphor for technological monocultures and provide a picture of the context in which the research took place.

The aim of this research is twofold. Firstly, to describe how students employ digital resources outside the platforms used to deliver online courses and their perceptions of these resources in an online learning environment. Secondly, I seek to describe the manner in which such student activities align with the potential development of skills and attributes that will support lifelong learning. I argue that the limitations of online learning offered primarily within an LMS combined with an outcomes-based education model restricts the ability for students to develop skills that will support learning initiatives that as employees they will increasingly be involved in after they leave formal postsecondary education.

In order to develop recommendations in these areas I surveyed around 2400 students enrolled in approximately 70 courses online courses in the department of Liberal Studies in an Ontario college. I employed a descriptive analysis research method that collected qualitative and quantitative data using the Joint Information Systems Committee (JISC) Digital Insights Survey. The survey collected data on the digital lives of students, their digital experiences in the institution, student attitudes to digital learning, and their digital experiences at a course level. The survey collected quantitative data supported by a qualitative analysis of individual student comments. I used a descriptive analysis method as it enables me to find out student preferences and attitudes towards their online learning environment in order to develop recommendations for further, targeted research. I also make recommendations to institutions on the potential of opening up the LMS-based learning systems, instructor support, and how to build lifelong learning literacies in students that will be of value beyond graduation and throughout their working lives.

Walled Gardens and Monocultures

For horticulturalists, a walled garden provides a fixed area from which to design what you plant; the walls provide warmth and nurture crops that may not grow in a wild space and they provide shelter from the elements and rogue plants eager to trespass (Campbell, 2008). However, this is a manufactured perfection. Life outside the walled garden is hardier, more complex, and niches evolve, expand and modify their ecosystem with all the inherent risk and rewards. Walled gardens offer protection from reality, but these monocultures require management as they cannot sustain themselves. A part, yet apart, from the wider ecosystem they miss so much of the vibrancy of wild meadows and woodlands. Students are sheltered within the walled garden of educational technologies such as learning management systems (LMS) and outcomes-based education (OBE) models where peripheral actors are restricted, and outcomes are pre-defined.

Figure 1

A Detail of the Walled Garden at Lyme Hall, Cheshire, United Kingdom

Note. Allen, S. (2011)

In an information age dominated by participatory media (Jenkins et al., 2009) and the logic of information capitalism in which citizens will need lifelong upskilling and retraining (Castells, 2009) walled gardens are relics of an industrial era. The industrial era also saw the rise of monocultures in farming. Necessary for the mass production of food for rapidly growing populations yet leading to a loss of biodiversity, monocultures also have their analogue in educational technologies where in postsecondary education in Canada LMSs became the default technology through which online courses are delivered.

Figure 2

A Monoculture Landscape Managed for Sheep Farming in the Peak District, United Kingdom

Note. Allen, S. (2016)

Furthermore, the boundaries the walled gardens and monocultures place on student perceptions of success run counter to the need for students to develop organizational, digital, and motivational literacies that students can employ for self-directed lifelong learning after they leave formal education. Constraints are inherent in how online courses are constructed and delivered and students want their instructor present in the learning environment and to “scaffold the learning experiences, help them make connections, and provide feedback” (Daniel, 2016, p. 10) and constraints are also inherent in all technologies and it is for the user, whether teacher or students to make a decision about those trade-offs. Nonetheless, there is a need to rethink online learning in the developing culture of open resources, personalization, collaboration, and contextualization (Conole, 2013). Students live their lives in a multitude of digital media walled gardens that have very permeable walls that ought to be leading to more diverse uses of technology for learning. Critically negotiating pathways among these open spaces is a vital emerging skill (Selwyn, 2017). Developing new learning systems that can take advantage of, and be critical towards, these new multimodal media environments are necessary or educators and students alike may lose control of what should be in their walled gardens (Dahlstrom et al., 2014). LMSs have made significant headways in recent years in terms of interoperability with other technologies and brought them inside the walled garden leading and diversifying the monoculture. Notwithstanding these important developments, postsecondary institutions, educators, and administrators will need to make administrative and curriculum decisions about how they will implement educational and technological systems that align with the growing need for openness and student choice.

The Research Context

Since their inauguration in 1967, the mission of the Ontario college postsecondary education system has been to provide applied learning that supports the needs of the workplace in the region. Unlike the university system which, through their senates, have a large degree of institutional autonomy, the college system receives more direction from the provincial Ministry of Training, Colleges, and Universities (MTCU). In practice the colleges have a fair degree of autonomy on how they run their programs, finances and operations. However, they remain accountable to MTCU and justify their quality standards and finances through annual reporting. In 2018 the funding model changed from enrolment-based, designed to reward the institution financially based on the number of students it received, to an outcomes model designed to measure additional metrics such as learning experience, innovation, and teaching quality. A series of metrics are now being introduced to enable the Ministry, the institutions, and the public at large to assess the extent to which the colleges are meeting their operational mandates. Meeting these metrics will also be used to define the ongoing funding for the colleges. This new outcomes-based model will impact the way Colleges programs are developed. Some of the themes MTCU use to justify this new model relevant to my study are to:

- shift away from enrolment-based model to outcomes
- support flexible study and a variety of online study options
- foster innovation and quality learning
- improve supports for part-time and non-traditional students
- ensure flexibility in program delivery
- improve collaboration

(MTCU, 2018)

The overarching theme of the change is to be more financially prudent, accountable to all stakeholders, introduce measurable metrics, and to generate a more holistic and external view of the place of the college in the community—for example through innovation that supports local industry. Fundamentally, the mission of the colleges will not change, and they will remain applied learning institutions. Nonetheless, increased measurement and financial accountability drives an outcomes-based view on academic program development and renewal as MTCU state:

> The current methodology behind assigning program funding was seen as outdated and failing to recognize new educational settings and innovative delivery models, such as experiential and project-based learning. Some suggestions to address this included reducing the number of funding units used in the funding model and providing a predictable and timely process for assigning new funding. (MTCU, 2018)

This new funding model is in its early days, but an emphasis on outcome-based education models is already apparent in the audits and reporting required by the ministry and in my institution through investment in the centralization of program planning, development, and renewal. The funding model will also lead to more collaboration such as program sharing and specialization between colleges, online program and course development and also a recognition that non-traditional students, such as lifelong learners, need to be catered for more comprehensively. These changes are likely to include increased recognition and simplification of prior learning assessment and recognition (PLAR), acceptance of transfer credits, microcredentials, and creative thinking around the traditional semester model. It also remains to be seen what effect COVID-19 will have on college funding given the massive budget deficits all institutions will have after 2021. For example, high unemployment may result in more adult learners returning to education. Adult learners looking to retrain will have their own views on how their studies proceed and will influence such innovations.

As educators it behooves us to consider the purposes of postsecondary education an increasingly networked society. In particular, the extent to which the incorporation of digital education technologies can limit as well as advance the need for students to have more ownership in the learning throughout their lives. Further, traditional concepts of lifelong learning and the skills associated with this need to be addressed in order to support the essential skills employers are asking for—as well as the attributes needed to be successful in digital learning and workplace environments during their lifetimes.

Rethinking Essential Skills Instruction in the Networked Society

The increasing centrality of information technologies in our personal, professional, and educational lives will have repercussions on the way we experience learning and work.

Multimodal digital communication is occurring in students' personal lives, embedded as it is in the user experience of social media apps. How these practices can be employed in education are part of a growing field of study and in considering this the New London Group put forth two main arguments arguing for expanding literacies beyond the textual to encompass the digital:

> The first relates to the increasing multiplicity and integration of significant modes of meaning making, where the textual is also related to the visual, the audio, the spatial, the behavioural, and so on. This is particularly important in the mass media, multi-media, and in an electronic hypermedia… Second, we decided to use the term "multiliteracies" as a way to focus on the realities of increasing local diversity and global connectedness. (Cazden, et al., 1996, p. 64)

Adding to this concept of literacies, Belshaw (2012) outlines eight elements contained in the concept of digital literacy: the mindsets of confident, cognitive, critical, and civic, and the skillsets of cultural, creative, constructive, and communicative. Belshaw's definition expands the notion of digital literacies away from the merely technical how-to of using digital tools and resources to a more complex, and fundamentally human, cognitive, affective, and contextually specific realm. These elements interconnect and are emphasized or deemphasized depending on the context (p. 210) and thus how students utilize these skills and mindsets is contextually dependent. We may be doing a disservice to our students by giving them the opportunity to learn online but then not utilizing the types of software, apps along with practices such as combining audio, visual and text that they are familiar with in their personal lives. Furthermore, these literacies are not only valuable for formal learning as their value stretches to the future when they may need to learn or upskill for changes in their career.

However, although studying online may be temporally dislocated from a college schedule it is still bound by the hours-to-credit system deeply rooted in postsecondary education. When instructors are bound by a 42-hour course length it is hard to find space in the curriculum for mastering program content and the acquisition of essential digital and other learning literacies. This may be due to the recognition of the need to support the way students integrate and critically engage with digital resources as they increasingly become the location for learning content and as tools in the workplace. An understanding of the type of skills learners need to successfully navigate these digital environments could be embedded in all courses or a discrete module in a specific course, perhaps in liberal studies electives, or in a new type of course altogether. This would entail rethinking course content and the desired course outcomes which, in consequence, means instructors need to come to terms with the expanded notions of literacy themselves as well as with what they are not. Embracing what students are learning within their own participatory and multimedia spaces outside the LMS may be a way to validate these potentially new literacies and to consider ways that self-directed activities in digitally enabled environments outside the LMS may support essential lifelong learning skills.

The next section describes the current state of the online learning environment in an Ontario college. This is the earth from which new learning systems that may also encourage lifelong learning literacies can emerge.

A Technological Monoculture in Online Teaching and Learning

Attaining mastery of content within a curriculum can be difficult for students as they negotiate the competing demands in all their courses within a program, work responsibilities, and their online and in-person social lives. Compounding these cognitive and organizational issues is the increasing expectation for students to enroll in online courses that do not embrace the students' pre-existing digital lives outside the online course. A knotty problem develops when online learning is enclosed in a walled digital garden that ignores the wider ecosystem students live and study within and the development of the attributes required to navigate these spaces. This learning system includes the in-class courses students take and other institutional supports, as well as in their personal lives outside of education. An LMS does not inherently represent a technological monoculture. However, the LMS in my institution is the central element in an online learning technological monoculture created by management-defined platform requirements and use and a preference for measurement by constructing learning through an outcomes-based approach.

To provide context to the technological monoculture problem described above I will explain the typical process of constructing a new online course in my institution. The first stage would be to bring together the subject matter expert (SME), instructional designer (ID), and a representative from the department of Program Planning, Development, and Renewal (PPDR), who are responsible for quality assurance and Ministry reporting in the institution. The first exercise would be to review where the course sits within the program. This would involve aligning the program-level outcomes (PLOs) with the course and defining what gap this course is filling and how it will add to students meeting the program outcomes. The SME, typically a person who will teach the course, will draft six or seven learning outcomes and how these will be assessed and share with PPDR and the ID. These will be finalized and agreed upon to ensure they fit with the program outcomes and also the extent to which these fit within the program map which outlines all course outcomes in the program and the extent to which knowledge is represented at a foundational, developing, or proficient level to ensure a balance of scaffolding of skills as the program progresses. PPDR will also assess how the course outcomes align with the

Vocational Learning Outcomes (VLOs) defined by the Ontario Ministry of Training, Colleges, and Universities. This is a key step as it ensures that outcomes, when measured, can be reported back to the Ministry for funding purposes. The outcomes are then entered (also completed annually) into an in-house software called COSSID (Course Outline Software Supporting Instructional Design). This software is rather inflexible and drives the instructor down a path that breaks down the course into modules, with sub outcomes and assessments that must then align with the course outcomes as shown here:

Figure 3

Creating a Course Learning Outline Resource

MODULE & TOPIC	COURSE LEARNING OUTCOMES	RESOURCES	ASSESSMENTS
Module 1 Exploring Cultural Awareness (Weeks 1-3)	1, 2, 3, and 4	Course material posted in Blackboard	Discussion Boards Posts; Wiki Post; Journal Activity
Module 2 Examining Internationalization and the Culture Lens (Weeks 4-8)	1, 2, 3, and 5	Course material posted in Blackboard	Discussion Board Posts; Wiki Post
Module 3 Understanding the Impact of Social Identities and Culture Mindedness (Weeks 9-14)	1, 2, 4 and 6	Course material posted in Blackboard	Discussion Board Posts; Action Plan

Note. This figure shows a section from a document to help instructors complete a step-by-step process to create a course outline (Humber PPDR, 2022)

Once this groundwork has been set, the SME works with the ID to construct the course in a Blackboard Learn development site and as can be seen from the guidance provided in the 'Resources' column in Figure 1 the recommendation is to post content into the Blackboard LMS. An education technologist may also be part of this group, but this is also usually the ID. When the SME provides the course material to the ID, they work together to build it module by module in the LMS. This may involve coding in html artifacts like interactive activities, visuals, animations, or embedding activities in other software interoperable with the LMS such as H5P. Upon completion of the online course build, the course is then given a formal name and code that is set within the registrar student information system and a start date set for students to register into it as an individual course or as part of a block of courses in a semester.

This is a very systematic approach and is the ideal scenario described by the institution; however, all courses must be entered into COSSID and built in the LMS. Other options are out of scope and would need special agreement. At each stage this process centers institutional management and Ministry reporting imperatives. A missing element in this process is the student, which agrees with Dron's (2007, p. 27) statement that they live at the "bottom rung of the ecological hierarchy". The instructor is also sidelined somewhat as, although the instructor defines the content, the content is still constructed top-down with the alignment of learning outcomes considered before the subject content of the course, all of which is to be built in pre-defined modules in the LMS. I talk more later and in chapter 2 about issues with outcomes-based approaches. Such a systematic approach has value in reporting and creating clarity in the process in a large institution with many instructors who are specialists in their fields, not necessarily in pedagogy. However, the institutional choices here drive an objectivist instructional strategy that predefine what a student is said to be able to *know* upon course completion.

Further, due to such institutional imperatives, other support services for instructors work within this framework. The Centre for Innovative Learning at my institution provides a suite of support services for instructors; however, these reinforce this top-down, LMS and outcome-based and -centred framework as can be seen in this comment with my emphasis in italics:

> Designing an online course is a unique opportunity to widen the doors of your classroom to new voices across the internet and even around the world. While the possibilities may seem limitless, *the one area that has not changed are the critical learning goals you have set for your students.* As these goals may be accomplished in new ways, your guidance and presence as a teacher is as important as ever….

And further:

> Consider how your students' learning experiences can be *broken down into a series of modules,* each with its own topic, purpose, learning objective(s)... Students should be able to *navigate through each module sequentially in order to build skills and knowledge and meet learning goals* and deadlines for course tasks.

(Innovative Learning, 2022)

Individual instructors have the freedom to adapt how they wish to approach their instruction but the institutional imperative in employing the LMS and outcomes-based model represented by the notion of a technological monoculture is continually present and designing learning activities that expand on the LMS-centred, modular approach is not at this time indicated in the support offered in the institution.

The design of learning in the monoculture outlined here is relevant to my study because instructional design methods emerging from research in the field of education psychology suggest we can design activities in multimedia environments to support comprehension and can help the students with diverse learning needs (Pollock et al., 2002). These designs tend to focus on helping students understand what is being asked of them, not necessarily getting them to engage with more cognitively complex activities. Ontario Colleges are open access institutions and teach students with diverse learning needs, such as recent immigrants and adult learners with

English as a Second Language (ESL) students. Colleges are responsible for setting and ensuring students achieve the desired outcomes but must also ask of students that they engage critically with what they are learning. Scaffolding activities to achieve these outcomes within digital environments that students are already familiar with may be valuable. For example, an English program within which I have experience ran about five percent of its first-year courses online with a strategic goal to increase this number even prior to the pandemic. The highest learning outcome for this first semester English composition course is to be able to develop a critical analysis using the rhetorical modes of ethos, pathos, logos in a written assessment. However, for many people, textual communication alone in many subjects and fields may be less common in the near future than communicating using multimodal tools such as audio, video, interactive images, and speech to text. Communication is more likely to occur through digital means than paper as evidenced by the utilization of popular social networking sites such as Pinterest, Instagram, Tumblr, and Snapchat (Hutt, 2017) as well as the rise of voice command assistants such as Amazon's Alexa, Google's Home, and Apple's Homepod.

Characteristics of Digital Technologies Used by Educators. The aforementioned digital communication spaces provide new means of connecting to the world and developing relationships. Furthermore, these spaces are multimodal in that they blend text, audio, and images, they are accessible and easy to learn how to use, and with interfaces that further enable connections to other layers or resources elsewhere (Bearne, 2003). These are artifacts and media that until recently were primarily in a mono-media form and under the purview of audio-visual and design specialists. The implementation of such software and devices employing multimodal forms of literacy has happened so fast that it has not yet been possible to measure the effect these have had on the literacy of children and adults. However, research seems to focus on two streams: comparing on-screen literacy to paper-based literacy, and the changing socio-cultural practices relating to literacy (Walsh, 2010). A study by Bearne & Wolstencroft (2007) shows that the way people read on a screen differs from how people read on paper in that they employ a strategy of radial browsing to pull key texts, differing from the left to right reading on paper. Lawless & Schrader (2008) further outlined how students navigate multimedia environments is also dependent on their sense of control, prior knowledge, self-efficacy and interest, as much as the design features.

A student in an online course will almost certainly interact with the learning content posted on the institutionally prescribed LMS because in most cases this is the only location of the learning content:

> A learning management system is the integral, behind-the-scenes player in a student's learning experience, serving as the course hub for management and administration, communication and discussion, creation and storage of materials, and assessment of subject mastery (Lang & Pirani, 2014).

For a student, this means their personal interaction with digital media is not only marginalized but learning content in online courses primarily resides within the closed system of the LMS thus limiting any opportunity to cross this personal and educational divide. Institutions control access to the LMS course sites through a single sign-on integration between an enterprise system for admissions and registrar purposes and the LMS. Once the student finishes a course their access ends and all the interactions they may have had in discussion forums and contacts with peers as well as the actual course content is lost to them. An obvious drawback of this is that students are not easily able to subsequently link previous content to new content in other courses and potentially reuse it in order to synthesize their thinking on the wider and deeper level that program outcomes may ask of them. This also contrasts with students' personal experience of technology. For example, it is hard to find a social media site that does not remind you of what you and your friends did five years ago. The social interactivity that is now taken for granted in digital resources also reveals the fact that the architecture of LMS technology has not fundamentally changed from the "course- and instructor-centric models" since the first LMS came out over twenty years ago (Brown, Dehoney, & Millichap, 2015, p. 2). LMSs still tend to rely on a rather lock-step page-by-page linear narrative to delivering the curriculum and when new features are added they tend to be poor imitations of what is more generally available (Hill, 2014). These pages tend to be text heavy, and although other media is increasingly present, the basic premise of uploading content for the student to view online in a rather unidimensional manner remains.

Although many educational technologies present similar issues to educators, I focus my study on LMSs as they are the most widely used digital technologies by instructors for teaching. In a UK study, 63% of instructors reported relying on a LMS for their teaching, however, only 24% responded that they found it valuable for encouraging them to try different activities (Feldman, 2018, p. 24). Other digital technologies instructors reported using were social media such as YouTube and Twitter, sharing sites like Padlet, and interactive software like Kahoot, Flipgrid, and Mentimeter. A common denominator among instructors was reported to be the need for more pervasive use of technology in their teaching, but this was countered by a slight reluctance in instructors to research new digital resources, whether through discussions with instructors or through reading (Feldman, 2018, pp. 32-34). This is supported by research that recommends instructors should be supported in professional development in relation to their awareness e-learning, but also that instructors also need to take responsibility for their own self-development in this area (Salyers et al., 2014). It may be that choice is a factor here. Institutions that define the software instructors ought to use may receive resistance. Selwyn (2007) notes that overly controlled application of computer technologies by institutions contrasts with the "creative , productive, and empowering uses which are often celebrated by educational technologists." (p. 83). This leaves instructors in a difficult situation in that they are increasingly being asked to use new platforms with little input as institutions tend to follow a top-down approach to new institution-wide digital technologies. This situation may also correspond to how students use technology in education environments and whether they have a sense of choice in which technologies they can bring to their learning environment.

Nonetheless, there are significant benefits with how LMSs have not changed. For educators, technologies like LMSs are the technology through which they teach, not what they teach, and getting used to a new system can be a distraction from teaching (Bates, 2015, p. 269). Once these technologies are locked-in to the teaching environment of an institution, changing them, or merely even the design and features of the existing LMS, may involve redesigning the curriculum in the new space which may include writing new HTML code to redevelop graphics and design features and reconsidering the way assessment functions, or reviewing material in light of accessibility requirements. Such technologies are entrenched in institutions as they involve time, money and professional development resources to update (Dahlstrom, Brooks, & Bichsel, 2014, p. 16). Dahlstrom, Brooks, and Bichsel's (2014) Educause report also went on to state that although instructors get used to a particular way of considering online learning due to the limitations of the LMS, 57% of instructors and 51% of students felt they would be more effective if they better understood the LMS technology (p. 15).

Instructors commenting that they would be more effective if they better understood the technology reveals the centrality of LMSs to understandings of what teaching online actually is. LMSs have become the de-facto location of online learning, and perhaps when instructors think of online learning, they may be thinking of how they would position the content in an LMS. Designing teaching online through LMSs is perhaps the larger problem. Opening up the online learning environment beyond the LMS enables more student choice in exploiting digital resources to meet the course outcomes and shape their personal digital literacies.

Characteristics of Digital Technologies Used by Students. If digital literacies and other essential lifelong learning skills are to be supported with educational interventions in online environments, then the affordances of participatory media could be the place within which to situate student work. Participatory media, also known as social media, has been shown to be effective in improving literacy (Currie & Cray, 2004; Featro & Digregorio, 2016; Yunus et al., 2012). Some examples of participatory media are Tumblr https://www.tumblr.com/, Instagram https://www.instagram.com, or Pinterest https://www.pinterest.ca/. Participatory media as a learning environment can be associated with the concept of personal learning environments (PLEs) as they share the elements of self-directedness, and social collaboration in a multimedia environment and can be a site for student-to-student, and student-to-content communication outside of an institutional LMS (Ehiyazaryan-White, 2012).

A common feature of popular participatory and social media software is that they have no direct cost to sign up. The trade-off is the data pulled by the software supports the apps business model as they sell this to third parties for marketing and tracking purposes. It would also be more accurate to call this type of software participatory *multimedia* given the almost ubiquitous facilities of audio, visual, and textual in the software. The software is also synchronous in nature, in that posts are updated in the platform, so communication is as good as instantaneous. Supporting this, the JISC Digital Insights Survey (Newman et al., 2018b) revealed that:

> Seven out of ten students used digital tools on a weekly basis to look for additional resources not recommended by their professor. (p. 8)

Furthermore, the report showed that:

> Six out of ten students used digital devices to make notes or recordings related to their studies at least weekly. (p. 8)

Eight out of ten of those students used their smartphone to access this content. One obvious issue with utilizing many types of licensed software is the lack of any single sign-on (SSO) capability like an LMS, unless, as noted later, they are interoperable with the LMS's SSO protocol. Indeed, password management may be a growing personal life-skill along with privacy and risk awareness.

Students take courses, access the content, and once they are done, they move on, typically with no further access to the artifacts they created and engaged with. The same is not true for the instructors who teach these online courses though who need to upgrade and review their online courses and the corresponding need to participate in professional development activities to do this effectively. The next section gives an overview of a framework that can be employed to construct online teaching and learning experiences.

Designing for Lifelong Learning in Online Courses: The Community of Inquiry Framework

The concept of *Presence* from the Community of Inquiry (CoI) model is a useful way to frame the cognitive, social, and teaching characteristics needed for an online teaching and learning experience to be successful:

- Cognitive presence that triggers action in learners that enable the exploration, integration, and resolution of knowledge
- Social presence that looks to develop affective, open communication, and cohesive communicative responses
- Teaching presence that sparks cognitive and social presences through instructional design and task development

(Dron & Anderson, 2014, pp. 110-112)

Since these three presences were articulated, other presences have been highlighted that resonate with the way students perceive and respond to online learning namely: emotional presence, learning presence, as well as other cultural factors. Emotional experiences combine with social presence in online learning environments, possibly as an affective response to social factors. However, emotional presence operates as a discrete presence that backgrounds the entire experience of online learning and is defined as:

> …the outward expression of emotion, affect, and feeling by individuals and among individuals in a community of inquiry, as they relate to and interact with the learning technology, course content, students, and the instructor.
>
> (Cleveland-Innes & Campbell, 2012, p. 283)

In technology-enabled learning, student identity goes beyond emotional presence to broader cultural conceptions of the place an individual has in education (Brookfield, 1993). These wider cultural factors influence how learners respond to the design of the environment (Laurillard, 2012) and literacy, in particular moving beyond merely textual literacy (Cooper, 2005; Rennie, 2010), and in notions of how to approach research (McNess et al., 2013). Cultural factors are also in play when educators assess student work and these oblige educators to move away from an a-priori deficit perspective of success to one which lifts and supports students (Zhao, 2016). Shia and Bidjerano's (2010) conceptualization of learning presence brings in notions of self-directedness and motivational constructs. They suggest:

> Learning presence represents elements such as self-efficacy as well as other cognitive, behavioral, and motivational constructs supportive of online learner self-regulation. (p. 1721)

Self-efficacy and the associated expectancy-value theories relate to a student's internal belief that they can be successful in a given activity and thus serve as motivational forces that drive students to engage in learning activities (Schunk, Pintrich, Meece, 2002). Students who apply these types of behaviors are also said to be successful at self-regulating their own activities and defining their own goals and what success in a specific activity means (Shea & Bidjerano, 2010, pp. 1723-1274). Personal browsing on the internet and within participatory media are largely self-directed activities, and thus it is likely that being an effective online learner will also involve a student's belief in their ability and how well they can organize their work. Learning presence seeks to bring these to the COI framework. Expanding learning away from core institutional education technologies like LMSs entails that instructors work with what students are already doing, and what they bring to the learning experience: it can no longer be a one-way delivery model. A key element in this will be a student's ability to be self-directed and to take control and make choices in the learning environment.

Meeting the cognitive, social, teaching, and emotional presences in the CoI framework and validating different cultural perspectives may be limited in LMSs that by design have management, control, and a linear approach to delivering content at their core. In students' personal digital lives however, certain aspects of these presences may be flourishing. The next section describes in more detail the rise and current centrality of learning management systems in postsecondary education.

Systems for Managing Online Learning

Most of us carry computers around in the form of mobile phones with a computing power not typically correlated to the texting, taking photos, and checking social media tasks we generally do with them. In identifying the affordances of emerging information and communications technologies compared to the infrastructure of those technologies Conole (2013, pp. 88-89) argued that the way the technologies are developed encourage a certain way of use that is not necessarily born out in the way learners actually use them. It could equally be true that this creative use of technology is a by-product of users not fully utilizing the features built within the software (Dahlstrom et al., 2014). This speaks to the text-rich structure of a course within learning management systems (LMSs) that have the capability for multimedia learning resources.

A term still common in European institutions and research literature for LMSs are managed learning environment (MLE). They are also known as virtual learning environment (VLE) and course management systems (CMEs) and although VLEs also include 3D environments like Active Worlds https://www.activeworlds.com/ and early environments like MOO’s (multi-user domain, Object-oriented). Although CMEs may more accurately describe what they do, this is a less common term nowadays. I will use the term LMS to describe what Lang and Pirani (2014) define as:

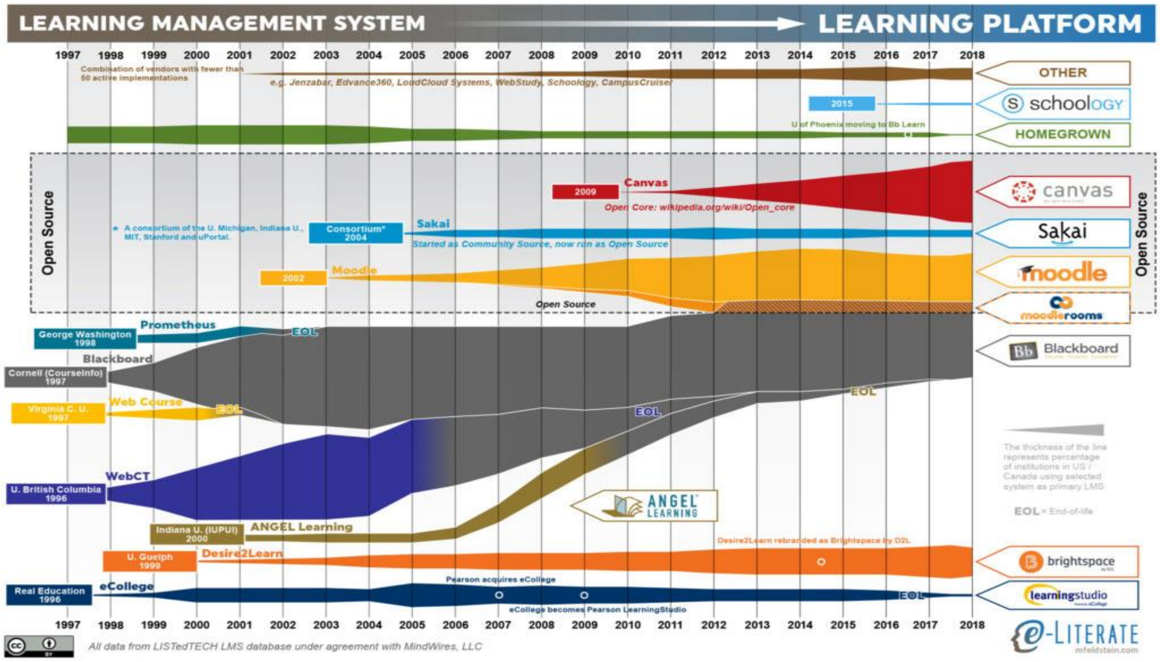
> Software that provides an integrated suite of online resources and communications capabilities in support of traditional courses and can also serve as a platform for fully online courses. A typical LMS provides a range of activity modules, such as forums, databases, and wikis; facilitates student assignments and quizzes; and enables monitoring

of student engagement and reporting of grades. Many LMS implementations are integrated with student information systems. (p. 2)

Early LMS were built within early computer conferencing software, for example Although not an LMS, or VLE as most systems were called then, the Electronic Combined Education (EKKO) was developed in Norway in 1985 to provision distance learning (M. Paulsen & Rekkedal, 2001), and later converted to internet servers and client software as the internet emerged. Similarly, First Class developed by SoftArc in the early 1990s enabled more types of collaboration beyond file transfer and the United Kingdom's Open University used the First Class LMS between the 1990s to 2000s, but by the early 2000s the main LMS were WebCT and Blackboard, with which WebCT was larger merged, with market shares in 2001 of 32% and 20% respectively. In 2001 Moodle was released as an open-source alternative to licensed software models. Figure 4 shows the consolidation of the market occurred throughout the 2000s with many LMS companies merging.

Figure 4

LMS Market Share for US and Canadian Higher Education Markets



Note. This figure shows the (Hill, 2019b). The top of the figure denotes the year of activity for the corresponding LMS noted on the right-hand column. Each colour represents a different LMS provider.

During this period, research into LMSs also showed an adoption of 99% in North American postsecondary institutions with the largest providers being Blackboard, Moodle, and Canvas at 31%, 24%, and 19% respectively. Figure 4 also reveals a pattern of consolidation from a wider variety of LMSs to around four today (Feldstein, 2017). A conclusion that could be drawn from this is also that the companies who own LMSs have less motivation to develop their products as competition has been reduced. This partly explains why LMSs have expanded their reach in postsecondary institutions while their functionality has not radically changed over the past 20 years. This is somewhat surprising given their diffusion across education as well as feedback from students which shows they consider LMSs “extremely important to their academic success" (Lang & Pirani, 2014, p. 1). The next two sections look at the organization of learning within education technologies and how this is changing.

The Evolution of LMSs. LMSs have gone through two main stages that mirror the development of the internet from static to multimedia followed by the addition of participatory media capabilities. These stages align to the read-only and subsequent read-write capabilities described by Tim Berners-Lee (Choudhury, 2014). The read only stage consisted of what could be considered a website presence with interaction limited to responding to and viewing quizzes, uploading text or image content, grading capabilities for instructors, and text-based discussion forums. These features developed over time with better graphics interface and speed, but the main development was their integration into student information systems (SIS). The next read-write stage coincided with the increased ability to interact, collaborate, adapt, and blend content as participatory media affordances emerged around 2005. Although these increased interaction and advanced interactive audio-visual and graphic content capabilities seemingly afford more student-centric approaches, LMSs developed further locked-in add-ons to their existing framework such as wikis and blogs, all still hidden within SSO protocols that were poor cousins to widely available software on the internet such as Blogger, WordPress, and MySpace.

Instructor and institutional control were further enhanced in the form of tracking student activity and notifications, as well as more seamless software updates and scalability to large student numbers (Kroner, 2014). Increasingly LMSs are able to offer external software integration through protocols like Learning Tool Interoperability (LTI). This interoperability is key to the latest generation of LMSs. Although many forms exist in walled gardens, Mass Open Online Course (MOOCs) platforms emerged in recent years and have similar features to LMSs with some open qualities like access and course length.

MOOC Platforms. MOOCs are a way of providing instruction to participants at scale as opposed to the class-based approach of LMSs. Until recently it seemed two distinct MOOCs were developing: xMOOCs that are closed, profit-oriented closed platform such as EdEx, Udemy, and Coursera. The other, known as cMOOCs, are an open form based upon Siemens (2014) concept of Connectivism. These are less of a single platform and more of an overarching method of combining various web-based resources and facilitating interaction and collaboration with participants. Methodologically, both forms of MOOC group students into cohorts with start and end points to the content to be covered (Dron & Anderson, 2014, p. 317). Neither term seems to have caught on in common parlance and both are generally referred to a MOOCs. MOOC platforms are not the same as LMSs. For example, LMSs require institutions to purchase licenses for access, and MOOCs tend not to be embedded within the IT infrastructure of an institution but rather up to an individual student to access. This lack of institutional lock-in has caused debate about cost-effectiveness and sustainability in xMOOCs due to a dropout rates (Dron & Anderson, 2014, p. 222). MOOC platforms are adding features that LMSs possess, with increased affordances not only as vehicles for content but also for course management routines that are required by registrar departments to support credentialing for full graduate and undergraduate degrees (Hill, 2018). LMSs further entrench their use in institutions through their interoperability with these student information systems (SIS) that support registration, admissions, transcripts and course management. Although these SIS are interoperable with LMS they tend not to be interoperable with other types of software and when new routines need to be built in they need to be coded into the SIS directly potentially leading to software bloat and inefficiency. The next section looks at the extent to which the management of online learning can be moved from the College to the teacher and student.

Extending the Networked Learning System

As education institutions recognize the affordances of digital multimodal literacies and learning strategies and further define learning and program outcomes, technologies like LMSs will be recognized as more central to these efforts. The drivers of these policies are the perceived need for customization, personalization, data collection and analysis, and system integration (Lang & Pirani, 2014, pp. 5-6). LMSs are, however, not immune in moves towards personalization and larger system integration. Technical developments like interoperability and a new generation of LMSs point to a way forward.

Interoperability. Recent developments with application program interface (API) and learning tool interoperability (LTI) are enabling software from different vendors that perform different types of tasks to speak to each other (Lang & Pirani, 2014). Two types of software that capture user-platform activities are xAPI (https://xapi.com/ecosystem/) and Activity Streams (https://www.w3.org/TR/activitystreams-core/). Activity Streams is an open-source standard that captures online events in platforms in the form of the actor-verb-object triplet in order to list the activities of a user in the platforms. Inspired by Activity Streams, xAPI is an interoperability standard that allows a system to collect data about activities in multiple environments, both within, and outside, an LMS. The analytics gathered through these interoperability standards can allow institutions to get a range of data from multiple platforms rather than that collected by an LMS alone yet up to now such data tends to be in the hands of an institution's IT departments. One example that enables instructors and students to engage with this data is the open source Learning Locker (https://learningpool.com/solutions/learning-locker-data-cloud/) which provides visual activity records to aggregated xAPI data that emerges through a course of learning, although this is targeted at corporate clients rather than education institutions. Although the technology is present to describe a quantified self, this is not yet often provided outside the Registrar offices Ontario colleges even though instructors and students have report this data as valuable in developing interventions or to focus on course activities (Verbert et al., 2014).

Learner Control. Learners may be too passive in LMSs due to the platform design and the way instructors construct the course within the LMS. Although LMSs are the primary institutional medium to connect with online learners, the process of constructing an online course in my institution is top-down with the instructor and instructional designer building the learning content inside the LMS. These typically include interactive activities, for example using Articulate software (https://articulate.com/) and discussion forums. The course design process assumes an idealized group of learners that the content is prepared *for*, not *with* during the process of the course. This limits opportunities for students to use the tacit knowledge, networks, and devices where they connect with these in their day-to-day lives. Websites and social media used by students within and external to LMSs may influence the acquisition of digital literacy skills. Rheingold (2008) refers to participatory media literacy that requires digital literacy to support civic engagement:

> If print culture shaped the environment in which the Enlightenment blossomed and set the scene for the Industrial Revolution, participatory media might similarly shape the cognitive and social environments in which twenty-first-century life will take place. For this reason, participatory media literacy is not another subject to be shoehorned into the curriculum as job training for knowledge workers. (pp. 99-100)

Additionally, instructional approaches in online courses created in LMSs may be circumventing the likelihood for students to think critically about digital content because of the top-down course design model. Reflecting on typical LMSs in a postsecondary institution Watters (2017) posits in her blog that:

> By working in digital silos specially designed for the classroom (versus those tools that they will encounter in their personal and professional lives) students are not asked to consider how digital technologies work and/or how these technologies impact their lives. (Watters, 2017)

Enabling more student control as they learn in these new digital spaces may be helpful in reducing instructor-centeredness and student passivity. Learner control moves along a continuum from structure provided by instructors to student expectations of control, choice and autonomy. These are considered by Candy (1991) as constituent parts of self-direction. Self-directedness is a combination of metacognitive and affective strategies learners employ as part of a course of learning and an important aspect of learner control (Hoven, 1997b). Differing dimensions of self-direction are discussed further in Chapter 2. Online instruction that uses an LMS in its current form may not be best placed to support essential digital skills development as their design inhibits dialogue between the student, instructors, and institution that can support varying levels of control. For example, a recent study with students in a MOOC built in the EdX platform indicated that:

> Depending on the platform of engagement, learner engagement differs dramatically in many ways. Simply, choice of platform is correlated to all measures of user participatory learning, with interactions on Twitter being far more likely to exhibit measures of learner participation. (Montero-colbert, et al., 2019, p. 32)

In the aforementioned study, students who chose to use Twitter to discuss the themes of the course showed higher critical engagement with the content, than those who remained primarily within the walled garden of the platform. Moreover, Dron (2007) comments that when a student is within an LMS environment “the assumption of teacher control is revealed at every turn.” (p. 211), and for a student to begin to exert some control and for an instructor to provide instruction in a more open platform is made more difficult by institutions falling into the trap of lock-in wherein technologies like LMSs have years long licensing agreements and are typically the only vendor to provide that service in the institution. In my institution this limits the ways courses can be designed in online courses.

This study is seeking to find out and describe what is going on in my institution’s digital learning environment. This involves looking at the environment more holistically. Beyond the level of the instructor and course, issues of learner control are also affected by the education system online students learn within and the Ontario College system is moving incrementally towards an outcomes-based education model that offers a specific vision for the way instruction is organized.

Defining Learning Outcomes

Learning as an adult can be hard, and some fields of learning can take serious effort and resources. Maintaining the motivation to learn while others seem to master the same tasks easily can also be frustrating. My own experience of occasionally successful usually sluggish acquisition of Polish and Spanish as an adult can directly attest to this. Learning is also complex. Cognitive science has started to reveal the way we organize knowledge and transfer this to new settings, and how the socio-cultural contexts we learn within profoundly impact the values associated with that knowledge and how we choose to employ it in creating meaning, both individually and collectively (Bransford et al., 2000). At what for some may be an inconsequential level, this is perhaps why I have yet to be able to teach someone how to make what I consider a perfect cup of tea. The complexity and context-specific nature of learning requires us to explain how we have been teaching online in postsecondary environments and what needs to do done differently.

I recall resolving trigonometry problems in high school using books with lists of numbers representing the formula you needed to use. This knowledge is important in engineering and in more visually oriented pursuits like design, but at the time the goal was merely to master the formula: ours was not to question how this knowledge could be applied or whether the list of numbers was the best method of representing this information. This approach to teaching has its foundations in behaviorism and how it emphasizes a systematic approach to learning. Instruction derived from behavioristic foundations is not bad in and of itself, it is certainly how I learned to employ sine, cosine, and tangents in trigonometry in isolation. What it did not tell me is how to connect trigonometry with skills that help me navigate using a map on cold moorlands in dense fog. Bloom and Krathwohl's taxonomy of educational objectives (Bloom & Krathwohl, 1956) and the associated belief that behavior and thus learning can be understood systematically (Campbell & Schwier, 2014) describes on a scale the extent of cognition involved in completing a task. The higher on the taxonomy, the more an individual needs to construct and critically reflect on the context. However, employing this taxonomy as the basis for constructing the outcomes expected of a student in a course leads to what Thomas and Brown (2011) refer to as the "mechanistic culture of education", where, similar to behavioristic approaches, the learning ideal is the outcomes-focused, efficient, and measurable mastery of a subject that subsumes the process part of the learning. They go on to say that our learning culture up to now is about showing what we know which implies a more objectivist approach, when in fact we should be asking students to also investigate what they do not know: in other words questioning and critical thinking (pp. 35-36) implying a more constructivist approach (Jonassen, 1991). Learning outcomes written with Bloom’s taxonomy in mind are a useful tool to design instruction yet critiques remain in that although outcomes help scaffold instruction the notion of being able to objectively measure the extent to which an individual meets these through the use of action verbs and descriptors is mistaken and of limited use (Hussey & Smith, 2002), in part because they centre managerial, not learning imperatives. These critiques are discussed in more detail in the next chapter.

There are ways to support more constructivist models of instruction and learning environments. An illustration of a successful adaptation from mechanistic to questioning is the work the staff of Alverno College undertook in the late 90s (Reed, 2001). They shifted the focus from subject and content mastery as the core outcome, to teaching how to apply that knowledge. Some of the important attributes they felt graduating students ought to possess were communication, analysis, problem solving, and valuing in decision-making and aesthetic responsiveness. At the same time the college also introduced audio-visual and computer technologies, multimodal presentations, collaborative learning, and self-assessment methods. On Bloom’s revised taxonomy these correlate to analyze, evaluate, and create (Krathwohl, 2002). Analysis, evaluation, and creation utilizing digital resources are core components of the kinds of digital literacy that will be valuable in lifelong learning endeavors (Leu Jr, Kinzer, Coiro, & Cammack, 2004, p. 1602). The Higher Education Quality Council of Ontario Practitioner’s Handbook on Learning Outcomes (Goff et al., 2015) define outcomes as

> Statements that indicate what successful students should know, value or be able to do by the end of a program. (p. 8)

The inclusion of the concept of ‘value’ in this sentence is of note. Institutions and instructors are largely responsible for defining learning outcomes and there will be inherent bias around what values are being propagated and whether these values conflict with students existing views or attitudes towards a field. Ontario College Postsecondary education is moving emphasis away from only mechanical measurement and organization of learning to also engaging students in the reflective and critical thinking practices embedded in the notion of essential skills. However, evidence of this movement is still largely instrumental in nature and reflected in the addition of learning outcomes at the program level that speak to ethical and critical thinking (Council of Ontario Universities, 2011, p. 12). Furthermore, course learning outcomes are closely tied to the recognition of prior learning, and transfer credit. Because each institution manages its own prior recognition and transfer credit processes it can lead to cases where because one or two outcomes are not present in a course even though it is the same type of course the transfer credit is not recognized, and the student has to repeat the course. Such administrative walled gardens may be limiting students control of how their own learning experiences are recognized and validated as they access additional courses they need to build a new set of skills. In many cases these students are being asked to take the whole program when only part of a program may be required—a situation not likely to be favourable to adults needing to reskill post pandemic.

Nonetheless, a socio-culturally diverse cohort of students is increasingly taking online course, notwithstanding the ramifications of the recent move to remote teaching due to COVID-19. These students are also fully engaged in a personal online world that is characteristically multimodal (Iyer & Luke, 2010). Resources students may access and create as part of their study may not necessarily be viewed haphazardly and discarded, there may be a level of personal organization to their study possibly contributing to literacies that will support them in lifelong learning endeavors. Such a level of organization could reveal a level of personal goal setting. Yet, these collections are likely to be external to the course LMS and may not even be associated directly with the learning content or outcomes advanced by instructors (Brown, Peterson, Brown, 2008; Marín Juarros, Salinas Ibanez, de Benito Crosetti, 2013; Parra, et al., 2016).

Expanding our notions of technology-enabled learning systems by providing space for students to negotiate or devise their own learning outcomes may facilitate learner self-directedness and control. This may lead to improved critical engagement with student generated *unknown* and *emerging* learning outcomes: a critical engagement that may be supported by enabling students more control to personalize their learning, an area I touch on in Chapter 2.

Personalizing Learning

My personal learning environment (PLE) consists of an internet connection, laptop, cell phone, large screen monitor, note paper, post-its, pens, highlighters, endless books, a music streaming service, and, of course, a cup of tea. On my laptop I have folders and software like Miro for managing projects and websites at hand such as a citation manager, my blog, the online university library, a social bookmarking site to organize links, and two or three social media apps. This may resemble another person's PLE but is likely unique in its combination of digital and physical resources. In this form, a PLE refers to the software-based and physical spaces within which an individual chooses to access learning resources and artifacts, communicate with peers, and store content whether for informal or formal learning purposes. This describes an informal and personalized model self-developed by an individual. It may be used by the person in formal education, but the environment is not demarcated by the teacher. Other forms of PLE are those facilitated by instructors, perhaps as a requirement as part of a course of study as an extension of a portfolio, or a pre-defined set of tools the student is asked to use. Sclater (2008) describes the understanding of PLEs as diverging in three ways:

> The first group argues that client software can be developed to mediate between the learner and the many resources and facilities on the Internet. A second group is attempting to achieve this by providing sophisticated web servers and enabling participation by learners via their web browsers without additional software. Finally, some people argue that PLEs are essentially here already and that many online learners already make effective and customized use of a range of online facilities. (p. 3)

The description of my own PLE falls into the third category and is digital, analogue, and affective, if not always effective.

Practice within a PLE is not necessarily psycho motor, it can also include cognitively modelling what it means to learn, interact, reuse, and apply online teaching and learning artifacts. This requires students, instructors and administrators to extricate themselves from the constructs of institutionally-walled technologies, to engage with the broader world of the internet (Haworth, 2016). In formal education, and most likely in the first two interpretations of PLEs cited above, a PLE may include an LMS and other platforms in some form, perhaps for storing grades, class lists, course outlines, and some required resources. However, these platforms will most likely only exist for the duration of the program. This renders the *personal* part of a PLE as obsolete as the students have limited control of this environment. A truly *personal* PLE whether in a formal or informal learning context will be under the control of the student and most of it can exist and adapt based on the students' ongoing, lifelong learning needs. The self-directed rationale behind PLEs derive from adult education and its social equity focus (Zimmerman, 2000) and it is this focus that could support teaching communication, organization, and digital literacies as the PLE could function as the site for a learner to dive into these voices and modes in a way that is relevant to them and to have a life beyond the pre-defined start and end dates of a course of study.

Students who explore, gather, and organize digital media into relevant fields to support learning could be curating their own learning archive. In formal education settings, students need to be aware of what is required of them by the program or course, and how they will be assessed, and therefore how the content they gather will support their success in this area. In other words, curating digital learning artifacts involves students inquiring about the content of the digital media they explore in relation to the course outcomes. For autonomous learners, motivational concepts such as goal-setting and self-efficacy become key elements in reaching the desired aim and Laurillard (2012) refers to inquiry-based learning as the facility of "learning how to learn" that avoids the "delivery" practice of more instructor-centered acquisition methods (p. 123).

Enabling inquiry outside the monoculture of pedagogical approaches to online learning in LMSs involves studying within an online, open, and connected instructional space. In such a distributed and connected environment, the LMS becomes just one of many tools that convey learning artifacts to students. This presupposes a level of responsibility on the learner to organize artifacts, resources, and documents made up of text, graphics, animation, audio, and video. An open-source tool such as Elgg (https://elgg.org/) may be provided to support this organization. An important part of instruction in this approach is to help students make sense of and organize non-linear, distributed learning content. In formal postsecondary contexts, supporting these online inquiry methods requires instructors or institutions to support students in applying metacognitive strategies such as questioning content validity and relevance, reflection, summarizing, and elaboration. These are also accompanied by essential skills like planning, time-management, organizing new information, and rereading (Azevedo & Cromley, 2004). The structured and top-down nature of LMSs encourages more structured pedagogical practices in online courses and such instruction is less likely to be planned with constructivist principles (Tomberg et al., 2013). Metacognitive and essential skills are more likely to emerge through constructivist approaches to instruction because of the potential expectation of learners to actively interpret and construct knowledge. Personalized learning that employs technologies like LMSs cannot be separated from the approach to instruction and the institutional management imperatives. Selwyn (2017) describes the defining narrative of technology implementation in education as one in which "A great deal of excitement tends to be reserved for the short-term, imminent changes in education and technology." (p. 173). This contrasts with what students and instructors tend to do in their personal interactions with technology as they are liberated from fiscal and institutional restraints, as well as the need to provide evidence for efficacy.

Still, when students do actively organize their personal technology use and associate it with education purposes, they could be considered to be developing their own nascent PLE. It may be that instructors are already applying innovative instruction outside of the technological monocultures of LMSs to support these informal efforts—something this research projects seeks to find out. Communities of practice are a way for practitioners to share practices and develop pedagogies that can feed back and support their PLE and potentially provide ways on thinking about how to facilitate student peer to peer interaction.

Communities of Practice. Instructors face a number of issues in adopting new technologies, whether uncovering these for themselves or having to work out how best to use technologies that are implemented on an institutional level. Communities of Practice (CoP) are a valuable way to encourage peer idea sharing and practice creation. The socially constructed notion of CoPs was first outlined by Lave and Wenger (1991) and defined as:

> Informal groups of people who interact regularly to use collective learning and shared expertise to solve mutually engaging problems. (1991, as cited in Hill, 2006, p. 122).

The key element of a CoP is that practitioners gather to share what they currently know and learn from each other. There is no defined leader or teacher and knowledge creation within the community is assumed to be collective not individual. Although not an instructional approach, the shared problem-solving of CoPs suggest possibilities for more grassroots instruction in that students as a peer group can define what they wish to discuss and learn then decide on actions that need to be taken to help them achieve this. This notion of community connected learning and decision-making parallels the notions of how a more networked learning model could be developed by including and valuing student voices in the discussion.

Networked learning is a form of community, in this case one bound by the students in the course. It also encompasses how previous students addressed learning in the course and how different instructors approach facilitating student interactions with content-bearing digital learning resources and how each member of the community has a voice in questioning and adding to the knowledge being developed. This networking between instructors, learners, and knowledge speaks to the concept of Networks of Practice developed by Wenger, Trayner, & de Laat (2011) one of the networked learning models discussed further in Chapter 2.

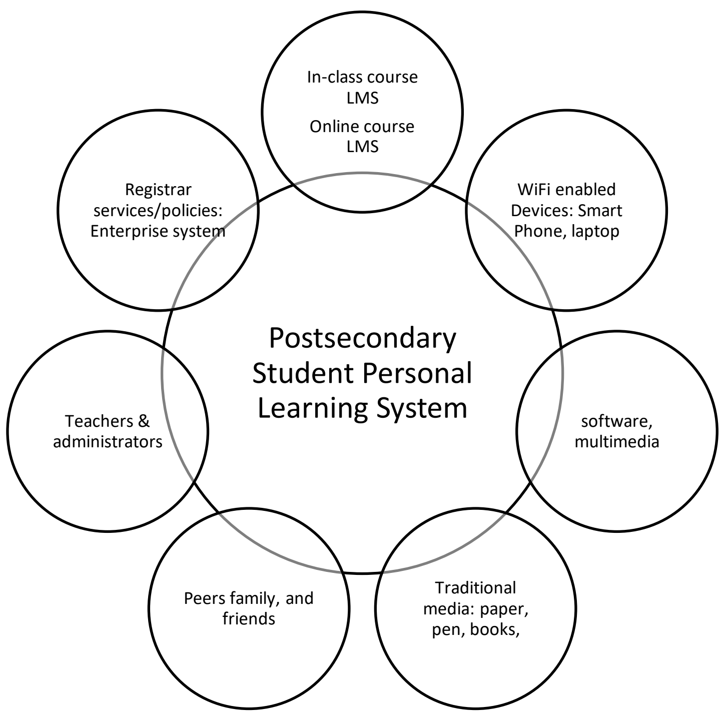
PLEs and the broader concept of network-supported learning share attributes such as expanding the possibility of creating pedagogies that facilitate learning outside walled-garden technologies, the chance for an instructor to either personalize the technology directly, or for the students to have more choice in the tools they choose to support the organization of their learning. The next section outlines what a current learning system may look like for a postsecondary college student.

A Current Student Learning System

The United Kingdom's Joint Information System (JISC) survey (Newman et al., 2018b) outlines the type of digital environment that postsecondary students report studying within. However, there are additional elements to a student's learning system beyond the technical. Figure 5, illustrates these digital and non-digital features and how, together, these form the PLEs, or learning context that many students typically study within:

Figure 5

Example of a Current Student Learning System



Note. Allen, S. (2021)

The characteristics of this technological-educational system can be broken down into institutional teaching and enterprise software, human interactions, device use, course software use, traditional media utilized, and the digital media being utilized. The circle is also used to indicate how each of these characteristics have dependencies and overlap to some degree. A key factor in this environment is that the student often has limited control or agency in the learning resources and ability to interact and collaborate to co-construct learning unless guided by the teacher. I discuss choice in the next chapter, and outline what a future learning network may look like.

In surveying what digital resources students are using outside LMSs in online courses, their attitudes towards their digital learning environment, and level of self-directedness, I provide recommendations on practices that can speak to models of study that can then be supported by instructors and institutions. This is particularly important as colleges move away from technological monocultures towards more open and adaptable solutions. Additionally, the presence of student agency and a personalized voice in pedagogies that employ such new digitally enabled learning systems will partly rely on addressing the current focus on outcomes-based approaches. Furthermore, this knowledge will help make recommendations for institutions as they upgrade their core operational and educational technologies in the coming years.

To facilitate research into these online spaces it is useful to view how instructional and theoretical concepts consider these issues. Additionally, the emergence of networked multimedia digital technologies has required researchers to consider how best students learn in these contexts. In the next section I outline key learning theories and their association with pedagogical approaches that utilize education technologies.

Learning Theories and Their Association With Education Technologies

Research into teaching machines from the late 20th century advanced along with the elaboration of learning theories and concepts from behaviorism through cognitive to constructivism (Vaney & Butler, 1996). Notions of how technology is understood and has developed in relation to education have been led by the manner of our interaction with technologies. Meyes and Freitas (2004) grouped learning theories and the pedagogical approaches associated with these into three streams, with Conole (2013) adding a fourth:

- Associative: Behavioristic, structured activities for an individual, through association and reinforcement
- Cognitive/Constructivist: learning through understanding, task-oriented prior knowledge association and development
- Situative: learning as social practice, interactive, and context-specific
- Connectivist: reflective, dialogic and personalized

(Conole, 2013; Meyes & Freitas, 2004)

Early forms of LMSs emerged in the late 1980s at a time when although pedagogy in education technology emphasized socially constructed approaches, a lot of education technologies offered instruction in the form of CD ROMS with activities designed to create individual mastery of content and not designed with educational theories as a basis to the instruction, not, in fact, dissimilar to now. In fact, some methods identified as constructivist were indistinguishable from behaviorist methods (Meyes & Freitas, 2004). For example, Gagne’s (1986) Nine Events of Learning hierarchies were dominant in education: a bottom-up, objectivist mastery model where discrete tasks must be mastered before you move to the next. A look at a typical online course in an LMS in my place of work reveals a focus on a lock-step model of clicking through discrete pages of content followed by learning activities. Britain and Liber (2004) further argue that early LMSs were:

> designed to support a model of teaching and learning interactions that was strongly based around information transmission via the provision of structured content from teacher to learners and the subsequent testing of learners on the content with little consideration given to the activities that the learners themselves might engage in. (p. 4)

A learner ensconced in their personal learning environment may have plenty of interaction with the learning content, yet without connecting and sharing with peers they are not likely to be challenged with other ideas, content, and opinions. In an overview of learning theories and pedagogical approaches to e-learning, Dyke, Conole, Ravenscroft, & Freitas (2006) described three elements that weave through many current descriptions of e-learning theory:

- Thinking and reflection
- Experience and activity
- Conversation and interaction

(Dyke et al., 2006, p. 88)

By emphasizing these elements of learning they move away from earlier behavioural learning theories that focused on designing learning so it shapes behaviour, leading to the use of Blooms revised taxonomy (Krathwohl, 2002) to embed outcomes-based approaches. Instead, they propose moving towards socially constructed approaches that focus on learner agency and control, thinking, reflective practice, and experience and not emphasize outcomes that define unprestatable personal learning experiences. Furthermore, in e-learning spaces information is ubiquitous and flows from multiple sources. In such contexts, skills such as managing and transforming information and the ability to interact with other learners and instructors become central. As such, these new pedagogical models will involve revisiting who defines the learning outcomes.

The next section outlines the questions this study used to investigate the current state of postsecondary online learning systems in relation to the level of student self-directedness, the extent to which students define learning outcomes, and how they employ and organize educational and other digital technologies.

The Research Problem

I argue that networked-based online learning, merged with applied experiences where required, designed to facilitate self-directed learning strategies combined with targeted student support services and resources is a way to support lifelong learning endeavors and support the development of these strategies in current postsecondary students.

The ongoing need to address the limitations of education technologies such as LMSs in online courses challenges educators to investigate whether the web-based tools students may be using external to LMSs may be a precursor for the organization of self-directed personal learning environments that support strategies that will be valuable in lifelong learning endeavors. The prevalence of walled garden LMSs as the primary location of learning in online courses may be restraining the utilization, development, and sharing by students and instructors of learning artifacts external to LMSs. Employing software resources that students already use, or archetypes they are familiar with such as social and participatory media, mashups, audio-visual streaming sites, and games can help students as they aim to gain mastery of the content and the essential skills and literacies required by the ministerial policy and institution. Furthermore, opening up the technology should be made in parallel with an opening up of the predefined learning outcomes to enable negotiation and personalization of outcomes and support goal-setting strategies and attainment in students.

LMSs are the primary medium for delivering online learning but yet tend to be vehicles for storing content, grades, and communications, rather than enabling more creative, flexible and personalized pedagogies (Lang & Pirani, 2014). Digital media resources are increasingly interoperable with LMSs and are starting to break down the walled garden model of the LMS (Brown et al., 2015). However, as described earlier in this chapter, in my institution online course design is teacher- and institution-centered and assumes the centrality of the LMS in building lock-step modules tied to outcomes. This contrasts with the partially self-directed behavior students are engaging in: communication and interaction that is increasingly multimodal; highly interactive in real-time; and interconnected across different platforms (Jenkins, 2009, p. 8). Furthermore, such literacies are increasingly included as an essential skill that need to be embedded in program outcomes (Ontario, 2017). Educators need to be more explicit in supporting students in articulating and making connections between the digital and non-digital skills they pick up informally to the digital and non-digital skills required in the workplace and education.

Only emphasizing the opening up of how online learning is delivered and providing students with opportunities to bring their own digital lives into their learning will not be adequate when the courses and program that students are studying within are increasingly ring-fenced within an outcomes-based approach to course construction, design, and assessment—including the recognition of prior learning. This is especially true when these outcomes are imposed on students and no room is given for students to construct outcomes they consider may be relevant for them.

This research project surveyed student attitudes and activities in nascent digital and non-digital learning systems that reach outside LMSs and looked to uncover their level of self-directed and goal setting behaviour. This data contributes to the understanding of, and helps make recommendations on, how these activities support the development of cognitive, reflective, and organizational literacies and strategies in postsecondary students. Additionally, as identified through the increasing focus on essential skills and institutional learning outcomes in postsecondary education, I propose that such goal setting, self-directed, and organizational literacies and skills in a network-based digital learning context can also operate as *lifelong learning literacies* that can also be supported by upgraded administrative routines around the recognition of informal and formal prior learning.

Hypothesis. If the kind of lifelong learning that graduates may require, or choose to access, is highly dependent on unknown future contexts and individual needs imposed by the logic of the networked society, then these needs will not be best served by an outcomes-based instrumental educational paradigm that reinforces instructor- and institution-centered outcomes that inhibit student agency and choice. This paradigm is reflected and exacerbated in the walled-garden analogy of an online student studying a course designed within the constraints of an LMS, which, for adults returning to education, is further reinforced by a walled-garden policy around the recognition of prior formal and informal learning.

The Problem. The notion that applied learning institutions are preparation for the workplace belies the fact that the workplace of the future will increasingly require the cognitive, reflective, and organizational skills to be successful in self-directed lifelong learning endeavors. Postsecondary students must be given the support and freedom to cultivate the literacies and skills they need to be successful in their personal futures, not only those predefined by the course, program, or institution. Thus, when online courses rely only on content and learning outcomes provided and defined by the creator of the course and delivered only within the limitations of locked-in technologies such as LMS, students are not supported in acquiring the lifelong learning literacies and skills they will need for success as adult learners in digitally enabled learning environments. Further, when adult lifelong learners return to formal education, routines must be in place for them to have control over the way their prior learning is recognized and recorded as these do not fit neatly in top-down pre-defined outcomes-based education models.

With the problem stated this way, certain research questions emerge as follows.

Research Questions

The principal research question is:

- To what extent are online courses that employ outcomes-based education models delivered primarily through LMSs inadequate for developing the lifelong learning literacies required for success by adult learners in digitally enabled learning environments?

Sub-questions that support the analysis of this principal question are:

- To what extent do student responses show characteristics of lifelong learning literacies?
- To what extent do participant responses reveal their limited agency in constructing learning goals and outcomes?
- To what extend are students employing technology to support self-directed learning?

To gather enough data to adequately answer these questions, I needed to consider a research methodology that would enable me to get close to the online context where students are studying. However, the methodology also needed to be able to collect a wide range of data from different participants.

Overview of Methodology

It was important to me to uncover what was actually happening in the instructional context and to make recommendations for practice and institutional strategy. To do this I employed a descriptive analysis methodology using the Student Insights Survey developed by JISC (Joint Information Systems Committee) to collect both quantitative and qualitative data from approximately 2400 students studying in online liberal studies courses in the Faculty of Liberal Arts & Sciences and Innovative Learning in an Ontario college. I will describe the survey and elaborate on the research project plan, the survey instrument, participants sample, ethics, validity, delimitations, and bias in the methodology chapter of this study. The same chapter will define the ontological and epistemological positions this mixed-method study takes and how the research questions are interpreted.

The Significance of the Study

Ontario Colleges are now being asked by the Ontario Government to delineate and measure the student learning outcomes in relation to the skills expected for the workplace. This instrumentalist imperative is also driving institutions to develop institutional learning outcomes that drive further outcomes-based measurement on student learning all the way to the course level. When the significance of postsecondary education is assessed only by pre-defined and measurable outcomes it is likely to devalue the students voice in defining at least some of these outcomes. The limitations on students to have control in their learning experiences are also indicated in the technologically deterministic basis for much educational technology.

In a recent survey to their members by the Association for Learning Technologies asking what they thought their biggest challenges would be in 2019 the three most commented upon fields were staff, learning, and VLE/LMS (Tulloch, 2018). LMSs are ubiquitous in North

American postsecondary education with a presence on 99% of campuses with an average lifespan of eight years (Dahlstrom et al., 2014). I will focus on LMSs as a representative analogue for educationally focused technologies that are increasingly entrenched in postsecondary education. In this, they are an established presence and considered part of the course information technology infrastructure. This longevity also serves to create change management issues within institutions when new technologies are brought in, or the existing one upgraded, for example blockchain to support the management of prior learning. If instructors and staff are used to a certain way of interacting with the technologies, changing these routines and potentially the course delivery design is challenging, not least as migrating existing learning content is frequently only partly possible. Furthermore, LMSs may have become the de-facto location for the location of content delivery in online and thus possibly the archetype for instructors' conceptions of what learning online looks like. LMSs are also costly to institutions, whether through licensing, hosting, or IT support and they are closely integrated with enterprise management software related to admissions, grading, and scheduling. Essentially, LMSs have achieved the ultimate goal of many emerging educational technologies: lock-in (Anderson & Dron, 2017). It is hard to imagine postsecondary education life without them. Nevertheless, for pragmatic reasons of cost and data security or educational goals of open resources, flexibility, interactivity, and creativity LMSs need to evolve. It may not be worth waiting to see whether LMSs evolve especially as the education technology companies who own them have limited motivation to do so given their ubiquity and lock-in. Consequently, educators and administrators need to collaborate in the development of more flexible and open network-based learning that utilize the capabilities of LMSs but expands them out of their walled gardens and bring in the students' digital worlds. Evolution in the walled garden is required, one that also looks into students' digital lives. Selwyn (2017) proposes that:

> Instead of focusing on 'state of the art' more effort should be made to develop debates concerning what actually takes place when digital technologies meet educational settings and how this compares with what has taken place in the past. These questions fall broadly into three basic forms: What is the use of technology in education settings actually like? Why is it the way it is? What are the consequences of technology use in educational settings? (pp. 184-185)

Surveying students on what technologies they use and their perception of how they support learning then exploring why LMSs look like they do and what consequences this is having for skill development, learning mindsets, and emerging literacies in post-secondary education may point to ways to move forward. Considering how digital resources and education technologies are applied in institutions may lead to creative thinking on developing pedagogies and systems in order to best support student learning.

The Organization of the Dissertation

The next chapter will review the literature pertaining to this investigation. I build an argument to support a view of postsecondary education in a networked information age and how the lock-in of education technologies and closed, top-down outcomes will not support the type, recognition of learning and access to lifelong learning that will be required. I describe the outcomes-based model in current postsecondary education, the way the college system recognizes prior learning, and how a shift to more choice and recognition of prior learning in courses and programs will support lifelong learning and credentialing and how these systems of control could be opened. I go on to discuss the kinds of emerging workplace needs and how they connect with formal education and how the system of education itself is a closed network. I then outline how educational technologies are not neutral in their effect on the system, but how they can be employed for the benefit of networked-based learning pedagogies. I continue by proposing steps to move towards a more open system of outcomes that will support the required lifelong learning endeavors in the coming years, not least in the aftereffects of the COVID-19 pandemic.

The literature review will be followed by the methodology chapter and gives a basis and rationale for the epistemological foundation of the research. I expand upon my research questions and go on to describe the mixed-method, descriptive analysis method I used to survey the participants as well as describe the procedure and project management of the research and how the data is displayed and analyzed. The methodology chapter leads into a separate chapter providing an overview of the research process and includes a description of the research ethics approvals and other organizational element to running the data gathering with the participants. I then provide the results of the data gathering by making extensive use of visuals and students supporting comments. The final two chapters in this study offer a detailed discussion of the results and the conclusions emerging from this discussion as well as recommendations for future practice.

Summary

In this chapter I used a metaphor for institution-wide education technologies like LMSs as walled gardens and how opening the walls of this garden are needed to enable more interaction with the wider digital world of students and how LMSs are representative of issues associated with educational technologies generally. I then illuminated how such technologies are only one part of a larger postsecondary context and learning system of which a key component is a student's level of control to effect and select the desired outcomes of a course of study. Moreover, there is an increasing emphasis on learning outcomes defined by the government, institution, or instructor that restricts the ability for students to influence their learning environment and the outcomes they wish to achieve. This drive for accountability seems to ignore the need for the system to be accountable to student needs and I go on to describe the importance of validating students' self-guided personal learning environments as a way to build strategies students will need throughout their lives. To ground these concepts, I give an overview of network-based learning theories that touch on the attributes digital learning enables and then outlined the core research problem and the questions that will be asked to investigate these phenomena. I closed by describing why this research is vital to all actors in postsecondary education and for how educators, administrators, and institutions approach the online teaching and learning system in the near future.

Chapter 2: Literature Review

Overview

This chapter explores the research and current debate around the key themes of educational technology within postsecondary education systems, notions of choice and control in learning, outcomes-based education models and the related systems for recognition of prior learning, and how these factors combine to limit the development of lifelong learning literacies to support the skills needed for fluctuating workplaces. I begin this chapter by outlining the provision of online learning in Ontario colleges and continue to discuss the concept of outcomes-based education and connect issues arising out of this to lifelong learning and how this is recognized and evaluated by the postsecondary system. The Colleges do not exist in a vacuum and I aim to connect how the workplace is changing in the information age and the extent to which the skills the colleges develop are relevant for the demands of employers. Following this I discuss notions of network-based learning, how this is actualized in emerging uses of educational technologies and how these can support lifelong learning literacies, open outcomes, and open educational operational systems. I then aim to bring these together to identify gaps in the data and knowledge and describe how I investigate the problem and add knowledge to these gaps.

The literature review relied extensively on peer reviewed journal articles, books and database searches through the Athabasca University and my workplace libraries. Database searches included JSTOR and Academic Search. Search terms were derived from the themes of the research, namely: LMS, Digital literacies, open educational resources, learner control and self-directedness, and learning design related to multimedia learning. Although not exclusively, I tried to cite scholarly works from open access journals. Furthermore, as an inveterate blog reader I discovered links to key works through recommendations from other scholars' public writing.

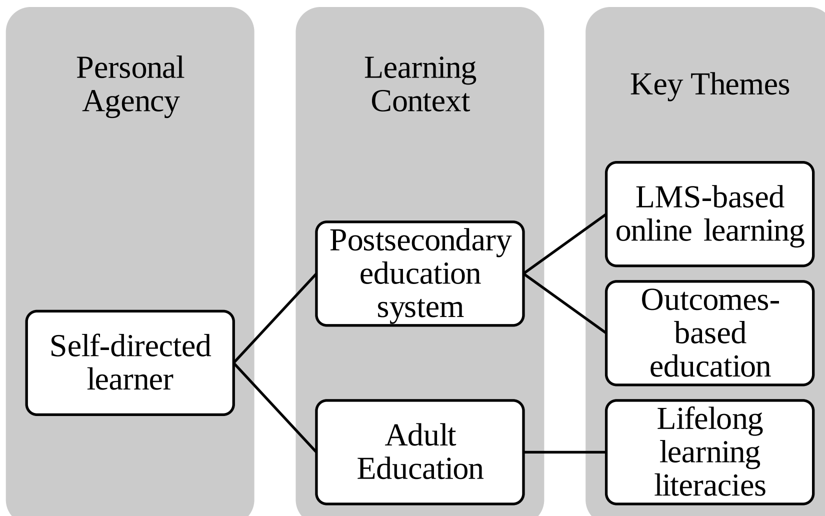
Last but not least I used conversations with colleagues and students in a community of practice I formed to investigate learning with digital technologies.

Identifying the Key Themes

This chapter expands on three core themes I have identified in my research. These are expressed in the figure below.

Figure 6

Core Themes Investigated



Note. This figure represents the three main themes in this research paper (Original, 2021). These build from the individual learner on the left towards the contexts within which they learn and then link to the themes characteristic of them that I describe in this chapter. Although much lifelong learning will increasingly occur online, I look at online learning in postsecondary education.

Together these themes form a complex interconnecting system beyond this research to investigate. However, I have identified three key obstacles within postsecondary education that, if overcome, I argue will enable learners to become more self-directed. These are the walled-garden LMSs central to the provision of online courses, top-down, outcomes-based approaches to education that limit student choice, and the capacity for lifelong learning experiences to be validated in a two-way, flexible manner that, when centrally managed by individual institutions can open access for adult learners to courses that can help them achieve their goals. To each of these themes, I also discuss the additional contextual factors of the education system and the future workplace post-pandemic and how these add additional layers of complexity. Towards the end of this chapter, I consider the data and knowledge gaps in these fields and identify the competing themes that may be limiting learners self-directed behaviour and planning. I will begin by describing how online learning is provided in postsecondary institutions in Ontario.

The Provision of Online Learning in Ontario Colleges

Ontario college students are increasingly taking online courses as the development of the Ontario Learn portal set up to support sharing online courses in Ontario's 24 Colleges can attest. As well as colleges developing online courses for their own students, since its inception in 1995, the Ontario Learn portal has grown to offer almost 1200 courses from over 500 programs to over 73,000 students (Ontario Learn, 2017). Ontario is also served by Contact North who have a remit to support access to education and training in remote communities, and eCampus Ontario with a remit to:

> develop and test online learning tools to advance the use of education technology and digital learning environments. (eCampus Ontario, 2020)

In recent years, eCampus Ontario has focused its attention on raising awareness and the use of open educational resources across the postsecondary sector. Furthermore, colleges have departments that focus on teacher professional development such as centres for teaching and learning. These departments aim to support instructors in designing courses that address the intrinsic differences in an online environment compared to a classroom-based environment such as the level of instructor presence needed to support students as they interact with complex content given that instructors are expected to bridge this gap as well as teach the content (Anderson, 2004). These increasingly vital departments also support the integration of digital technologies and universal design standards in online as well as face-to-face courses. If an instructor is looking for resources, ideas, or advice on course development it is possible to find it, mostly freely accessible.

Student Preparedness for Online Study. Although COVID-19 resulted in a pivot to remote teaching and learning, online course offerings had been increasing in Ontario colleges prior to this. However, this increase has not been met with any associated preparedness for learning online for students. New students in Ontario postsecondary education face struggles in acclimatizing to college for numerous reasons such as being the first of their family to attend postsecondary education, they are more often part-time, and enter less-prepared with a lower high school GPA on average than university peers (Fike & Fike, 2008). Many new students in Ontario colleges come from diverse backgrounds with different cultural conceptions of education and understandings of communication proficiency (Hyland, 2009). New students also enter college focused on studying content areas such as applied technology, business, or culinary arts; they do not enter college with online learning in mind, and nor are they prepared for it by their K-12 schooling although the lack of experience Ontario high school students have in online courses will change in the coming years as the Ontario Government institutes a mandate for all high school students to take two online courses (HEQCO, 2020). On entering college, students are expected to engage in higher literacy skills such as critical thinking and analysis as well as newer digital fluency skills, concepts and practices they have met in only a limited way in the

Ontario High School English curriculum (Ontario Ministry of Education, 2000), and rarely, if ever, in online contexts.

Graduating students are expected by Ministry mandate to possess employability skills such as communication, numeracy, information management, as well as interpersonal and personal skills. The skills are demonstrated through “analyzing, synthesizing, evaluating, decision making, and creative and innovative thinking” (Ontario, 2017). Many of the colleges take the essential skills framework further and embed these skills alongside subject-specific outcomes within all course outlines (Program Learning Outcomes, 2017) as well as identifying them in strategic plans when defining what success means (Humber College, 2013, p. 23). Such outcomes are defined by program instructors, administrators, and the Ministry of Training, Colleges, and Universities (MTCU) in Ontario and students rarely have input into shaping or defining these outcomes. Predefining outcomes is a particular issue in online courses as they involve significant advance planning, design, and construction within the LMS platform. The next section covers in more detail the concept of outcomes-based education (OBE) and the issues stemming from this model of relevance to this research as it becomes commonplace in postsecondary systems.

Outcomes-Based Education

Notions of control over what students are expected to know are also present in the Ontario essential skills framework and the increasing emphasis by institutions in clearly delineating and measuring learning outcomes on course, program, and institutional levels. A number of provincial organizations work with institutions to define these outcomes, for example the Ontario Quality Assurance Service (OQAS) and the Postsecondary Education Quality Assessment Board (PEQAB). In order to develop a new degree-level program, colleges must complete a PEQAB application within which all course outcomes must be aligned with program outcomes and relate institutional outcomes. There is no requirement in this document to provide space for outcomes the students may try to define for themselves.

Outcomes-based education (OBE) was originally conceived of as the community and institution working together to develop the skills and knowledge students need upon graduation (Donnelly, 2007) and have been present in the form of craft guilds outlining what apprentices need to learn since the middle-ages. OBE approaches emerge from a didactic tradition wherein the teacher sets the outcomes and is the knowledge purveyor and students are receptacles of this knowledge. Postsecondary institutions in Ontario are replicating the top-down model of these craft guilds although it is the instructor and institution that decide the outcomes students need to meet—not necessarily the community at large. The students are largely absent from these discussions. Malan (2000) outlines the core features of OBE approach as:

- Needs-driven: it aims to prepare students for the workplace and lifelong learning
- Outcomes-driven: the process is less important than the outcome and outcomes reside in all aspects of the syllabus.
- A design-down approach: outcomes are defined first, then learning content built around these.
- Specifying outcomes and levels of outcomes: for example, Bloom's (1956) taxonomy
- Shifting the focus from teaching to learning: teaching is student centered and facilitator oriented.
- Holistic in its outcomes focus: outcomes seek to speak to higher-level outcomes, such as critical thinking.

(p. 24)

In each of these features the student seems to be a passive participant. They also seem to contradict each other. For example, a facilitator-oriented approach should emphasize the *process* of students engaging with the content, but the *outcomes-driven* method deemphasizes process. Further, the outcomes aim to be *holistic* but conversely holistic learning outcomes that are created in a top-down manner by provincial governments also run the risk of being too generic and seen as ambiguous by instructors in how they instrumentalize them. For example, critical thinking is difficult to measure resulting in differing interpretations within and between institutions (Caspersen et al., 2017). Conversely, this ambiguity offers hope that individual instructors can also include student interpretations of outcomes.

OBE as a way to develop a program curriculum and to ensure each course outcome aligns to the overarching program outcomes and possibly institutional outcomes aligns neatly with the constructive alignment model of curriculum design described by Biggs (1999) wherein curricula are constructed of simple learning components separated from the broader complexity of their contexts and tightly aligned with learning outcomes and assessment that describe what learners do in order to learn. OBEs also enable institutions to publicly state what students will learn in programs which in turn can be seen to meet ministry demands on preparing graduates for the workplace as well as create pathways between programs and simplify transferal of credit between institutions (Tam, 2014). OBE thus supports strategic educational planning from a political and educational stance. All of these are well-founded and valid reasons for employing OBE approaches. However, consider a student in a program, hemmed in by multiple outcomes they are expected to meet, none of which they had any say in defining. What is important to the instructor, may be less so to the learner and this, again, reveals the top-down control of the learning environment. This approach also emphasizes outcomes at the expense of the learning process. Indeed, OBE models emphasize "being able to do' and eclipse the conceptual content" (Prøitz, et al., 2017, p. 32). It is within the process of learning that students conceive of their own emerging outcomes. Tam (2014) states that:

> From the operational perspective, assessment for outcomes could become too focused on the student's acquisition of skills and knowledge that other more important developmental outcomes over time are ignored (p. 9).

Further expanding on the value of including outcomes that may be emerging or even unknown Ewell (2008) comments that:

> Outcomes-based approaches are criticized for their constrained serendipity which presumes that all of the valued and important ways that a learner can construct meaning in the context of a particular discipline or ability are known in advance (p. 6).

OBE is a top-down approach to constructing a course of study. A student studying for a number of years in such a top-down model can be frustrated in their lack of agency in defining what they also feel is important in the learning process. They may equally become inured to being a passive receptacle of content and learn only what is needed to reach the externally defined outcomes and no more. This instrumentalist imperative could impede the likelihood of students developing the lifelong strategies, affective factors, and critical engagement increasingly considered essential skills (Blaschke, 2012). Ultimately, it is the individual student alone who has to make many of the critical decisions as they plan their career and life choices after graduating. OBE are, thus, impeding the qualities they intend to develop.

Complexivist Approaches to Emergent Knowledge. While maintaining the organizational benefits of OBE approaches during postsecondary education, it is also important to add an additional dimension to these top-down outcomes—that of the *unknown* or *emerging* outcome. In

OBE approaches to designing and delivering instruction there is assumed to be an alignment between the curriculum and instructional inputs and the outputs in terms of capabilities. The OBE model achieves this by reducing the complexity by isolating units of content to be learned from the broader field from which they emerge, as noted earlier in the description of Biggs' (1999) constructive alignment. For example, in language instruction this would emphasize pronunciation clarity while not paying attention to the social and cultural dispositions of the learners and the extent to which they value sounding like a 'Canadian'. In this example, instruction that respects a complexivist approach would involve also recognizing learner identities and encouraging individuals to find their own voice for communicating in English and not assessing this in a prescriptive way. By taking this approach, learner voices can emerge in a unique and probably unexpected way that retroactively defining how a person 'should' sound would not validate.

As in this example, OBE models that reduce this complexity out of the learning experience risk being oppressive and the question Gough (2011) asks is "who is reducing complexity for whom, and in whose interests?" (p. 9). Complexivist approaches to curriculum respect the gaps in between the inputs and outputs as a place of emergence of knowledge in unpredictable and unique ways and that education should be more than graduating with qualifications with the actualization rather than "subjectification" (Biesta, 2009, p. 40) of learners. Learning outcomes can be stated with confidence in programs and course outlines, however, learning outcomes are, to a certain extent, *unprestatable* because as a person learns the combination of their learning experience and acquisition of knowledge synthesizes into a unique combination of newly constructed knowledge phases and ideas on how to apply it. Stating outcomes at the start is a pragmatic organization practice, but not necessarily one that reflects the complexity of individual student learning. Such outcomes emerge as a consequence of the students unique learning journey and are separate from the main objectives that are aligned more tightly with the learning content developed by the teacher. Correspondingly, holistic outcomes incorporate the means in which learners think and practice, in particular the affective factors not usually accounted for in learning outcomes, and how these shape the result of the learning experience (Michelsen et al., 2017). Emerging outcomes are those wherein the student can reflectively define and measure their level of attainment as they choose and furthermore they are outcomes that exist outside the boundaries of the course or program, allow individuals to create, alter, or edit, and could be more accurately termed *open learning outcomes.* Online learning is uniquely positioned to support these unknown and emerging outcomes because the context, if so designed, offers the ability for students have the physical and temporal freedom to take new paths and make connections to discover content and to synthesize this with the teacher-provided resources and content. Conceptualizing online learning this way also fits with the representation of instruction theorized in Connectivist, Networks of Practice, and Heutagogy approaches to instruction and learning which will be described later in this chapter.

Outcomes-based Education and LMS Constraints. Constraints are omnipresence in all aspects of online learning from the digital platforms used, the instructional approaches employed, the digital literacies of the learners and teachers, accessibility issues such as poor internet, and the way curriculum may be delivered in lock-step chunks, 3 hours per week for a semester. Constraints described above in OBE models are also not necessarily bad. The model provides an organizational platform to help students and instructors organize learning, scaffold learning content and signpost future activities and key themes students need to be aware of in the field. Furthermore, as Ewell describes (2008), outcomes provide a common language and clarity to stakeholders about what it *does* which allows those who do not spend their time thinking about education with a way to enter the conversation. This common language has also enabled more clarity for students as it helps them align applications for prior learning assessment or transfer credits as discussed later in this chapter.

When developing a course of fully online learning the content is created and arranged in the LMS in advance of the course starting in a way that is not required in an in-class instructional environment. Advance preparation of the learning content in an online course in an LMS is necessary to some degree because it would be very time-consuming to build and provide the learning content in an LMS as the course progresses and as Selwyn (2007) notes “Many courses are administered and presented in highly structured virtual learning environments” (p. 86). This is true of an in-person class of course, and much advance work is also done in this modality, but there is less work involved in making changes during the course as it is unlikely to involve things such as the re-coding of html activities, embedding new input like videos and texts, as any changes the teacher needs to make, also need to be made in content living in the LMS. Furthermore, particularly in an asynchronous modality, the instructor may wish to provide all the content in the online course in advance so students can work through this at their own pace. Changes mid-course in this scenario may result in some students missing or doing unnecessary work. Additionally, the most popular LMSs lead the instructor to organize the learning content in pages or modules and require clear descriptions of what is to be achieved and worked on — else the instructor may get constant questions about what activities need to be done and how. This leads to significant structure created by the instructor in the LMS which is further regulated if the institution required outcomes to be stated and measured in all courses. Such extensive structure in LMS-based online courses may be stifling the likelihood of unknown or emerging outcomes to become manifest and valued and, as instructors interviewed in a European study who were redeveloping their courses in an OBE model noted:

> Whilst clarity was valuable, it was only possible and desirable to explain some of what was to be learned. At some point, students must make sense of things for themselves. There was a sense that efforts to specify how students were expected to perform could go too far, to become ‘spoon feeding’ or encourage a ‘tick box’ approach to the course. (Sweetman, 2017, p. 50)

Such a tick-the-box approach to achieving outcomes within highly structured online learning environments does not facilitate the kind of essential skills strategies and attributes employers are asking for. In order to overcome these constraints two attributes for future online learning systems will be to facilitate personalization and collaboration. These can only be effective if students have some level of choice in who, what, where and when they collaborate with and how they choose to personalize their environment.

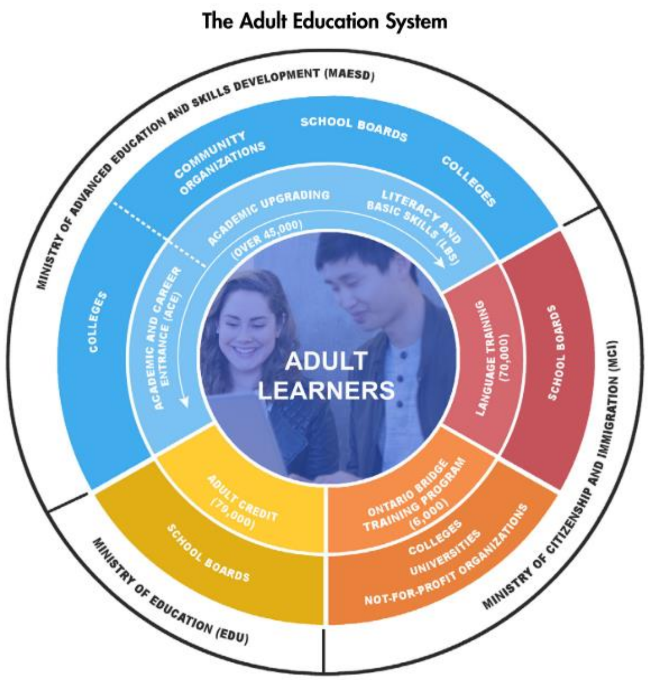
In the next sections I will describe notions of lifelong learning and how these link to control and any associated constraints. I will also consider how the postsecondary system impedes lifelong learning through practices that limit recognition of prior learning and recognition of previous study through admissions and registration routines.

Lifelong Learning and the Postsecondary Education System

Lifelong learning describes the self-directed informal or formal learning for professional or personal reasons pursuit of knowledge or skills. In formal education this includes the provision of adult education, typically through continuing learning course or workplace training and offered through higher education, school boards, community organizations, and the private sector. Adult learners are typically considered as those who are 19 years plus and the courses and services are primarily offered to those who need to complete their secondary school diploma, upgrade their language skills, access specific postsecondary courses and programs, and recent immigrants who wish to gain recognition of their qualifications and experience. Language and literacy are clearly vital foundations for employment in Canada, however, I am not focusing on this area in relation to lifelong learning as it can be seen as a prerequisite to successfully taking part in society at large. In this section I focus on those who are looking to access college programs and courses for the purpose of retraining and upgrading skills. Figure 7. below gives an overview of the network of operators in Ontario.

Figure 7

The Adult Education System in Ontario



Note. This figure shows how different ministry portfolios manage different adult learning. The federal ministries fund and manage language and literacy and bridge training, and the provincial ministries support their public sector and community organizations. The largest of the groups is provincial, with the largest part being adult credit courses at 79,000 per year. Language and literacy under the remit of the federal government is also large at 70,00 participants per year in Language Instruction for Newcomers to Canada (LINC). (Ministry of Advanced Education and Skills Development, 2017, p. 15).

All public postsecondary institutions in Ontario offer continuing education (CE). In some institutions this is centralized into a department whereas in other institutions each Faculty or department is responsible for developing and offering courses. In most cases, the registrar's department manage the enrollment, credential assessment and recognition, and student admissions for CE. The focus of adult education in Ontario has been to bring adult learners into the formal education system and into upgrading, undergraduate, or graduate programs in specific institutions and not necessarily on a form of lifelong learning that offers a high degree of flexibility in time, place, self-selection of courses to build a personalized program of study for a purpose defined by the individual. Rather, the model remains top-down and recognition of what is valuable is owned and selectively applied by the institutions. The complexity of work in a knowledge economy that is unpredictable in how it will change will necessitate adults taking more control of their own lifelong learning in order to be competitive in future niche areas in their field. The current model in postsecondary continuing education does not scale to the extent it could or allow the flexibility to offer this. Although the foundations of distance education were targeted to adult learners (Simonson, 2009) and online course and credential provision in CE departments have risen alongside the rise in provision in non-CE programs, online learning in current CE offerings still run on semester models such as number of weeks, hours of study cost per course, largely mirroring the postsecondary model but without the credits. The flexibility of learning at a distance has not yet been widely recognized as central to innovative CE programs that break the temporal and physical barriers of access. This may be because CE departments are considered revenue generating departments in institutions and this profit incentive has resulted in more entrepreneurial and profitable brand-building with offerings such as corporate training where institutions partner directly with businesses for training. Nonetheless, there are movements in stackable and microcredentials that offer the promise of innovative access to adult learners.

Microcredentials. A microcredential is a certification consisting of a short course, or combination of courses, typically offered online or in a hybrid modality to address a specific skill area a participant plans to upgrade. It does not necessarily lead to a credential, however the concept of earning badges is closely linked to microcertifications. A key issue with microcredentials, or microcertifications, has been how to recognize these within the current system which is tightly bound by enterprise software that is not flexible enough to recognize courses that do not fit in the semester or credit hour system and thus how to charge and validate the learning. eCampus Ontario, an organization that supports eLearning in Ontario, provide a microcertification framework for institutions (eCampusOntario, 2019) which consists of a set of principles and a framework for institutions follow so that the Ontario postsecondary education system agrees on the purpose, development, and recognition. It specifically states this is an outcomes-based model based on the European Skills/Competencies, Qualifications, and Occupations classification (ESCO). eCampus Ontario also frame the need for microcredentials as supporting lifelong learning in a rapidly changing workplace:

> In today's fast-changing workforce and emerging gig economy, a nimble recognition system is essential for both professionals and employers, who are increasingly moving towards skill or competency-based hiring. (eCampusOntario, 2019)

These few words connect the tension at play in outcomes-based education and the role of education in society and rapidly changing workplace. Microcredentials are seen as a way to resolve this and offer adult learners flexibility; however, eCampus Ontario and the postsecondary system still centre the top-down OBE model they control over the independence of learners to negotiate or define their own outcomes. As microcredentials have the potential to be stacked to form a series of courses leading to a program these top-down outcomes are necessary to manage how courses stack. Adult learners will want to have a say in how they stack microcredentials or any credentialed courses they take in CE to form a program of study that suits their niche need. The structure of such flexible programs is controlled by the institution not the learner and the only outcomes validated are those defined by the institution. This places control with the credentialing organization and their view of what the student needs to achieve, in spite of the fact they may not be in the best place to state what niches the different learners aim to work within. Some level of enabling negotiation of outcomes, or partly self-defined outcomes, is needed as microcredentials expand their reach within and between institutions.

It is this inter-institution network, or rather lack of it, that I turn to next as I describe two mechanisms adult learners can use to validate their professional and previous study experiences, namely, Prior Learning Assessment and Recognition (PLAR) and transfer credits.

Recognizing Prior Learning. The focus on PLAR is on students to produce evidence of their learning often consisting of an application form combined with an electronic or paper portfolio of evidence that may include professional work, non-credit professional development activities, evidence of studies in other countries, and other projects the individual may have been involved with. Typically, the student will pay the institution to which they are applying to have their PLAR recognized. PLAR approaches align closely with outcomes- and competency-based education. PLAR is far more robust in Canadian open access institutions such as Thompson Rivers University and Athabasca University both of whom who have an approach to PLAR that also include challenge exams and transfer credit (McGreal, Anderson, & Conrad, 2015). Transfer credits are another method that adult learners can employ to build recognition of individual courses that can be used to construct further training. An issue with transfer credits is that there is often argument that if the course is not almost exactly the same in terms of the outcomes described then it will not be transferred. The only realistic way to assess this is to view the course outcomes, and as explained in this paper, the outcomes do not often reflect the full extent of a student's learning experience. This can lead to the situation of a first-year course that a student may have taken years before not being considered equivalent to a similar first year courses in the same subject based only on the list of outcomes each institution and department has defined. The weight of proof resides not with the student but on a series of outcomes or policies they do not have an opportunity to control for their unique background.

I refer to notions of control of learning outcomes in this paper and I focus on how this can happen in online courses. However, control of your own personal life data and experiences is an important extension of the openness debate and one that has significant benefits to the current system which where the burden of proof, and cost, is on the student every time they access the system. The next section discusses the extent to which self-directed behaviour in formal education settings can enable students to take control of their learning.

Choice and Control in Learning

A student can have choice but no control in their learning. Many types of educational software offer a somewhat Hobson's choice of activities, with the flow of the activities leading to a pre-defined outcome. Moreover, for a student in an online course, control is illusory as the teacher provides learning content usually built into the learning platform in advance of the course giving student has little control over the pathways their learning could take unless empowered in this by the instructor's choice of instructional approach.

Choice and Goal Setting. Choice can be aligned with goal setting where the goal is an outcome one is consciously trying to attain. Locke & Latham's goal-setting theory (1990) describes human action as purposeful and to create the purpose goals must be consciously set and thus choices made. Goals differ in specificity, difficulty and commitment and a high level of commitment to reaching a goal is correlated to a person's expectation of achievement consequently leading to increased motivation. Goal-setting theory is important in education because of how it may affect performance, indeed, Hattie's Visible Learning research shows that goal-setting, whether longer-term or immediate, has a significant influence on learning outcomes (Hattie, 2018). Clear goals can allow people to focus on the goal in hand rather than less relevant tasks. For example, an easy distraction in online learning is to open another browser window and read the latest social media posts. Importantly, deciding on clear goals allows people to plan appropriate strategies to attain them (Schunk, Pintrich, Meece, 2002). Conversely, offering unlimited choice in accessing resources without some scaffolding or guidance from the teacher can stymie students as they may have too many choices to make and thus not make a serious effort to think through the choices they are making resulting in a paradox of choice wherein too many choices can frustrate students (Schwartz, 2004). This is a concern for a more open learning environment that may not be designed with sufficient teacher presence. Kirschner and Merriënboer (2013) use the term shared control and define it as:

> Shared control is a two-step process, in which the teacher or coach first selects from all available learning tasks a subset of tasks with characteristics that fit the needs of the learner. (p. 178)

Moreover, the theory of cognitive load (Paas & Sweller, 2014) argues against minimal guidance and increased choice because a self-guided student needs to manage the concepts or content they are seeking out to learn and the mental work involved in actually seeking and filtering the aforementioned concepts or content: work teachers typically do for students. Rather more succinctly, Dron (2007) points out that it is unlikely anyone could master a field without the help of others. Dron goes on to say that student autonomy is not a characteristic present throughout a course of study and that it is as much choosing what to delegate to others as making choices for oneself (p. 44). A student making choices for themselves can be described as exhibiting self-directed behaviour. Self-directedness as a trait that learners can develop arose from humanistic learning theories and is outlined in the next section.

Self-Directed Learning. Humanistic theories which value holistically viewing an individual in terms of their behaviour, thoughts and feelings are rooted in a psychological tradition opposed to behaviorism which views human actions as specific responses to stimuli (Schunk, 2012). Early humanistic thinking saw developing a lifelong relationship with learning as having democratizing possibilities (Draper, 1998). Humanistic learning theories also emphasize the concept of self-actualization which is defined as being independent, having positive relationships with others and having some kind of external passion or cause (Candy, 1991). It is this individualistic view of social progress that formed the foundation for much adult education thinking.

This emphasis on the individual within society coalesced with the notion of adult learning as an inherently political act. From here it led to a reconceptualization of adult education as andragogy and how this entailed a movement from dependency to self-directed learning (Knowles, 1980). Mezirow (1981) argued that andragogy itself must be defined as a field that facilitates learners to become self-directed and Brookfield (1993) advanced self-directed learning as an emancipatory and political activity in that the locus of control lies within the individual. Self-direction does not necessitate the elimination of the teacher or expert. Rather, calling for the complete removal of the teacher was never advocated by Knowles, Mezirow, or Brookfield as they saw the teacher as being required in some cases perhaps as the content provider or facilitator. This touches on notions of control. A successful learning experience in a self-directed online learning ecosystem is linked to the ability to make decisions and to define and recognize their outcomes.

Control. A concept linking humanistic theories with andragogy and self-direction is the notion of control. An important theory of control and student autonomy in distance learning, such as student self-selection of resources outside the course LMS, is Moore's (1980) theory of transactional distance. This theory emphasizes teacher-student communication as a pedagogical and structural issue, not physical distance, as the factor to overcome in learning at a distance. Dron (2007, pp 28-29) expands on transactional distance by describing it as transactional control. Control in this form is a subset of transactional distance and emphasizes the communication and interaction gap over psychological traits associated with distance between educator and learner. These traits could be the lack of paralinguistic features such as body language, facial expression, and tone of voice that give an educator visual cues of student responses to events in a classroom environment or motivational factors. Such traits are not considered unimportant, merely that choice and time, the core elements within transactional control, are highlighted. Choice and time are assessed relative to the position and constraints placed on the learner in a given educational system. Dron stresses here that it is ideally the learner making the choices in the learning environment, thus echoing self-direction. Paulsen (1993) developed six Cooperative Freedoms over which students may be free to exert control in their learning environment.

- Place: freedom to choose where one learns
- Time: freedom to choose when one learns
- Pace: freedom to choose how fast or slow one learns
- Medium: freedom to choose the media used for learning
- Access: freedom to learn regardless of qualifications or extrinsic obstacles
- Content: freedom to choose what one learns, from what source

(Paulsen, 1993)

Notably, these freedoms do not include the freedom for a student to define their own learning outcomes and the manner in which they want to measure the success of these outcomes. However, these were developed with more formal learning contexts in mind. To account for increasingly distributed and social learning contexts, Dron and Anderson (2014) eliminated Paulsen’s access, and added five additional dimensions:

- Technology: freedom to choose the tools with which one learns
- Method: freedom to choose the approach and pattern of learning
- Relationship: freedom to choose with whom one learns and how to engage with them
- Delegation: freedom to choose whether and when to choose
- Disclosure: the freedom to decide what and to whom it is revealed

(Dron & Anderson, 2014, Pp. 66-70)

An awareness of the settings where students can exert a level of control will be valuable as educators and students expand online learning networks outside the LMS. Educators can design learning experiences that make use of open, interactive, social, and multimodal resources as well as designing courses that offer more choices and facilitate the ability for students to exert more self-directed behaviour in their learning environment. However, students do not learn in a social and cultural vacuum and other factors such as motivation and the relative level of agency play a role. Furthermore, full control, and thus choice, may be illusory as students are still functioning and making choices within a culture that has demarcated how it “manages the creation, organization, distribution, legitimization and storage of knowledge” (Gremmo & Riley, 1995, as cited in Hoven, 1997a, p. 175). Moreover, students bring their own affective characteristics and previous learning experiences to formal education systems. The cognitive learning theories of expectancy-value, goal-setting, and self-regulation strategies speak to this.

Expectancy-Value, Goal-Setting, and Self-Regulation. Opening up the walls of LMSs presents more choice to instructors and students. Goal setting and expectancy-value theories can offer strategies that help overcome the paradox of choice and support self-directed behaviors because with pre-defined goals and a perception of success students are more likely to limit the paths they need to go down to reach their learning goal. Goal-setting theory is a set of completion, reflection, and performance strategies that successful students learn to utilize in order to achieve their goals (Schunk, Pintrich, Meece, 2002). These strategies are further defined in expectancy-value theories. Humans are assumed to possess an innate urge to learn and overcome challenge, so humans are inherently motivated. The basis of expectancy-value theories is therefore what directs and shapes this motivation (Dörnyei & Ushioda, 2013). Expectancy-value theories direct our choices, but we construct our own idea of value by remembering our previous successes or failures and making conclusions about future success or failure. Such attributes can be divided into controllable factors of effort and mood and the uncontrollable factors of ability, task, and family (Dörnyei & Ushioda, 2013; Schunk, Pintrich, Meece, 2002).

Control of effort and mood in this context links to the concept of self-regulation. Self-regulation is a set of strategies students can employ to manage affective and organizational factors in their learning experiences. Self-regulation involves goal setting and reassessment of these goals over time. The reassessment process feeds into self-efficacy, or how a person perceives their capabilities: in other words, expectancy of success or failure. By progressing, learners build and develop self-efficacy and this sustains motivation (Schunk, Pintrich, Meece, 2002). The goal setting and reassessment strategies within self-regulation suggest the ability of a learner to change the way they approach their learning. Some factors students cannot change are their developmental level, or age, their innate ability in the specific field and their personality as well as the reality of their previous learning experiences (Hoven, 1997a, p. 140). Notwithstanding this, students can change some factors and Hoven (1997a) comments that metacognitive factors such "attitude, motivation, possibly learning and cognitive style, and learning strategies are more open to influence." (p. 140). Self-regulating strategies students can employ attempt to address these changeable factors regardless of the level of control a student has in their learning environment.

An example of software that engages students in self-regulated behaviour, particularly in relation to motivational factors is Guerra, Hosseini, Somyurek & Brusilovsky's (2016) Master Grids system. The Master Grids system is an interface designed with social comparison features to enable students to see their progress through practice exercises in computer science education. The interface allows students to see how they are doing compared to other students and the class as a whole. This information appeals to both extrinsic and intrinsically motivated students. Furthermore, the exercises are adaptive as the student works through them and provide activities that a student does in a self-directed manner, such as worked examples, visual animations, and activities that reveal to students the process in working through the development of a computer program.

Affective factors are of profound influence on student success. This success is inhibited by an over-reliance on outcomes-based approaches to learning that favour instrumental attitudes to digitally enabled learning. Lifelong learning is increasingly important in the information age as individuals negotiate workplaces that exist in a deskilled gig-economy alongside a rise in knowledge or mental labour. As colleges are applied learning institutions with a primary remit to prepare individuals for the workplace, larger economic factors will dictate what the future of college applied education looks like and the next section gives an overview into the rise of a networked, information and knowledge-oriented labour force.

The Workplaces of the Future

Up to the latter part of the twentieth century the economy was described as the industrial age. Since the 1970s onwards the rise in information technologies has led to the economy to be described as the information age. The digital information technologies that enabled this have not evolved to enclose economic activity in multiple and separate entities but as a profoundly interconnected network. As such, it is the interconnectedness of the network, one that superimposes national borders and power structures, that frames everything going on in the global economy. As Castells states in The Rise of the Networked Society (2009):

> Information technology does not evolve towards its closure as a system, but towards its openness as a multi-edged network. It is powerful and imposing in its materiality, but

> adaptive and open-ended in its historical development. Comprehensiveness, complexity, and networking are its decisive qualities. (p. 76)

An example of how new economic activity is created in the information age can be seen in the internet industry itself which Castells (2009) describes as currently consisting of four major parts: internet infrastructure, software developers developing infrastructure applications, software as a service and web services like social media that derive indirect revenue through advertising, and lastly e-commerce companies. An additional layer known as surveillance capitalism is now also emerging. The logic of surveillance capitalism is that of using the human experience as “free raw material for translation into behavioural data” (Zuboff, 2019, p. 8). Some of this data is used to improve the software it is collected through; however, the rest is:

> *Behavioral surplus* that is fed into advanced manufacturing processes known as “machine intelligence” and fabricated into prediction products that anticipate what you will do now, soon, and later. This data is then traded in a new kind of marketplace for *behavioural futures markets*. (Zuboff, 2019, p. 8)

Surveillance capitalism is a direct result of the logic of the hyper-connected networked society and presents a risk to what it means as a human, and thus an employee, to be part of the interconnectedness of the networked economy as organizations and power seek to either profit or protect themselves from surveillance.

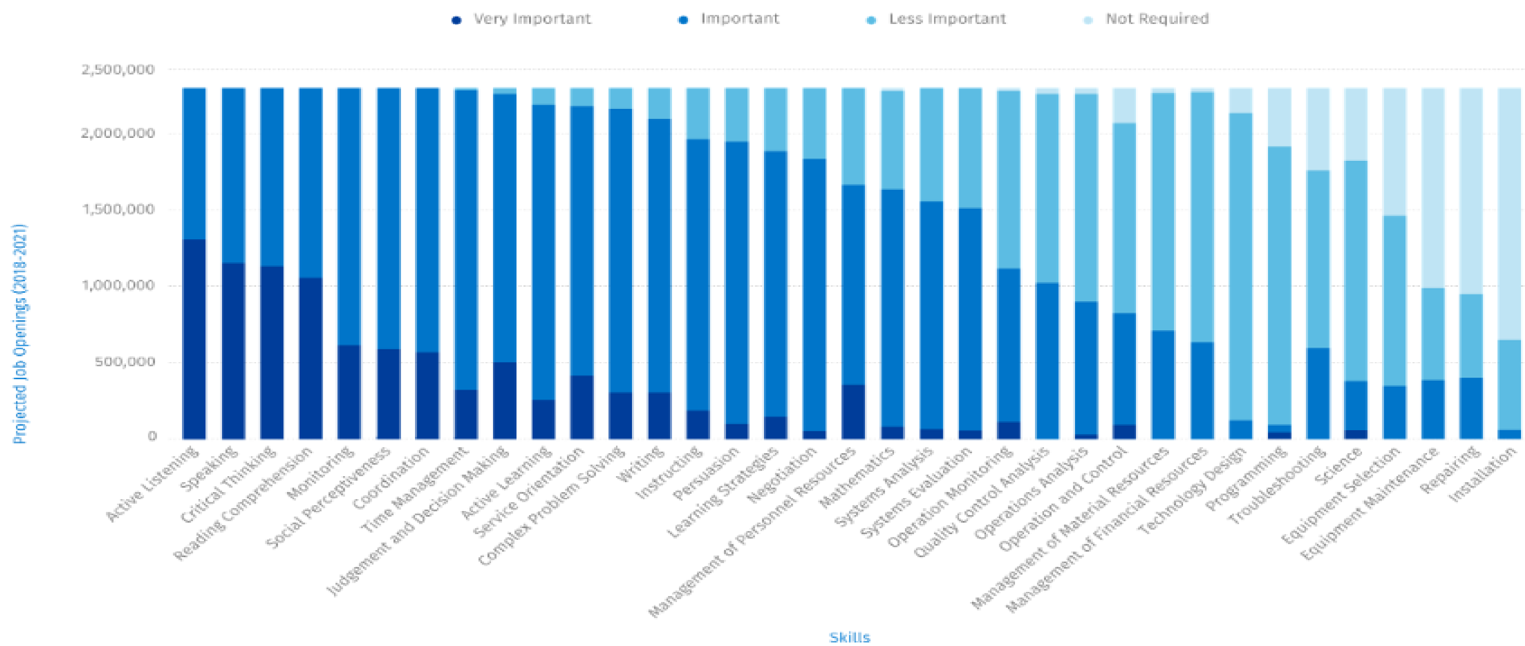
Employment opportunities in this networked society are knowledge-based (Castells, 2009) and are the management, professional scientific, technical, financial, and administrative services that, as I will outline in the next section, have also been the least affected in the COVID-19 pandemic because their work now exists to support the innumerable interactions within the networked society. An example of the rapid shift to e-commerce that may not be completely reversed is that of Shopify which grew 62% between March 12th and April 24th 2020, compared to the previous 6-weeks during the first lockdown phase of the pandemic while at the same time becoming Canada's most valuable public company with assets of $1.58 US billion, up 47% on the previous year (Silverberg, 2020). Moreover, much of Shopify's workforce will be now work from home and they are discarding much of their office infrastructure. Because eCommerce removes the need to staff stores and the services that support such practices, this example encapsulates the type of jobs that were most affected were the office real estate, tourism, food, manufacturing, and agriculture sectors—sectors which are increasingly insecure and prone to deskilling in the service economy model in Canada (Castells, 2009). However, communication skills remain central as the nature of these new jobs in the networked economy require:

> Cooperation, teamwork, workers' autonomy, and responsibility, without which new technologies cannot be used to their full potential. The networked character of informational production permeates the whole firm, and requires constant interaction and processing of information between workers, between workers and management, and between humans and machines. (Castells, 2009, p. 262)

Thus, employers are increasingly communicating the need for essential employability skills as well as the vocational skills Ontario colleges support (Beletzan et al., 2017). Figure 8 illustrates the types of essential skills employers will increasingly demand:

Figure 8

Projected Skills Demand for all Occupations in Order of Descending Importance



Note. To compile this data the Royal Bank of Canada conducted research using the Canadian Government National Occupation Classification (NOC) data, and United States Department of Labour O*NET data and assessed nearly 20,000 skills sets across 300 types of occupations accounting for 2.4 million jobs in the coming four years. Qualitative data was gathered through interviews with over 30 individuals within education, and 54 employers (RBC, 2019).

Further reflecting the demand for essential skills, the RBC data in Figure 8 reveals the demand for foundational skills such as active listening, speaking, reading, and writing, as well as critical thinking, and organizational and problem-solving skills. Further evidence of this comes from independent bodies such as the New Media Corporation who produce annual reports that identify areas of emerging technology in education technology. From this data they comment that:

> A primary goal of higher education is to equip students with the skills they need to be successful in the workforce and to make an impact on the world. A recent study conducted by the Association of American Colleges and Universities revealed employers' sentiments that recent graduates should be more prepared in vital areas such as critical thinking. (Johnson, et al., 2016, p. 70)

Colleges are designated applied learning institutions and as such teach subjects that require a significant mastery of routines, tools, procedures, rules, regulations, and safety aspects. Yet, as the Ontario MTCU mandates, and the networked society seems to necessitate, there is an additional requirement in Ontario colleges to extend the educational focus from an emphasis on vocational mastery and to develop the essential skills employers are increasingly expecting graduates to possess. Large parts of the labour force have been negatively impacted by the COVID-19 pandemic and this will have as yet unseen ramifications on the economy and the jobs and activities that materialize. The next section looks at some of the emerging data.

The Ramifications of Covid-19. Whether alarmist or considered, there is little disagreement that COVID-19 will have both immediate and long-term effects on the workplace and postsecondary education. In education, the pivot to remote teaching will have meant students, instructors, and institutions coming to terms with education technologies and teaching from a distance for the first time and the positive and negative experiences associated with this. An immediate ramification of this has been the increase in job postings for instructional designers and education technologists. Eventually, courses will return to face-to-face, but there will be many courses available to teach in an online modality instead of, or as well as, face-to-face. This could result more choice for students in the type of modality they elect to take. One issue with this is that in applied learning institutions it will likely be the less applied courses being asked to make their courses available online. This could lead to institutions working together to jointly develop and offer across the province the required liberal studies, academic writing, and math courses. Because transfer credits already exist for many of these in databases the argument will be that institutions should share resources and work at scale to offer these across the system. As Colleges report directly to the Ministry, it is possible this could be mandated—especially as all intuitions have significant deficits because of the loss of students and a drop in provincial funding. With the content and outcomes being defined even further away from students, this is not likely to result in more student-defined outcomes.

In the labour market, Statistics Canada (2020) data from July 2020 reveals that in June 3.1 million workers were affected, the accommodation and food services industries were the largest affects at a 66% employment rate compared to pre-COVID. The least affected were professional scientific, technical, financial, and public administration services who were at 97-99% employment compared to pre-COVID. In Ontario, the provincial government released figures for June 2020 that show the occupations that lost jobs were:

- sales and service (230,700)
- trades, transport and equipment operators (71,000)
- art, culture, recreation, and sport (51,700)

And the occupations that gained jobs:

- natural and applied sciences and related (27,100)
- manufacturing and utilities (26,500)

(Ministry of Labour Training and Skills Development, 2020)

Furthermore, the data shows that those without postsecondary qualifications were twice as likely to have lost their job in this period. The reason for this may be that those with postsecondary qualifications work in industries where physical distancing or home working were possible or that they do not rely on direct client contact. Women have been more affected than men in all age demographics by at least 3% points—the difference for those under twenty-four years old being larger. This data is from June 2020, when much of the lockdown measures had been lifted. It is thus possible to predict that these figures may not change significantly until vaccines have generated community-wide immunity.

The experience of the pandemic is likely to result in more acceptance of flexible worktime and location with more on-the-job training being run remotely leading to a rise in online professional services and inter-provincial employment opportunities that were only available to those based in the larger cities. What governments will need to address is bringing those aged under thirty, who tend to be single, without children, and lower levels of education back into the jobs that do eventually reappear. This could take years during which this group of Canadians will look to upgrade and retrain to enter those jobs that do flourish. These individuals may not be able to afford the time and cost of formal, full-time programs as they will have rent to pay. The current postsecondary education system needs to plan to help offer the flexibility in courses and open access in terms of enrollment and recognition of prior learning as well as enabling a level of negotiation of how they wish to study to rejoin the labour force. It also needs to support the development of the literacies that lifelong learners need to hone for success in the knowledge economy. The next section outlines what these literacies consist of.

Lifelong Learning Literacies

Throughout this paper I have described a set of skills and literacies that employers will increasingly expect in the knowledge economy. I define lifelong learning literacies (LLLs) as a set of communication, reflective, selection and organization skills sustained by the cognitive skills of goal-setting and self-regulation necessary to support the construction of knowledge in a self-directed online learning experience for personal or professional needs. In this section I will describe what these skills and literacies consist of.

All of these literacies and skills can be actively learned or improved and applied by an individual as needed. The cognitive skills of goals-setting and self-regulation are more complex to learn as they are likely to involve a change in learning behaviour; however, they form a foundation for the other literacies to work effectively. MTCU outlines the criteria for essential skills graduates are expected to achieve in the Ontario postsecondary system and are shown in the table below (Ontario, 2017). These outcomes inform program planning and development as colleges are required to provide evidence of how these skills are attained in graduates. Although lifelong learners may not take full programs, individual course, and microcredentials they may take will still be informed by this outcomes-centered approach.

Table 1

Essential Employability Skills

Skill category	**Learning Outcomes: The levels of achievement required by graduates. The graduate has reliably demonstrated the ability to:**
Communication	communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience. respond to written, spoken, or visual messages in a manner that ensures effective communication.
Numeracy	execute mathematical operations accurately.
Critical thinking & problem solving	apply a systematic approach to solve problems. use a variety of thinking skills to anticipate and solve problems.
Information management	locate, select, organize, and document information using appropriate technology and information systems. analyze, evaluate, and apply relevant information from a variety of sources.
Interpersonal	show respect for the diverse opinions, values, belief systems, and contributions of others. interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals.
Personal	manage the use of time and other resources to complete projects. take responsibility for one's own actions, decisions, and consequences.

Note. The content of Table 1 is adapted from the Ontario Ministry of Colleges and Universities website (Ontario, 2017) and outlines the 6 skill categories and an overview of the outcomes expected upon graduation.

These skill categories align with my definition of lifelong learning literacies as follows:

- Lifelong learning *reflective* literacies are present in the outcomes linked to essential personal skills

- Lifelong learning *selection and organizational* literacies are present in the outcomes linked to essential information management skills
- Lifelong learning *goal-setting and self-regulation* literacies are present in essential critical thinking, problem-solving, and personal skills.

Goal setting and self-regulation were described in more detail earlier in this chapter. These are strategies that can be learned and applied as needed. They are significant as they form the foundation for selection and organizational skills which can be iteratively honed through reflection and the subsequent reformulation of goals. These literacies are often stated as learning outcomes in liberal arts and humanities, although they tend to be relegated to lower outcomes compared to critical thinking. Critical thinking is hard to measure in instructional activities (McMillan, 1987); nonetheless, an individual who is able to set goals, organize the resources and take actions to achieve these, then reflect upon them, revise as needed, and subsequently communicate the outcomes, could be said to be employing aspects of critical thinking.

The research question associated with investigating this area asks to what extent OBE models in online instruction in LMS are *inadequate* for developing LLLs.

As noted earlier in this chapter, OBE models emphasize the learners being able to do something, which is aligned to assessment that provides the student an opportunity to show to the instructor what they can do and relegates conceptual learning in the curriculum (Prøitz et al., 2017). As also noted, busy students are less likely to pay attention to work that is not being assessed due to the way OBE models lead to more instrumental approaches to meeting the outcomes. Conceptual learning is central to the liberal studies electives the participants in this study are taking, for example learning that requires the LLL skills of critical assessment and reflection such as in philosophy-based courses. Conceptual learning is also central to *disciplinary* *knowledge* (the way someone thinks and understands the intersecting complexities in their field), which, in a College OBE model, is also deemphasized in the place of being able to show the applied skills and knowledge required to perform the job (Prøitz et al., 2017). An example is offered by Michelsen, Vabø, Kvilhaugsvik, and Kvam in a 2017 study comparing how learning outcomes were shaped and understood in engieering, medicine and humanities programs. They found that although these fields tended to develop objectives, not outcomes, that focussed on what is being done in the course *not* the outcomes of the course, the medical and engineering programs also aligned with external requirements linked to profesisonal practice and bodies. This differed in the humanities which do not teach into specific careers. Here, developing the outcomes was seen as meeting management and institutional needs, not student needs – in part because there was not a clear alignment to a specific career or professional body. This is perhaps because the OBE model is driven by evidence-based, scientific notions of assessing learning that does not align well with the measurement of conceptual knowledge (Biesta, 2007).

This conclusion points to how OBEs are inadequate for developing LLLs in the humanities fields – the field my institution has defined as central to developing these essential skills. This is perhaps because institutional imperatives in requiring outcomes based on the scientific measurement principles of OBE models did not emphasize the conceptual knowledge and thus the interpretation of this knowledge both by the instructors and the students. Teaching critical thinking and reflective skills must surely also entail students being able to choose and work towards their own interpretation of the outcomes.

Although numeracy and communication skills are germane to LLLs I have not emphasized these in my definition of LLL as they are relevant to most formal education experiences. Interpersonal skills are also central to success in online lifelong learning, however, developing these is highly individualistic and challenging to develop after formal education. Reflection, organization, and goal-setting literacies are particularly valuable in lifelong learning endeavours to motivate and engage on a path of self-directed study. Furthermore, they are the literacies that enable an individual to develop a sense of their own learning outcomes and to be able to negotiate these in a formal learning context.

As a foundation to the solutions I propose, the next two sections outline the concepts and theories behind networked-based learning, and the kinds of emerging uses of technology in education.

Networked-Based Teaching and Learning

Earlier in the chapter I referred to learning outcomes as *unprestatable*, and how emerging outcomes describe the nature of personally constructed acquisition of knowledge during a course. This describes a *phase state* in knowledge. The notion of a phase state, although originally applied to engineering, has also been used to describe ecological evolution. As described by Longo, Montévil, & Kauffman, a phase state is:

> Ever changing, intrinsically indeterminate and even unprestatable: we do not know ahead of time the “niches” which constitute the boundary conditions on selection. (2012, p. 2)

More succinctly, as something evolves it is as much affected by its environment as having an effect upon it, thus changing the direction of its evolution as it creates a new (and constantly changing) niche and what constitutes the new boundary conditions. I apply it here to the notion of how a student’s knowledge develops in a course and why learning outcomes are, in part, unprestatable. This has consequences on where knowledge resides and who may own it in network-based environments. As knowledge is emerging, it appears within the network as the student makes connections (Hase & Kenyon, 2000). In such cases ownership of knowledge is transitional as the student will build new knowledge from their pre-existing knowledge. Ownership is related to the extent to which the knowledge is communicated, and by whom. Manuel Castells (2009) states that cultures are made up of communication processes. He refers to this as real virtuality and comments that:

> All forms of communication, as Roland Barthes and Jean Baudrillard taught us many years ago, are based on the production and consumption of signs. Thus there is no separation between "reality" and symbolic representation. (Castells, 2009, p. 403)

Because such meanings in language are imprecise and ambiguity is thus encoded this allows a diversity of interpretations that differ language from formal logic and mathematical reasoning (Castells, 2009). In this way, knowledge only becomes 'owned' when access to it is controlled by a system. Concepts of networked-based learning argue that knowledge is distributed in the network, and that meaning is present in artifacts with which we engage and through which meaning is made. Portrayed this way, knowledge is as much external as internal.

Three concepts that endeavor to inform how learning may occur in interconnected and distributed e-learning environments are Connectivism, Networks of Practice, and Heutagogy. These descriptions of what may be happening in distributed learning contexts may also inform what is happening in personal learning environments, and by extension, a more open learning environment.

Connectivism. The first thing to say about Connectivism is that there is no consensus on whether it is a learning theory. Wiley (2014) argues that Connectivism may not have sufficiently defined the term *entities* and what they are. Because the entities, or nodes, are central to the epistemology of the concept, defining them in depth is necessary before Connectivism can be considered a learning theory. Taking this argument further, Verhagen (2006) contends that

Connectivism should be considered not at the instructional level where learning theories can describe how learning occurs, but rather at the curriculum level as Connectivism is providing an organization structure around which learning may take place. Siemens also comments that Connectivism as a theory requires more research into how it can account for cognition, pedagogy, design models, and interactivity (Siemens, 2017). Connectivism as a concept suggests that "nurturing and maintaining connections" is key to ongoing learning (Siemens, 2014, p. 5). Interacting with peers through media such as online forums, social networks, web-conferencing and webinars may not be enough, as that alone may result in short-term learning and not the acquisition of new concepts. Students who curate and produce their own learning artifacts in an emerging learning system may be demonstrating lifelong informal learning and the technology mediated deliberations of a Connectivism approach to learning (Siemens, 2005). Siemens (2017) also speculates on learners creating artifacts in online environments:

> How does creating a blog post, video, or meme contribute to enlarging the curriculum? How do artifacts contribute to, and take away from, the course content? What is a well-designed artifact? What causes resonance between learner resources being shared and students that respond to those resources? (Siemens, 2017)

Moreover, an approach to learning that involves learners curating artifacts is supported by the aforementioned employability skills of active learning, coordination, and judgement and decision making as well as a students' perception of control and agency. Anderson and Dron (2010) comment that:

> it is already becoming clear that connectivist approaches must become more intelligent in enabling people to connect to and discover sources of knowledge (p. 90).

Connectivism assumes that we are making choices about relevance and significance all the time, and that even recently made decisions need to be reassessed as new information is presented. The intent of Connectivism is to describe the just-in-time, up-to-date knowledge that can be garnered through interconnected networks. Connectivism proceeds from the knowledge of an individual and how they share it with their network and organization. Network and organization are loosely defined but could be social media networks or peers in a course of study, and colleges or places of work respectively. This expands the notion of learning from only internal to include an external environment a notion developed by Aldahdouh, Orório, & Caires (2015) who state that:

> It does not make sense to consider learning merely as an internal construction of knowledge. Rather, what learners can reach in the external network should be considered as learning. Moreover, the knowledge itself has a structure; it is not something fuzzy or mysterious. It is complex and chaotic, of course, but it has a structure (p. 4).

Knowledge flows through these external networks, between each of the individual "nodes" and is reciprocated through further sharing, and knowledge transfer (Siemens, 2014, pp. 6-8). Anderson and Dron (2010) suggest a feature of Connectivism as a learning theory is that it can rely on super connectors with larger networks to act as focal points for much of the transference of knowledge between the network nodes (p. 89). Super connectors have an increased relevance in driving the connections in small-scale networks that may be more common in formal, walled garden environments. These may be individuals or institutional entities who have extensive online networks and because of a critical mass of connectivity between other individuals and entities function as informal connecting agents. An example of this may be an individual who has a large number of followers on Twitter and consequently posts by them connect to multiple people who then further connect to their own networks. Without these individuals, sharing is restricted in much the same way that a single major railway junction allows multiple routes to many destinations, whereas lots of individual junctions permit relatively fewer possible destinations.

Networks of Practice. An extension of the concept of Communities of Practice (CoP) (Wenger, 1998), Networks of Practice makes a distinction between groups, referred to as communities in CoP, and networks. Networks are not considered to have specific interests or agendas in the way that groups or individuals may have, rather, they support connectivity between groups. Nonetheless, networks may have meaning when they emerge as individuals and groups connect (Wenger et al., 2011). Analogous to this may be the solipsistic notion that items only exist when they are observed. In such a position the learner is within a system of learning that is constructing itself as learning progresses. As more networks appear, more content is available as the network connects to more groups. In this way, the network is the intermediary of knowledge, not the teacher or group, as the knowledge only exists when the learner chooses to access it through the network. Developing this, Dron & Anderson (2014) observe that:

> This approach carries with it an underlying assumption that the networked learner is concerned with meaning-making in a constantly shifting, dynamic context. It is a process in which the creation of value is linked to the creation of content; the process of navigating a network and interacting with others in it is a process of learning in and of itself. (Dron & Anderson, 2014, p. 59)

In this way, Networks of Practice accentuate learner control and choice. The next section gives an overview of another concept that places an emphasis on choice in the learning environment.

Heutagogy. Heutagogy is the study of self-determined learning emerging from humanistic traditions such as Andragogy and focused on knowing how to learn and the sharing as opposed to hoarding of knowledge. Heutagogy steps away from the flexible delivery focus of andragogy and aims to propose ways in which the teacher provides the content but the learners negotiate which of these they choose to use, how to expand on what is provided, and the notion of assessment as a learning, not measurement experience (Hase & Kenyon, 2000). Heutagogy emphasizes learning as an adaptive skill, one essential for the current workplace. Like Connectivism, it looks to develop methods to support learning but with the emphasis on changes to the learner, not the teacher or learning system and thus shift the choice of what, when, where, and how to learn to the learner.

Although not specifically mentioned in these concepts, networks and groups may also be analogous to implicit and explicit knowledge respectively. Implicit knowledge is not easily transferable through a verbal or written manner. In much the same way, networks may encompass the implicit knowledge of a multitude of disparate but groups, knowledge that only becomes explicit when it is connected through a network to a group and thus individual. The group or individual can then choose to make use of this now explicit knowledge in the way that works best for them. Individuals in such a fully connected system are vulnerable to poor or even harmful information and actors, particularly as they may not see the danger until they have acquired or acted upon it. Yet individual choice and control must be present so a person can set up defenses as they choose. In postsecondary education the teacher or institution can support those defenses, but learners need to take responsibility for their own actions through reflection and critical thinking.

The implicit and explicit knowledge that notions of networks and groups in Connectivism, Networks of Practice, and Heutagogy describe have the capacity to support the set of socially constructed elements outlined by Dyke et al (2006):

- Thinking and reflection: through the ability to have agency in what activities and resources the learner engages with, and how to define the next steps for future learning
- Experience and activity: through the use and creation of learning resources they have located or been provided with through their network, or course
- Conversation and interaction: through the nodes and connectivity with peers and educators

Together these offer a theoretical bed to the kind of distributed, networked learning that will be necessary as we open the walls of LMSs and the top-down nature of outcomes-based approaches in formal education. This emphasizes uncovering what else supports learning outside the pre-defined course content—as well as what emerges from it, and the values attached to that. Moreover, such a theoretical bed also moves us away from much of the positivistic thinking inherent in a lot of educationally focused technology which still seems to rely on more behavioristic methods and outcomes.

The next section looks at how the educational technologies increasingly at the core of postsecondary education developed alongside the rise of the internet and the networked interactive multimedia capabilities this enabled and how they play a large part in defining the boundaries and capabilities for openness in the system.

Emerging Applications of Educational Technologies

This section looks at educational technologies that are already locked-in to institutions or are emerging as possible solutions to access and cost issues in formal education. I will outline the promise and drawbacks of how such technologies organize the students through registrar activities, how technologies are emerging for instructors, and how technology is enabling the use of technology on a needs-basis through interoperability standards.

Enterprise Systems. Enterprise systems have been an important component in the lock-in of LMSs. Often residing under the responsibility of the registrar, these systems enable institutions to manage admissions, course registration, program and group formation, progression, transcripts, and other student related information such as academic misconduct notices. Enterprise systems are interoperable with LMSs. For example, a group formed in an enterprise system will then appear under the instructor login in the LMS. The instructors can grade students in the LMS and these grades then appear in the enterprise system tracking all the courses for that students. Interconnection at this system level is convenient and they manage such a broad range of activities that they are very unlikely to disappear. This streamlined interconnectivity is why LMSs will remain in formal education contexts in some form or another. With their ubiquity, enterprise systems and LMSs may be the most common education technology used by postsecondary educators on a daily basis. Nonetheless, this interoperability between LMSs and software designed by different vendors is moving the concept of LMSs forward as they enable customization at an individual instructor level as opposed to an institutional level. These new learning systems are described as requiring functionality in “interoperability; personalization; analytics, advising, and learning assessment; collaboration; and accessibility and universal design” (Brown, Dehoney, & Millichap, 2015, p. 4).

Blockchain in Registrar Functions. Blockchains, as noted earlier, are secure ledgers distributed through a network usually without a central repository or authority. The most well-known example of a blockchain technology is Bitcoin (bitcoin.org). The main interest in blockchain is because it enables:

> a community of users to record transactions in a shared ledger within that community, such that under normal operation of the blockchain network no transaction can be changed once published. (Yaga, et al., 2018, p. 4)

Significant hype surrounds the use of blockchain technology in education, not least the early marketing of Woolf University (https://woolf.university/) who claimed that they would utilize blockchain to facilitate contracts to reduce administrative overheads. This was not subsequently realized and comments on blockchain were removed from their websites and messaging (Gerard, 2019). Nonetheless, discussion continues about how blockchain ledgers may be used to support registrar functions in order to ease transfer credits and prior learning, assessment, and recognition (PLAR) processes. Chatiani (2018, as cited in Browning, 2018, p. 238) notes that blockchain can be used by employers and institutions to issue and accept credentials and can enable a systematic way of formal and non-formal recognizing prior learning. This raises the hope that the knowledge people gain through their employment can be certified through the PLAR process recognized and shared between the individual, institutions, and employers in the form of blockchain. In such cases credentials become a form of currency that the provider of the training, the person, the employer, and the verifier (the college) can trust. The individual lifelong learner can also carry and own their currency in their blockchain ledger wallet and continue to create value from it throughout their lives. Ownership and the right to use, reuse, and edit educational technologies are also at the heart of the open educational resource movement.

Open Educational Resources. The development of reusable learning objects (RLOs) in the 1990s were a precursor to OERs and they share some characteristics. Loosely defined as “any digital resource that can be reused to support learning” (Wiley & Edwards, 2002) learning objects are interoperable with LMSs through the SCORM protocol, reusable, archivable, designed to save time for instructors in instructional design creation. OERs refer to the wide range of course content and material resources and apps available to educators and learners loosely associated by the fact they are created and distributed for free. Downes (2011) defines OERs as "materials used to support education that may be freely accessed, reused, modified and shared by anyone". The term open in OERs indicates that these materials are licensed with copyright licenses that provide permission for everyone to participate in the 5R activities - retain, reuse, revise, remix, and redistribute:

- Retain: the right to make, own, and control copies of the content
- Reuse: the right to use the content in a wide range of ways
- Revise: the right to adapt, adjust, modify, or alter the content itself
- Remix: the right to combine the original or revised content with other material to create something new
- Redistribute: the right to share copies of the original content, your revisions, or your remixes with others

(Wiley & Hilton, 2018, pp. 134-135)

OERs need not only be educational technology related, they can be paper-based, and also include course books such as those developed by British Columbia (BC) Campus Open Education (https://open.bccampus.ca/). Furthermore, the Canadian tri-agency research bodies developed policy actively supporting open access to research. As well as digital resources, in considering OER use in any new learning environment we also need to think of how the term is used in reference to the open data and creative commons licensing movements (McGreal, Anderson, & Conrad, 2015). The frequency of the term OER at the top of a content analysis study of journals in trends in distance education reveals the familiarity and use of the term

(Bozkurt et al., 2009, p. 341). For many instructors OERs are also linked to the social justice associations of zero cost resources, as well as reusability, creation and accessibility factors.

One issue with OERs and RLOs is actually locating and tagging them for use. University libraries are increasingly developing their own repositories as well as other sites such as OER commons https://www.oercommons.org and the college consortium repository: https://www.cccoer.org/learn/find-oer/general-oer/. Such repositories are typically archived using one of the main metadata standards: The Institute of Electronic Engineers Standards Association (IEEE) Learning Object Metadata (LOM) developed specifically for educational resources, Instructional Management System Project (IMS), Dublin Core and Learning Resource Metadata Initiative (LRMI), part of Google, and Yahoo and Bing’s schema.org semantic metadata mark-up standards (Haneefa K & Chembrakuzhi, 2014). Such standards enable organizations to aggregate and showcase OERs and RLOs to support the ability for instructors to search resources applicable for their need. A potential downside of such repositories is that they can rebuild the walled garden model, albeit a more varied and richer ecosystem, as educators may not search beyond them for resources, or create their own and as McGill, Currier, Duncan, and Douglas (2008) comment:

> There are several recent developments that have changed the way teachers develop, store and share their learning materials. Some of these could be argued to have had a negative impact on sharing, such as the rise of the closed access virtual learning environment (VLE), which encouraged teachers to take resources previously on the web into the safe and restricted storage space of their institution. Whilst the growth of VLEs did encourage the development of content in digital forms they did not encourage sharing within or outside the institutions (p. 6)

The repository may also be access controlled, and though this may be appropriate in some cases for privacy and protection reasons, for example in health care or K-12 contexts, it still leaves educators at the mercy of the individuals who decide what is aggregated there.

Compounding the issue of searching for and sharing resources is that once an instructor has found the resources, they then have to work out how to include this in their curriculum and how much it needs to be adapted. Analogous to this is that it is quite difficult to use another instructor's lesson plan. Each person notes what they personally think is necessary to deliver the content and their "own annotations and organization may be the 'added value' that makes the personal collection valuable.". Furthermore it would take just as much time to "wade through others' work finding what is useful and how to adapt it…" (Harley et al., 2006, p. 4-27).

OERs thus change the nature of how instructors approach course development. When the designer can choose from multiple open resources, the need for creating new ones diminishes. This in turn can contribute the separation of the individuals responsible for content creation, design, upkeep, and teaching which can have a negative effect on teaching quality (Kanwar & Uvalić-Trumbić, 2011). Nonetheless, the prevailing perception of OERs is highly positive and increasingly part of how institutions resource program development and will almost certainly be a disruptive force breaking down the walled garden model of LMSs (Brown et al., 2015). Further breaking down the walled garden of LMSs, OERs also require educators and institutions to reflect on notions of formal and informal learning and ownership. In the access control username and password model of current LMSs ownership is usually institutional and possibly instructor controlled. Informal learning may be happening, but this is in spite of, not because of the way the course is controlled and designed within the LMS. Students lose access at the end of their course and cannot follow up on learning co-created in that environment so sharing with peers in similar courses, and other institutions is proscribed. Given the importance of the knowledge economy, restraining the sharing of knowledge is antithetical to the purpose of postsecondary education. In the next section I outlines the characteristics of emerging technological and organizational solutions supporting online learning.

Next Generation Digital Learning Environments. Increasing interoperability between a larger web of software stands in contrast to the walled garden of LMSs. This has led to questions of how to proceed in developing LMSs, whether to rebuild the LMS architecture from scratch, or to add value to existing LMSs by increasing their interoperability with external learning objects, and software. The former solution has the associated problems of cost, implementation, and technical issues. The latter circumvents these difficulties but has the potential to further embed a walled garden paradigm as all that is really happening is adding more tools to an LMS toolbox. The concept of a next-generation digital learning environment (NGDLE) arose to address these. Brown, Dehoney, & Millichap (2015) outline the key attributes of an NGDLE as follows: a interoperability and integration; personalized; collaborative; analytics; aggregating functionality; embedded principles of universal design; all bound within the characteristics of a mash-up (pp. 3-4). Google Classrooms is an example of a suite of software tools that draws on the dissatisfaction of closed LMSs and the nascent concepts of NGDLEs and although this differs fundamentally as it is not open it needs to be taken seriously due to the ubiquity of the developer especially as Google classrooms, part of the G Suite for Education Apps, has an increasing presence in K-12 and higher education (Hill, 2019) and describes its capabilities as:

> Google Classroom makes teaching more productive and meaningful by streamlining assignments, boosting collaboration, and fostering communication. Educators can create classes, distribute assignments, send feedback, and see everything in one place.

> Classroom also seamlessly integrates with other Google tools like Google Docs and Drive (Google, 2019).

Google has the ability and resources to further build its ecosystem. However, this may merely replace one walled garden with another, albeit more flexible, walled garden—one whose walls will be constructed through the collection of our data as we walk around the garden.

The NDGLE concept is quite dependent on an individual student taking a lot more responsibility than the current instructor directed LMS model. It is expecting a lot for students to aggregate resources they feel are valuable and to archive, share, personalize, and then collaborate with their peers. It is for these reasons of utility that systems like Blackboard, Instructure, and D2L Brightspace tend to be strengthening their hold as immovable institutional platforms by adding cloud-based features and analytics. Nonetheless, to support students in such learning spaces, we need to give them more control over their learning process.

The latest LMSs may seem similar to existing LMSs in that they maintain the existing features, but institutions are asking for more functionality and components that cannot be sustained in a single piece of software. The need for an architecture that provides a standardized basis for software development, supports interoperability, and modularized approach that facilitates individual parts to be enhanced was recognized in the early 2000s by The Open Knowledge Initiative (O.K.I.) and the E-Learning Framework (ELF). O.K.I's stated aim is to support the adoption of the architecture as a set of global standards across the education sector in order that institutions could scale up their LMS as new resources were developed with limited negative effects on the existing system. The Sakai LMS still employs the O.K.I which makes it easier to choose from a wider range of tools than the plug-ins architecture used in Moodle for example. Indeed, a core motivation for O.K.I's activities was the recognition that the architecture of existing LMSs had been set up for ease of use and increasing profitability for the vendor while not really addressing the emerging needs of system interoperability and specifically commented that:

> The price of the course management systems themselves is rising as vendors strive for profitability, and anecdotal evidence indicates that some campuses have written more lines of code to integrate their campus systems with a vendor's course management system than there are lines of code in the vendor's system itself.
>
> (Collier & Robson, 2002, p. 5)

During the subsequent years, LMS vendors have taken on architectural standards like API but have remained walled-gardened platforms of increasing profitability without the commensurate evolution and innovation.

To address these ongoing deficiencies, an Educause learning Initiative paper proposed a model termed Next-Generation Digital Learning Environments, or NDGLE. The paper proposed that NGDLEs need to also support “interoperability; personalization; analytics, advising, and learning assessment; collaboration; and accessibility and universal design.” (Brown et al., 2015, p. 4). Interoperability requires the software to work in common formats, for instructors to easily add and remove tools they choose to employ, and to maintain the ability to track and analyze data. Interoperability also requires agreement among software developers to maintain interoperability standards in order that new software speaks to older software. Personalization necessitates the ability for the learning environment to be flexible enough to be configured on an individual or institutional level to change the learning experience. Such flexibility must also enable adaptive learning based on enhanced data analysis capabilities that empower personalized assessment and outcomes-based approaches to course length (Brown et al., 2015, pp. 4-6).

Learning analytics implies the collection of data on a personal, course, institution, and regional level and is defined as:

> The measurement, collection, analysis, and reporting of data about learners and their contexts, for purposes of understanding and optimising learning and the environments in which it occurs. (Siemens et al., 2011, p. 4)

Data collected within LMSs can then be combined with data from the institutional student information system around grades, transcripts, and possibly regional education data to support integrated advising systems. Unlike current LMSs where interactivity tends to be teacher to student or student to content new learning ecosystems are expected to facilitate multiple forms of collaboration within the institution and beyond with other educational institutions and local businesses where students may take work placements. Conversely, this level of interoperability may result in yet more lock-in through licensing. Along with interoperability, collaboration is key in breaking the walled garden model of LMSs and opening the private to the public in a way that individuals can control (Brown et al., 2015, p. 7).

Collaboration is inherent in much of the participatory media students use in their personal lives and so, by exploiting these technologies, educators are already breaking down the walled garden model. Conversely, relying on educational software that does not encourage students to collaborate with peers or teachers results in additional walls within walls with Haworth (2016) defining an ideal student learning environment as “easy to use, ‘open’, dynamic, and give options for collaboration” (pp. 360-361). Collaboration also relates to the level of self-direction a student can have in their learning environment, which in turn relates to the construction of a personal learning environment. I address these concepts later in this chapter, but Tomberg, Laanpere, Ley, & Normak (2013) emphasize the centrality of collaboration within these models when they state that:

> The requirement for combining the LMS and PLE functionalities stems from the different kinds of affordances they offer. While LMS have more affordances for course management, Web 2.0 tools and social media have more affordances for individual expression of students, self-directed learning, expression of ideas, and group collaboration. (p. 111)

Finally, universal design and accessibility are relevant design features of these new learning ecosystems. Universal design is the:

> Design and composition of an environment so that it can be accessed, understood and used to the greatest possible extent possible by all people regardless of their age, size, ability or disability. (*What Is Universal Design?*, 2012)

Furthermore, universal design does not consider the learner as merely a receiver of knowledge but also a creator and participator in knowledge creation and thus a necessary participator in the outcomes of the learning. We may be finally entering a phase of education technology with at its heart the features of personalization, interoperability, and collaboration. This new phase may be the closest LMSs have come to matching the notions of learning contained within constructivist and situative learning theories outlined by Meyes and Freitas (2004).

This chapter has described the research and thinking arising around the core themes and obstacles related to my research problem—those of over-reliance on educational technologies such as LMS as the de-facto location for online courses, a top-down, and outcomes-based education models and centrally-managed prior learning recognition that restrict student choice.

The next two sections outline a set of potential solutions that can help overcome these obstacles and gaps in the data and knowledge proximate to these areas.

Proposed Solutions

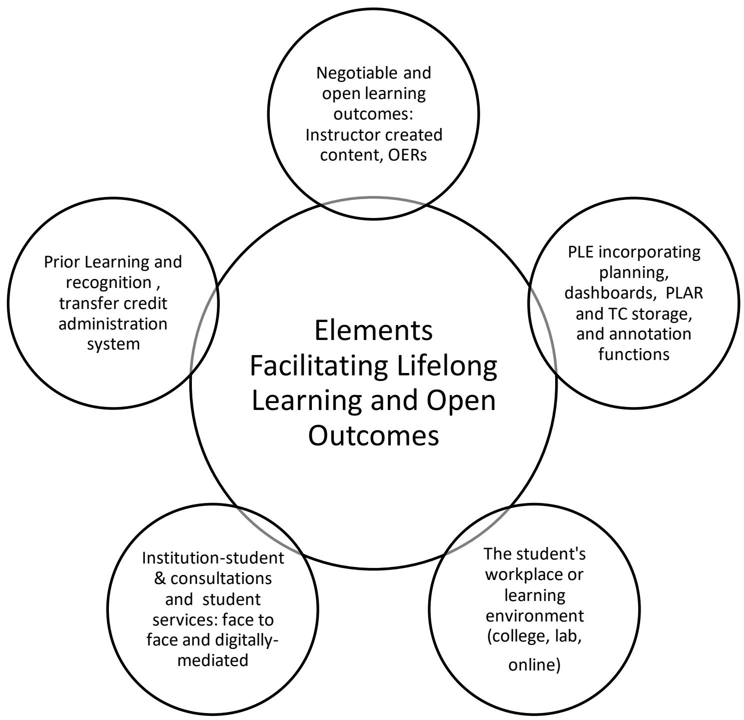
This chapter argues that there exists a tension between an outcomes-based education model wherein institutions and governments delineate what students are expected to know upon graduation, and how this model may restrict the agency of students to create their own goals and take actions towards achieving these. Developing this, I also argue that encouraging the expansion of online learning beyond the LMS will offer more scope for students to develop attributes that support lifelong learning in digitally enabled learning environments. These combine in limiting access and pathways to learning that will be increasingly necessary in a networked society. My research is designed to uncover the extent to which perceptions, study strategies and habits, and use of digital resources and artifacts students are accessing outside the institution's LMS are supporting self-directed behaviour— a key attribute for success in lifelong learning.

In uncovering and making an analysis of the data, it is my plan to make recommendations for a pedagogical and administrative initiatives that supports lifelong learning in a networked, information society. In this section I will describe the components of these initiatives and go on to outline the gaps in data and knowledge.

Future Student Learning Systems. Many, if not most, digital technologies used in education seem barely improved upon versions of non-digital resources or worse have limited foundations from learning theories but yet embed implicit assumptions about how the developer think people learn and thus tend to belie the hyperbole of the education technology industry. Nonetheless, technologies like LMSs are here to stay in one form or another and it befits educators to use them creatively for our purposes, not for them to use us. Figure 6, below, visualizes what a possible administrative and learning system that facilitates lifelong learning may consist of:

Figure 9

Outlining the Elements Within a Possible Future Student Learning System



Note. This figure shows how the network of systems outlined here is similar to the current system outlined in Figure 4 in that it contains human social characteristics, devices, software, traditional media, and digital media. However, it differs in the way the locus of control has shifted from only the institution and teacher towards empowering the learner within the system by incorporating PLE dashboards, including the recognition of prior learning, supporting student services, as well as the teaching and learning modalities (*Original, 2020*).

The Role of the Institution in Facilitating Lifelong Learning. The institution's role is that of facilitator, not manager of learning. Already important student services will also be available for lifelong learners in non-full-time programs and microcredentials. These are services designed to support career and learning advice and access. The institution will provide much of the learning, both online, and in class or lab where required, the student will be able to retain access to many of the teaching and learning resources through increased use of OERs and interoperability. Although the student may lose access to the LMS they will still have access to the teaching and learning resources and the student will be able to organize these and other course-related resource sin their PLE. Furthermore, the lifelong learner can add to their PLE resources form any professional development or on-the-job training they go through. The PLE can also act as an organizing location and eportfolio, and include things like credentials and resumes, cover letters. Students in postsecondary programs will work with their individual institution on transfer credits and PLAR, but lifelong learners will be able to make use of an institution-independent cross-Canada networked PLAR and transfer credit system.

One conclusion of this networked approach could be that institutions in a specific region collaborate to set up a separate location to manage access to lifelong learning. These would not be instructional locations as these would be distributed in the home institutions, but oriented around student counselling, support, PLAR, and to facilitate workplace learning and connections with industry to help with co-op placements and connect with institutions to manage applied learning that requires a lab or specific facility.

The disruption of education will not be as narrated by Silicon Valley evangelists, but rather an administrative and policy restructuring that results in institutions being connected sites of experience, nodes within a larger network of information and credentials, both physical and online, that students can access throughout their lives. Institutions may look similar on the surface but in the background new procedures and inter-institution polices will change the way they operate and enable lifelong learning.

This is the administrative foundation to support lifelong learning that supports the pedagogy and self-directed learning component. Another element in the learning system is a PLE that is also equipped with storage, organization, search, and annotation functionality. In the next section I will discuss how students developing some form of a PLE will be an inherent element of a new learning ecosystem and how the lifelong learning adult education theories behind PLEs support the agency required to enable students to define some of their own learning outcomes.

Personal Learning Environments and Technologies. A personal learning environment (PLE) is a way of describing the way individuals can organize their informal learning through the use of downloadable or cloud-based technologies through personalization, participation and knowledge-pull (Andjelkovic Labrovic, et al., 2014). PLEs can also be placed in the field of lifelong learning within the self-directed learning approach described in heutagogy. As outlined in Chapter 1, heutagogy describes self-determined, autonomous learning that involves setting goals, making choices and reflecting on actions. As Blasche noted, Heutagogy is thus a concept suited to learning with digital technologies and the affordances of the internet in online learning and in supporting learning how to learn (2012).

A deeper characterization of the form PLEs may take is proposed by Sclater (2008):

1. The PLE should be client software that mediates between the learner and whatever re-sources the learner wants or requires
2. A Web-based portal can be an effective PLE without the need for client software
3. PLEs are already here in the form of physical and electronic resources that learners can manipulate and customize to learn effectively

(Blasche, 2012, as cited in Martindale & Dowdy, 2010, p. 180)

In an era of “always on” media students increasingly have different expectations of where and when their learning takes place (Baird & Fisher, 2005). Control is thus likely to be important to the learner in the PLE, but control also comes with responsibilities to organize, archive, critically assess, and filter valuable content on the internet related to their formal learning and then collaborate or communicate this with peers or their instructor. This is the real challenge for students - not the assemblage of resources, but the framework within which the resources reside. Athabasca University has such a template in the Landing (https://landing.athabascau.ca), powered by ELGG (https://elgg.org/). The Landing is a social platform that enables users to curate their own learning portfolios, and pages within which they can embed resources and although not a PLE, it can be part of one. Another open-source example is Exo (https://www.exoplatform.com/). Exo offers individuals or groups a framework to manage content, activities, and integrate resources for collaboration and communication purposes. A PLE can also consist of a suite of platforms such as participatory media, the google suite of apps, and social bookmarking sites like Symbaloo (symbaloo.com). These can serve as a loose frame for archiving resources, podcasts, a personal YouTube channel and open MOOCs related to their program of study and the learner will organize these on their mobile device or laptop for always on accessibility.

PLEs should be able to offer collaboration and communication opportunities as they are dynamic and evolving, and learners are more familiar with the software with a key attribute being openness as opposed to the closed nature of LMSs. Furthermore, institutional LMSs contrast unfavorably to the technologies students use informally such as web apps and social media yet it is this “flexible, reflexive, creative, and intuitive user of technology” (Selwyn, 2007, p. 92) that a PLE can empower. Schaffert and Hilzensauer (2008) describe these changes that

PLEs can effect in the learning paradigm: learners are self-directed, creators of content, personalization is supported by data sharing among community members, learning content is almost infinite, and the learning and teaching can highly social. A PLE may be developed of individual volition; however, the environment can include a community of learners. Informal PLEs may develop attributes students can employ to enhance their engagement with the learning content in more open learning systems.

The next section considers the gaps in our knowledge and research in the fields I have described in this chapter and those of relevance to my proposed solutions.

Data and Knowledge Gaps

Research and analysis related to this paper traverses the macro to micro fields of research laid out by Zawacki-Richer and Anderson (2013). It traces a line from the macro-field of government policy, institutional structure and administration related to outcome-based models, across the meso-field encompassing adult education, and networked-based teaching and learning, finally arriving at the micro-field covering the application, effectiveness, and student perceptions of educational technologies like LMS, and self-directed learning artifacts like PLEs.

I have identified a knowledge gap in the relationship between outcomes-based education models, choice and control, and the development of student self-directed learning behaviour. I have cited in this paper work in these fields separately, and comments like those by Sweetman (2017) who states that:

> outcomes need to leave space for elements of uncertainty and varied, personal outcomes if they are to support the development of enhanced teaching and learning in higher education. (p. 54)

This reveals that thinking and practice in the area is likely happening but with limited research as yet. I have also identified a gap in the connection between network-based descriptions of learning and outcomes-based models of pedagogy. Hase and Kenyon (2000) touch on this area when they state in relation to their concept of Heutagogy that there is a need for:

> having teachers think more about process than content; enabling learners to make sense of their world rather than make sense of the world of the teacher; forcing us to move into the world of the learner. (p. 8)

Nonetheless, research is lacking that looks at the relationship between online learning and outcomes-based education models as implied within networked-based learning theories. My research incorporates the themes of institutional adaptations imposed by the logic of the networked society in order to provide lifelong access through the implementation of open learning outcomes, networked PLAR initiatives, and the expansion of online learning outside of walled garden educational technologies to support self-directed behaviour. Together these combine to situate the research in a combination of the macro, meso, and micro research agendas respectively. This conceptual triangulation may afford an analysis that enables me to propose institutional modifications but keep the learner at the heart of the analysis and hopefully the desired outcomes.

Filling these gaps in our knowledge means conducting research into the elements I have described in this chapter. By employing the Digital Experience Insights Survey, I have gathered a set of data that has enabled me to uncover to what extent elements in the proposed networked education system (outcomes-based education, LMS-centered online courses and resources, and self-directed practices like PLEs) lead to the development of lifelong learning literacies in postsecondary students taking online courses. Additionally, I explore in my analysis the way students' comment on their interaction with the digital aspects of their education reveal the level to which they are already lifelong learning literate. As I will show in the discussion and conclusion chapters this information has enabled me to identify areas for institutions to focus on in further developing student skills and literacies and helping students to articulate the literacies they acquire. The next section gives an overview of the tool I used to research this, how it has been used before and why it is relevant to this investigation.

Investigating the Problem

Conceptualizing lifelong literacies in the way described in this chapter reveals them as organizational skills required to manage a self-directed learning experience and the cognitive skills of goal setting, self-regulation, and reflective skills. In a course run in an online modality this will mean organizing digital resources, possibly in a PLE, setting goals to complete the work and achieve the required outcomes, or, if possible, to negotiate or define some of those outcomes. I used the JISC Students Digital Insights survey to uncover the extent to which students are employing organizational strategies and setting goals.

The following table connects the key concepts I investigated with the questions in the JISC Student Digital Insights survey.

Table 2

An Overview of the Interacting Features Investigated by the Survey Themes

JISC Survey Themes	**Elements in the Learning System**	**Concepts and Technologies in the Ecosystem**
You and your technology	Digital resources	PLEs
Technology at your organization		Institutional and ministry-level learning outcomes, OER, Education technologies like LMSs, participatory media, PLAR.
Technology in your learning	Outcomes-based models	learning outcomes, network-based learning theories
Developing your digital skills	Student-digital relationship	choice, control, personal attitudes and beliefs toward learning (heutagogy), goal setting

Note. The table outlines the relationship between the key elements within the postsecondary learning system and their constituent technologies and concepts. The table also aligns how each of the themes in the JISC survey has been employed to holistically investigate the relevant interacting components (Adapted from Belshaw, 2012; Newman et al., 2018).

Derived from this depiction of the online world of students is the research question: To what extent are LMSs inadequate as a tool for developing the lifelong learning literacies required for success as adult learners in digitally enabled learning environments? My use of a descriptive analysis methodology offered me a way to identify hidden patterns in the data by digging in to the interacting constructs contained in each of the core elements and connecting them to aspects within digital literacies (Loeb et al., 2017). The data uncovers the extent to which students have already acquired lifelong learning literacies and how they are emerging even though students may not yet be able to articulate these. A descriptive analysis also aids in understanding how open learning environments may already be evolving due to informal student and instructor activities outside LMSs, and thus possibly revealing self-directed practices. In the next section I will outline some examples of how the survey has been used in research projects relation to my themes.

Prior use of the JISC Survey. The JISC Insights survey is run annually in nearly all UK Universities and Colleges. The data from this is released in an annual report through the JISC organization (Feldman, 2018; Langer-Crame et al., 2019; Newman et al., 2018a, 2018b). The breadth of the data that is possible to gather in relation to the digital lives and perceptions of students, digital at the institution, and course level from the Student Insights survey made it relevant for my investigation as I sought to connect perceptions, actual organization and use of digital resources, and the level of self-directedness occurring. The 2018 JISC annual reports describe students commenting that a way to improve digital learning would be to provide a platform that offers a social forum for students to collaborate and a place to access and upload resources (Newman, Beetham, & Knight, 2018, p. 73). Such comments are further reflected in Anderson, Poellhuber, and McKerlich's (2010) survey on student use of social software in online courses that described student interest in software that facilitates multiple types of collaboration, with the caveat that familiarity with the tools is a key component of adoption. In comments that are particularly relevant for my research project, the JISC survey (2018) also revealed the top-down nature of how LMSs are managed in institutions. Teachers surveyed in the JISC digital insights survey commented "Lose the LMS. It's a straitjacket and it is very hard to navigate without a mouse" thus reflecting frustrations with LMS limitations on mobile devices, and also "Better integration between the specialist tools I use in teaching and the LMS" revealing that tools external to LMSs are already being used and the need for increased interoperability (Feldman, 2018, p. 25).

Research emerging from the JISC surveys also led to the organization developing a definition for digital literacy that the UK Open University uses (Open University, 2015): "Those capabilities which fit an individual for living, learning and working in a digital society" (p. 1). In addition to digital literacies, work with JISC has also been used to argue for the development of PLEs to support lifelong learning through the growing use of interoperability standards (Olivier & Liber, 2001). Furthermore, in relation to LMS and emerging educational technologies, the survey has also been used in addition to a case studies approach to investigate next-generation digital learning environments emerging in UK Universities that showed emergent models and practices (Phipps, Allen, Hartland, 2018). These examples partly reveal that the JISC survey has the depth and breadth to produce data that helps me investigate the core themes and research questions I pose. The next section summarizes the key themes and arguments within this chapter before I move on to describe the methodology I will employ in Chapter 3.

Summary

Of increasing interest in post-pandemic postsecondary online education will be ensuring students graduate with strategies that support lifelong learning literacies as well as mastery of content knowledge and how students are able to operationalize both. This is particularly challenging in online courses when existing educational technologies such as LMSs are not being fully utilized due to lack of engagement and creative possibilities for instructors. Additionally, the type of software students' use in their personal lives have significant strengths in providing opportunities to organize resources, collaborate, and communicate over those preferred in formal education, not least as they continue to be accessible after the formal education ends.

The ability to communicate effectively in different contexts in a variety of modes, organize resources, reflect upon the experience, and set future goals is recognized as vital by employers and institutions. For students though, who study within a multiplicity of pressures, improving these literacies may not be as important to them as taking responsibility for learning the course content itself in order to get through the requirements of the course and their program (Garrison, 1992); nonetheless, if the expectations of education and employers is that they are able to graduate with the ability to strategically apply a set of essential skills as well as content knowledge, we need to help them achieve those literacies and strategies.

Associated with these outcomes-based education constraints, the current system for recognizing prior learning remains in a set of institutional walled-gardens that do not communicate effectively with each other and other training providers. These administrative mechanisms limit learners wishing to reuse prior learning for the skills they have set goals to develop. The upgrade of such skills will be indispensable in the networked, information society we are now working within, especially in the employment landscape post-pandemic. However, herein lies a tension between the outcomes the instructor or institution set and recognize and how this outcomes-based model may restrict the agency of students to create their own goals and take actions towards achieving these.

Online courses that reside in more open, network-based learning systems may be uniquely placed to help overcome these tensions. Such pedagogies require educators and institutions to expand their restrictive view of walled garden technologies and administrative policies and recognize that not all learning, even in formal environments, can be totally bound by outcomes that the students have no part in constructing. As more adults return to education post-pandemic, full-time programs may not be the structure they seek, but rather to stack existing learning and credentials with additional courses and applied learning experiences to achieve the skill upgrades they have identified. To enable such prior learning recognition, institutions will need to develop a more network-based approach to recognition of prior learning and to simplify and recognize the outcomes of formal and informal lifelong learning.

The Methodology chapter outlines the way in which this tension is investigated and analyzed.

Chapter 3: Methodology

Overview

This chapter deals with the method used to investigate phenomena around student activities and perceptions when they use digital technologies as part of an online course. It restates the research problem and the questions asked to help investigate the problem. It describes the descriptive analysis research method, and why this method was of use in finding out what was happening in the context as well as grounding it in its associated ontological and epistemological lenses. The rest of the chapter details the survey tools, participant samples, considerations of bias, and aspects of validity and credibility, as well as the limitations inherent in the research. Finally, the ways the qualitative and quantitative data will be presented and analyzed are also outlined. In order to understand my background context, the next section outlines the research context.

Research Data Collection Context

The research was conducted in a large, urban post-secondary institution of applied learning in Ontario. The institution has a student body of around 30,000 full-time students taking one to four-year certificates, diploma, bachelor's degrees, and graduate certificates. All diploma students are required to take general education and liberal studies electives and these courses are scheduled for three hours per week over the 14-week semester and scheduled into the students' program structure. The courses are taught by faculty from the school of Liberal Arts & Sciences and Innovative Learning. Prior to the pivot to emergency remote during the pandemic, teaching these courses were mostly face to face with around 2500 students take purely online versions. The institution uses the Blackboard LMS for all courses including online, there is no other cross-institutional software requirement when teaching online. It was this group of students in online

Liberal Studies elective courses using the LMS that constitute my research participants. Of relevance to this study, the institution has a set of Institutional Learning Outcomes (ILOs), one of which specifically addresses the need for all course and program outcomes to speak to the ILOs. The following section restates the problem and how this connects to the need to develop new learning systems, open learning outcomes, and lifelong learning literacies.

Restatement of Problem

LMSs have significant penetration in postsecondary education in North America with an implementation of over ninety percent (Hill, 2014). Because of such wide adoption LMSs are also the de-facto digital platforms used as the basis of structuring content in online learning contexts (Brown et al., 2015). The concept of lifelong learning literacies and the growing need for these literacies is recognized by the Ontario Ministry of Training, Colleges and Universities (MTCU) in their essential employability skills framework (Ontario, 2017) as well as within the strategic plan of the host institution of this research project (Humber College, 2013). There is thus a need to support the development of essential skills that support lifelong learning in postsecondary students, yet this conflicts with the walled garden nature of many educational technologies and an emphasis on top-down outcomes-based learning models that limit student agency and choice. These are further compounded by a complex, walled-garden system of prior learning recognition that does not help lifelong learners in constructing the kind of learning experience that will suit the place they are in their career. Employing software resources that students already use, or at least the archetypes they are familiar with such as social and participatory media, mashups, audio-visual streaming sites, and games can help students as they aim to gain mastery of content and the essential skills and literacies required by MTCU and the institution. Familiarity and comfort with these resources may imply that the students are developing lifelong learning literacies. These are reflected in the foundational communication and organizational skills employers will be increasingly seeking and show in Figure 8 in the previous chapter. I argued in Chapter 2 that networked-based online learning merged with applied experiences where required that helps students acquire self-directed learning strategies and supported by an advanced system of recognition of prior learning combined with targeted student support services is a way to support lifelong learning endeavors in the future.

Hypothesis. If the kind of lifelong learning that graduates may require, or choose to access, is highly dependent on unknown future contexts and individual needs imposed by the logic of the networked society, then these needs will not be best served by an outcomes-based instrumental educational paradigm that reinforces instructor- and institution-centered outcomes that inhibit student agency and choice. This paradigm is reflected and exacerbated in the walled-garden analogy of an online student studying a course designed within the constraints of an LMS, which, for adults returning to education, is further reinforced by a walled-garden policy around the recognition of prior formal and informal learning.

The Problem. The notion that applied learning institutions are preparation for the workplace belies the fact that the workplace of the future will increasingly require the cognitive, reflective, and organizational skills to be successful in self-directed lifelong learning endeavors. Postsecondary students need to be given the support and freedom to cultivate the literacies and skills they need to be successful in their personal futures, not only those predefined by the course, program, or institution. Thus, when online college courses rely only on content and learning outcomes provided and defined by the creator of the course and delivered only within the limitations of locked-in technologies such as an LMS students are not supported in acquiring the lifelong learning literacies and skills they will need for success as adult learners in digitally enabled learning environments. Further, when adult lifelong learners return to formal education, routines must be in place for them to have control over the way their prior learning is recognized and recorded.

By surveying students and making a descriptive analysis of what is currently happening in an Ontario institution, I aim to reveal ways in which walled garden technologies and learning outcomes can be opened up to support structured self-directed learning and whether online courses can support the growth and awareness of lifelong learning literacies specifically for digitally enabled learning. Because I was seeking to find out what was happening in this content it was valuable to describe the philosophical lens the research took in investigating this problem (Cohen et al., 2011). The next two sections look at these ontological and epistemological views respectively.

Ontological Concerns

I took a pragmatic position ontologically that accepts both realist and anti-realist positions. Creswell (2014) proposes a pragmatic philosophical position that seeks to find out what "truth works at that time" (p. 11). Defining a preferred methodological position is difficult without considering the context of my research - this in itself suggests that I favour a constructivist approach (Schunk, 2012). However, I have a concern with strong social constructivism in that I believe there is an external reality and also that being overly relativistic results in an inability to delineate boundaries within which to make an analysis and offer solutions. Without such boundaries, even the boundaries that positivist, scientific approaches create, we would rely too much on a personal viewpoint illustrated through the vocabulary we choose to explain a position. This can result in problems assessing whether it is an ideological or emotional tract we are reading, or sound research (Angen, 2000). I see reality as co-constructed around a shared basis of understood and biological and evolutionary influenced foundations. Each of us is internally complex with differing perspectives we bring to this shared reality. This notion of external reality, or ontological realism (Seale, 2012) places my personal ontological position as objectivist yet balanced somewhat by a belief that although social reality is a collective, individuals have agency and do act individually and develop individual belief systems (Cohen et al., 2011).

Understanding external reality in this way allows a researcher to investigate behaviour both as a participant and as an observer of the collective reality. This was relevant for me as I was seeking to find out what individuals were doing but also to draw conclusions that could support initiatives on an institutional level. Predefining research questions could imply a deterministic position in that I assume there is a cause, and I can uncover this cause through research. It also assumes an empirical position as I aim to verify the situation through collecting data, and to address the validity of the data (Cohen et al., 2011). Nevertheless, a positivist, objectivist position alone will encumber the research with too specific a lens and not allow for the muddle of human experience—for example, students' perceptions of how they use digital technology. A subjectivist, interpretive position could address these concerns, however, these approaches tend to favour highly contextualized investigations, which make it harder to generalize (Cohen et al., 2011). Ontological concerns lead to the associated epistemological questions that ask how we investigate the problems we define.

Epistemological Concerns

I followed a constructionist position epistemologically as I was looking at a contextually bound phenomenon. The value of the constructionist position was in generating a contextual understanding of the context and problem. To investigate activities and student perceptions in online learning systems and whether they facilitate lifelong learning literacies that support learning in digitally enabled learning contexts it was worth considering the epistemological positions of positivist and interpretivist paradigms as they helped inform my choice of research methodology and the value, or axiology, I placed on the data I gathered. For positivists, reality is external (Lincoln et al., 2011) so the preferred method of investigation is a nomothetic scientific method. Such research is investigated through quantitative observation and experiments that dispassionately avoid the metaphysical realm as it searches for causality and replicable facts (Szostak, 2003). Furthermore, it takes a deductive approach in that causation is in the past and considers the rigor of method as having the ability to reveal generalizable truths (Maxwell, 2004). For interpretive constructivists who view knowing as relative (Cohen et al., 2011) focus is therefore placed on how individuals understand their own contextually-bound world. Within such research, understanding is found in the specific, not the general. Ideographic methods like qualitative research are seen as ways of understanding behaviour (Johnson & Onwuegbuzie, 2004). Another key difference is that the data gathered in positivist research does not necessarily inform practice, whereas for interpretive researchers the idea of social improvement through action or influencing educational practice is embedded in the ethical notions of the epistemology (Angen, 2000). Both of these epistemologies have attributes that could have helped me investigate the digital lives of students. There is a caveat to consider when selecting a method to investigate phenomena involving humans—that research in the field of education that does not involve random assignment of subjects to experimental conditions is not a true scientific experiment. Due to this, this research was unlikely to produce results that definitively prove a causal impact of conditions on outcomes. Some research designs are stronger than others in reducing uncertainties about competing hypotheses, but none are perfect. There are always methodological imperfections, uncertainties, and alternative possibilities (Conole, 2013).

I looked at the behaviour and perceptions of actors in a learning space as well as constrains the system places upon them. I was not looking for causal impact. I have described and illuminated what was happening and have made recommendations for other practitioners as well as institutional strategy for the development of institutional learning systems and the ways these may be supported by more open learning outcomes. In this aspect of my research, generalizability was important for me as I aimed to understand student attitudes towards digital technology and how they elected to use these to support their learning.

These areas can be investigated through positivist quantitative and/or interpretive qualitative research methods, although debate exists that suggest the method does not necessarily have to fit its traditional paradigm (Johnson & Onwuegbuzie, 2004). Quantitative studies aim for external validity, in order to generalize what is happening and this can help visualize complex data in ways that are graspable by those who need to solve issues involving a large number of students in a specific context. Quantitative approaches also tend to have the advantage of speed (Johnson & Onwuegbuzie, 2004) and investigating in an organization bound by semester start and end dates this will be relevant. Descriptive quantitative approaches using a survey tool can inform what is happening in a situation and such broad questioning can allow a wider explanation of the cause of the *what* (Creswell, 2007). Alternatively, qualitative approaches tell us more about the reasons why a specific phenomenon or situation occurred and are more likely to get to a recognizable truth of an issue as understood by the students in the college as well as result in much richer and valuable detail. This is in part because of the participant, rather than the observer, role of the researcher (Johnson & Onwuegbuzie, 2004). Because qualitative approaches tend to be contextually focused, localized problems can be better addressed. This is a benefit as institutions differ culturally (Cohen et al., 2011). The two main research paradigms may not merge, but increasingly, agreement on some aspects supports eclectic, mixed methods research (Johnson & Onwuegbuzie, 2004; Yu, 2005). Investigating the intersection of technology and learning is inherently interdisciplinary as it brings together educators and psychologists with those in the computer sciences (Conole, 2013) and this intersection of interests also brings different perspectives on how to investigate phenomena in the field. A somewhat agnostic approach is required to listen to, and make an analysis of, both voices.

A research method was needed that enabled both quantitative and qualitative data gathering methods that can objectively and subjectively describe the learning environment. With this need in mind, I applied a cross-sectional, descriptive survey methodology with its foundations primarily in positivist epistemology but flexible enough to allow more personalized commentary and interpretation based on the collection of qualitative student open responses. The next section describes in more detail the descriptive methodology I incorporated and how it supported the collection and analysis of both qualitative and quantitative data.

Descriptive Analysis Research Methodology

The goals of research are threefold: to describe, to predict, and to explain (Conole, 2011). Descriptive research describes phenomena in specific settings and does not seek to predict or understand cause-effect relationships. Descriptive research is designed to reveal what is going on and thus typically uses case study, observational, or survey methods to gather data. The research can be longitudinal or cross-sectional. This research method does not involve the manipulation of independent variables that experimental methods employ. A strength of the descriptive method is its ability to support the development of additional questions once a phenomenon has been adequately described (McMillan & Schumacher, 2001).

Descriptive data can be collected quantitatively, qualitatively, or using mixed-methods (Borg et al., 1996). Although a need for a descriptive analysis may emerge from hypotheses shaped by previous qualitative studies it diverges from purely qualitative studies in that it tends to focus on specific areas of a wide topic and goes deeper in its analysis of these areas (Creswell, 2015). For example, investigating phenomena around students use of digital resources and the emergence of new learning ecosystems that support lifelong learning literacies is only one aspect of the larger system of education students' study within. Furthermore, because this method is looking to find out *what is* it does not rely on interventions or manipulation of variables in the way an experimental method might (Nassaji, 2015). Finding out what is in a given setting could result in a very large set of data, yet descriptive studies seek to avoid overcomplex analysis and look to simplification in data presentation to communicate findings. Thus, the role of the researcher is to reduce the complexity of the data into the main qualities of the phenomenon. In this regard, descriptive studies have been used in educational settings to understand the characteristics of a context, how a system works, diagnosing problems that need attention, prioritizing causal mechanisms to work out what to and what not to conduct follow up studies on (Loeb et al., 2017, p. 13).

Descriptive analysis methods have three drawbacks. Firstly, they are not able to test a research problem statistically and as a result of this careful attention to bias is required. Secondly, because the method is concerned with what is happening in a given setting, descriptive analysis does not seek to infer cause and effect relationships in educational activities. Nonetheless, the qualitative aspects of descriptive research can inform causal research in that it can identify the benefits of an intervention or to help plan for future interventions by pinpointing patterns in data in a given context (Loeb et al., 2017, pp. 1-4). Thirdly, is the issue of replicability. Because the context and setting of the research may develop over time, it is also hard to replicate the results with enough validity.

Research design is important in order to make a transmittable analysis of complex phenomenon. Descriptive analysis follows an iterative process from identifying the phenomenon through to analysis and data presentation. Table 3 offers an overview of how this research project addresses these steps.

Table 3

Descriptive Research Key Elements, Attendant Steps and Activities in This Research Project

Key Element	Steps	Associated Activity in this Research Project
Research questions and Constructs	1. Identify a phenomenon.	Emerging from personal experience and the literature review
	2. Consider which features of the phenomenon are most salient.	
Measures	3. Identify the constructs that best represent these features.	Deconstruction of the research question and selection of JISC Survey
Samples, Synthesis, and Evaluation	4. Determine whether there are observable patterns in the data.	Survey data analysis
	5. Communicate the patterns in the data that describe the realities of the phenomenon.	Survey data presentation
	6. Rethink and repeat as needed.	Revisit the data analysis

Note. Adapted from (Loeb et al., 2017, p. 8)

Resulting from these elements and steps, descriptive research posits five key elements consisting of: research questions, constructs (variables), measures, samples, and methods of synthesis and evaluation (Loeb et al., 2017, p. 18).

Defining the problem and the ontological construct and methods that can be used to investigate this then entails the need for the development of research questions to help understand the variables involved in studying this phenomenon.

Research Questions

The principal research question is:

- To what extent are online courses that employ outcomes-based education models delivered primarily through LMSs inadequate for developing the lifelong learning literacies required for success as adult learners in digitally enabled learning environments?

Sub-questions that will support the analysis of this principal question are:

- To what extent do student responses show characteristics of lifelong learning literacies?
- To what extent do participant responses reveal their limited agency in constructing learning goals and outcomes?
- To what extend are students employing technology to support self-directed learning?

The next sections look at the constructs that emerge from the core research question, and the measures, samples and methods respectively.

Questions and Constructs. Studying humans and their interactions with digital resources is messy and requires consideration of multiple variables. A variable is a quality that "can be measured or observed and that varies among the people or organization being studies." (Creswell, 2014, p. 52). Descriptive studies use the term *constructs* to refer to variables. It is important in descriptive studies to clearly define each of the constructs within the research problem in order to measure the phenomena from the data. For example, in the research question posed above the term 'digital resources' needs to be clearly defined in order that the study can clarify what is happening (Babbie & Benaquisto, 2002). In this section the research question is deconstructed in Table 4 to emphasize its constituent elements. This highlights the underlying complexity within the research question and its associated issues. These are addressed in the descriptive analysis in Chapters 5 and 6. The principal research question is: To what extent are LMSs inadequate as a tool for developing the lifelong learning literacies required for success as adult learners in digitally enabled learning environments?

Table 4

Constructs, Operational Definitions, and Points for Clarification in the Research Question

Constructs	Operational Definitions & Questions for Clarification
To what extent	*How much* of the phenomena is occurring in the investigation's target context?
are LMSs	LMS refers to the digital platform in which the content is planned and delivered
inadequate	To what extent is the LMS software design, student or instructor user experience, or the institutional emphasis on standardization versus flexibility *inadequate?*
as a tool	'as a tool' refers to the LMS as a delivery mechanism for learning content *What are these tools?*
for developing	'developing' refers here to the process of knowledge, or skill acquisition
the lifelong learning literacies	'lifelong learning literacies' are the continuum of attributes people develop over their life to help them learn *What are these literacies?*
required for success	'required for success' refers to the attributes and attitudes that may be essential for adults to acquire to help them be successful in learning new skills. *Who defines what success is and what is required?*
as adult learners	'adult leaners' are people who choose to take on a course of formal or informal study for personal or professional reasons
In digitally enabled	'digitally-enabled' refers to technology and information in a digital form. These can be devices, software, websites, courseware, OERs, and pdfs
learning environments	'learning environments' refers to artifacts, devices, and resources a person has chosen, or had chosen for them, that work together to support a learning experience. *What do these learning environments consist of?*

The issues that needed clarifying in each of the constructs in Table 4 were addressed through the core research question and the sub-questions. The survey yielded qualitative and quantitative data, and the research questions were used to structure the analysis. This table operated as a prompt and guide for developing the initial abstraction of the survey data and coding the qualitative responses. The next section deals with how these were measured.

The Data Collection Tool. The research used the Joint Information Systems Committee (JISC) Student Digital Experience Insights Survey. I sought to reveal what students were doing with digital technologies at a particular point in time. In order to achieve this, I conducted a cross-sectional study to enable enquiry into what elements of students' study practices, course design, and institutional approaches to technology-enabled learning infrastructure may need to change in order to develop more sophisticated learning systems in online spaces. I also asked questions to uncover the level of student agency in defining their own learning goals. The one-off nature of the survey encouraged participation as it is did not take too much student time to complete and as I was not seeking to uncover aspects of how the phenomena was changing overtime a longitudinal survey was not necessary (Cohen et al., 2011). The survey was provided online and open for a period of two weeks and the next section provides an overview of the survey tool.

Descriptive studies rely on well-tested and reliable research instruments for measurement and observation (Borg et al., 1996), furthermore, quantitative validity and qualitative reliability are of importance in assessing the value of research tools (Seale, 2012). The JISC Student Digital Insights survey used in this study is used by 83 higher education institutes, has been used with over 37,000 participants, and has been "extensively tested for relevance, readability and ease of response." (Newman et al., 2018, p. 18). The Student Digital Insights survey is administered online and consists of 38 core questions, some of which have sub-questions leading to a maximum of 75 pre-defined questions. The survey also allows additional questions to be added by the administering institution. Questions are optional, and most, except four that can be added by the researcher, are locked and cannot be edited, thereby enabling standardization in a tracker feature that supports concurrent criterion validity between institutions (Newman et al., 2018b). The survey collected data that was quantified and data that provided qualitative responses.

The survey considered four themes: You and your technology, Technology at your organization, technology in your learning, and Developing your digital skills. Table 5, below, identifies the correlation between the Student Insights survey and this research project.

Table 5

A Comparison of the Student Insights Survey Themes with my Research Themes

JISC Student Insights Survey Themes	**My Research Themes**
You and your technology	Self-directedness: To what extend are students employing technology to support self-directed learning?
Technology at your organization	Outcomes-based education: To what extent do participant responses reveal their limited agency in constructing learning goals and outcomes?
Technology in your learning	Walled garden digital technologies: To what extent are student attitudes towards online learning reflected in the concept of lifelong learning literacies?
Developing your digital skills	Lifelong learning literacies: To what extent do student responses show characteristics of lifelong learning literacies?

Note. Adapted from (Newman et al., 2018b)

The research project was descriptive in nature and did not emphasize measurement. In this regard, descriptive validity was more pertinent than reliability as the project sought to objectively show the “truth of what is” in a given setting (Seale, 2012, p. 529). The research themes, questions, and constructs were aligned with the themes of the survey in order to help support construct validity. This was further supported by the deconstruction of the core research question and the expanded definitions of the constructs in Table 4 (Seale, 2012, p. 530). Furthermore, the process of deconstructing the core question in order to develop the constructs supported internal validity for any relationships that were revealed between the data and the constructs investigated (Loeb et al., 2017). Generalizability of the data was also important in order to offer recommendations for strategy with similar groups of online learners: thus, internal validity became more important than external validity with its attendant need to generalize the data to all postsecondary students (Cohen et al., 2011). Nonetheless, external validity was supported, though not emphasized, as an open mix of students self-selected their online courses thus providing a representative sample of the student population. This supported some generalization of findings after the analysis and the final chapter offers recommendations for practice and institutional strategy.

Participant Sample. The potential participant sample consisted of approximately 2,500 full-time, first- and second-year college students who were taking Liberal Studies diploma- or degree-level electives. These were pre-existing online courses, designed for the modality and not emergency remote teaching courses created due to the COVID-19 pandemic. The students self-registered into the online courses in advance of the semester and without the knowledge that they would be asked to participate in a survey. Students in the target courses were invited by email from the research assistant. The potential participant group was large although this allowed for a significant number of students withdrawing or choosing not to participate. Cohen et al. (2011) recommend a minimum of 30 students when using quantitative methods such as Likert scales. I did not identify individuals to take part in the survey other than those that had self-registered into the target courses.

Methods of Analysis

The JISC Digital Insights survey tool collected both qualitative and quantitative data. Onwuegbuzie and Johnson (2006) refer to two types of legitimization in mixed methods research, both of which were borne in mind during the data presentation and analysis:

- Weakness minimization: compensating for weaknesses in the qualitative and quantitative data.
- Conversion: How far numerical data can be *qualitized*, and how far qualitative data can be *quantified*.

(2006, as cited in Cohen et al., 2011, p. 198).

Developing and questioning these issues were the core of the narrative as the qualitative and quantitative analyses were brought together to assess the online learning system, student perceptions of their online learning experience, and data correlating with the notion of lifelong learning literacies. Ensuring boundaries for the data analyses were clear and of relevance was important because fishing for data without defining the concepts to be analyzed in advance could have resulted in probing among the data and finding patterns that seemed statistically relevant but have no relevance to the hypothesis (Loeb et al., 2017).

The next two sections outline how the research approached quantitative and qualitative analysis.

Quantitative Data Analysis. I used a descriptive statistical analysis of the survey data as this enabled me to see patterns and build a narrative around the descriptions. The survey was designed with closed and open questions. The closed survey questions offered gradations of response similar to Likert scales and checklists. Student responses to these questions were rendered into numerical form and entered into SPSS software, upon which statistical analysis of the data was conducted. Descriptive analysis emphasizes communication of results in as simplified a form as possible and is used to “summarize, organize, and reduce large numbers of observations.” (McMillan & Schumacher, 2001, p. 206). When organizing the statistical data, I made extensive use of graphical analysis and presentation methods including, bar charts, pie charts, crosstabulations, percentages, and frequency distributions. Other descriptive statistical approaches employed are described in the next section.

Method for Quantitative Statistic Calculation. The results chapter presents the qualitative data results through extensive use of bar charts, pie charts, and figures displaying rank values. The bar and pie charts display both the raw score in bold and the percentage in brackets. Including the percentage offers a clearer description of popularity of that response within the participant sample. Some questions imply a scale, for example questions nine and eleven. Results to these questions are displayed in a figure displaying the ordinal scale of the responses. Each of these figures also provides the mean rank, variance, standard deviation, and lower and upper quartile values. The Mean Rank was calculated first and was the arithmetic average of the positions in the list and calculated by taking the sum of values, divided by the number of values (n) – or sum(y/n). In this way each value is given equal weight, 1/n, to their sum of n values. The variance was then calculated as the average of the squared differences of the Mean. To calculate this, I took each number (of responses to each item), subtracted the mean (as calculated above) and squared the result—this results in the squared difference. I then took the average of all the squared differences to create the variance. The standard deviation is the measure of spread between a set of values. The standard deviation was calculated by creating the square root of the variance and thus measured spread around the mean. Lastly, the lower and upper quartiles were calculated. The lower and upper quartiles are the median of the lower and upper 25% of the data respectively.

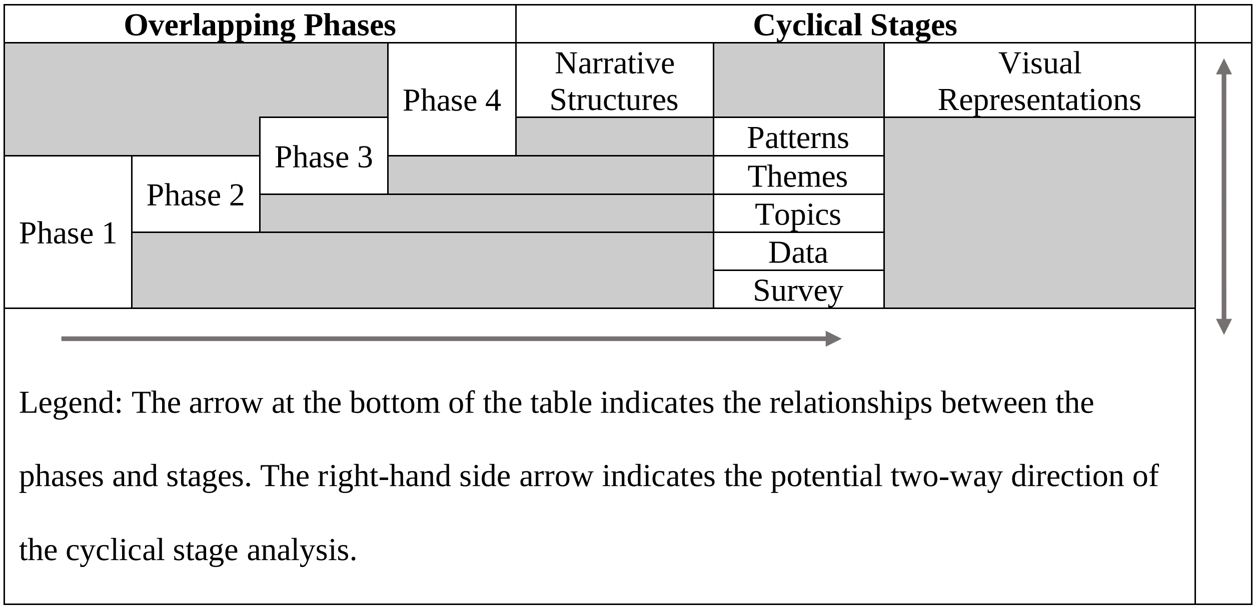
Reliability in the survey instrument is not be addressed overtly as I used a well-tested, pre-existing survey. In the next section I explain how I approached the qualitative analysis.

Qualitative Data Analysis. The survey offered participants options to add qualitative responses in open questions around their perceptions and use of digital resources as well as their attitude to self-directed learning. As with the quantitative data, a descriptive analysis was employed through the use of coding. Because the qualitative responses consisted of short answers, I used a hand coding method supported by SPSS. The data was rendered into SPSS, and the frequency of individual words and phrases were tagged and totaled. I then tallied the number of similar responses and sorted them into themes. These themes are displayed and detailed in figures in the Results chapter. Selected student qualitative comments were then used to build a supporting picture of the emerging themes and to compare and contrast this with the quantitative data.

The survey asked for student perceptions on their experiences of digital resources in the institution and personally. This opened the research to a double hermeneutic as the researcher interprets what students have already interpreted. The analysis took into consideration the researcher's etic, and the students' emic positions (Cohen et al., 2011). As with the quantitative data, having clearly defined boundaries of what I wished to reveal helped avoid misinterpretation. The initial analysis was deductive and based on searches developed from the research questions. This was followed by a deeper inductive coding to search for emerging concepts related to new learning systems, self-directedness, the creation of learning goals, and emerging lifelong learning literacies (Seale, 2012). The inductive analysis employed a series of cyclical phases as outlined in Figure 10.

Figure 10

The Cyclical and Overlapping Phases of Inductive Data Analysis



Note. This figure is adapted from McMillan & Schumacher (2001, p. 463) and describes the increasing depth of analysis in each of the four stages. These abstract from the survey-level data through to developing topics, categories, emerging patterns, and how these are revealed through narrative and visual representations.

During the analysis phase it was necessary to return from one level of abstraction to a previous one in order to clarify, for example, the topic, or categories. This was because although the deductive stage narrowed down the topics I was looking for, to get to a nuanced level required me to make step-by-step interpretations of student responses. Furthermore, I did not wish to place too many coding restrictions on the qualitative data in order to maintain an interpretive analysis (McMillan & Schumacher, 2001). This permitted a wider picture of the learning environment to emerge from the raw data. Nonetheless, purely open coding was not possible as the survey did not allow for extensive responses. Developing a set of initial categories supported an inductive, discovery analysis method. For example, some questions asked of the data were those such as: word choice – students' use of specific words; frequency - how often terms may arise; affective intensity - level of emotional resonance to the response; and big picture - patterns that emerge from a variety of responses (Seale, 2012, p. 373).

The initial patterns I sought to uncover were informed by my research questions and my hypothesis about what may be uncovered. Figure 6 outlined the elements that support lifelong learning literacy development: learning design, digital resources, and the student-digital relationship. These elements formed the foundation of the patterns I sought in the data. Trustworthiness was addressed by cross-validating the data to see whether similar responses occur among multiple respondents—in particular those who are in different fields of study and whether they are at a diploma or degree level of study. I also sought responses that did not contradict, or support, an emerging pattern derived from the cross-validation. This helped focus the picture that emerged from the data patterns (McMillan & Schumacher, 2001).

A core facet of a descriptive analysis is presenting data in a manner that can effectively communicate the most salient pieces of the data to the reader (Loeb et al., 2017) and the next section describes how the data is presented in the results chapter.

Presentation of Data. The role of the descriptive analysis researcher is to reduce the complexity of the data to communicable forms. This takes the form of visualizations such as tables, and cross-tabulation tables, figures such as bar or pie charts, student quotes supporting the quantitative data, and incidences of numerical data that informally correlate or support qualitative data. These visualizations also support the descriptive text and helped me ask different questions about, and cross-analyze, the data (McMillan & Schumacher, 2001). Qualitative data is presented with comments from participants that contradict or verify the hypothesis. Connections and emerging narratives in the data are visualized using crosstabulation of data in tables and figures in the Discussion chapter.

Limitations. In this section I will address the limitations of validity and reliability in the data, the participant sample, and organizational limitations. Replicability is not sought as this research does not follow an experimental model. However, generalizability within similar student groups in similar postsecondary institutions in Canada is of value as I offer recommendations for institutional strategy, professional development and student supports that may be useful to other institutions. Additionally, I was not seeking evaluative validity as my aim was to find out *what is* and not to judge this through a critical-theoretical lens (Seale, 2012). I was not seeking causality directly; however, the data showed links to causal effects that can be followed up in a future study.

Organizational factors such as time, participant sample size, and access to participants also created limits on this research. The survey ran over a two-week period to a specific group of students in online courses, namely those in online Liberal Studies electives. A richer data set and increased validity and reliability would have been gained by running the survey more than once over a two-year period. However, the research project did not support, or warrant this timescale. I was also only looking at a convenience sample of online students in a specific set of courses. Yet, all students in the college use the LMS. Surveying all students, or even all students in online courses would have been highly valuable, but this would have yielded an unmanageable data set of up to 20,000 participants and additional variables beyond the purposes of this study. Lastly, I did not consider demographic variables of age or identity, or academic variables such as grades and main program of study. These variables were outside the scope of this study as I am not investigating the effect these have on the development of learning systems and student goal setting. They are also attributes that are difficult to change in relation to any recommendations I make. Participants were within the sample because I targeted students from a specific cohort of courses within which they were self-registered. The next section discusses the potential of bias in the research analysis.

A Discussion of Bias. Self-reflection on how the researcher's personal experiences and world view may shape interpretations of the data is useful for readers to be aware of (Creswell, 2014). As an educator I value data that can inform all aspects of practice: socio-cultural, methodological, and andragogical. The data can be positivist or interpretive in nature as I respect both forms of investigation as yielding valid results that seek truth in their own particular ways. I do not have an overt preference for one over another and rather draw from a pragmatic viewpoint reflected in Lincoln and Guba's (2011) statement of the ongoing dialogue concerning paradigms:

> "…there will be no single "conventional" paradigm to which all social scientists might ascribe in some common terms and with mutual understanding. Rather, we stand at the threshold of a history marked by multivocality, contested meanings, paradigmatic controversies, and new textual forms." (p. 125)

What I offer in this regard is that I came to the research in a spirit of wishing to declutter the complexity of human-digital interactions in education in such a way that emphasizes practice over paradigms and results in the recommendation of effective practices for institutions, educators, and students.

Summary

This research study sought to uncover the extent to which lifelong learning literacies such as self-directed learning were emerging around the institutional LMS. My hypothesis was that the development of lifelong earning literacies and enabling more choice in defining learning outcomes are restricted by outcomes-based education models and walled-garden LMSs. This chapter outlined the descriptive analysis research method I used and the ontological and epistemological lenses it was viewed through to enable me to see what was happening within the study context in order to make recommendations for practice and institutional strategy. The research employed the JISC Student Digital Insights online survey and collected qualitative and quantitative responses. The research followed a descriptive statistical method for the quantitative data and used SPSS software to support analysis and presentation of data and the qualitative data followed a deductive then inductive coding method and utilized SPSS and Microsoft excel for analysis and presentation. The coding was bound contextually by the constructs formulated in Table 4 from the core research question and the sub questions arising from this. Data presentation is graphical in order to simplify the complexity and support communication of results to readers. The next chapter provides an overview of the research process that includes a description of the ethics approvals, tools and process employed for the analysis, and participants. Following this chapter, I provide the results of the survey with a brief commentary on any patterns emerging in the participant responses, followed by an analysis of the survey results. Following the Discussion chapter, I present the conclusions and make recommendations for future research and practice.

Chapter 4: Research Process

This section provides a description of the context and process of the research from advanced preparation in getting access to the research tool and identifying the courses the students in the participant sample would study in, to research ethics board approval and on through to running the survey and the subsequent preparation of the data that enabled the result and discussion chapters to be written in the Winter and Spring of 2021. I outline the research ethics board process for both institutions, in particular issues of informed consent and issues of data storage. I also detail the demographic data of the participant sample and provide details on student response rates to the qualitative questions and the extent to which student provided substantive responses. The role of the research assistant is explained and the role this individual played in communicating with students and preparing the data in order for the analysis to take place and removing anything that could enable identification of the students.

The COVID-19 Research Context

The research was conducted in an Ontario postsecondary College of applied learning during the COVID-19 pandemic. Although many students surveyed were studying on-campus in workshops and labs in applied trades and engineering programs the majority of courses were delivered online. Moreover, many of the core program courses were the result of an emergency pivot to remote teaching, yet the elective courses targeted in the participant sample were fully designed to be offered online. The JISC survey did not ask questions about the experience of the pivot to remote teaching instigated due to the pandemic as it was designed prior to its emergence. Nonetheless, there are four questions that may show evidence of frustrations that could be attributed to this unforeseen context. One example of these frustrations are student responses to question 21 as shown in Figure 14 in the Results chapter. When asked about who supports them most using technology in their learning the rate of participants who responded that it was their instructor was equal to the responses from all the other categories, namely: fellow students, friends and family, support staff, and instructional videos. Similarly, participant responses to question 32 about discussing digital skills show students as discussing these skills with their fellow students at the same rate as with their instructor. This possibly indicates that support from their instructor was lacking in the online environment compared to an in-class context where the instructor would be using the technologies with the students as part of the course work. This is supported by student qualitative responses to question 34, in Figure 26, when asked about developing digital skills. Here 45% of the student comments related to the need for additional support compared to 34% noting that they needed support on the core learning content. Students clearly feel that the support they would have usually received in-class from their instructor was negatively affected by this transition indicating that the technical and learning support service was not emphasized enough in the transition to remote teaching. With the rapid switch to remote it may be that the core learning content was prioritized over the supplementary, yet seemingly essential, ancillary supports. These results are addressed further in the Discussion and Implications chapter.

Research Timelines. This research context was within postsecondary education and as such the research was bound by the academic calendar of the institution. This resulted in activities needing to take place at specific times due to student and staff availability. Table 6 presents the timeline of activities encompassed by this research project.

Table 6

Research Timeline

Time	Process	Activities
Winter 2020	Advanced Preparation	• Register to use JISC survey and adapt • Prepare survey information letters, promotion, and incentives
Winter 2020	Participant Sample	• Identify potential student groups to take survey
Spring 2020	Candidacy	• Approval of research by committee
Spring/Summer 2020	REB Approvals	• Research Ethics Board approval: Athabasca U, Humber College • Hire a research assistant
Fall 2020	Conduct survey	• Information and ethics letter sent to participant sample • Conduct online survey over 2-week period – includes follow-up emails to remind students to participate
Fall 2020	Data Preparation	• Data collection • Prepare visual organization of data
Winter 2021	Data Analysis	• Review and analyze online survey data • Write results, discussion, and conclusion chapters
Fall-Winter 2021-22	Revisions & Defense	• Required revisions • Share findings and recommendations with institution • Oral defense

Each stage of the research process and timeline proceeded as planned in spite of the College moving to remote teaching and working from March 2020. Access to the JISC research tool, was given in the Winter of 2020 for one year and I completed the survey within this timeframe. This enabled me to plan the survey deployment through the Blackboard LMS and all information sheets to help students navigate the survey well in advance. Furthermore, I received REB approval early in the October of 2020 having submitted this at the start of the Fall semester with Athabasca University. This gave me time to work with the institution in the September of 2020 to select the courses I would target to recruit my participant sample and because no changes to my research plan occurred after the REB approval I did not need to make any adjustments to seek further approval.

The next section places the research within the institutional and demographic context.

Data Collection Method

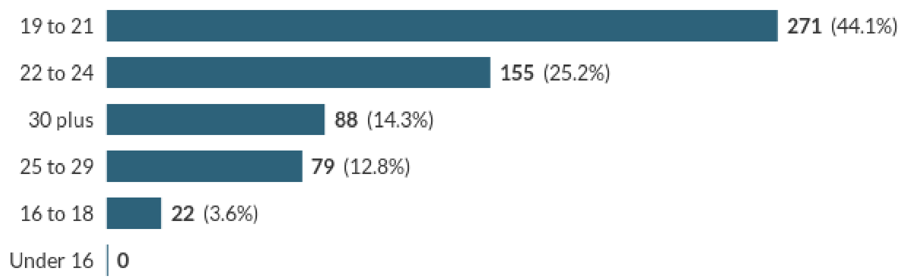
I used the online JISC Student Digital Insights Survey to collect the data. The survey considers four themes: the digital lives of students, digital in the institution, digital at course level, and student attitudes to digital. The 38 questions in the JISC survey are a blend of closed quantitative questions using Likert scales, nominal, and rating question designs, and qualitative open-ended questions enabling single word and longer sentence responses. The JISC Student Insights survey question template can be found in Appendix H.

The next section provides an overview of demographic data among the survey respondents.

Demographic Data. The first four questions fall outside the limits of the analysis in this research; however, the demographic data helps place the research in context. Accordingly, the responses show 63% of students had studied at the institution for up to two years and the other 37% beyond 2 years. 7% of students were studying in undergraduate courses with the rest in graduate (11%) and pathway or upgrading programs (19%). As shown in Figure 8, 69% of students were aged between 19 and 24 years old, 13% aged 25 to 29, and 14% over 30 years old.

Figure 11

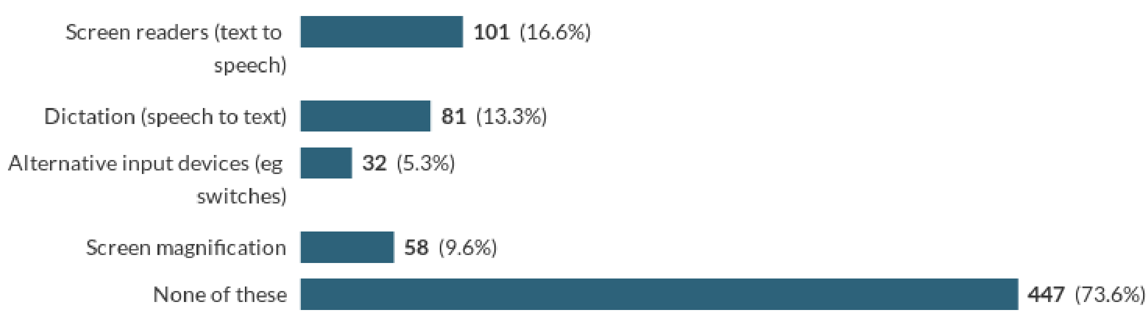
Participant Age Range



3.5% of students aged 16 to 19 years are students in dual credit programs who can take liberal studies electives. Asking students to identify their gender resulted in data showing 71% identifying as female, 28% as male, and 1% as other. The survey also asked about the use of assistive technologies and responses to this are shown in Figure 9 showing that 24% of students used an assistive technology of some sort, the most common being a screen reader that 17% of students reported using.

Figure 12

The Use of Assistive Technologies



Note. This figure shows the most common types of assistive technologies used by participants.

The following section describes the response rates for the qualitative and quantitative components of the survey.

Survey Response Rate. The survey was distributed online to approximately 2,400 students studying in online liberal arts elective courses in an Ontario postsecondary college in the Fall of 2020. All students in this group were asked to participate and 720 students accessed the survey with a total of 618 completing questions in the survey and submitting their responses. The responses of the 102 students who accessed but did not participate in the survey to completion have not been included in the final data set. Responses in the text reported in percentages are rounded to the nearest digit.

The survey also contained six questions designed to elicit qualitative data. These free text questions allowed students to respond with anything from single words to sentences. No word limit was placed on student responses. The free text questions garnered a lower response rate than the quantitative questions. Appendix G provides a screenshot sample of the student response patterns to these questions and the rest of this section gives more detail to the response rates for these free text questions.

Questions 16, 23 and 37 (Appendix H, Copy of Survey Questions) ask participants for single word or short sentences, not substantive opinions. Response rates and the length of the responses for these questions were as follows:

- Question 16: 298 responses (48%), averaging between one and three words.
- Question 23: 396 (64%) responses, the typical respondent wrote a single word answer, with 35 students writing a short sentence of around seven to ten words.
- Question 37: 184 responses (30%), with 121 respondents writing between one and three words, and 63 respondents writing short sentences of 5 words or more.

As is shown, question 37 that asked “Apart from what is provided by the teacher in your online course, tell me which resource(s) you find most useful in helping you learn” garnered the longest responses, whereas question 23 that asked “Please give an example of a digital tool or app you find really useful for learning” engaged the largest set of responses.

Questions 28, 34, and 37 asked students to provide an opinion on an aspect of digital teaching and learning. The nature of these questions was such that they encouraged participants to respond in a more substantive manner. The response rates and text written are described here:

- Question 28: 333 responses (54%), with 60% of students providing a response longer than five words.
- Question 34: 264 responses (43%) with 47% of students providing a response longer than five words.
- Question 36: 176 responses (28%) with 80% of students providing a response longer than five words.

Of the questions that asked for a more substantive response, question 36 “What one or two things can the college do to prepare you to be independent after graduating so you can make choices to learn the new skills you might need in your career?” elicited the largest substantive responses even though it had the lowest overall percentage of participation.

Response rates for the quantitative questions are reported in the tables and figures associated with the questions. These figures were derived from the data management tools built into the data management component of the JISC survey tool.

The next section outlines the activities of the research assistant this research project engaged.

Research Assistant Activities. The research assistant (RA) is a graduate of a research analyst graduate program https://liberalarts.humber.ca/programs/research-analyst.html. Graduates of this program are familiar with Tri-Council policies on ethics, privacy, and confidentiality. They are also familiar with quantitative and qualitative research methods and SPSS software. The assistant conducted a number of data preparation and communication activities outlined as follows:

Quantitative Analysis (all SPSS):

- Created stacked bar charts for all of the Likert scale and "how often" style questions
- Created multiple response sets and bar charts for the "check all that apply" questions

Quasi-Quantitative Data Text Preparation:

- In Excel, used text functions and sorting and filtering and manual editing to formatted text responses for questions 16, 23, and 38 that only asked to name apps and technologies in order to do simple word counts
- Created SPSS charts and ran chi-square tests for the word counts showing the proportion of mentions among top 10 items (those with significant counts) for different levels of study years, course level, gender, faculty, and age group, and noted significant results
- Created bar charts for these top 10s in Excel, and a combined doughnut chart that added all of these together, using higher level grouping variables.

Qualitative text preparation (all Excel):

- For the text responses that were more complex (questions 28, 34, 36) the RA classified each response into a category (e.g., "computer access", "communication", "better wifi") and then classified all of these categories into larger theme (e.g., "School Resources" would subsume the above), and then did counts of those themes
- Created donut charts for questions 28, 34, 36 showing the proportions of each theme, and added bar charts of the most frequent categories that made up of these.

Using the JISC survey instrument:

- Downloaded raw data after survey and checked that student responses to the qualitative questions do not enable identification of the participants.

Use of raw data:

- Created unique identification numbers
- Organized short answer responses to an excel sheet: all responses per student, then per question.

Work with SPSS and Excel:

- Qualitative answers: produced graphical representation of the emerging themes identified by researcher

The RA was named in the Student Information letter (Appendix B) and performed a number of important communication activities and represented the researcher as the point of contact for student questions, prior to, during, and after the survey. As part of this the RA assessed ongoing participation while the survey ran and sent two group email reminders asking students to complete the survey (day 4 and day 7) and used Excel's random number generator to select gift card winners and contacted winners to coordinate sending the gift cards.

The RA's role was delineated in the Research Ethics Board Applications. The REB activity is outlined below.

Practical and Ethical Considerations

This research project was approved by both Athabasca University and Humber College's research ethics boards (REB). With any research with human subjects, careful attention was paid to minimize risk to participants and data privacy issues. This section describes procedures put in place to minimize risk. Ethics approval was sought first from Athabasca University Research Ethics Board (REB) through the institution's research portal and the completion of the online

REB application. REB approval was given on October 1st, 2020 (Appendix E). Upon approval from Athabasca's REB, I applied for approval from Humber College's REB through the REB application process as well as approval being granted by the Associate Vice President of Academics. The AVPA provides the final seal of approval for any research conducted with Humber students. This was assessed and approved on October 15th, 2020 (Appendix F). With approvals in place, the survey then ran from November 9th to 20th, 2020.

Informed Consent. Prior to the survey running the participants had already self-registered into the target courses. An information letter describing the aims of the research, the outline of the survey, as well as issues around privacy and data protection was sent to all the students (Appendices B and C) in the target courses one week in advance of the survey. At the start of the survey, students were informed by email that completion and submission of the survey was viewed as their seeking their consent to participate. Students were then asked to click to continue with the survey, or they could choose not to complete the survey. Students were informed by email in the invitation letter that their teacher had no access to the data and any presentation of data will not occur until long after final grades were entered. Furthermore, students were given the option to withdraw at any point with no repercussions or penalty of any type by just closing their browser window. Students were directed to an email address managed by the research assistant who could respond to questions and concerns the students or faculty may have had.

Data Protection and Storage. As I used an online survey hosted by the Joint Information Systems Committee (JISC) organization, the data was collected and stored in JISC servers in the UK. JISC is a not-for-profit, UK-based organization dedicated to the improvement and development of digital services and solutions in the United Kingdom's post-secondary education sector (https://www.jisc.ac.uk/about/who-we-are-and-what-we-do). JISC store personal data for one year, and anonymized data for a maximum of seven years. All data that can identify an individual student or staff member is removed by the JISC survey team prior to analysis. JISC do not re-sell or use the data for marketing purposes. Details can be found here: https://digitalinsights.jisc.ac.uk/privacy/ and are further outlined in the Privacy Notice (Appendix A). The research assistant removed the raw survey data from the JISC servers 5 days after the survey completion window. Before I accessed the data, the research assistant prepared the qualitative data to remove any potential identifiers. The raw data is stored on a password and security protected device belonging to the institution and the data will only be accessible to the researcher and the research assistant and kept for 5-years.

Summary

This chapter describes the postsecondary context of the research and the times lines from the initial planning through to completion of the data analysis. The chapter gives statistical details on the data collected, such as the participant demographic data, and survey response rates. The research ethics process and approvals are outlined for both institutions with specific details in data storage and informed consent. Lastly, as I employed the use of a research assistant I describe the specific activities they worked on in participant communication and data preparation. The next chapter displays and comments on the results emerging from the survey.

Chapter 5: Results

In this chapter, I present the results gathered from participants through the online survey in order to help me understand the learning context and define future intervention strategies.

Overview

An overview of the methodology is provided, and the research questions and hypothesis are restated. I then visualize in Table 7 below the way the research questions align with the survey questions and themes with the rest of the chapter presenting the results in sequence relative to the questions in the survey. The analysis of the results is covered in the next chapter, so no rationale or discussion is proffered here other than a short summation of respondent data from each survey theme. The data is visualized through the extensive use of figures and tables with statistical and qualitative language where relevant as described in the methodology chapter.

The Research Focus

As Laurillard articulated "Knowledge is information already transformed: selected, analyzed, interpreted, integrated, articulated, tested, evaluated" (1993, p. 123). However, interpreting data drawn from the information rich networked society described by Castells (2009) leads Dyke, Conole, Ravenscroft, & Freitas to comment "changing information can present a challenge to the very ontological security provided by everyday living" (2006, p. 85). In order to help transform such a breadth of information into knowledge I am using a descriptive analysis research method because it:

> can help researchers understand a phenomenon of interest and use that knowledge to prioritize possible causal mechanisms, generate hypotheses and intervention strategies, interpret the findings of causal research, diagnose problems for practitioners and policymakers to address, and identify new issues to study. (Loeb et al., 2017, p. 1)

This research project set out to understand the extent to which the online digital environment in postsecondary education supports lifelong learning literacies. This was analyzed and interpreted through the primary research question:

- To what extent are LMSs inadequate as a tool for developing the lifelong learning literacies required for success as adult learners in digitally enabled learning environments?

and the sub-questions:

- To what extent do student responses show characteristics of lifelong learning literacies?
- To what extent do participant responses reveal their limited agency in constructing learning goals and outcomes?
- To what extend are students employing technology to support self-directed learning?

The research questions emerged from the hypothesis as follows:

If the kind of lifelong learning that graduates may require or choose to access is highly dependent on unknown future contexts and individual needs imposed by the logic of the networked society, then these needs will not be best served by an outcomes-based instrumental educational model that reinforces instructor- and institution-centered outcomes that inhibit student agency and choice. Access to formal education can also be stifled by prior learning, assessment and recognition policies that centre outcomes-based models and are not standardized within and between institutions (Dron, 2014; McGreal, et al., 2014). This model is reflected and exacerbated in the walled-garden analogy portrayed in the opening of Chapter 1 of an online student studying a course designed within the constraints of an LMS. The interdependence of the research questions, survey themes and questions are provided in Table 7 below.

Table 7

Map of Research Themes to JISC Insights Survey Questions

JISC Themes	My Research Themes	Research Question	JISC Insights Survey Question
Demographic data	N/A	N/A	1. How many years have you studied here?
			2. What level is the course you're studying?
			3. How old are you?
			4. What gender do you identify as?
			5. Do you use any of these assistive technologies? • Screen readers (text to speech) • Dictation (speech to text) • Alternative input devices (e.g., switches) • Screen magnification • None of these
You and your technology	Self-directedness	To what extend are students employing technology to support self-directed learning?	6. Which of these PERSONALLY owned devices do you use for learning? Tick all that apply • Desktop • Laptop • Tablet • Smartphone • None of these
			7. Which of these ORGANISATIONALLY owned devices do you use for learning? • Desktop • Laptop • Tablet

			• Smartphone • None of these
			8. Which best describes your attitude to technology?
			9. Do you actively help others to develop their digital skills?
			10. Overall, how confident are you at trying out new technologies?
Technology at your organization	Outcomes-based education	• To what extent do participant responses reveal their limited agency in constructing learning goals and outcomes?	11. Which of these do you have access to at your organisation whenever you need them? Tick all that apply • Reliable wifi • Online course materials • e-books and e-journals • File storage and back-up • Recorded lectures • Online skills training resources
			12. How much do you agree that (Agree Neutral Disagree) • Teaching spaces are well designed for technology use • The software used on your course is industry standard and up to date • The system for submitting work and getting feedback works well
			13. How much do you agree that (Agree Neutral Disagree) • You get the chance to be involved in decisions about digital services • Your organisation has told you how your data is collected and used • Your organisation helps you to track your grades/progress
			14. How much do you agree that your learning environment is: (Agree Neutral Disagree) • Reliable • Well designed • Easy to navigate
			15. In the last week, which of these activities have you used your learning environment for? • Check course dates or deadlines

			• Submit coursework • Take a quiz • Discuss coursework with other students • Work with other students on a shared presentation/report • None of these
			16. In the last week, have you used any other apps or platforms outside of the learning environment to discuss or collaborate on coursework with other?
			17. How much do you agree that your organisation: Agree Neutral Disagree • Supports you to use your own digital devices • Lets you access online systems and services from anywhere • Communicates effectively online (e.g., email, messaging, notifications)
			18. Which of these would be most useful to you? • More computers in computer rooms • More laptops/tablets available in class • More laptops/tablets available on long term loan • None of these
			19. Overall, how would you rate the quality of your organization's digital provision (software, hardware, learning environment)? • Best imaginable • Excellent • Good • Average • Poor • Awful • Worst imaginable
Technology in your learning	Walled garden	To what extent are student attitudes towards online	20. In your own learning time, how often do you use digital tools or apps to: (Weekly or more, Monthly or less, Never) • Make notes or recordings

	digital technologies	learning reflected in the concept of lifelong learning literacies?	• Access course materials online • Access recorded lectures • Look for additional resources not recommended by your lecturer
			21. Who supports you most to use technology in your learning? • Other students • Lecturers on my course • Other support staff • Friends and family • Online videos and resources
			22. Which of these would be most useful to you as a learner? More: • Interactive polls/quizzes in class • Time working online with other students • Practice questions available online • References and readings • Course-related videos
			23. Please give an example of a digital tool or app you find really useful for learning:
			24. As part of your course, how often do you: Weekly or more, Monthly or less, Never • Use live polls or quizzes in class • Work with data (e.g., analysis, visualization) • Work online with other learners • Create a digital record/portfolio of your learning • Get digital feedback on your work • Use simulations, virtual or augmented reality (VR or AR)
			25. Overall, how motivated are you to use technology to support your learning? • Very motivated • Quite motivated • Neutral • Not very motivated • Not at all motivated

			26. How much do you agree that most of the teachers on your course: Agree Neutral Disagree • Make good use of digital tools and platforms • Help you with the digital tools you use for learning • Signpost you to useful digital resources
			27. Overall, how would you rate the quality of digital teaching and learning on your course? • Best imaginable • Excellent • Good • Average • Poor • Awful • Worst imaginable
			28. To improve the quality of digital teaching and learning ... what ONE thing should your organisation do?
Developing your digital skills	Lifelong learning literacies	To what extent do student responses show characteristics of lifelong learning literacies?	29. Which of these skills does your organisation offer support for you to develop? Tick all that apply • Basic IT skills • Data analysis skills • Research and information skills • Specialist software use • Create digital materials • Manage your digital identity
			30. How much do you agree that your organisation provides you with: Agree Neutral Disagree • Guidance about the digital skills you need for your course • The chance to assess your digital skills (e.g., for career planning) • Keeping personal data safe • Online copyright and plagiarism

	31. How much do you agree that you are informed about: Agree Neutral Disagree • Staying safe online • Your health and wellbeing as a technology user • None of the above
	32. When have you discussed your digital skills? Tick all that apply • During induction • One to one with tutors • In lectures and classes • With other students
	33. Overall, how would you rate the quality of support you get from your organisation to develop your digital skills? • Best imaginable • Excellent • Good • Average • Poor • Awful • Worst imaginable
	34. To help develop your digital skills ... what ONE thing should your organisation do?
	35. Please select how much you agree with the following statements. Strongly agree, Agree, Neutral, Disagree, Strongly disagree • I prefer it when someone else organizes what I need to learn. • I prefer to make decisions about what I need to learn and how I will learn it. • If I want to learn something, I am able to plan a way to learn it
	36. What one or two things can the college do to prepare you to be independent after graduating so you can make choices to learn the new skills you might need in your career?

		37. Apart from what is provided by the teacher in your online course, tell me which resource(s) you find most useful in helping you learn.
Demographic data	N/A	38. What Humber Faculty do you study in? Faculty of Business Faculty of Health & Wellness Faculty of Media & Creative Arts Faculty of Applied Science & Technology Faculty of Social & Community Services

The next section provides the results of the survey through extensive use of tables and figures to display the data emerging from student responses to each question.

Results

In this section the results from the survey questions, provided in full in appendix H, are presented in order of the four themes within the JISC Student Insights Survey and how these themes correlate with my four sub-questions as stated in Table 5. The results are described either in text or visualized through extensive use of figures and presented without analysis. Nonetheless, throughout the Results Chapter I will tentatively summarize whether the results support, or do not support, the research questions and hypothesis. The data emerging from each survey question is described or visualized individually and in turn with a deeper analysis using methods such as cross-tabulations of data between different questions untaken in the next chapter. The first set of survey questions deals with demographic data within the participant sample and these were reported in the previous chapter.

The next section presents the questions associated with my research theme of self-directedness and the survey theme of ‘you and your technology’.

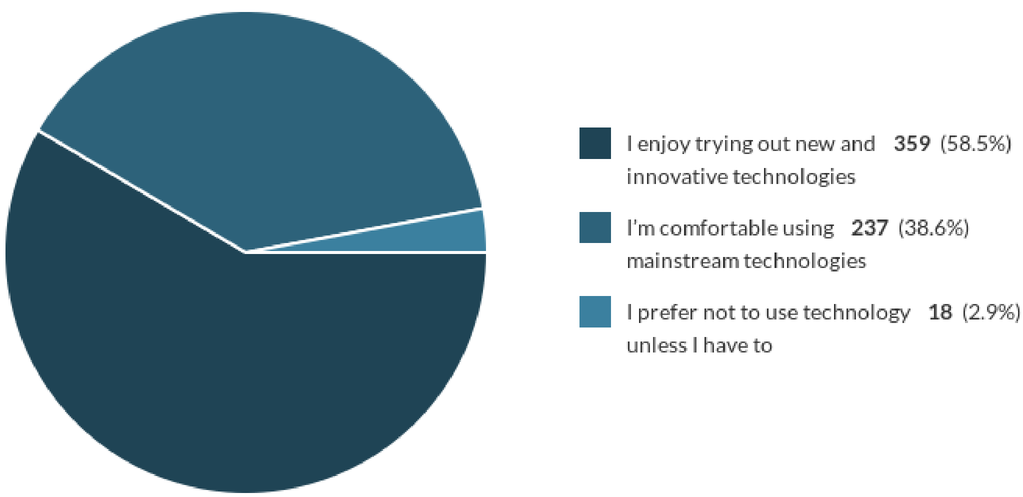
Self-Directedness: You and Your Technology

These questions reveal the degree to which students report self-directed behaviours with technology and the construction of nascent personal learning environments. Survey questions six and seven asked students about the devices they use personally, and those provided by the college respectively. The most popular personal devices used by students were a laptop (94%) followed by a smartphone (84%), then desktop (30%) and tablet (26%). For devices provided by the college students reported using desktops and laptops at 30% and 28% respectively. 15% of students reported not using any college provided device.

The relatively low rates of students using organizationally owned devices and high rates of students using laptops and smartphones supports the notion that students in the institution where this study took place were self-reliant in the provision of devices they were likely to use to study online. This was further supported by student responses to question eight in Figure 13 as they reported their attitude towards trying new, innovative and mainstream technologies and very few participants reported a preference for not using technologies unless they had to.

Figure 13

Student attitudes to technology



Note. This figure illustrates the student responses to question 8: Which best describes your attitude to technology?

A confident attitude towards experimenting with technologies indicated a level of self-efficacy, an overlapping feature of self-directedness (Saks & Leijen, 2014). This was further supported by the majority of students who reported in question nine of helping others to develop their digital skills with response rates of: Yes, often at 35%, Sometimes at 57%, and Never at 8%. These responses compare with the 40% of students who reported in question 10 being 'very' and 30% ‘quite’ confident at trying out new technologies, with 0% of students saying they were not at all confident.

The next section presents results related to the second theme in the survey, that of technology in your organization and considered through the lens of outcomes-based education models.

Outcomes-Based Education: Technology at Your Organization

The responses to this section of the survey were used to help understand the extent to which outcomes-based education (OBE) modes limit or enable lifelong learning literacies. This area places special attention on education technologies like LMSs, and participatory media.

Questions 12 and 13 asked about digital facilities on campus. During COVID-19 students were mostly not on campus so the data here may reflect their perceptions of studying before social-distancing measures prevented students accessing campus-based resources. Table 8 shows students as well-provisioned with core resources for online learning, although the lower rank of online skills training compared to the delivery of online learning resources like e-texts and recorded lectures may back the notion that digital literacies being taught was seen as less central than instructor- and institution-centered content instruction.

Table 8.

Access to Digital Resources

Rank value	Option	Count
1	Reliable wifi	553
2	Online course materials	534
3	e-books and e-journals	358
4	File storage and back-up	171
5	Recorded lectures	106
6	Online skills training resources	197
7	None of these	9

Mean rank	2.67
Variance	2.62
Standard Deviation	1.62
Lower Quartile	1.0
Upper Quartile	4.0

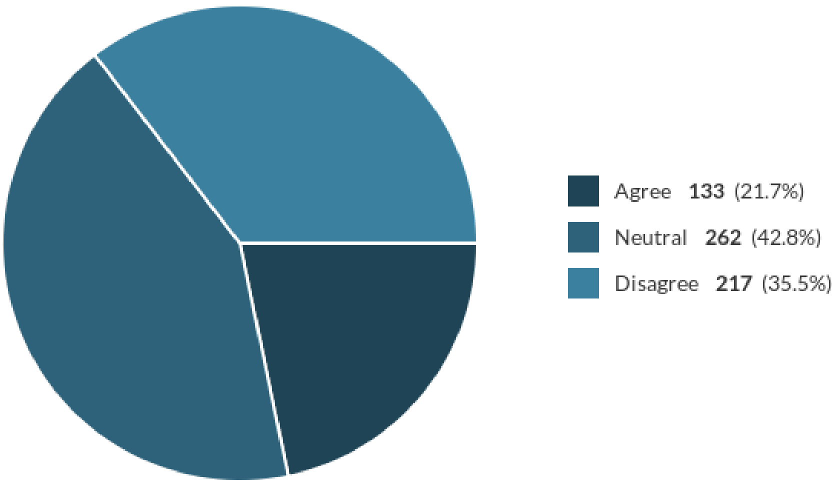
Note. This table illustrates the student responses to question 11. Which of these do you have access to at your organization whenever you need them?

Responding to question 12.1, a large majority of students either agreed or were neutral, at 51% and 41% respectively, that teaching spaces are well designed for technology. Further, 60% of students reported in question 12.2 that the software they use in the college is up to date. In particular, in question 12.3, 66% noted that the system for submitting work and receiving feedback works well. The system in place is the Blackboard LMS.

Questions 13 through to 16 mostly asked students to report on the Blackboard learning system. Question 13.1 differs as it asked a general question about whether they got the chance to be involved in decisions about digital services with responses indicating that students were not involved in discussions about the College's digital services. Responses to question 13.2 also indicated that 31% of students were not aware or 41% were neutral in how their data is collected and used. Institutional emphasis in the LMS is placed more on informing students of their grades. When students were asked in question 13.3 whether the college helped them track their grades/progress, 70% of students agreed and only 3% disagreed. Both these sets of responses seem to support the hypothesis that institution-centered OBE models limit student choice and agency in the learning environment.

Figure 14

Involvement in Decisions About Digital Services



Note. This figure illustrates the student responses to question 13.1. How much do you agree that you get the chance to be involved in decisions about digital services?

Questions 14.1, 14.2, and 14.3 asked about the reliability, design, and navigation of the learning environment respectively. The environment students primarily use in online learning is Blackboard LMS and 68% of students reported it was reliable, 49% reported it as well designed, and 54% reported it as easy to navigate.

These generally positive responses indicate success in the institution's efforts to utilize and work with the LMS effectively. These responses were reinforced in the activities students conveyed undertaking in their learning environment from question 15 and described in Table 9. However, the top three activities were *operational* activities like checking grades, submitting work, rather than *learning* activities such as discussing coursework with other students—calculated as the upper quartile response in the sample.

Table 9

Activities Within the LMS

Rank value	Option	Count
1	Check course dates or deadlines	564
2	Submit coursework	549
3	Take a quiz	504
4	Discuss coursework with other students	334
5	Work with other students on a shared presentation/report	252
6	None of these	2

Mean rank	2.62
Variance	1.75
Standard Deviation	1.32
Lower Quartile	1
Upper Quartile	4

Note. Table 9 illustrates the student responses to question 15. In the last week, which of these activities have you used your learning environment for?

Learning-related activities were occurring outside the LMS as shown in responses to question 16 in Figure 15. One phrase in this question to note is ‘in the last week’. Although collaborative work may have been happening outside the LMS, only approximately half reported this happening in the past week. The next section provides more data to illuminate the extent to which students are undertaking learning activities outside the LMS.

Figure 15

App and Platform Use Outside the LMS

Note. This figure shows student responses to question 16. In the last week, have you used any other apps or platforms outside of the learning environment to discuss or collaborate on coursework with other students?

Question 16 also asked for examples of which apps or platforms they use. The top 5 reported in descending order were WhatsApp at 47%, Google documents at 33%, and iMessage, texting, and email at 5% each.

Students broadly agreed with the statements in questions 17.1, 17.2 and 17.3 that they were supported in using their own digital devices (69% agreed), could access online services from anywhere (74% agreed), and that the College communicated to them effectively online (67% agreed). Reponses to question 18 reveal that, although students felt supported in using their own digital devices, they felt it would be most useful for the college to provide more computers for use in computer rooms (33%) and in class (26%). Of note, 25% of respondents did not find any use in the institution providing access to more computers, whether on- or off-campus. Furthermore, the availability of more laptops on long-term loan was considered useful by only 15% of participants, perhaps supporting responses from question 17 wherein students felt they were supported in using their own devices.

These responses revealed students to be equipped with personal computers they can use for online learning purposes and in question 17 students reported generally favorable responses to feeling supported by the institution in using their devices. This correlates to responses to question 19, shown in Table 10, where students rated the college's digital provision as excellent or good. This question asked for student perceptions of the learning environment as well as software and hardware, thus showing positive sentiments to their overall digital environment, although it should be noted that students who had already dropped out of their program or course due to the need to study online would not be represented here and so skews the results to those who persisted.

Table 10

The Quality of the Institutions Digital Provision

Rank value	Option	Count
1	Best imaginable	41
2	Excellent	174
3	Good	271
4	Average	106
5	Poor	16
6	Awful	3
7	Worst imaginable	2

Mean rank	2.84
Variance	0.9
Standard Deviation	0.95
Lower Quartile	2
Upper Quartile	3

Note. Table 10 displays responses to question 19: Overall, how would you rate the quality of your organization's digital provision (software, hardware, learning environment)?

To summarize, students felt well-provisioned and supported by the institution in their digital learning environment. Responses shown in Table 10 indicated that significant activity in the LMS was operational, not instructional, and that only half engaged in activities outside the LMS in the past week.

The next section presents results related to the third theme in the survey - technology in your learning. The responses here were used to assess whether, and how, students work outside walled-garden digital learning environments and sought to provide a more complex picture of student attitudes, agency, and activities to learning with technology.

Walled-Garden Digital Environments: Technology in Your Learning

The responses to survey theme 'technology in your learning' were used to assess the extent to which walled-garden digital technologies limit lifelong learning literacies. The analysis considers concepts like self-direction and networked learning theories.

Question 20 asked three sub-questions about how often students used digital tools or apps in their own time with responses revealing that 74% of students made notes or recordings weekly or more, and 93% accessed course materials online weekly or more. When asked specifically about accessing online recorded lectures only 37% noted they did this weekly or more, whereas 44% reported never having accessed recorded lectures. This seemingly indicates that only half of the teachers recorded lectures for future consumption. This could be because the instructor elected not to record the lecture for student privacy reasons, or for a class management reason in that by not recording the class the students were required to be present in the synchronous session. Additionally, these figures may also indicate that students did not feel the need to access the recordings as they either felt they had the information they needed, perhaps from talking to peers—a common method because a majority reported taking notes. Another reason may be that they could access the learning resources they felt they required directly from the LMS-based learning content given the positive impression students had of the overall learning environment as shown in Table 10, thus speaking to the notion that the LMS is an organizational and not instructional environment. That the LMS is considered primarily an administrative environment is supported by student comments such as "Improve Blackboard especially for assignment submission" and "Blackboard is the most useful to me to do my assignment. There are ppt, documents and learning materials that the lecturer provide" and further reinforcing the notion of the LMS for administrative purposes "offer more than one way (instead of Blackboard) to do work and quizzes and essays" and "Make emailing the professor through Blackboard clear and easily accessible".

Lastly, question 20.4 asked about the extent to which students sought out digital resources without being directed to by their teacher. The data in Figure 16 showed that 88% of students made self-directed decisions about digital learning resources at least monthly and supports my research question "To what extend are students employing technology to support self-directed learning?".

Figure 16

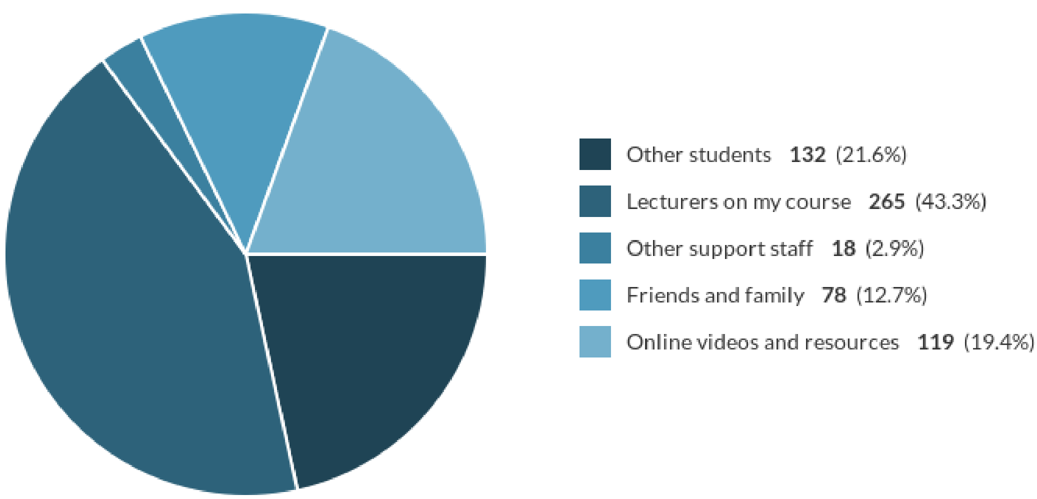
Frequency of Use of Digital Tools

Note. This figure shows responses to question 20.4: In your own learning time, how often do you use digital tools or apps to look for additional resources not recommended by your teacher?

Question 21 provided an additional dimension to the extent of student self-directedness by asking who students they received support from in their learning.

Figure 17

Support for Using Technology



Note. This figure shows responses to question 21: Who supports you most to use technology in your learning?

Responses here show that 55% of students sought support from individuals or resources that were not in a formal instructor or college support staff role, thus showing an expanded community involved in supporting self-directed activities. I associate such resource seeking organizational behaviour as a strategy within the concept of lifelong learning literacies which I define as a set of reflective, selection and organization strategies sustained by the goal-setting and self-regulation to support the construction of knowledge in a self-directed learning experience for personal or professional needs. Responses to question 21 showed students exhibiting organizational literacy characteristics and shows initial support for my research question “To what extent do student responses show characteristics of lifelong learning literacies?”. Although not asking whether such digital resources were provided by an instructor or sought out by the students, question 22 in Table 11 reveals that the most popular learning activities in the list are those that were typically provided by an instructor such as practice questions, interactive polls/quizzes, and course related videos. The least useful according to students at only 9% was time online working with their peers.

Table 11

Activities Students Find Most Useful for Learning

Rank value	Option	Count
1	Interactive polls/quizzes in class	109
2	Time working online with other students	57
3	Practice questions available online	276
4	References and readings	64
5	Course-related videos	104

Mean rank	3.0
Variance	1.6
Standard Deviation	1.26
Lower Quartile	2.0
Upper Quartile	4.0

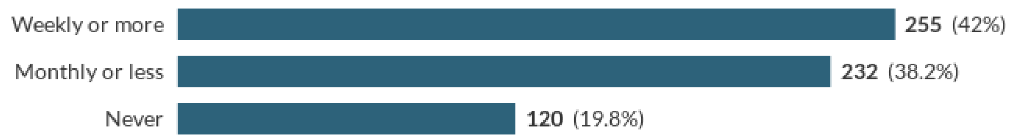
Note. Table 11 shows student responses to question 22 by asking which of the given options they would like more of as part of their learning. The question is stated as: Which of these would be most useful to you as a learner?

Question 23 then asked for students to 'Please give an example of a digital tool or app you find really useful for learning'. In order, the top five responses from students were, in descending order: YouTube and Blackboard at 11% each, Kahoot and Google at 8% each, and Google Docs at 5%. Quizlet, a quiz making software similar to Kahoot, was placed at number six in the list. The list reveals a mix of software like Google and YouTube that are also likely to be commonplace in a student's personal life, and software like Blackboard, and Kahoot, that are primarily provided by the instructors.

The next question contains six nested questions and asked participants how often they engaged with different types of software or activities as part of their course.

Figure 18

The Use of Polls and Quizzes



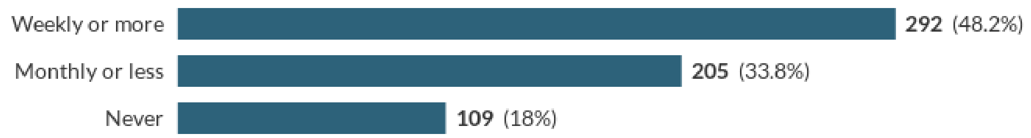
Note. This figure shows responses to question 24.1: As part of your course, how often do you use live polls or quizzes in class?

Responses to 24.1 back up the data from question 23, where participants reported they found polling and quiz software such as Kahoot really useful for learning. Figure 18 shows that instructors frequently used such tools. Question 24.2 expands on the practice of reviewing data from online polls by revealing that 79% of students reported working with data at some point in their course. 42% of respondents noted working with data weekly or more.

Although not specifying the manner in which learners work together online, the data from question 24.3 in Figure 16 reveals nearly half of students working with their peers at least weekly. Conversely, nearly 20% of students reported never working online with other learners. The extent of such peer-to-peer activities ostensibly refutes the research hypothesis wherein the outcomes-based model is very instructor-centric. It does seem that students have significant opportunities to collaborate and independently construct elements of their learning experience.

Figure 19

Working Online with Other Students



Note. This figure shows responses to question 24.3: As part of your course, how often do you work online with other learners?

However, this refutation of the hypothesis is seemingly only partly supported by the data shown in Figure 20. Here, 26% of participants reported creating a digital record of their work, yet 39% responded that they never used a digital portfolio. The responses do not indicate if these portfolios were teacher-directed, created by individual students, or, for what purpose.

Figure 20

Creating a Portfolio of Learning

Note. This figure shows responses to question 24.4: As part of your course, how often do you create a digital record/portfolio of your learning?

Digital portfolios are an element of personal learning environments (PLEs) discussed in Chapter 1. Such nascent practices, whether self-directed or not, align with the notion of students developing inquiry habits outside of the LMS that are a necessary part of lifelong learning literacies. The practices also seem supported by the extent to which students received digital feedback on their work. Figure 21 reveals 52% of students getting weekly feedback on their work, with only 10% never getting feedback.

Figure 21

Digital Feedback

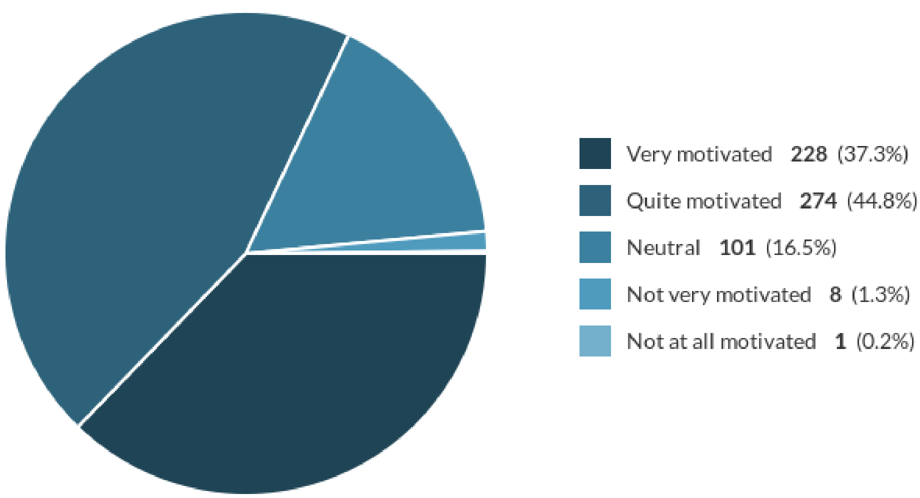
Note. This figure shows responses to question 24.5: As part of your course, how often do you get digital feedback on your work?

A pattern of regular instructor support begins to emerge from Figure 17 and Figure 21. This frequent interaction with the instructor is reflected in the peer-to-peer work students reported in Figure 19. Such extensive interaction shows significant teaching presence in the online environment in the form of peer and instructor interactions to support learning. Responses to question 24.6 corroborate this where 48% of participants reported using software such as simulations, virtual or augmented reality weekly or more. The content and activities in such software are likely to be provided and guided by the institution and instructor due to their complexity and cost.

Instructors were likely to find that their students are very, or quite motivated to use technology to support their learning as shown in Figure 19 with almost no students reporting being not very, or not at all motivated in using technology.

Figure 22

Motivation in Using Technology



Note. This figure shows responses to question 25: Overall, how motivated are you to use technology to support your learning?

Substantiating the emerging narrative of an instructor-centric environment are the results to the next three nested questions that asked participants to rate how teachers support their learning. For example, in question 26.1 62% of students agreed that teachers on their course made good use of digital tools and platforms, with 33% being neutral. Furthermore, instructors seemed to offer an equivalent level of support in using technologies deployed for learning related activities as indicated in responses to question 26.2 that show 44% of student agreeing, and 46% being neutral when asked how much they agreed that most of the teachers on your course help them with the digital tools they use for learning. Similarly, when students were asked in question 26.3 how much they agreed that most of the teachers on your course signpost them to useful digital resources 46% reported agreeing and 44% neutral. Responses to questions 24 and 26 could be summarized as students frequently using advanced digital technologies in their courses, having a positive view of how these are deployed, and receiving support from both instructors and peers. Question 27 captures a bigger picture of how students perceived the quality of digital teaching and learning. Here the data shows a mean rank of 2.84 rating the quality between excellent and good.

Table 12

The Quality of Digital Teaching and Learning

Rank value	Option	Count
1	Best imaginable	39
2	Excellent	194
3	Good	240
4	Average	112
5	Poor	22
6	Awful	2
7	Worst imaginable	3

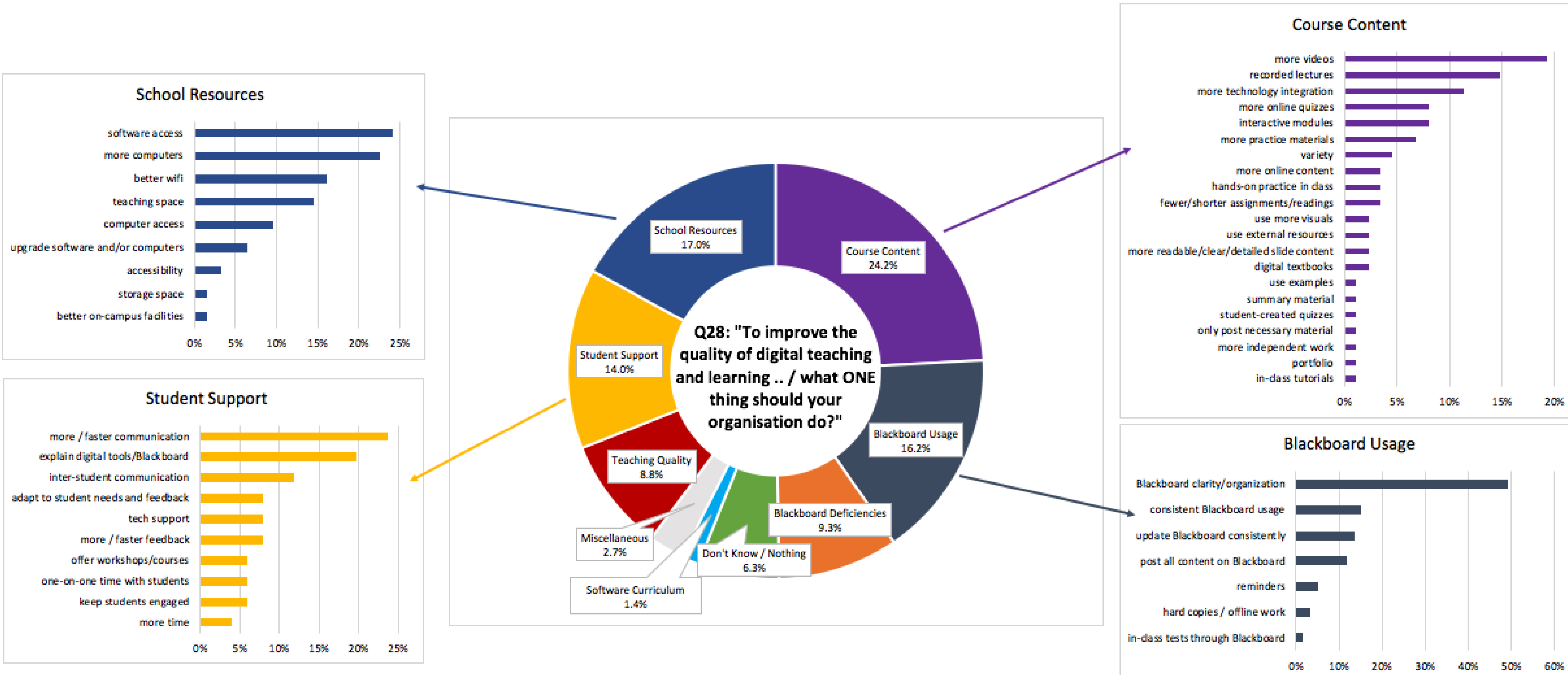
Mean rank	2.84
Variance	0.98
Standard Deviation	0.99
Lower Quartile	2.0
Upper Quartile	3.0

Note. Table 12 shows responses to question 27: Overall, how would you rate the quality of digital teaching and learning on your course?

Students seemed motivated and getting support to make extensive use of digital technologies. However, qualitative responses shown in Figure 26 later in this chapter contradict this as they reveal students seeking more on-demand support in using core learning technologies like the LMS and course-specific software from instructors and the institution. Additional nuance is added to these quantitative questions in the qualitative responses to question 28 where students were asked: To improve the quality of digital teaching and learning ... what ONE thing should your organization do? The results of question 28 are displayed in Figure 23.

Figure 23

Improving Digital Teaching and Learning



Note. This figure shows student responses to question 28: To improve the quality of digital teaching and learning ... what ONE thing should your organization do? This was an open response question with 340 unique responses. Student replies were coded for frequency and nine themes emerged: course content, Blackboard (LMS) usage, Blackboard deficiencies, do not know, software, miscellaneous, teaching quality, student support, and school resources.

Participant responses revealed that the most common thing the institution should do to improve digital teaching and learning were grouped in the category of course content. Within the course content category, the most commented upon area was a request for more videos, either by just using the word “videos” or a request for recorded lectures. For example, one student commented that the institutions should “make more videos available” with another noting that it should “add more recorded lectures (video, audio casts) online”, and further “offer online reading/videos materials related to in-class lecture for review at home”. Comments related to the Blackboard LMS were associated with the way it was used by instructors such as “all course assignments or tests should be posted on Blackboard calendar and all lectures be uploaded” or that “all teachers should have to use blackboard, some don't”. Another student commented in more detail on the organizational property of the LMS in stating that “Blackboard is the predominant software I use for teaching purposes within school. It would be beneficial if there were a cohesive way that professors organized their Blackboard pages so that you could find information more accessible”. Blackboard was also referenced in relation to its perceived inadequacy such as provide a “better platform than Blackboard, which has many flaws and issues” and “create a better blackboard app!” and in relation to the user experience one student noted that “it's hard to navigate blackboard so instead of the symbols blackboard should have small titles under the symbols to make it easier to navigate”. Some examples of software and school resources being suggested other than the Blackboard LMS were “YouTube”, “Adobe”, “Photoshop”, and “Sketchup” used for design programs as well as “Get better WiFi” and “Provide more computers”. Evident in Figure 23 are the frequency of comments linked to students asking for more support that would inherently be enabled by the instructor or institution. For example, comments relating to college and student supports or how the Blackboard LMS was employed for teaching, and in the course content category in Figure 23 where many of the comments were about what the students would like more of from their instructors. Although further analysis is conducted in the next chapter, it indicates the desire for the kind of support that would help them become familiar with digital learning environments—which I argue is a key component of lifelong learning literacies even though results from question 24 and 26 indicated they felt supported in using more complex work-related technologies. I will be analyzing and discussing this in greater detail and examining other possible interpretations in the discussion chapter.

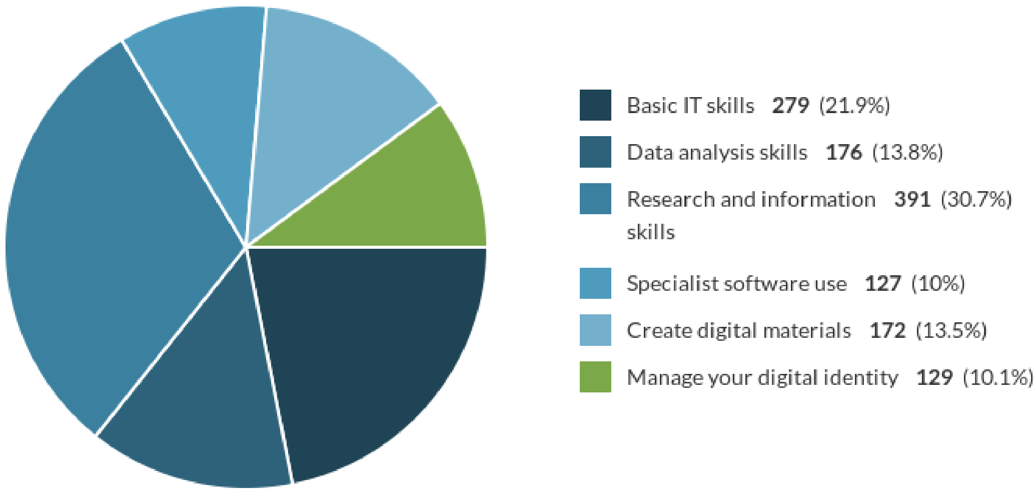
In the final section of the survey, I present results related to the theme: developing your digital skills. Participant responses to these questions are examined to see whether they do or do not support the emergence of attributes and skills proposed within concept of lifelong learning literacies.

Lifelong Learning Literacies: Developing Your Digital Skills

The responses to the final survey theme ‘developing your digital skills’ are employed to build a picture of the relationships between the participants and the digital environment in relation to concepts like choice, control, goal-setting, and beliefs towards learning. Through analysis of the survey responses, this study sought to measure the extent to which characteristics of lifelong learning literacies were present in the participant sample. Digital literacies as a component of lifelong learning literacies were supported by the institution as shown in Figure 24, in particular as 31% of students were exposed to research and information management skills. Also of note are the 10% students who reported being supported in managing their digital identity and 13.5% of students who are supported in creating digital materials—both key components in personal learning environments.

Figure 24

Skills the Organization Support



Note. This figure shows responses to question 29: Which of these skills does your organization offer support for you to develop?

The next question invited students to comment on how the institution supported them in digital skills development and also how they could assess these skills for career readiness. Figure 25 shows that 47% agreed they were supported with a small minority disagreeing.

Figure 25

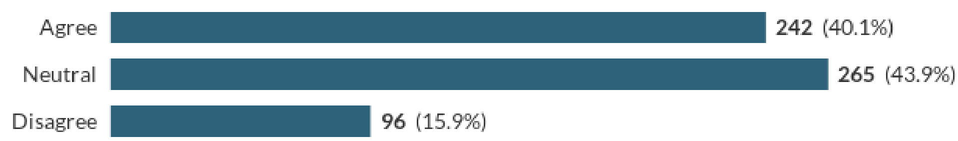
Guidance on Digital Skills

Note. This figure shows responses to question 30.1: How much do you agree that your organization provides you with guidance about the digital skills you need for your course.

As a work placement is a fundamental component of all college programs, students being able to recognize their workplace readiness with regards to the digital tools they will use is an important skill. Figure 26 reveals that 40% of student agreed, and 15% disagreed with the extent to which they are supported in this by the college.

Figure 26

Assessing Digital Skills

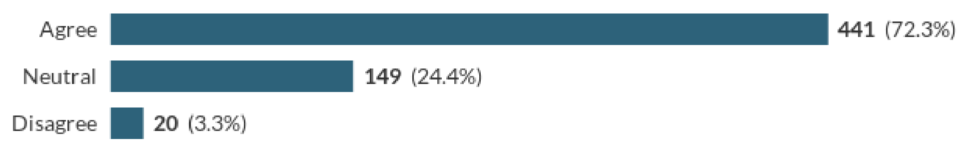


Note. This figure shows responses to question 30.2: How much do you agree that your organization provides you with the chance to assess your digital skills (e.g., for career planning).

The four parts of question 31 explore how the institution supports and informs students of ethics and safety in the online environment. The sub questions 31.1, 31.3, and 31.4 show that on average just under half the students agreed they were supported in understanding data security and safety and wellbeing while studying online, with around 15 to 20% disagreeing they were informed. Exploring whether they were informed about copyright and plagiarism, responses to sub question 31., as shown in Figure 27, revealed 72% of students were seemingly well-informed about ethical practices in the submission of assignments and work.

Figure 27

Information on Copyright and Plagiarism

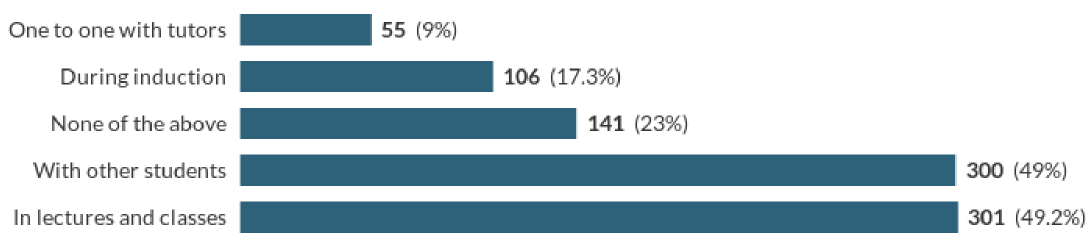


Note. This figure shows responses to question 31.2: How much do you agree that you are informed about online copyright and plagiarism?

With only around half of the participant sample agreeing they were supported in health and safety online; student responses seem to show that instructors did not perceive a significant need to support student online safety. The contrasting responses to how students were supported in their online safety with ethical practices could be interpreted as instructors and the institution placing more emphasis on control of student output than providing students with the skills and literacies to remain safe online. Partly supporting this, Figure 28 shows that student discussed digital skills with their peers at the same rate as in class, at 33% respectively, with only 6% discussing these directly with their instructor or tutors.

Figure 28

Discussing Digital Skills



Note. This figure shows responses to question 32: When have you discussed your digital skills?

The responses in Figure 28 are corroborated by those to question 33 in Table 13. Although nearly 25% of students reported the quality of support was excellent or better, 38% of students replied that the support was average or worse. This seemingly shows that students were developing learning literacies independent of any institutional or instructor initiatives that were in place.

Table 13

The quality of Support in Developing Digital Skills

Rank value	Option	Count
1	Best imaginable	25
2	Excellent	125
3	Good	229
4	Average	176
5	Poor	43
6	Awful	8
7	Worst imaginable	4

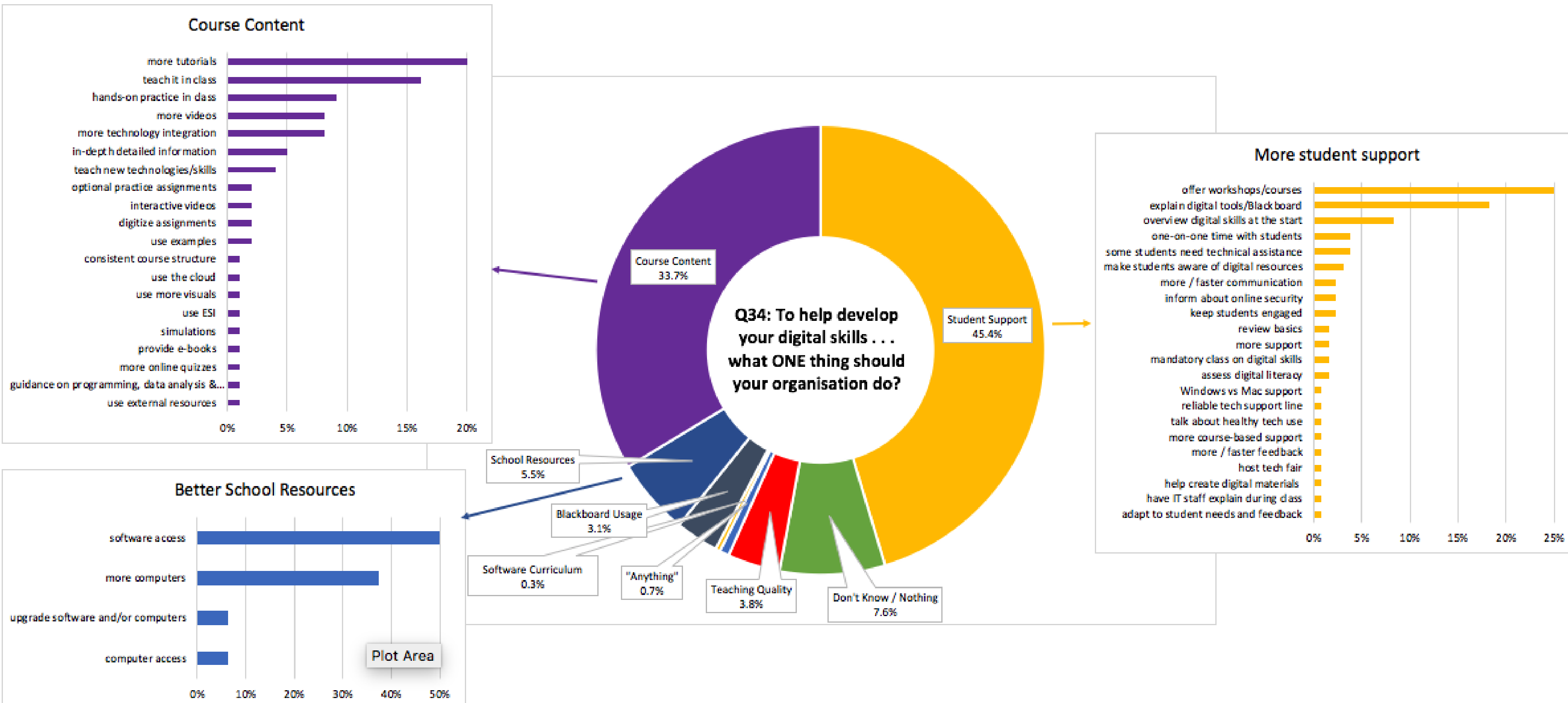
Mean rank	3.21
Variance	1.12
Standard Deviation	1.06
Lower Quartile	3.0
Upper Quartile	4.0

Note. Table 13 shows responses to question 33: Overall, how would you rate the quality of support you get from your organization to develop your digital skills?

Question 34 asked students for qualitative responses about what the institution should do to support digital skills, these are summarized into the main themes in Figure 29.

Figure 29

How the Organization Should Support Digital Skills



Note. This figure shows responses to question 34: To help develop your digital skills…what ONE thing should your organization do? Students were given the option to write a single word or sentence for this part of the survey. The 179 unique responses were then coded for emerging themes.

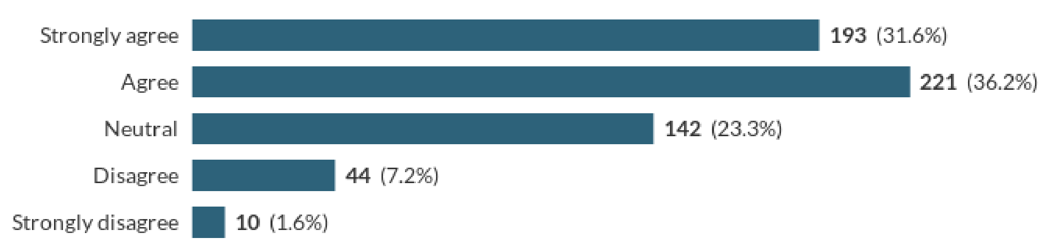
Eight themes emerged as shown clockwise from the right. Four of the themes were commented on by more than 5% of respondents: more student support, better school resources, course content. The figure lists the subcategories within each of these four themes. Question 34 as represented in Figure 29 sought qualitative responses from students by asking what one thing the institution could do to develop digital skills. I will examine other possible interpretations in the discussion chapter with the comments here providing an initial overview. The most common theme in the responses was the request for more student support in the form of workshops and for instructors to explain digital tools and skills. Comments related to this theme were those such as this student who replied that the institution should “give tutorials on blackboard, Humber website, word, excel” with another adding “have interactive YouTube videos that allow the user to complete the task at hand in a quick and efficient manner” and correspondingly “one lecture dedicated to digital skills”, and another noting more starkly “Help us with technology. No one cares if we do not know how to use technology”. As in the previous section, students are asking for interventions to provide them with the tools they need to help them learn. Such comments do not show evidence of independent learning or self-directed behaviour. The second most common responses were around the theme of including digital support within courses, particularly in tutorials, and to teach the skills directly in a and hands-on manner in class such with comments such as “hand out 'how to' papers” and “have more application of theory” or “introduce new ideas and skills rather than covering the same concepts”, and further for the instructor to offer “practice assignments that are optional to hone one's digital skills”. Such responses reveal the need for interventions and support from the institution and instructors in class for digital skills development.

The responses to questions 29 to 33 challenge the hypothesis that students have a lack of agency in instructor-centered, walled-garden online learning environments as they seemed to be acquiring learning literacies from peers as much as instructors. However, these same responses ostensibly support the research question 'To what extent do student responses show characteristics of lifelong learning literacies?' in that students were taking personal responsibility by asking their peers in acquiring the know-how to be safe online and not expecting the institution to provide this information. Nonetheless, Figure 29 shows that, although students have the agency and a sense of control to seek the support they need, they were primarily looking to the institution to help them with their digital skills.

The next set of three questions ask participants about the extent to which they agreed with statements that seek to uncover lifelong learning literacies associated with self-directed behaviour. Students were asked to select how much they agreed with a series of statements. The first of these questions, as shown in Figure 30, asked students to report the extent to which they like to control what they need to learn. With over 67% in agreement, and only 9% disagreeing, the data reveals that students preferred when someone else organized what they needed to learn.

Figure 30

Control in Organizing Learning

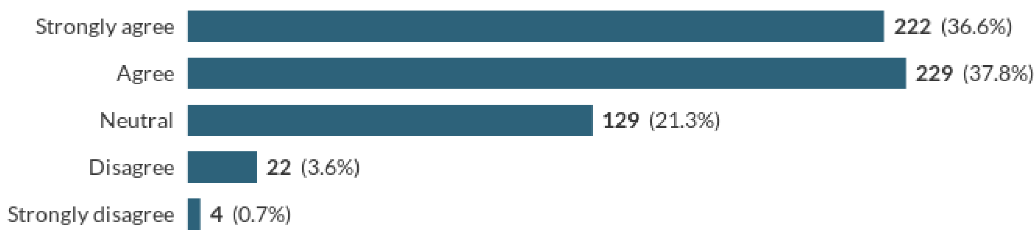


Note. This figure shows responses to the statement in 35.1: I prefer it when someone else organizes what I need to learn.

Contrasting these responses, Figure 31 shows that 74% of students preferred to make decisions about what they needed to learn and how they would learn it., with only a small group of 4.5 % disagreeing. This seeming contradiction shows students, as Dron (2007) notes, “choosing when to choose” to work independently or seeking support from the instructor to scaffold resources.

Figure 31

Control in What and How to Learn

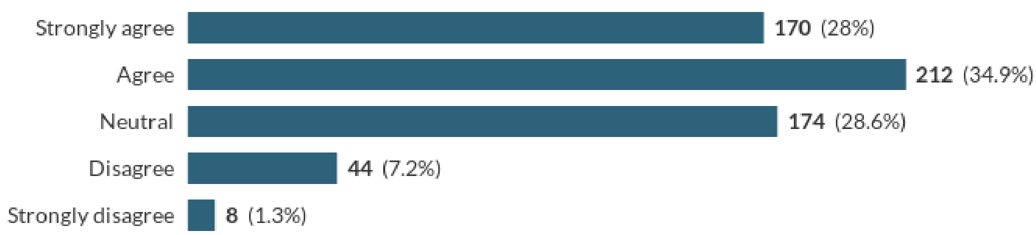


Note. This figure shows responses to the statement in 35.2: I prefer to make decisions about what I need to learn and how I will learn it.

Supporting the data that shows students want significant control of their learning experience, Figure 32 shows 63% agreeing and strongly agreeing that when they wanted to learn something, they had the attributes required to plan a way to learn it.

Figure 32

Planning Learning

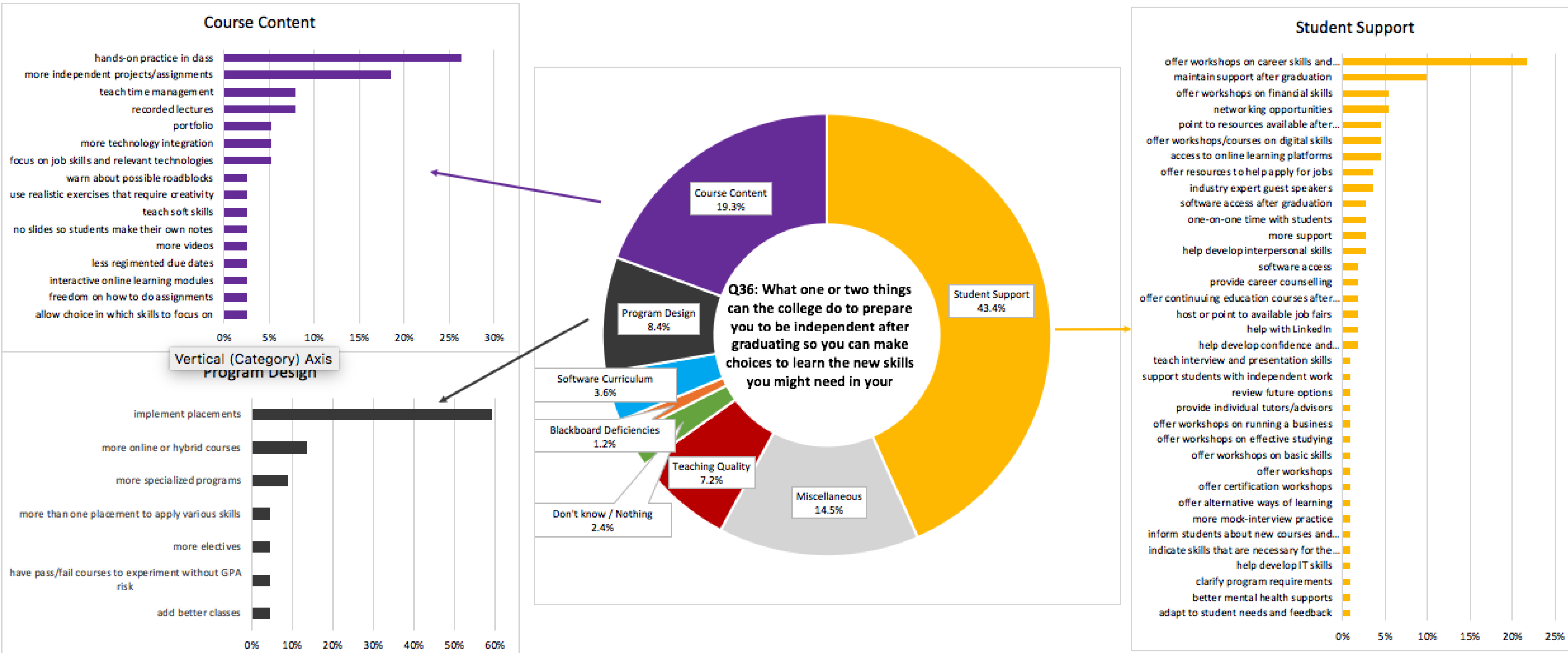


Note. This figure shows responses to the statement in 35.3: If I want to learn something, I am able to plan a way to learn it.

Following up on this, the next question asked for qualitative responses to uncover the extent of how students perceived their level preparedness for any future lifelong learning.

Figure 33

Preparing Independent Students



Note. This figure shows responses to the statement in Question 36: What one or two things can the college do to prepare you to be independent after graduating so you can make choices to learn the new skills you might need in your career? The results were coded for emerging themes. Eight themes emerged as shown clockwise from the right. Three of the themes were commented on by more than 8% of respondents for each: student support, program design, and course content. The figure then lists the subcategories within each of these three themes.

An initial interpretation of the results shown in Figure 33 reveals students as a group looking for practical, hands-on skills, whether from the instructor in class, or through workshops and other resources in the institution. These are revealed through comments such as expecting the institution to “enforce workshops/lectures addressing ‘adult responsibilities’ such as credit scores, how to do taxes etc.” with another student noting that

> on top of the knowledge, I have gained through college, I believe college can prepare me by increasing my time management and self-discipline skills with the online courses. These types of courses push one to be completely independent. Offering more online courses is perfect, and maybe hybrid type of courses.

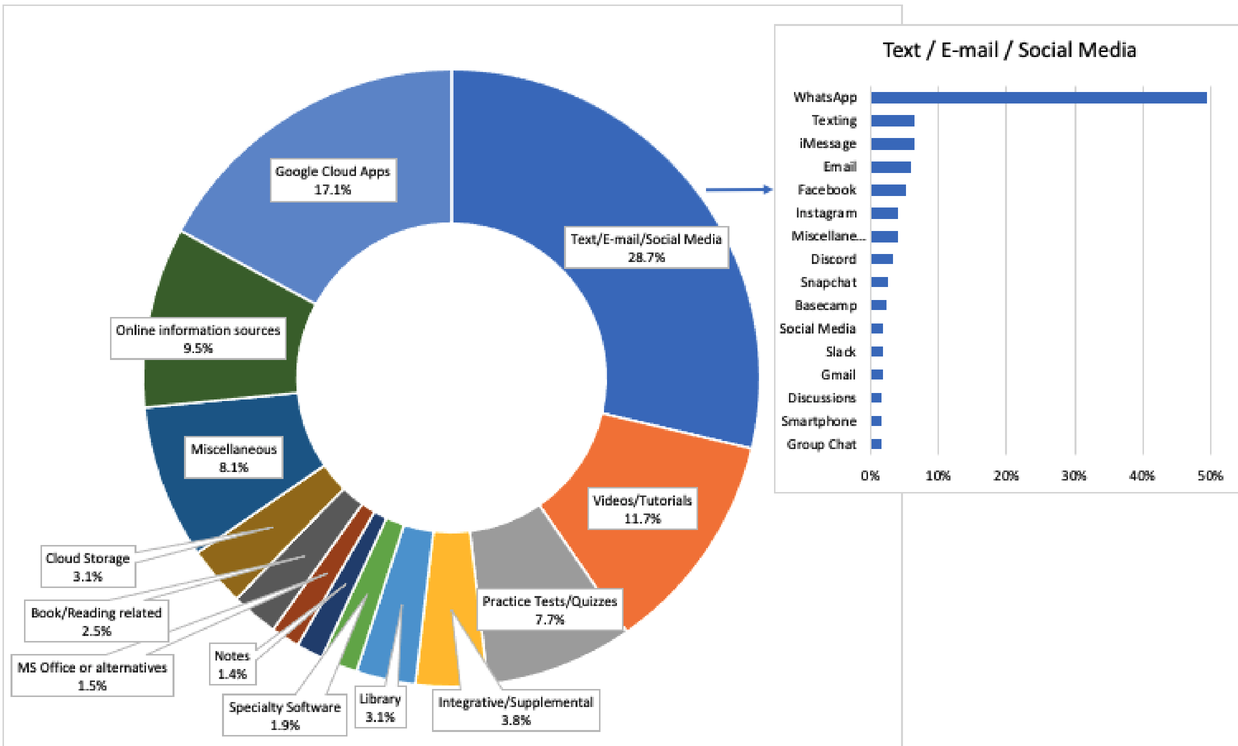
Specifically implementing more work placements also emerged as a strong theme. Although all programs have work placements, one student seemed to indicate that the institution should prepare students better for the placements and commented “make more career opportunities available to students through coop or placements by college. Have events designed for students to connect to real world or to find connections more easily”. Other students reflected this sentiment by noting the institution should “offer more networking programs so we can connect with people on our own after we graduate and chose to go into our careers”, and to provide “workshops on learning applicable skills to different career paths - job fairs with people from different industries to learn about getting jobs when graduated college” and further, “bring in industry professionals to talk about our careers after graduating”. These statements show students expecting direct support in readiness for the workplace by preparing them for their first experience of this in their work placement. Having the confidence to work alongside fellow professional could be a type of lifelong learning literacy, one that a person should actively cultivate in order to develop their career. At the same time, it seemingly revealed students seeking more independence as comments were present relating to the need for independent projects/assignments and the request for portfolios, possibly in creative design program areas, for example “create an online portfolio like an online recording” and “connections and faster one-on-one meetings to go through each student's portfolio”. Further interpretations of these qualitative comments are provided in the next chapter.

The responses to questions 35 and 36 above reveal students as requesting a level of structure from the institution and instructors in courses and resources. However, the students also seemed to be asking for flexibility for independent action and the provision of choices embedded within this structure. These seemingly contrasting features are discussed in the next chapter. Nonetheless, the results seem to challenge the hypothesis that restricted walled garden environments do not support the development of lifelong learning literacies as it seems students felt they had some agency and attributes to succeed in self-directed learning experiences.

The penultimate question in the survey asked students for qualitative responses of a single word or short statement sharing what resources they found most useful in helping them learn, apart from those provided by the instructor and student responses are shown in Figure 34. The results from this question showed extensive use of participatory and communication media, the type typically used through mobile devices. Such multimedia was not provided by the institution, or interoperable with the LMS, thus making it difficult to formally incorporate into an online course. This indicates that students were working outside the LMS to communicate with each other, and possibly the instructor, as well as sharing multimedia through social media accounts that were connected to their course of study—again, apparently reinforcing the fact that although there is a walled-garden learning environment, students seemed to circumvent the barrier this presented to their agency and control.

Figure 34

Useful Learning Resources

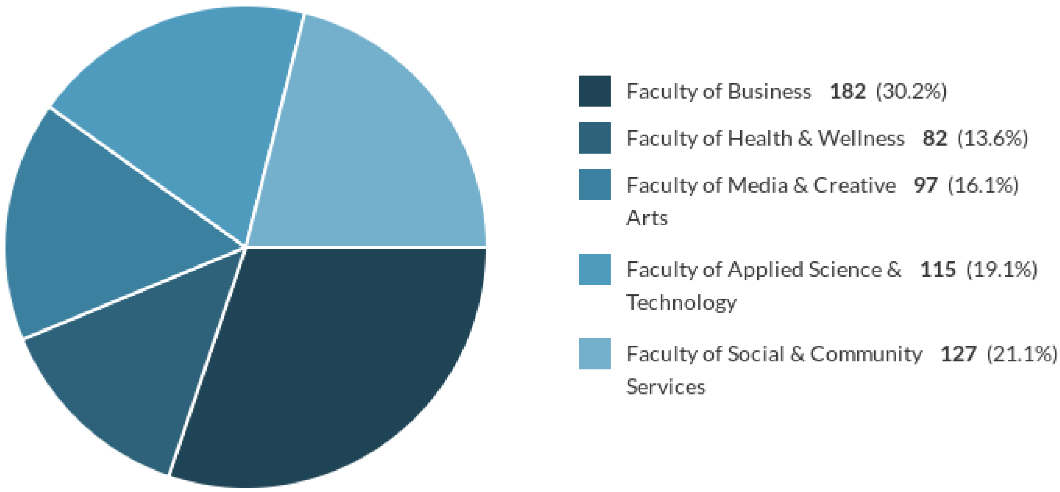


Note. This figure shows responses to the statement in Question 37. Apart from what is provided by the teacher in your online course, tell me which resource(s) you find most useful in helping you learn? The results were hand coded for emerging themes. Thirteen themes emerged as shown clockwise from the right. One theme emerged with comments by 29% of respondents: the use of participatory and communication media. The table on the top right in Figure 34 lists the subcategories within this theme and clearly shows the extensive use of typically mobile phone social media applications.

The last survey questions asked students to select the College Faculty they were studying within. As Figure 35 shows, 30% were studying in the Faculty of Business, reflecting the comparative size of this Faculty in the College. The other Faculties were distributed fairly evenly among respondents and also reflect their relative size in the institution.

Figure 35

Respondents by Institution Faculties



Note. This figure shows responses to the statement in 38: What Humber Faculty do you study in?

The spread of respondents among the faculties and their respective programs provides an indication that student attitudes towards, and use of, digital resources will be relevant for a wide range careers as they graduate and enter the workforce.

Summary

This chapter presented the results emerging from my survey data collection tool: the JISC Student Digital Insights Survey. I presented the results in sequence as asked in the survey. The chapter sections were further organized into the main survey themes and aligned with the major categories in my research:

1. You and your technology: Self-directed learning
2. Technology at your organization: Outcomes-based education
3. Technology in your learning: Walled garden learning environments
4. Developing your digital skills: Lifelong learning literacies

The quantitative results were displayed in bar and pie charts indicating the frequency of responses in numbers and percentages, or in figures that detailed the results using statistical methods such as mean rank, and standard deviation. The qualitative results were presented in figures displaying the main themes uncovered during coding of the text-based responses. This process looked for the frequency of occurrence of words and concepts that were then organized into the themes.

Throughout the presentation chapter I included some tentative observations of the results in relation to my research problem. The next chapter provides a deeper descriptive analysis of the results and seeks to address the extent to which the data supports the hypothesis and research questions. It also describes any implications for practice resulting from the analysis as well as indicating any limitations on interpreting the results.

Chapter 6: Discussion and Implications

Where Chapter 5 presented the quantitative and qualitative results of the survey questionnaire, this chapter presents an analysis and discussion of the implications of the survey results. To address the research questions and hypothesis I employed a descriptive analysis research method. Descriptive analysis "characterizes the world or a phenomenon—answering questions about who, what, where, when, and to what extent" (Loeb et al., 2017, p. 1). Such analysis does not seek causal relations and although it may point to mechanisms behind causal relationships, it aims to contribute to knowledge through the translation of the survey data into findings that lead to, in this case, improved instructional practices. The previous chapter displayed the quantitative results in pie charts, bar charts, and tables and figures with, where relevant, statistical measurements. The qualitative data presented in the previous chapter was coded and organized into themes showing frequency and data patterns and supported by student quotes. In this chapter I restate the research questions in order to break down the hypothesis into two parts. I then make an analysis of the data referring to the hypothesis and questions and include relevant analysis and cross-analysis of select data to potentially support improved instructional practices. The chapter closes with a description of any implications arising from the data and to open, I provide an overview of the research project.

Overview of Research. This research project sought to find out student perceptions of their online digital learning environment and in the process find the extent to which lifelong learning characteristics such as goal and outcome setting and the development of self-directed behaviour in students was present. The primary research question and the associated sub-questions are unpacked by analyzing the extent of the development of lifelong learning literacies and what these literacies are. I also described the outcomes-based education system in my institution and how this describes the endpoint of the planned learning experience without acknowledging the process of how this changes an individual's formation of knowledge throughout due to the collision of new and existing knowledge unique to each student. As well as constrained through an outcomes-based model, students are also bound by the limitations of the LMS within which online courses are constructed and how the LMS, OBE and managerial imperatives result in a technological monoculture that is more likely to drive an instrumental mode of learning in students than a reflective approach learning that builds the type of essential skills employers increasingly ask for. These issues are aligned to the research questions restated below.

Restatement of the Research Questions

The principal research question is stated as:

- To what extent are online courses that employ outcomes-based education models delivered primarily through LMSs inadequate for developing the lifelong learning literacies required for success as adult learners in digitally enabled learning environments?

Sub-questions that will support the analysis of this principal question are:

- To what extent do student responses show characteristics of lifelong learning literacies?
- To what extent do participant responses reveal their limited agency in constructing learning goals and outcomes?
- To what extend are students employing technology to support self-directed learning?

The research questions emerge from the hypothesis outlined in the next section.

Exploring the Hypothesis

In this section I break down the hypothesis into two interrelated parts and follow this up by interrogating each part through cross-analysis of select survey data. The two interrelated parts of the hypothesis are as follows:

- Hypothesis part 1: If the kind of lifelong learning that graduates may require, or choose to access, is highly dependent on unknown future contexts and individual needs imposed by the logic of the networked society, then these needs will not be best served by an outcomes-based instrumental educational paradigm that reinforces instructor- and institution-centered outcomes that inhibit student agency and choice.
- Hypothesis part 2: The paradigm described above is reflected and exacerbated in the walled-garden analogy of an online student studying a course designed within the constraints of an LMS, which, for adults returning to education, is further reinforced by a walled-garden policy around the recognition of prior formal and informal learning.

The rest of this chapter provides a discussion and analysis of the data through the lens of the hypotheses supported by the research questions. In order to clarify whether the hypotheses were demonstrated, I compare and contrast data emerging from the survey, and also by cross-tabulating responses to select questions. Firstly, I will provide an initial high-level overview of the results.

Overview of Results. The initial overview of the results indicates a high level of self-confidence with technology which may be an element supporting self-directed practices. Students also felt well supported and included by the institution in decisions, however student qualitative comments also revealed student use of digital resources outside the LMS as mostly organizational and operational, rather than for specific uses for learning. Responses also showed students feeling a lack of agency in the way they employed technology for learning, although they were generally satisfied with the technology the instructors used for learning purposes. The data also revealed students as engaged in extensive peer-to-peer collaboration and comfortable in reaching out to peers for support. Although this seems to refute the instructor-centered notion of outcomes-based education models, when asked, the type of things students would have liked to see more of tended to be resources and activities typically provided by instructors. Notwithstanding this, the students also reported extensive use of participatory multimedia for learning outside the LMS. This seems to indicate students taking action to augment the restrictions of LMS centered, walled garden learning—comments that were further supported by students indicating a desire for independent project and assignments and to increase the use of portfolios that demonstrate learning. Additionally, some components of lifelong learning literacies seem to be present in the form of confidence and the motivation to use digital technologies with students reporting being digitally literate, applying self-directed learning and organizational behaviours as well as collaborative practices with peers that are considered essential in the workplace (RBC, 2019).

This section discusses in more detail the results through the lenses of the hypothesis and research questions.

Discussion

This section interrogates each hypothesis in turn through reference to the results from select individual questions and cross-tabulation combined question results. Each part of the hypothesis is also associated with different research questions and I will refer to these throughout. The next section deals with the first part of the hypothesis.

Themes Related to Outcomes-Based Education

The first hypothesis is primarily concerned with outcomes-based education that restricts student control and choice and the research sub-question related to this discussion is

- To what extent do student responses show characteristics of lifelong learning literacies?

This section discusses the extent to which survey participants are self-directed and how much control they feel they can exert on their learning environment and goals with particular attention given to the support participants report receiving and needing as they use digital technologies. Throughout the section I refer to the quantitative data and support this using qualitative comments from the open response sections of the survey. The section begins with a discussion of self-directed learning.

Self-directed Students. For lifelong learning efforts to be sustainable, students not only need the options to make choices and take a level of control, but they also need the requisite lifelong learning literacies to undertake formal and informal learning experiences successfully. One of these literacies is confidence in experimenting with technologies they need to be familiar with in the networked society, something the OECD note that:

> modern society is increasingly looking to people who can confidently solve problems and manage their own learning throughout their lives, the very qualities which ICT supremely is able to promote. (OECD, 2001)

Responses to question 10 showed 40% of students to be very confident and 38% to be confident in trying out new technologies. Building on this are students' responses to question 20.1 where 74% of students reported using digital tools to make notes or recordings each week, and in question 20.4 in Figure 13 where 56% of students were looking for additional resources not recommended by their teacher on a weekly or more frequent basis. Both these learning activities reveal a large extent of existing self-direction in the students. Corroborating this are the responses shown in Figure 14 where 57% of students sought support for using technology from sources other than their teacher. This is further supported by responses indicated in Figure 25 where 49% of students reported discussing their digital skills with their fellow students. This percentage is as high as with representatives from the college overall. Seeking help through their own volition is likely to be a valuable characteristic for lifelong learning, especially in the increasingly common informal and connected contexts where seeking help and making connections is likely to help in problem-solving (Betz, 2014, p. 16). Notwithstanding these interpretations, the reason for students seeking and experimenting with digital resources outside those recommended by the teacher as well as seeking peer support could be due to poor online instructional practices and course design. However, this interpretation was not supported in student responses in question 27 as shown in Table 12 where the majority expressed a ‘good’ or ‘excellent’ view of the quality of teaching and learning or by responses to question 14 where students report positively on their learning environment. Self-direction and a sense of agency that enables taking action towards learning are essential skills and LLL characteristics. Evidence for such agency is reported in responses to question 35.3 in Figure 29 where 37% of students strongly agreed, and 38% agreed that ‘if I want to learn something, I am able to plan a way to learn it’. Only 4% of students reported disagreeing with this statement.

These responses build a picture of students who have a level of self-confidence to experiment with and seek out digital technologies and the agency to seek support from their peers in relation to the technologies they are using. Supporting this picture of students confident in their self-directedness are responses to the statement in question 35.2 in Table 28: ‘I prefer to make decisions about what I need to learn and how I will learn it’. Responding to this, 28% and

35% of students strongly agreed or agreed, respectively. Conversely, 29% reported being neutral and 8% disagreed or disagreed strongly. This picture is tempered by student responses to questions 35.1 in Table 27 where 32% of students strongly agreed and 36% agreed with the statement ‘I prefer it when someone else organizes what I need to learn’. Indeed, although 23% of students were neutral on this, 9% disagreed or strongly disagreed and showing students making active choices in when to seek support and when to work independently (Dron 2007). The portrait that emerges in the quantitative data is supplemented by student comments in the qualitative data that together can be summarized as one of digitally literate students confident in devising learning paths and drawing on their peers as a support network. These are the kind of self-directed practices that I argue are an element of lifelong learning literacies and their presence implies that LLLs were either emerging or already present in the students. Notably, there is little difference between the age groups represented in the participant sample with younger and older broadly agreeing on the extent to which they like to work independently and to have support from the instructor although there is a slight difference between the younger and older cohorts of students as shown in Table 14

Table 14

Cross Tabulation of Questions 1 and 36.1

I prefer to make decisions about what I need to learn and how I will learn it.	How old are you?					
	Under 16	16 to 18	19 to 21	22 to 24	25 to 29	30 plus
Strongly agree	0.00%	36.36%	24.72%	32.90%	21.52%	30.68%
Agree	0.00%	31.82%	36.90%	32.90%	37.97%	27.27%
Neutral	0.00%	18.18%	28.04%	26.45%	30.38%	32.95%
Disagree	0.00%	9.09%	8.49%	6.45%	5.06%	5.68%
Strongly disagree	0.00%	4.55%	0.74%	1.29%	1.27%	2.27%
No answer	0.00%	0.00%	1.11%	0.00%	3.80%	1.14%

Note. This table compares the student age groups with the question 'I prefer to make decisions about what I need to learn and how I will learn it'. The table shows the 16 to 18 age group strongly in agreement with the question; however, this age group only represents 4% of the total number of students. Outside of this group, the Table shows a rise in preference for self-study, except for the 25-29 cohort who were also only 12% of the total sample – although they 'agree' at a higher rate than the other cohorts with all cohorts agreeing in principle to this question.

The next table asked a contrasting question to find out how much students of different age cohorts preferred more scaffolding and direction by the instructor.

Table 15

Cross Tabulation of Questions 3 and 36.2

I prefer it when someone else organizes what I need to learn.	How old are you?					
	Under 16	16 to 18	19 to 21	22 to 24	25 to 29	30 plus
Strongly agree	0.00%	31.82%	34.69%	35.48%	24.05%	20.45%
Agree	0.00%	40.91%	32.84%	34.84%	35.44%	46.59%
Neutral	0.00%	9.09%	24.72%	20.00%	29.11%	21.59%
Disagree	0.00%	13.64%	6.27%	8.39%	6.33%	6.82%
Strongly disagree	0.00%	4.55%	0.74%	1.29%	1.27%	4.55%
No answer	0.00%	0.00%	0.74%	0.00%	3.80%	0.00%

Note. This table compares the student age groups with the question 'I prefer it when someone else organizes what I need to learn'. Here, the results differ in the strongly agree category slightly, in that as the eldest two cohorts indicate a preference for less direction from the instructor compared to the three youngest. However, this is tempered by the 'agree' responses which show an increase as the cohorts age. Overall, the cohorts agree with this question.

The next section builds on this dependent / independent discussion.

Support With Digital Technologies. Within the qualitative responses to question 36: 'What one or two things can the college do to support you to be independent after graduating so you can make choices to learn the new skills you might need in your career' shown in Figure 30, many students made comments around the theme of student support such as "give us access to more online workshops for digital career prep" and "provide workshops and online resources on programming and other IT skill required in the workplace." Other students took this request for support further by asking the college to "educate your students on the different resources that are available to use once they graduate from their program, teach them tips or ways to go about new skills that may not be known to them, etc." and in another comment hinting at learning strategy support that the institution ought to "teach students how to learn by themselves. Where to find the learning materials. Offer support/help for students with their out-of-class projects. Learn more practical things (how people actually do a particular skill in real life)". Echoing this, one student responded specifically that the college should "educate us on what we should learn on our own that will benefit us in our profession. Like tell us what digital software to learn on our own time" with another student replying more specifically in relation to workplace tools "give software courses such as Photoshop/ InDesign to design students to create portfolios and aid them to get a job." Such comments correlate with responses to question 11 as shown in Table 7 that show the provision of on-demand online skills training resources falling in the upper quartile with around 37% of respondents noting they had access to these resources.

Combining the qualitative responses with the quantitative data results in a more complex image emerging of students who, although self-directed students with agency to make choices, were also asking for specific support from the institution in becoming prepared for the workplace and for a future as effective lifelong learners. When explicitly asked whether the institution supports skills, Figure 21 shows only 10% of students reporting being supported in using specialist software, and only 13.5% receiving support on creating digital materials. This compares to the 22% who reported getting basic IT skill support and the 31% who reported getting support in research and information skills. Expanding on the theme of support, 9% and 44% of participants reported ‘disagreeing’ or being ‘neutral’ in the guidance they got on digital skills when answering question 30.1 as shown in Figure 22. This contrasts with the 47% who agreed they received support. When asked about other areas of support they received, just under half of the students on average agreed with getting support for keeping personal data safe, staying safe online, and their health and wellbeing as a technology user. Responses differed when asked whether they received support around online copyright and plagiarism in which 72% agreed they were supported. These results are shown in Figures 23 and 24 respectively. Nonetheless, Table 12 reveals a mean rank of 3.2 (between good and average) when students were asked to rate the quality of support around digital skills.

The qualitative responses in Figure 26 to question 34: “To help develop your digital skills ... what ONE thing should your organisation do?’, show 45.5% of responses being related to student support. Students were asking for specific time to be allotted for developing digital skills and responded with statements such as “teach it during class time. Students do not have time balancing class, work, extra activities, assignments, tests and family to go to another class and develop digital skills. It needs to be taught during class times with practice” with another comment requesting specific skill instruction “have a class that is a mandatory requirement to take to upgrade digital skills” and more specifically “teach students how to use the digital tools that are available to us to help develop and improve our digital skills.” Also shown in Figure 26, a further 34% of participants were looking for support with course content that required the use of digital tools. Related to this emphasis in incorporating digital skills into the instruction one participant responded “I feel that my organization should provide all first-year students with a tutorial of how our digital teaching sites work. When I started school, no one taught me I had to figure it out on my own.” Expressing frustration at the lack of standardization in the LMS learning environment one student asked that the institution “stop changing things per teacher. There should be a routine to the use of blackboard.” Some responses made direct connections between digital in the workplace and the college with one student relaying some frustration with the contemporaneousness of knowledge when commenting “when hiring experts to come in and teach software to students, they should hire experts that are still in touch with students in a learning environment rather than hiring profs that don't know the technology or experts in the industry who don't have time for small problems of students”. This sentiment was supported by a student who commented “have a specialist come to class in the beginning of the semester instead the end of year before summer break and show students on how to navigate certain websites we use on a monthly basis (e.g., HSPNET)”.

An inference that can be drawn from the quantitative data around institutional support for developing digital skills is that the support students were receiving by the institution were skills that were primarily relevant for academic environments. Belshaw (2012) describes this as a “communicative literacy” that enables students to be effective users of digital media (p. 209) and indicates that institutions need to provide training resources to help students gain this communicative lifelong learning literacy. However, student qualitative comments showed concern for training on software they perceived they would need in their future career. The next section looks at data showing a possible link between instructor support for technology in relation to the students’ future workplaces.

Students who are literate in using technologies are better positioned to organize such tools for different uses. One of these may be in constructing a PLE. By comparing the results in questions 24.4 and 30.2, as shown in Figures 25 and 31 respectively, there were similarities in response rate between students who reported ‘agreeing’ or being ‘neutral’ to getting the chance to assess their digital skills for career planning and those that also created a digital portfolio of their learning. Furthermore, the cross-tabulation in Table 16 below shows that those who got a chance to assess digital skills were also more likely to create a portfolio of their learning. A provisional conclusion for this could be that instructor support in the form of helping students assess their digital skills created the link between the instructional use of digital technologies and their future use in the workplace. As noted earlier in this section, students desired this support with digital technologies in relation to their workplace. Although not indicated in the results, it is possible the assessment of digital skills took the form of a portfolio of work—commonplace in creative and design related programs that respondents may have been studying in given that 16% (97 respondents) studied in the Faculty of Media and Creative Arts.

Table 16

Comparing the Extent to Which Students can Assess Their Digital Skills With Those Who Report Creating a Portfolio of Their Learning.

The chance to assess your digital skills (eg for career planning)	Create a digital record/portfolio of your learning			No answer	Totals
	Weekly or more	Monthly or less	Never		
Agree	14.72%	12.78%	11.17%	0.49%	39.16%
Neutral	7.77%	17.80%	16.34%	0.97%	42.88%
Disagree	2.10%	3.40%	9.87%	0.16%	15.53%
No answer	0.49%	0.32%	0.81%	0.81%	2.43%
Totals	**25.08%**	**34.30%**	**38.19%**	**2.43%**	**100.00%**

Question	Response count
24.4.a	603
30.2.a	603

Note. Although this data does not indicate whether the student self-assessed or created the portfolio or whether this was directed by the instructor, the implication is that a learning portfolio was part of some form of career readiness assessment and used by instructors or students to connect their digital skills to their workplace.

Students were concerned with ensuring they knew the software they needed to use in their studies and expected this training from the institution, whether directly in their courses, or provided by the institution on a needs basis that would allow them to sign up for training. Furthermore, students were seeking training to build digital skills that related directly to their future work environments and also expected the institution and instructors to provide this as part of the course learning objectives.

A tentative inference that can be drawn from this is that students were responding to restrictions on their agency and control in the outcomes-based and instructor-led environment by expecting the instructors to directly teach digital skills, or for the institution to provide these resources and help students locate them so students could access them in a self-directed manner. Another inference would be that this is a formal education environment and that in such, the students expect to be ‘told’ what they need to learn. This suggests students were expecting the instruction first, rather than initially engaging in practices to seek the information themselves and were thus not displaying self-directed lifelong learning literacies. A further implication may be that the institution is best placed to provide support in technologies related to learning whereas the instructor provides the training in digital technologies the students will meet in their future workplaces. This delineation of responsibility can be a useful way to clarify digital supports in the institution.

The next section explores this further by looking at the extent to which students felt they could set goals and take action to achieve these goals.

Student Control and Choice. Students understanding that they have agency and can act upon this to make learning decisions is recognized as a goal-setting essential skill (Ontario, 2017). This is a skill that is also central to the concept of andragogy as outlined by Knowles (1980) and as a lifelong learning literacy. Associated with an analysis of this, participants responded to question 35.3 in Figure 29 that stated, “If I want to learn something, I am able to plan a way to learn it”, 28% and 35% of students strongly agreed or agreed respectively, thus revealing that students had a high level of confidence in their ability to plan in order to achieve their goals. Furthermore, qualitative comments to question 36, as shown in Figure 33 that asked, “What one or two things can the college do to prepare you to be independent after graduating so you can make choices to learn the new skills you might need in your career?” also revealed students as seeking training to help them learn to be an effective learner and to provide on-demand resources they could access in a self-directed way. This is an apparent contradiction. Students were confident in planning learning, but also desiring support in being effective learners. This could indicate that because students were confident, they were equally confident in seeking out further support that would provide them with more learning strategies which, in turn, increased their confidence. Shea and Bidjerano (2010) touched on this in a study into self-efficacy and the Community of Inquiry Framework and termed this positive feedback loop 'Learning Presence':

> Learning presence represents elements such as self-efficacy as well as other cognitive, behavioral, and motivational constructs supportive of online learner self-regulation" (p. 1721).

This contradiction could also be related specifically to the COVID-19 pivot to remote teaching. The absence of the in-class routines prevalent pre-COVID may have resulted in uncertainty in the new online setting leading students to report a need for additional training in learning strategies and locating resources. The students may have been confident in planning learning pre-COVID, but the pivot led to a new perceived need for resources. The positive correlation between self-efficacy, a potential lifelong learning literacy, and the creation of digital portfolios is explored in the cross-tabulated data in Table 17 below.

Table 17

Comparing the Extent to Which Participants Report Feeling Confident in Planning Their Own Learning with the Creation of a Digital Portfolio of Their Learning.

If I want to learn something, I am able to plan a way to learn it.	Create a digital record/portfolio of your learning			No answer	Totals
	Weekly or more	Monthly or less	Never		
Strongly agree	11.49%	12.30%	11.65%	0.49%	35.92%
Agree	8.41%	11.97%	16.34%	0.32%	37.06%
Neutral	4.21%	8.41%	7.61%	0.65%	20.87%
Disagree	0.65%	0.65%	2.10%	0.16%	3.56%
Strongly disagree	0.32%	0.16%	0.16%	0.00%	0.65%
No answer	0.00%	0.81%	0.32%	0.81%	1.94%
Totals	**25.08%**	**34.30%**	**38.19%**	**2.43%**	**100.00%**

Question	Response count
24.4.a	603
36.3.a	606

Note. This table cross-tabulates responses to survey questions 24.4 and 35.3 corresponding to Figures 29 and 32 respectively. Participants who reported ‘strongly agreeing’ or ‘agreeing’ with the statement shown in the first column are also those who were more likely to create a digital record / portfolio of their learning. This compares to almost no students who will make time to create a portfolio if they felt incapable of self-directed learning. This potentially shows a correlation between confidence in setting learning goals and taking action in the form of creating a portfolio to achieve these goals. This correlation is supported in research into digital personalized learning systems that encourage instrumental approaches to achieving the outcomes because the mechanisms and algorithms that “represent the current state of the student’s knowledge are hidden” (Guerra, et al., 2016, p. 153) and emphasize machine-led over student-directed personalization. Yet, Guerra, et al. (2016) suggest that there are recent developments in more interfaces that have “introduced the ability to view, explore, and even modify the state of a student's own knowledge" (p. 153). Such open models enable learners to describe their own learning paths as well as take recommendations from the machine learning. In order to be successful, these nominally personalized learning systems may only be effective if the students are both confident and free to set some of the learning goals. Opening the back of the human 'learning machine' to students so they can see the way in which they interact with the moving parts of their learning motivates and engages students in the learning they undertake. This involvement is reflected in student responses to question 13.1 illustrated in Figure 14 that showed 36% of students disagreeing, and 22% agreeing with the statement 'you get a chance to be involved in decisions about digital services.' An interpretation of this is that there were students who were pushing at these constraints because they were asking for instruction that would help them 'learn how to learn' and for resources to be provided for them to make decisions about technologies. This interpretation is supported by the fact that a majority of students reported in Figure 32 of feeling capable of planning their own learning experience. Furthermore, qualitative responses to question 34, when asked what one thing the organization could do to improve their digital skills, reveal students as asking for more tutorials, orientations, ease of access, overt skills development and more time in relation to improving digital skills. This indicates that students strongly feel the need for support with these skills as part of their courses. The participants clearly see a need to take control of the way they use digital technologies but need the help to get there.

These inferences suggest that the first part of the hypothesis is supported by the quantitative and qualitative data. This is due to the evidence demonstrating that although students were taking actions that showed evidence of self-directed learning and were seemingly confident in seeking support, they still expected the instructor and institution to provide much of the support in using digital technologies, both study and work related. Students seemed to live in this contradiction. They were digitally literate and could probably find this training for themselves, yet they were asking the instructor or institution to provide it for them.

The next section considers the data through the lens of the second part of the hypothesis.

Themes Related to Technological Monocultures

The second part of the hypothesis questions issues associated with technological monocultures and is worded as: ‘This (the outcomes-based education) paradigm is reflected and exacerbated in the walled-garden analogy of an online student studying a course designed within the constraints of an LMS, which, for adults returning to education, is further reinforced by a walled-garden policy around the recognition of prior formal and informal learning’. This part of the hypothesis is addressed through the two research sub-questions:

- To what extent do participant responses reveal their limited agency in constructing learning goals and outcomes?
- To what extend are students employing technology to support self-directed learning?

This section will address the theme of technological monocultures by initially focusing on student perceptions of their learning environment and their use of digital technologies. This is followed by a focus on the way instructors are reported by the students to employ technologies. The section then builds on this by analyzing students comments on improving their digital learning and instructional setting. The section closes by describing the students as independent and digitally literate learners and how to facilitate this independence. I make reference to the quantitative survey results and provide extensive student qualitative comments to synthesize the data in order to address the research questions.

Student Perceptions of Their Digital Learning Environment. The survey participants used the Blackboard Learn LMS. All online courses in the institution were constructed through this LMS. No other platforms were recommended by the institution, apart from specific software that students were required to be familiar with as part of their programs and work-preparedness. According to responses in question 14 students were broadly positive about the reliability, design, and ease of use of the LMS although one student comment in response to question 37, shown in Figure 34 described a concern with the interface: “Email or Google Drive - Blackboard makes it very hard to find documents, keep track of due dates, and communicate with instructors and other students”.

When asked about their attitude to technology, as shown in Figure 13, a picture emerged of students enjoying and feeling confident in using technologies for learning. This is supported in responses to question 10 that revealed students as confident in trying out new technologies to the extent that a combined total of 92% reported they also ‘often’ or ‘sometimes’ actively helped others develop their digital skills. These responses support the notion that a large majority of the participant group were happy to experiment and utilize digital technologies. The next set of responses showed the type of activities students performed inside and outside of the LMS. As noted in the previous chapter, data from question 15, shown in Table 9 shows that much of the interaction participants had with the LMS was organizational and not directly related to instruction. Out of the six options given, the top three were ‘check course dates or deadlines’, ‘submit course work’, and ‘take a quiz’. The final two in the upper quartile were learning related in that they were connected to discussing or working with their peers in some form, the last one being ‘none of these’. This seems to show that the LMS is more *course* management than *learning* management. Such operational activities are important function of an LMS, especially as it is interoperable with the college's enterprise software for registrar purposes. However, it also shows the extent to which the LMS centres institutional management imperatives rather than emphasizing student learning activities. Additionally, when asked in question 20.3 how frequently they accessed recorded lectures in their own learning time, 37% stated doing this weekly or more, and 19% monthly or less, but 44% reported never having accessed recorded lectures. Recorded lectures are very likely to be posted by instructors on the LMS rather than public platforms. An inference to be drawn from this is that fewer than half of the instructors recorded lectures and posted them online. This is supported by the twenty student comments such as "Add more recorded lectures (video, audio, casts) online" and "I would prefer if professor's audio recorded their lectures or post a video for each class. This would make me feel more connected". Such comments and the quantitative data suggest that instructors were not making use of the functionality of the LMS to record them. This is relevant during COVID-19 remote teaching as the institution recommended instructors record lectures to enable temporal flexibility for students with busy home lives. Moreover, student responses to question 20.1 that asked how often they used digital tools or apps in their own learning time to make notes or recordings showed 74% of them doing this weekly or more and when asked how frequently they accessed course materials online 93% reported doing this weekly or more.

These responses indicate that students view the LMS more as an organizational, not learning environment. This is reinforced by responses to question 16, shown in Figure 15, wherein 48% of students reported *not* having 'used any other apps or platforms outside of the learning environment to discuss or collaborate on coursework with other students. The implication of this being that for nearly half the participants much of the activity undertaken in the LMS was either not directly related to course learning content instruction or that the apps were employed within the LMS. This aligns with responses to question 15 in Figure 14 wherein the top three reported categories are organizational and between 40% to 50% of students collaborating on activities in some way in the LMS such as a shared presentation – an activity not likely to utilize LMS based apps.

A supposition from this is that because students to some extent did not perceive the LMS as primarily a learning environment, the LMS did not, therefore, restrict their ability to construct learning goals and outcomes. The tentative inference from the previous section described students as being confident and self-directed but relying on the instructor or institution to provide support with digital technologies, an inference corroborated by the table below which provides a cross tabulation of responses to compare the extent to which participants were confident in using technologies and who supported them the most in using these.

Table 18

Cross Tabulation Comparing the Extent to Which Participants Report Feeling Confident in Planning Their Own Learning with Who supported them in Using Digital Technologies.

Who supports you most to use technology in your learning?	Overall, how confident are you at trying out new technologies?					No answer	Totals
	Very confident	Quite confident	Neutral	Not very confident	Not at all confident		
Other students	8.90%	7.12%	4.37%	0.97%	0.00%	0.00%	21.36%
Lecturers on my course	16.18%	16.83%	9.06%	0.81%	0.00%	0.00%	42.88%
Other support staff	0.81%	1.29%	0.65%	0.16%	0.00%	0.00%	2.91%
Friends and family	4.85%	4.69%	2.27%	0.81%	0.00%	0.00%	12.62%
Online videos and resources	9.06%	7.77%	2.27%	0.16%	0.00%	0.00%	19.26%
No answer	0.16%	0.16%	0.16%	0.00%	0.00%	0.49%	0.97%
Totals	**39.97%**	**37.86%**	**18.77%**	**2.91%**	**0.00%**	**0.49%**	**100.00%**

Note. This table cross-tabulates responses to survey questions 10 shown on the columns and question 21 shown in the rows on the left. The table shows a clear correlation between support by instructors and confidence in using technology. The next strongest correlations were those of peer support and use of online videos.

Further, combining these two inferences seems to indicate that students did not feel restricted because they did to some extent create learning goals and they expected the institution and instructor to provide supports in using digital technologies as evidenced in the table below.

Table 19

Cross Tabulation Comparing Who Supports the Learner in Using Technology and the Extent to Which Respondents are Comfortable Planning Independent Learning.

If I want to learn something, I am able to plan a way to learn it.	Who supports you most to use technology in your learning?					No answer	Totals
	Other students	Lecturers on my course	Other support staff	Friends and family	Online videos and resources		
Strongly agree	6.47%	17.80%	0.49%	4.85%	6.31%	0.00%	35.92%
Agree	8.74%	16.02%	1.13%	4.85%	6.31%	0.00%	37.06%
Neutral	5.02%	7.12%	1.13%	2.27%	5.34%	0.00%	20.87%
Disagree	0.97%	1.29%	0.00%	0.00%	1.13%	0.16%	3.56%
Strongly disagree	0.00%	0.32%	0.00%	0.16%	0.16%	0.00%	0.65%
No answer	0.16%	0.32%	0.16%	0.49%	0.00%	0.81%	1.94%
Totals	**21.36%**	**42.88%**	**2.91%**	**12.62%**	**19.26%**	**0.97%**	**100.00%**

Note. This cross tabulation compares questions 21 and 36.3a in order to show the extent to which the source of support in using digital technologies is related to confidence in planning learning in a self-directed manner.

The table clearly shows a correlation between support from lecturers and being able to plan a self-directed learning activity at 18% (Strongly Agree) and 16% (Agree) with the next nearest being peer student support. Higher ‘Agree’ percentages in the ‘videos and resources’ column would indicate a much more self-directed approach as these contrast with support provided by other people and so have the potential to be sought out independently.

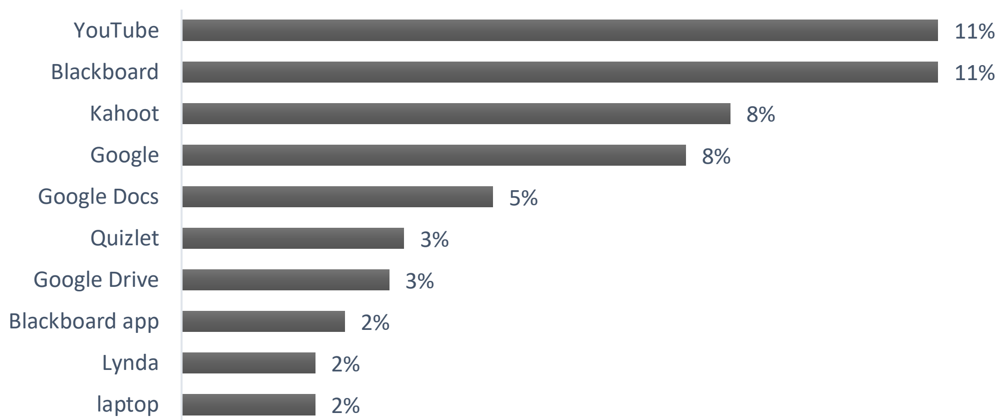
The next section looks more specifically at the technology students were using and sought find out how students perceived the digital technologies they were using for learning.

Student use of Digital Technologies. The apps and platforms the students reported using were Google suite, social media, email, and text—ubiquitous software that was likely used by students in their personal as well as study life, a notion supported by participant responses to question 37, shown in Figure 31. When asked which resources were most useful in helping them learn, students most frequently reported using social media and the Google suite of cloud-based resources, both of which are common in personal use. The third most reported type of technology were the use of video tutorials at 12%, followed by online information sources such as online texts. 7.5% of students reported using online quizzes/practice tests, 2.5% reported using books, 3% using library resources, and just 2% used specialty software. It also became apparent from student comments to this question that multimedia resources, in particular audio/visual multimedia, was widely employed by students to support their learning when they felt they were not getting the direction from their instructors. For example, as one student noted “YouTube to be honest and maybe Lynda. I YouTube for a lot of stuff. Because my online teachers have lacked to inform us on issues or skills we need to run a program efficiently” and replicating the comments around streaming video services another student noted the value of “videos explaining topics, if I still don’t understand something from my professor teaching. What usually helps if someone else explains a topic, more than one explanation helps. Teachers should find academic links for further understanding”. This comment seems to indicate a self-awareness around how they feel they will acquire new knowledge by organizing the instructional content—a key lifelong learning literacy. Connections to the organization and design of learning and how it will help students acquire knowledge should be indicated as part of the instruction especially as students seemed to be aware of these connections. For example, one student provided a sense of how they would prefer to learn if given options and commented that they found “Google scholar to be useful in providing fresh, specific information provided by trusted sources as well as other students. I also find using online tutorials can be useful when I don’t understand or resonate with the teaching method used” with another student correspondingly commenting “if there is a concept that I find to be very challenging, I turn to YouTube for clarification. I am a very visual learner, and a step-by-step tutorial is very helpful”. Another participant described how they sought support from their peers when they didn’t understand the required tasks and described the value of “learning from my peers when we explore options to do our assignments that aren't the tools given to us,” and from another student on the same theme “other academic publications on the course subject, people who have taken the course before or are very familiar with the subject, YouTube videos, etc.”. These comments correspond with the 93% of students who reported accessing course materials online weekly or more in question 20.2. Another indication that the LMS is not central to the learning experience were student responses to question 22, in Table 11. Here, the most popular response when asked what items would be most useful to them as a learner was for practice questions to be available online. For this to happen the instructor would need to employ software available outside of the LMS such as Kahoot or Mentimeter or to build these into the LMS. The least useful item on the list were references and readings. Notably, these were the resources commonly posted by instructors in the LMS to support learning.

Further evidence for student perceptions of the relative usefulness of Blackboard for learning, even though all online courses were constructed and delivered within it, were the qualitative student responses to question 23 as summarized in Figure 36 below. When combining responses for Blackboard and the Blackboard mobile app, only 13% of students noted that it was useful for learning. As reflected in other student comments, YouTube was considered almost equally useful with Kahoot with the search engine Google closely behind. Lynda (LinkedIn Learning) at 2% is also a streaming media platform, not dissimilar to YouTube but focused on specific training for software as well as work and study related skills. Echoing the software selections of Quizlet and kahoot shown in Figure 34 students also reported frequently using interactive polls and quizzes as shown previously in Table 11.

Figure 36

Digital Tools Students Find Useful for Learning



Note. This figure shows the top 10 student responses to question 23: Please give an example of a digital tool you find really useful for learning. The percentages reflect the number of students from the total of respondents who stated this software. The ‘Blackboard app’ is the mobile device version of the Blackboard LMS. Lynda is now known as LinkedIn Learning.

A pattern developing from the data analyzed here is that the students were actively employing multimedia and social media digital tools to access learning resources outside the LMS possibly because students saw the LMS as lacking the multimedia capacity and interactivity of software they preferred and more of a repository for more static text-based readings. This could also be due to lack of instructor awareness or time to incorporate such resources into their instruction and may point to why students considered the LMS as an organizational, not instructional technology because they did not feel it had the required functionality they would expect a learning technology to have to be useful for learning.

An inference from this is that the LMS was used as a repository of mono-media resources like texts or articles and for operational functions like grades and was not used to its instructional capacity. Because of this, students went to multimedia resources they prefer outside the LMS for learning materials. One implication of this is that the instructors were not utilizing the LMSs full functionality, such as posting recorded lectures, and quizzes, although it may also be that instructors felt similar to students and were extensively recommending external multimedia resources to students. This is supported in research by Philips (2006) that showed much of the activity in LMS as the transfer of content, assessment, and grading. Further research will need to be conducted that questions instructors directly on their experience of using LMSs and how they design instruction and employ digital technologies in these learning environments.

What was not clear was the extent to which students saw the instructor as supporting their use of digital technologies. The next section analyzes responses to questions around this topic.

Instructor Promotion of Digital Resources. Student responses to question 25, shown in Figure 19, which asked them how motivated they were in using technology in their learning, showed 82% of the participants as quite motivated and very motivated. Only 1.5% of students were not that motivated—comprehensively depicting students as eager to utilize technology for learning purposes. A high level of motivation like this is partly replicated in the data from question 26.1 that showed 62% of students perceiving their instructors as 'making good use of digital tools and platforms'. However, when asked in question 26.2 whether the instructors helped them use these technologies the responses were split between those that agreed (44%) and those who were neutral (46%). These results were echoed in question 26.3 where 47% and 44% agreed or were neutral respectively when asked if the instructor signposted digital resources for them.

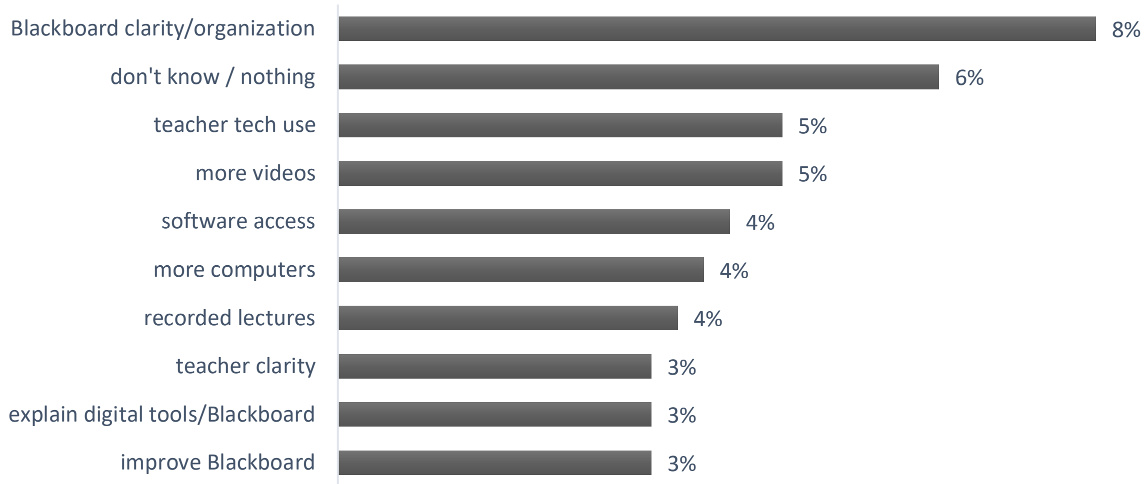
The data here seems to show that although instructors were keen to employ technologies, they only partly supported students in using and finding them. This may indicate that instructors were not confident in their own knowledge of digital resources or were perhaps centering the LMS as the location for instruction, which as noted previously, students saw as an organizational and not instructional technology. Another inference is that students were, no pun intended, left to their own devices with the technologies they preferred to use. Nevertheless, students were broadly positive about their experiences of digital teaching and learning as can be seen in student replies to question 27, shown in Table 12 where the largest number of students claimed the quality of digital teaching and learning was ‘good’ with the second most being ‘excellent’.

The next section analyzes questions 28 and 34 in Tables 20 and 26, both of which provided students with the opportunity to give qualitative responses on how the institution could improve digital teaching and learning.

Student Comments on Improving Digital Teaching and Learning. Although a majority of students reported the digital experience at the institution as ‘good’, 340 students took the opportunity to respond to question 28 to indicate how they felt their experiences could be improved. When their responses were coded for topic, theme and word frequency, the themes shown in Figure 37 emerged representing just under half the comments.

Figure 37

Reported Themes to Improve the Quality of Teaching and Learning



Note. This figure shows the top 10 themes that emerged based on student responses to question 28: To improve the quality of digital teaching and learning … what one thing should your organization do?

The most frequent responses referred to the Blackboard LMS and data from other questions revealed students as searching outside the LMS for digital resources. Comments that mentioned the LMS were around two themes: the LMS user experience and how instructors organized content in it.

In relation to the user experience design students made comments such as “get rid of blackboard or get the newest version of it that has better UX” and “make a more user-friendly website instead of blackboard”. Some students had experience with other LMSs, and Blackboard compared unfavorably such as this comment

> In my opinion, d2l (Desire to Learn/Instructure) is more organized and easier to navigate than blackboard, especially for first-time users. I had a lot of trouble in accessing information and resources on blackboard when I first started using it, even now,

> accessing certain learning materials are difficult for specific classes. The platform is not user-friendly at all.

This echoes other comments that describe students as looking for a level of standardization or ease of use. Further comments explored the limitations of the LMS on mobile platforms with one student requesting for the institution to “make Blackboard available on all types of devices (mobile versions) and seamlessly, make the app more advanced like the desktop version” with another asking for the institution to “create a different blackboard type app” and similarly to “make Blackboard easier to use on MOBILE. It works well on desktop, but not mobile”. These comments echoed the extent to which student used their own mobile devices in their studies where in response to question 6, 85% of students reported using a smartphone. This compares to 95% who used a laptop—thus revealing students as having the ability to engage in peripatetic learning.

Other student comments reflected issues with how the instructors organized the leaning material in the LMS with one student commenting frustratedly that there was a need to “update the blackboard with more stuff that will help the students” and yet another requesting the institution:

> set a system in place which is more user friendly. Blackboard has so many tabs which are irrelevant, so you tend to ignore them. But then I realized one instructor was posting quizzes on Online forum (usually a dead tab) and I was losing marks. Also, we never get replies on BB from instructors.

In relation to the lack of interactive capability on Blackboard, one student requested that instructors “make the rubrics easier to access and allow us to send pictures (more than one at a time) through blackboard messaging” and “when they post all the course stuff on Blackboard, it would be nice if it wasn't so confusing” with another asking for instructors to “make emailing the professor through Blackboard clear and easily accessible”. Because of the limitations of the LMS students seemed to be taking matters into their own hands and sourcing technologies they preferred to use and felt may be more useful to their learning efforts.

The Blackboard LMS is the only teaching platform provided across the institution and is fully locked-in to the operations of admissions and registrar functions. Because it is considered the de-facto location for providing teaching, students also perceived it as important to access learning materials. Despite this ubiquity in the provision of learning materials many student comments reflected frustration with the lack of skill instructors displayed in using the LMS, and technology generally, and asked that the institution “make sure professors are trained on using the apps they suggest we use” and to “educate teachers on new technology. Most have trouble turning off YouTube auto play” as well as this comment around instructor use of the LMS that “it varies based on professors, some do a great job interacting with student through digital teaching and other refuse to use it and post due to their view. I feel that my organization should make it more consistent among all teacher/professors”.

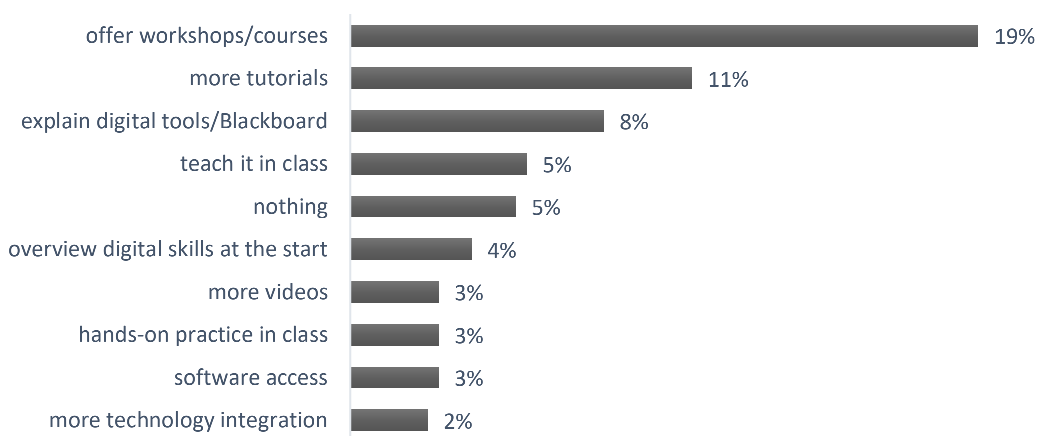
Such comments show students looking to the institution to think critically about the choices around technology use and as a consequence of this to provide more professional development for instructors on the digital tools the institution requires them to use as well as those made available to students—which may also imply that instructors are not making use of the digital tools they have at hand or are not interested in using any beyond the required LMS even in an online setting. The data here also showed students as having significant concerns with the LMS and demanding alternative technologies and training for the instructors in these. As inferred in the earlier discussion on how OBE models restrict student’s choice and control, it seems they were well able to make goals regarding technology use for learning, but still expected instructors to be central to these learning experiences and make best use of the learning technologies the institution provides.

The next section looks in more detail at the data showing how students were also looking for support in becoming digitally literate.

Independent and Digitally Literate Learners. Students were seeking support with digital technologies and their experience of online learning. Question 34, as shown in Figure 38 below, asked students to briefly comment on what the institution should do to improve their digital skills. The comments indicate they were seeking support in using the LMS and multimedia services.

Figure 38

Reported Themes in Developing Your Digital Skills



Note. This figure shows the top 10 themes that emerged based on 179 unique student responses to question 34: To help develop your digital skills … what one thing should your organization do?

Reflecting the results in Figure 35, student comments on developing digital skills revolved around two main themes:

- Support in using digital technologies
- Increase the digital components of the courses

As outlined elsewhere in this discussion, students were seeking support from the institution and instructors with the technologies they are asked to use, with some students suggesting this should be provided by a learning centre and others that it should be built into the instruction in the program or course.

Those in favour of this support being provided by the instructor made comments in relation to the use of video streaming learning objects to help them with using digital technology, for example “have interactive YouTube videos that allow the user to complete the task at hand in a quick and efficient manner” or to “provide more comprehensive tutorial videos for new users to follow along” and further to provide “video tutorials by instructors especially when it comes to the use of software”. Another student noted that teaching digital skills in class helped them with their study time management and noted that instructors should “teach it during class time. Students don't have time balancing class, work, extra activities, assignments, tests and family to go to another class and develop digital skills. It needs to be taught during class times with practice”. Yet another student asked for instructors to “allow more help and class time for this,” and another student felt that there was a need to “create room to discuss the level of digital skill at the beginning of the program,” while others felt it would be useful to “have IT members explain to students in classes”. And on similar theme one participant asked for “tutorials for things that they expect to be done or software they want us to use when we have not taught them, they should teach us”. Yet other participants felt such skills could be developed on a needs basis by providing “practice assignments that are optional to hone one's digital skills”. However, there were concerns among participants that the instructors may not be in a position to develop digital skills in class and the institution needs to:

> find teachers that actually are dedicated to help students work computer programs - especially in my design program. We finally have a teacher that takes the time and asks us what we know and what we don’t - so we can learn Revit. Before we were learning from his recorded videos and it was like a copy and paste class. The instructor also never gave feedback. We need teachers that KNOW the programs and are WILLING to help; especially to those that get stuck.

Perhaps more relevant for building critical thinking, a key lifelong learning literacy, one student commented that “talk and acknowledge the harm that can be made through not using the technology in a right manner”. Furthermore, by raising issues of control, one student suggested that the instructor “not put restrictions on tools used if other tools could do the task as well”.

Conversely, multiple respondents commented that the college should provide more “tutorials”, and 31 students (18% of total responses) began their comment with the word ‘provide’ as in: “Provide more comprehensive tutorial videos for new users to follow along” and “Provide information about available resources/ free classes to attend. If students are not informed they don't know that the support exist” and “Provide more courses about developing digital skills”. 15 respondents also used started their comments with the word “offer” as in “Offer more free workshops to teach students basic to intermediate digital skills based on their programs (could include "How to use Microsoft Excel: Basic Skills" to "How to effectively use Meltwater in a Public Relations career") this could be through the learning centre, or by inviting alumni or professors that are knowledgeable in those specific digital skills or software programs”. Such terms indicated an expectation from respondents that they saw it as the institution’s role to provision digital skills training on top of what is going on in the course—stated succinctly in this student’s request noted earlier that there should be required courses to develop digital skills.

Very few respondents commented that the institution did not need to help students with their digital skills, although one student stated that they did not need any support because “it is pretty straight forward and easy to navigate through,” and another student revealed pragmatic thinking around technology implementation by commenting that “I think my organization attempts to keep up with the latest trends. The world of technology is ever changing and evolving and can be quite difficult. I believe they are doing the best that they can”. With another student, perhaps showing a confidence in their own capacity for self-direction, commenting that “it’s not so much the organization, I just have to apply myself to want to increase my digital skills”.

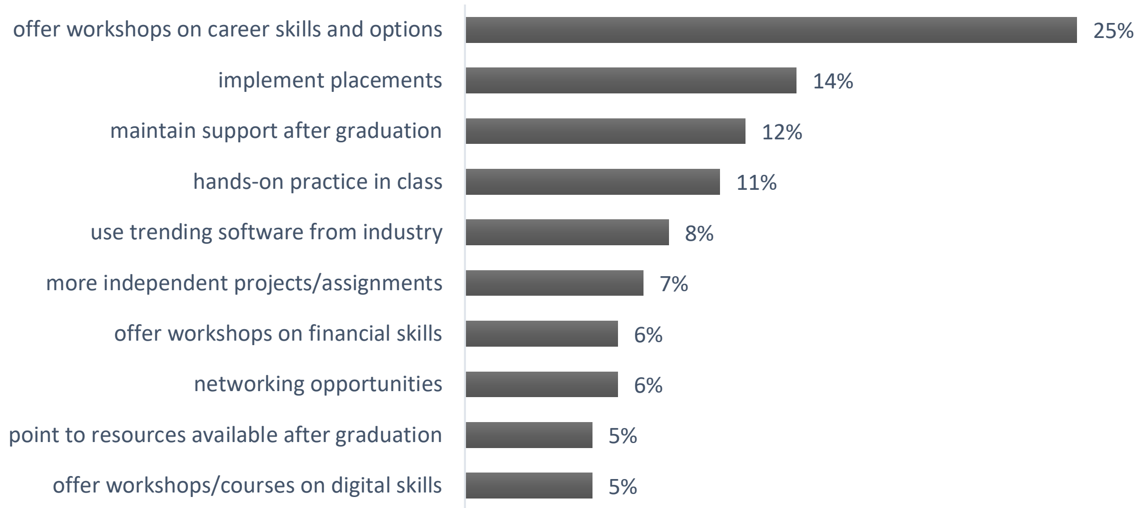
The data that emerged here also supports the inference described earlier that students differentiate between the type of support the instructors should provide and that which the institution should provide in relation to digital resources. Students would like the former to be more workplace oriented with training in software they feel they will eventually need to use, and the latter more digital literacy related with training on digital resources useful for learning and organizing learning. This is a reasonable assumption for students in applied learning courses overtly designed to develop workplace skills which makes it more concerning that instructors in some cases are not doing this. It also corroborates the analysis that students were self-directed and not necessarily restricted in making choices about learning resources by the limitations of the LMS. What did seem to be restricting students was the unfulfilled expectation of their instructors to provide training in the technologies they felt they needed to know. Students wanted this training but did seem to be seeking it out for themselves when it was not provided. Facilitating such independence is the theme this discussion considers next.

Facilitating Independence in Students. This section looks again at student responses to questions 35 and 36, one of which sought to find out the extent to which students felt they could control their study environment to be able to make decisions and take actions, and the other asks how the institution could help them achieve these. Participant responses to questions 35.1 in Figure 27 showed a majority of students as seeking a clear framework provided by their instructors for their study environment. Contrasting this, responses to 35.2 in Figure 28 showed a majority of students as also preferring to have agency on their study decisions. This was supported by responses to question 35.3 in Figure 29 where students reported feeling able to realize a course of action they set for their studies. That students were seeking a framework for their learning corresponds to students who were also looking for the instructors to train them in the technology they need and make sure the learning environment was well-designed and easy to navigate, again, this is a reasonable request by students in an institution that centres work preparedness.

These participant responses are developed in their responses to question 36 in Figure 33 which asked students for their thoughts on how the college helped them to become independent learners. The top 10 themes are show in Figure 39.

Figure 39

Reported Themes in Support to be an Independent Learner



Note. This figure shows the top 10 themes that emerged based on student responses to question 36: What one or two things can the college do to prepare you to be independent after graduating so you can make choices to learn the new skills you might need in your career?

Three themes stand out from the analysis of the student comments:

1. Ongoing support/access to resources after graduation
2. Specific training on digital technologies and skills
3. Preparation for skills they feel they will need in the workplace

Addressing the first of the three themes one student requested the institution "provide resources that we can use outside and beyond college. As well as showcase the multitude of options we have". This seems to indicate a wish for open resources and reflects an issue with the LMS in that students lose access to work that may be useful in their career after the courses end. Another student commented in two parts that:

> 1. For assignments: instead of strict guidelines, maybe have the option to do any format you want (ex. Essay, PowerPoint, presentation). This allows students to be more independent and learn of good ways to deliver information.
>
> 2. For deadlines: in the real world with real jobs, there won't be an online posting of when tasks are due. Students should stay accountable and remember their own due dates. Instead of the teacher posting due dates everywhere and constantly reminding, have them record it in a calendar/journal so they're responsible to be independent and remember.

Yes another student commented similarly by asking that the institution "not provide classes with slides regarding the course work, students should independently create notes based on chapters found in the text". These students were specifically asking for choice to be built into the assignments and course work and connected this with the ability to think critically. Such attributes are at the core of lifelong learning literacies yet contrasts with the desire for structure reported by other respondents. Other students emphasized the need for fluency in the digital tools they would need for work. One student connected the applied and digital skills by requesting:

> Set us up with counselling to discover how to build a professional resume or specific to our field. To educate us on what we should learn on our own that will benefit us in our profession. Like tell us what digital software to learn on our own time.

This student seemed to be asking for instructors to connect what is happening in the course with a future workplace. Another student asked, "how to gain information from academic resources on my own and how to access certain software that were only accessible as a student".

The last main theme emerging from question 36 revealed students as seeking skills that would help them become self-directed learners. As a previous student noted, students were looking for digital support in the transition from college to the workplace. This was reiterated in this students' comment about the eventual need to search for a job when they suggested "at the end of graduating semester, have an information session about different tools and people that can further help with independence. Good job search engines, not just Indeed. Information sessions with people from the field". Such a sentiment was also embodied in this student's comment offering advice on post-study access to support as they noted that

> there are often simple things that one may consider you do not need to learn but when you have left school and enter the workforce there is no one to guide you. Mentoring program after you finish your program will be beneficial to those who are entering the field. There can be different technology courses available within a program so that those who are deciding on a career that has various fields can specialize in the technology designed for that specific area.

In another comment noted in the Results chapter a student explicitly referred to organizational skills, a key lifelong learning literacy, by seeing the institution as needing to provide training on time management and self-discipline skills in online courses to help their independence. Another student referred to resiliency when they asked the institution to "teach us about the negative roadblocks that may come our way and how to overcome them" and yet another revealed the self-awareness that learning strategies would be useful to be successful as a student and suggested instructors "make it clear what skills we need to develop rather than forcing us to figure it out alone and in turn being behind developmentally".

It is apparent in analyzing student responses that they were seeking support but not to merely pass courses and to be familiar with the technology. Students made clear links between the effort they expended in studying and the benefits for them in the workplace. They were seeking support in that transition with an expectation of more self-directed practices occurring in the workplace. Furthermore, the data around student perceptions of technology use showed that students were motivated to employ technologies yet felt, according to student comments, somewhat frustrated that instructors did not actively support searching and using such technologies in their teaching. Students were compensating for this by employing multimedia technologies, especially video streaming services for learning purposes outside the LMS and what was required by the course or instructor. It also seems apparent that although students were actively using multimedia and participatory media technologies, they were not necessarily collaborating or working with other students through these services. Although not reported by employers in Figure 8 as being an aptitude they seek in employees, it is defined as an "interpersonal" skill in the Ontario Essential Employability Skills and an attribute that graduates need to be able to demonstrate (Ontario, 2017). Furthermore, collaboration is also seen as essential to self-directed learning as students employ collaborative technologies as part of PLEs (Haworth, 2016) and next-generation digital learning environments that may succeed the current walled garden LMSs (Brown et al., 2015). Not least, my own institution also recognizes collaboration one of the primary "skills in action" in its institutional learning outcomes framework (Humber College, 2020). This framework guides the way course outcomes are developed from the course to program level and graduates are expected to be able to actualize these skills in action as they enter the workplace.

Described this way, students could be said to be taking control of their use of digital technologies and making choices on resources they feel will be of use to them in a self-directed way. They were also undertaking these activities largely outside the walled garden of the LMS and individually, not collaboratively. Furthermore, there is no evidence of students taking a systematic approach to these activities in a manner that would indicate the development of PLEs.

Such responses could be related to a lack of instructor competence in digital technologies, so the students had to take on this responsibility. Alternatively, it may be that instructors were not aware of these needs from students and although they planned lessons to deliver content, they did not see a need to overtly provide students with direction in this area and possibly leading to students reporting more self-directed behaviour.

In summarizing the discussion around the second part of the hypothesis that asked whether the walled garden LMS restricted student agency in making learning goals and the extent of self-directed behaviours in employing digital technologies the data seems to suggest that students were not constrained by a notional walled garden. In fact, the students were experimenting and employing technologies extensively perhaps because they were digitally literate and had the know-how to do this but also because the walled garden LMS was perceived to contain organizational not learning resources and lacking the multimedia functionality of external resources they used and additionally because the instructors may not have been using the LMS to its full functionality. Perhaps because of this, students placed less emphasis on it in terms of its relevance to their learning. Certainly, student comments reveal they see the LMS as a place of grades, assignment submission, and communicating with the instructor. Where restrictions existed, they were largely due to student's perception of insufficient support from instructors or the institution in helping them with learning or future workplace related technologies.

The first part of the hypothesis asking whether OBE model restrict the development of lifelong learning literacies seems to be only partly supported. It is not clear whether students were defining their own learning goals and outcomes, or merely making the best of a situation where digital support was merely satisfactory by employing technologies they preferred to use to help them achieve learning outcomes they had concluded they needed to achieve to pass the course and thus took an instrumental approach to their learning. Students did seem to be constructing one outcome they wish to reach that is not necessarily directed or articulated by the institution or instructor— the need to be familiar with the technologies they would eventually use in their future workplaces. However, although being able to collaborate effectively to solve study and workplace issues is seen as a lifelong learning literacy, the OBE and LMS centered instruction model did not seem to be facilitating this and students seemed to be working towards their goals alone. One inference from this is that students were making self-directed choices and taking action to fill the gap left by poor online instructional practices, for example by instructors not facilitating the social aspect of the online community of inquiry. Building social presence is complicated, as noted in Chapter 2, by the top-down design of learning in LMSs and so careful thought needs to go into how to bring student voices into the learning environment to overcome the teacher-centered nature of the platform. In this sense, the LMS is not so much a walled garden than a chain-link fence – a restricting barrier, but one full of holes.

The next section builds a picture of the students in the participant sample and analyses this using the primary research question.

Combining the Leading Themes Emerging From the Data

In this section I will build a composite picture of the students in the participant sample and make an analysis of this using the primary research question:

- To what extent are online courses that employ outcomes-based education models delivered primarily through LMSs inadequate for developing the lifelong learning literacies required for success as adult learners in digitally enabled learning environments?

The section starts by outlining the main themes from discussions in the previous two sections addressing the sub-questions from the research and considered through the lens of the primary research question. This synthesis of the data leads into a discussion of the implications emerging from this for instructional practice and student support.

The main themes emerging from the qualitative and quantitative data are presented in Table 20 below.

Table 20

The Topics Emerging From the Survey Data Organized into Themes and Larger Patterns and How These are Addressed in the Primary Research Question.

<table>
<tr><th>Topics arising from data</th><th>Themes</th><th>Pattern</th><th>Category in research question</th></tr>
<tr><td>Peer support for technology use</td><td>Students report extensive peer support</td><td>Choice</td><td rowspan="7">Outcomes based education</td></tr>
<tr><td>Instructor support for technology use</td><td>Students generally report good support but seek more around workplace related technologies</td><td rowspan="2">Control</td></tr>
<tr><td>Institution support for technology use</td><td>Students seek more support around learning technologies</td></tr>
<tr><td>Structure/design of courses</td><td>Students seek similar designs for ease of use</td><td rowspan="4">Top-down approach</td></tr>
<tr><td>Perceptions of the LMS</td><td>More operational and organizational than instructional</td></tr>
<tr><td>Limited evidence of formal goal setting</td><td>Students do not set goals in a systematic way, but they do make choices to fill gaps left due to instructor and LMS limitations</td></tr>
<tr><td>Preparedness for work</td><td>Students ask for clear connections to be made between technology and the workplace as well as post-graduation access to these college resources</td></tr>
<tr><td>Use of participatory media outside LMS</td><td>Extensive use of participatory media</td><td rowspan="2">Organizing learning</td><td rowspan="2">Digitally enabled learning environments</td></tr>
<tr><td>Use of video streaming resources by students</td><td>Extensive use of, and preference for, A/V resources</td></tr>
</table>

Student use of digital tools outside the LMS	Extensive but not systematic, students want control and use the resources		
Instructor use of LMS	Limited use of the full set of features available		
Provision by instructor of digital resources for learning outside the LMS	Exploration and use of non-LMS based technologies	Existing extent of digital literacies	
Confidence in using technology	Students are generally confident, willing, and literate. Instructors are less confident and literate		
Interoperable technologies and the LMS	Instructors not making use of the ability to embed resources		
Institutional provision of resources to support technology use	Students request more on-demand support	Emerging digital literacies	Development of lifelong learning literacies
Time management	Students report a need for instructors to define priorities	Self-directed learning	
Planning and organizing learning	Confident in planning and organizing learning, yet report minimal systematic development of PLEs		
Student agency in learning how to learn	Students ask for and seek training in engaging with learning		

Note. Table 20 lists the major topics emerging from the qualitative and quantitative data. The theme column matches focus of the student comments in this topic. These themes and topics are then organized into broader patterns discussed in the literature review and introduction chapters and finally connected with the relevant element from the primary research question. The arrow indicates the direction (left to right) from micro topic to macro theme to the category in the research.

A picture begins to emerge from Table 20 that shows students with considerable freedom to make choices in their learning, in particular in accessing learning resources provided by the college or employing technologies they use in their personal life. It also shows the outcomes-based model partly meeting their needs by creating a clarity of structure yet also limiting their ability to generate outcomes they wished to meet, such as more connection between course learning tools and workplace tools. Students reported being digitally literate users of audio-visual and participatory media technologies for personal and study purposes. Students also reported frequently feeling the need to employ digital tools and platforms outside the LMS to seek further learning resources, yet the students did not report organizing these tools and resources into a nascent PLE. As lifelong learners, the students were digitally literate and aware of their own limitations to the extent they frequently requested being able to access on-demand training modules to become familiar with digital tools they would need in their workplaces. This suggests students were aware of future needs and were seeking out opportunities to resolve knowledge gaps. This also indicates extrinsic motivation to pass the course, yet it still requires students to plan activities to resolve gaps in knowledge. Further evidence of this was in the way students reported planning for learning as well as recognizing the need to learn how to learn.

In reference to the primary research question, students were not constrained by the restrictions inherent in the LMS and any restrictions that were in place were due to the extent to which it was used by the instructor. Furthermore, many students saw the LMS as an organizational and not instructional technology placing less emphasis on it as a learning environment. The students sought to overcome this limitation by using digital resources they enjoy using such as YouTube and used these sites to seek helpful learning content and guidance on using the technologies they felt they would need in the workplace. These kind of self-directed learning activities were not organized systematically in a way that would point to students constructing a PLE, however such self-directed activity points to students making choices about the learning they felt they would need and which they did not feel was provided by the instructor through the LMS. Furthermore, these self-directed activities seemed to be conducted independently of other students and students electing to collaborate on learning was not in evidence. Notwithstanding this, further research needs to be undertaken to interrogate the instructional effectiveness and quality and the extent to which this results in students taking action in their own hands.

Students were constrained by the outcomes-based education model in that it created a structure in the learning environment that seemed to generate an instrumental approach to learning. This was because it centered institutional structures and instructor knowledge that created in students a perception that the instructor and institution should provide knowledge and supports for them rather than them seek this out themselves. There is a contradiction however, in that students were actually seeking out other learning resources, especially through the use of multimedia video streaming services and from peers. Nonetheless, students were taking actions to meet learning outcomes they have devised even though those outcomes were not clearly articulated in this study. Lifelong learning literacies of the kind students reported employing appeared to be the following:

- Confidence in making learning choices
- Digital literacy
- Self-awareness of their own knowledge limitations
- Self-organized learning behaviours such as seeking peer support and articulating their need for support in overcoming these limitations through the use of on-demand video-based training activities.
- Collaboration (with peers)

The implications for instructional practice and student support emerging from these results are discussed in the next section.

Implications

The patterns and themes emerging from the discussion result in implications for practices related to course design, the provision of digital resource training for both students and instructors, and support for self-directed learning strategies. The overview of the findings as organized in Table 16 lead to five wide-ranging implications:

1. Instructors provided good workplace technology training, but students also sought support in using learning- and study-supporting technologies as the LMS did not provide this
2. Although training and in-course support from instructors in digital tools was present, students wanted on-demand access, preferably using video instructional modules
3. Poor online instructional practice delivered through the LMS resulted in students filling the gap with alternate platforms, tools, and resources
4. When students employed technologies to support their learning, they were not typically doing this in a systematic or collaborative manner
5. A need to deemphasize the LMS as a *learning* environment and focus on its capabilities as an *organizational* tool and include flexible and adaptable PLE templates as part of it.

Students perceived themselves to be digitally literate when it came to using technology as can be seen in the results in Figure 10 where they stated enjoying and being comfortable trying out new technologies with only 3% reporting they preferred not to use technology unless they had to, results also replicated in the JISC 2020 Insights Survey report (JISC, 2020). As seen in the responses to questions 24 (Figures 18 to 21) and 26, instructors were supporting students in using the technologies that they would use in the workplace but do not seem to support technologies that would be valuable in managing learning. Students reported that their instructors needed to “expose us to more different technological learning tools” and to “help provide better knowledge to teachers on how to integrate technology”, thus indicating it is not the student but instructor digital and andragogical literacies that need developing. This instructor knowledge gap with digital technologies as well as poor online instructional practices may be one of the reasons why students asked for on-demand training videos or modules to help them use digital tools. The other reason being that students valued immediacy of information and access in their personal online lives:

> This net-centric generation values their ability to use the Web to create a self-paced, customized, on-demand learning path that includes multiple forms of interactive, social, and self-publishing media tools. (Baird & Fisher, 2005, p. 5)

Centres of Teaching and Learning, valuable but prior to the pandemic somewhat underappreciated departments in institutions, have found themselves as irreplaceable sources of support and strategic direction with the rapid shift to remote teaching and learning. These centres are usually responsible for providing instructor and student supports to teaching, learning, and course design with much of the support in the form of walk-ins, workshops, and information sessions, all of which are now online. How these centres have transformed in order to provide on-demand training and instructor support will be a rich area of future research. In my institution it is the same centre that is also responsible for the LMS, both in terms of infrastructure and instructor support. Because the LMS was considered pre-COVID as the de-facto location for online teaching and learning, the rapid pivot to online teaching may have revealed weaknesses inherent in their design and also in how and the extent to which instructors utilized them. These design and instructional gaps also seems to have provided opportunities for instructors and students to experiment with platforms and tools outside the LMS, as reported in responses to question 16 in Figure 15. One implication from this is that such experiments likely arise from individual teacher decisions and are not necessarily suggested by the institution. An area of focus in the future will be to see how to gather these practices and share the knowledge among instructors, including in the near future from when this study was made when many courses remain purely online, and in-person interactions are limited. Although the data from Figures 32, 33, and 34 showed students felt reasonably confident in their self-directed ability to resolve learning problems, the qualitative data summarized in Figure 31 underlined the significance students placed on being able to access support for learning how to learn, and to connect activities to their future workplaces. Again, an implication arising from this is that a lot of experimentation is taking place but it may be a little haphazard and not based on evidence progressing from research into online learning course design—an area “decision-makers ignore at their peril” (Bates, 2005, p. 133). Nonetheless, given this was a period of rapid transitioning to remote teaching, many instructors, and students, had limited previous exposure to the specific instructional demands of teaching at a distance and were basically experimenting in real time as best they could.

A summary of the inferences from this discussion is as follows:

- Select lifelong learning literacies were present but in spite, not because, of the LMS learning environment
- Students in this study saw the LMS as an organizational not instructional environment
- Students in this study were extensively employing digital technologies in a self-directed manner

- Students in this study sought support from their *instructors* in using digital technologies they expect to use in their future workplace
- Students in this study sought support from the *institution* in employing technologies that could facilitate their learning endeavours
- Students in this study reported being confident with technologies and digitally literate, and reported instructors as being less digitally literate
- Outcome-based education models in this applied learning institution seemed to focus students on an instrumental approach to learning that emphasized workplace preparation

This concludes the analysis and discussion part of this study. After a summary of this chapter, the next chapter provides conclusions and any accompanying recommendations emerging from these inferences and the discussion.

Summary

This chapter discussed the data presented in the Results Chapter. The chapter divided the hypothesis into two parts: outcomes-based education and technological monocultures. Each part of the hypothesis was analyzed through the lens of the relevant research sub-questions and research cited in the literature review. Throughout the chapter I provided student qualitative comments and additional figures to further illuminate the data presented in the Results chapter. The first part discussed data related to self-direction, support for using technologies, and student control and choice, and the second part discussed student perceptions of using digital technologies, instructor and student use of technologies, digital literacies and independent learning. The next section of the chapter combined these themes in order to address the primary research question which seeks to uncover the relationship between the limitations of digital platforms, outcomes-based education models and the development of lifelong learning literacies.

The last part of the chapter considered four implications arising from the analysis, namely student and instructor engagement with digital technologies within the limitations of the system for providing online courses and how these relate to practice and institutional strategy.

Tentative observations and inferences were provided in the chapter that are explained in the next, and final, chapter that provides the conclusions and associated recommendations.

Chapter 7: Conclusions and Recommendations

Chapter 6 provided a discussion of the quantitative and qualitative results presented in Chapter 5. This concluding chapter provides a summary of the argument and thesis, outlines the intent of the research project and describes conclusions from themes emerging from the thesis and how they align with the survey data. The chapter then considers the significance of the conclusions and how these can contribute to the provision of online learning in postsecondary education in Ontario. I also reflect on the limitations of this research and what I would do differently in this and future research. First, I provide a synopsis of the thesis.

The Research Context. The research was conducted in an Ontario public postsecondary College in the Fall of 2020. All participants in the research were first- and second-year diploma and degree students taking online liberal studies elective courses required as part of their respective programs. COVID-19 social distancing measures, in place since March 2020, had moved around 70% of the institution's courses to an online modality. The 30% of on-campus courses were offered in areas such as the trades, health sciences and applied technology programs requiring specific instructional environments and equipment. Although many of the College courses were rapidly transitioned in the Spring and summer of 2020 to a fully online modality, the courses targeted for this research study were pre-existing online courses fully designed for teaching and learning at a distance. Nonetheless, if the campus and program were operating as normal, online learning may not have been the participants' modality of choice when choosing their electives. Moreover, during this period the participants were also studying in other courses not intentionally designed for online delivery more accurately described as emergency remote teaching and learning and their responses to the survey should be considered within these contexts.

Key Themes of the Study. Four key themes and the issues associated with these are described in this study: outcomes-based education, walled garden learning systems, self-direction, and lifelong learning literacies. This section provides an overview of these key themes resulting from the literature review.

Outcomes-based education (OBE) models are rooted in Ontario postsecondary education. On the one hand, this is a result of policies implemented to measure learning outcomes and associate these with the essential skills considered to be required in workplaces. Such measures of educational effectiveness are increasingly linked to government funding of the education systems which, in turn, provides institutions with more incentive to measure outcomes. On the other hand, the ubiquity of OBE is also a result of more careful attention by instructors to the organization of curriculum, assessment, and curriculum design decisions. This activity arises as a result of the aforementioned policies, but is also due, again, to the institutional need to measure learning for purposes such as transfer credit and prior learning, assessment, and recognition (PLAR). An assumption within my study is that online learning is susceptible to OBE methods that have the potential to restrict students' ability to have a voice in the outcomes they wish to achieve (Sweetman, 2017). Such restrictions are further compounded by designing, developing, and providing the learning in walled garden platforms that limit student control and choice in the kind of resources and locations they may wish to employ in their learning (Dron, 2007b). The most common of these platforms in postsecondary education are learning management systems that create boundaries around the course, the content, student and instructor interaction, and the ability to revisit learning after the courses has ended through access control measures. This combination of digital walled gardens and OBE models will influence the manner in which students can exert control and engage in self-directed practices. These factors are likely to have implications for non-traditional students given that the post-pandemic environment will increase the number of adult learners seeking to access formal education as they retrain or upskill for changed workplaces (OECD, 2020).

As recognized in the Ontario Essential Skills framework (Ontario, 2017), digital, organizational, and critical thinking literacies are expected by employers. However, these days with the rise of the post-industrial networked society lifelong careers are increasingly rare, and such lifelong learning literacies will need to be explicitly taught and developed alongside workplace-specific skills. Adult learners re-entering postsecondary institutions may be less willing to follow courses within which their own life experiences and existing knowledge are not recognized; furthermore, they may also be looking for flexibility in when, where, and how they learn as well as the type of credential that is relevant for them. Ensuring adult learners have the self-directed learning skills, a key lifelong learning literacy, to cope in an increasingly complex work environment should be addressed by opening the walled learning environments and pre-defined outcomes. The networked learning theory of Heutagogy (Hase & Kenyon, 2007) that recognizes learning as an adaptive skill, not one that *prestates* what is to be learned is well-placed to inform online curriculum design that can support a shift from delivering the desired learning content in walled garden digital platforms to one that networks learners, instructors, and learning resources together in the wider wild world of the internet in order that student choices, voices, and experiences are incorporated into the instructional and learning experience.

Method of Inquiry. The study incorporated a descriptive analysis methodology in order to reveal what was going on as students engaged in learning online with digital technologies. The descriptive analysis, although not experimental or revealing cause-effect relationships, has enabled me to point to the main qualities of the phenomena and provide data to justify more specific research or instructional interventions, and designs. To gather the data, I used the online JISC Student Insights Survey which collected qualitative and quantitative data on four themes aligned with my research (Table 7). The survey ran over two weeks and gathered responses from 618 students out of a total of around 2400 potential participants. The data was presented in tables, pie, and bar charts that employed quantitative statistical methods and qualitative text analysis. These are described in detail in Chapters 4 and 5.

The following section offers a synopsis of what this research aimed to uncover.

The Research Purpose

The purpose of this research was to assess the extent of any constraints present in online courses provided through a learning management system, as well as reveal the digital technologies students are using and their attitude towards these. The specific areas within which this research project aimed to assess the relative benefits and/or constraints were as follows:

- the outcomes-based education models increasingly prevalent in postsecondary education courses and programs
- whether students are defining their own outcomes or taking a level of control over their learning in a self-directed manner
- Whether lifelong literacies of the type that can support ongoing learning were present

The presence of these attributes, or lack thereof, are represented in the hypothesis as stated in Chapter 1 that asked: ‘If the kind of lifelong learning that graduates may require, or choose to access, is highly dependent on unknown future contexts and individual needs imposed by the logic of the networked society, then these needs will not be best served by an outcomes-based instrumental educational paradigm that reinforces instructor- and institution-centered outcomes that inhibit student agency and choice’. This paradigm is reflected and exacerbated in the walled-garden analogy of an online student studying a course designed within the constraints of an LMS, which, for adults returning to education, is further reinforced by a walled-garden policy around the lack of recognition of prior formal and informal learning.

The hypothesis was operationalized in the research questions. The primary research question addressed issues emerging from the deployment of outcomes-based education models:

- To what extent are online courses that employ outcomes-based education models delivered primarily through LMSs inadequate for developing the lifelong learning literacies required for success as adult learners in digitally enabled learning environments?

The principal research question was supported by three sub-questions articulated to address the core areas within the study, namely those of lifelong learning literacies, the digital learning environment, and the extent of self-directed learning in online courses. The sub-questions were stated as follows:

1. To what extent do student responses show characteristics of lifelong learning literacies?
2. To what extent do participant responses reveal their limited agency in constructing learning goals and outcomes?
3. To what extend are students employing technology to support self-directed learning?

My intent in describing and assessing the online learning environment through these lenses was with the aim of providing descriptive evidence that could support arguments in favour of the inclusion of more student choice in defining learning outcomes in online courses and to make recommendations for adapting the current digital learning environment to make space for networked learning opportunities. These are opportunities that should endure for students after they have graduated and left formal education in order to support lifelong learning. Furthermore, such lifelong learning that does occur would benefit from being recognized in a Canada-wide system of PLAR that centres the adult learner re-entering education, not institutional assessment prerogatives. Additionally, I was looking to recommend professional development and research into online instructional practices.

Summary of Implications. An analysis of the results through the lenses of the research questions led to five principal implications. Firstly, that students were digitally literate and were motivated to use digital technologies as part of their studies, and they sought support in employing technologies that would help them learn and organize their learning from institutional services, but technologies related to future workplaces by their instructors. Secondly, that students expected on-demand access to multimedia learning and support resources. Thirdly, that instructors and students were employing alternative digital technologies to support their teaching and learning to either make up for deficits in the LMS or for poor online instructional practices. Fourthly, that although students were employing the aforementioned technologies, they were not doing this in a systematic manner that could be considered a nascent personal learning environment. And lastly, that students perceived the LMS as an organizational and not a learning environment.

These implications are elaborated upon in the next section where I describe the conclusions as they relate to the research questions.

Conclusions

This section considers the implications in relation to the research questions and proposes three conclusions. Briefly paraphrased, the primary research question asked to what extent are LMS-based online courses designed in an outcomes-based model inadequate in developing the literacies needed for lifelong learning in online environments. The first sub-question sought to uncover characteristics of lifelong learning literacies, the second asked about the level of student control, and the third the self-directed use of learning technologies.

Students did not report in the descriptive survey results that they were systematically organizing the way they use digital technologies for learning, yet they were making extensive use of technologies like video streaming services for learning purposes. The organizing of learning, such as the development of a PLE is considered a valuable learning strategy (Parra et al., 2016; Prendes et al., 2016). The absence of such organizational strategies reported by the participant sample appears to imply either that OBE models in LMS-based online courses do not encourage, enable, or motivate students to self-develop this organizational literacy or for instructors to support their development. OBE models in Colleges lead to the creation of outcomes closely tied to future workplace skill preparation which may come at the expense of supporting the lifelong learning literacy of organizing learning resources and artifacts—Even though these are spelled out in institutional outcomes and Ministry requirements. This seemed to focus instruction, and thus the focus students placed on this, on the learning outcomes that were linked to future workplace skills and less so on the inclusion of strategies and digital resources that could build strategies in learning how to learn.

Students reported employing self-directed behaviours, another important lifelong literacy (Saks & Leijen, 2014), in using multimedia and particularly media above and beyond what was asked of them by the instructors, or provided in the LMS. This indicated a usability issue with the LMS because students seemed to prefer to access the technologies they used in daily life *and* study (social media, search engines, multimedia streaming services) rather than the learning artifacts within the course's LMS. Further, participants reported that the LMS was more a platform to arrange learning resources, not an instructional tool. The implication of this is that students viewed the LMS as the place where instructors organize their learning, whereas the students looked outside the LMS for learning resources they considered useful. As a consequence of this, the LMS was not considered by students as hindering their learning because they did not even see it as a place of learning but rather as an organizational platform. Furthermore, students did not feel the need to rely on their instructor to provide digital learning resources because they were comfortable enough to seek digital learning artifacts in a self-directed manner—albeit in a way that was not organized like a PLE. When students did look for support with technologies that would help them organize their learning, they expected this from the institution and not necessarily from their instructors. Students must therefore have known what type of learning resources to seek out for themselves, hence indicating an awareness of the desired learning outcomes and associated assessments they needed to know of to complete the required learning activities in their courses.

This has three implications, firstly that the clarity of learning outcomes in the OBE model enabled students to make informed decisions about the type of digital artifacts and resources they ought to seek out to help them achieve the course outcomes. Secondly, if students were emphasizing the organizational, instructor, and institutional support aspects of their learning experience in relation to their future work it would indicate that they were taking more of an instrumental approach to achieving the outcomes as meeting the outcome is stressed in the OBE model more than respecting the complexity of individual approaches to the process of learning. Thirdly, it implies that the self-directed uses of technologies for learning were a product of the participants' digital fluency and comfort with the technologies they used in their personal life—and not a direct consequence of the restrictions of the LMS. However, this could equally imply poor online instructional practice, something of particular relevance in the rapid transition to remote teaching.

I will make two conclusions around the development of two specific components of lifelong learning literacies. One is related to digital literacies and the other to self-directed learning literacies. I will also make a third conclusion about the extent to which the digital learning environment restricts student agency in constructing learning goals and outcomes.

Conclusion 1. The first is that courses constructed with an outcomes-based design and delivered primarily through an LMS are only as adequate in developing digital literacies as the corresponding instructional and institutional support provided for students in using digital technologies. Thus, digital literacies (as a component of lifelong learning literacies) are present but in spite of, not because of, the constraints due to the LMS and OBE model. Furthermore, without implementing ancillary supports in essential skills these valuable digital literacies may not emerge. Evidence of this is provided by extensive comments from participants requesting software training for workplace and study skills. Poor online instructional practice is also a significant factor and future qualitative research must be undertaken to investigate this.

Conclusion 2. The second conclusion is that the OBE model in online learning centered in an LMS provides *adequate* opportunities for students to engage in self-directed learning practices. Students were, to a large extent, seeking out digital resources to help them study but they were not doing this in a systematic way that could be considered a notional PLE. Although further study will be required to assess why, I hypothesize that the OBE model provided a scaffold and set of signposts to guide students through the course which students responded positively to as it provided a focus on where students *and* instructors invested their study and instructional time. Although students were self-directed in seeking out learning resources they were more likely to engage in an instrumental approach to achieving outcomes by seeking out and becoming proficient in the digital tools they felt they would need to be work-ready—a knowledge requirement likely to be indicated in the course or program learning outcomes. This may also have led to students and instructors not seeing the relevance in developing or teaching students how to develop a PLE because the OBE model and institutional support provided a quasi PLE—especially when students can access support through departments such as open learning centres and the library that provide free institutional access to LinkedIn Learning and Office 365 as well as access to research, graphic creation, image curation, and video editing software that can be supplemented by peer-led one-on-one consultations. Further research into instructor perceptions of the use of LMSs will be of value as a follow up.

Conclusion 3. The final conclusion is related to whether the digital learning environment restricts student agency in constructing learning goals and outcomes. The results from the student survey did not indicate that an LMS-centered online course that employed elements of an OBE design restrict the ability for students to construct learning goals and outcomes. Students were making personal choices to seek out resources to support their learning and using digital resources that they were not necessarily guided to by their instructor or within the LMS. In fact, students reported seeking support from peers more often than they did their instructors. However, it is not clear from the participant responses what prompted students to seek out these additional resources and for what purpose they were seeking them out, for example whether it was to help them complete an assignment, or activity, or because they saw a gap in information the course was not filling. Nevertheless, students had a preference activities and resources associated with a perceived future workplace. This indicates that the current learning environment encourages an instrumental approach to learning and not one that facilitates the development of lifelong learning literacies. Because of this, it is not possible to conclude that it is the OBE, LMS-centered learning environment that restricts the construction of learning goals as students were making learning choices in spite of, not because of the constraints place upon them by the instructional model and platform. Further targeted research is needed to uncover the specific reasons why students sought out these learning resources.

Combined, these conclusions indicate that self-directed behaviours were commonplace in the online learning environments in particular those related to seeking out digital resources that would support acquiring knowledge or skills that students had concluded they needed in a future workplace. However, it was not clear whether this was a result of the limitations or an attribute of the online learning environment or the prestated learning outcomes. Nevertheless, this self-directed behaviour is a lifelong learning literacy that students are likely to carry on to workplace environments and that this may ameliorate the lack of learning strategies the LMS and OBE-based learning environment seemed to support.

Summary of Conclusions in Relation to the Hypothesis and Research Questions

This study hypothesized that OBE models and walled garden LMSs inhibit the development of the lifelong learning literacies increasingly required in changing and complex workplaces. This hypothesis was operationalized for analysis by the principal research question outlined earlier in this chapter.

Drawing from the conclusions presented above I determine that the hypothesis was only partly met in that the combination of the digital learning environment and OBE model do not inhibit the emergence of lifelong learning skills in that students were making choices and goals they wished to achieve and sought resources outside the LMS in a self-directed manner. However, the environment did lead to students taking an instrumental approach to learning as they stated a preference for the organizing structure of the OBE model because it helped them target the learning activities expected of them especially when they could associate these with future workplace preparedness. In specifically addressing the three sub-questions the conclusions indicate that:

- In response to the first sub-question, students showed characteristics of lifelong learning literacies to a large extent as they revealed students independently making critical, reflective, planning, and self-directed actions in the online environment.
- In response to the second sub-question, student responses did not reflect their limited agency in constructing learning goals because they considered the learning environment an *organizational* and not *learning* setting.
- In response to the final sub-question, it was clear that students were extensively employing technologies to support self-directed learning independent of instructor guidance. However, they were doing this on an ‘as needed’ basis and not organizing these in basic form of PLE.

The significance of these conclusions enabled the study to provide targeted recommendations for future practice and are described in the next section.

The Significance of the Conclusions

Colleges of applied learning in Ontario are not research intensive institutions, although the number of research projects has increased in recent years (Ontario Research Infosource, 2020). Research is applied and related to industry applications. Scholarship of teaching and learning research is often, by nature, smaller scale and for a specific instructional purpose. Furthermore, unlike the JISC surveys run annually in the UK, there are no Canada-wide agencies that run annual surveys targeting student learning experiences. Colleges are not Universities so the student goals and the kind of teaching and applied learning to meet those goals differs. This research project, though modest in ambition, was the first cross-program study in the institution into student activities and perceptions of online learning. This alone is significant and a strategic reason behind employing a descriptive analysis research method because of the need for more institution-specific data to inform the quality and increased provision of online teaching and learning in the aftermath of the COVID-19 pandemic. The gathering and analysis of descriptive data with regards to student perceptions and activities as they employed digital technologies for learning has opened a door to the walled garden LMS that will help make informed recommendations for future practice in applied learning institutions in Ontario. The rest of this section describes the overall value of undertaking this research.

The pandemic-induced pivot to remote teaching and learning sharpened the focus on online learning and the systems that support and hinder them. The rapid transition to teaching online would not have been a decision anyone would have made without the need to protect the health of students and staff. Participant responses described a valuable lifelong learning attribute emerging: resilience. Students continued with the activities expected of them as students and widely sought support from their student peers to help them in their learning and use of the digital resources. There was negativity about learning online, but this was not largely what they talked about in the qualitative responses. Students had concerns about workplace preparedness and the value of resources but not the modality. These observations and the prior conclusions are significant because focusing on the relative benefits of one modality over another in the coming years is a distraction. It distracts those tasked with implementing online learning from the more urgent need to address student support for instructional and organizational digital tools and the location and focus of online learning. Not least, a modality distinction can distract from instruction that develops strategies and skills associated with lifelong learning literacies of the kind of students will make use of as they enter or re-enter an increasingly complex networked society and workplace post-pandemic.

Building on student comfort with online learning, the results outlined in Figure 14 showed students as seeking informal support from peers and others to a larger extent than from their instructors, and Figure 25 showed the students as preferring to discuss their digital skills with their peers. This data was also supported in Figure 16 that showed students as frequently working together in online courses. Together these revealed students as quite capable and used to engaging in learning activities without the direct presence of the instructor. The study also showed students as very comfortable with a variety of digital technologies and able to critically reflect on how well these were used by instructors in their courses. Nonetheless, Figure 26 shows that although students do have a sense of control they also preferred to be led by an instructor.

This is notable because one aspect of this research set out to assess how walled garden LMSs restrict student agency. From a student perspective the LMS is not a learning location, but an organization structure around which learning can occur. That students were actively seeking support for learning outside of the instructor and LMS is significant information as it shows how students perceive the place of institutional support in developing lifelong learning literacies. Nevertheless, students also felt the need for guidance and direction from their instructor and this should form the basis of new ways of thinking about the location of learning in online courses and how teaching presence, by which I mean instructor design, direction, facilitation, and guidance, remains central to an online learning environment.

The results also highlight an issue the College sector has in building essential lifelong learning skills. As Ontario colleges seek approval for teaching more 4-year degrees the institutions will have to grapple with the instrumental approach that OBE models inculcate in applied learning programs. The course outcomes emphasize workplace preparation, not essential skills that support breadth of knowledge in the liberal studies tradition. However, such liberal studies courses are required in degree programs approved by the Ministry. This will involve support for instructors from teaching and learning centres in teaching their students how to be lifelong learners as well as becoming skilled in their chosen career. Furthermore, institutions need to recognize that students are already setting their own goals and seeking resources to help them be effective learners.

This study was conducted during the COVID-19 pandemic. This created a number of limitations on the study. I will discuss this in the next section, as well as other limitations and how I would address them differently in future research.

Limitations of the Study

The main limitations that need to be acknowledged in this study are those of the effect of the pandemic and the resulting pivot to emergency remote teaching and learning, and the courses the participant sample were studying in. Any conclusions and recommendations extended in this final chapter should keep these limitations in mind. Nonetheless, the findings enable recommendations to be made for instructional and institutional practice, especially if data is gathered annually by running a similar survey of student perceptions of digital factors in my own, and fellow institutions. This is particularly relevant if online teaching and learning remains more prevalent than prior to the pandemic.

Timing of the Survey. The survey was run in the Fall of 2020 when the majority of courses the students were taking in their programs were fully online due to social distancing measures defined by the provincial government. Some programs in the trades, health sciences, and applied technology fields had blended delivery that included hands-on instruction in labs and workshops, as well as fully online courses such as the liberal studies electives the survey participants were enrolled in. Ordinarily, such students would be mostly in on-campus courses. Prior to the pandemic, my research was designed to survey students who self-enrolled in intentionally designed online courses but due to the pandemic all students were taking these online courses, regardless of their personal preference. Ideally, this study would have been conducted during a period when students had a choice between online and in-person courses as this could provide a more representative picture of student perceptions of digital learning in the post-pandemic world. Furthermore, the survey question set was designed to refer to an ongoing digital environment, not one of rapid pivot to emergency remote teaching and learning; therefore, it was not possible to know whether student responses were intended to relate to the COVID-19 situation or the ongoing digital environment. In this context, the overriding request from students for more support may refer to the current emergency remote teaching.

Participant Sample Programs of Study. The sample consisted of students who took liberal studies electives. In the Ontario college system, these are limited to students who take undergraduate level courses at the diploma and degree level. The participant sample did not include students taking postgraduate level programs as these students were not required to take electives. Although not a significant limitation, the graduate students would represent an older cohort of students who would have completed a bachelor’s degree and thus have quite extensive experience in making choices as a learner in formal education. Furthermore, they may already have had significant workplace experience. The instructional approach in online Liberal studies electives consists of critical response and thinking with extensive reading and viewing of learning materials and assessment typically consists of essays, and projects with presentations.

This differs from the more applied programming in the College that involves much more workplace specific skills development and lab, shop or creative media work. This is a limitation as it is hard to deconstruct whether the students are responding to the survey with only liberal studies courses in mind, or with their other, non-liberal studies, online and even in-person courses. These limitations mean that any analysis and recommendations related to lifelong learning habits and endeavors can only be based on a sample of participants who are yet to embark on their career and any associated lifelong learning activities. Furthermore, the study relied on student self-reports as they responded to the survey in both the qualitative and quantitative responses. This presents a validity issue as students may misinterpret the questions or exaggerate or misreport the issues they face to make the situation seem worse than it is – especially relevant during the pandemic. This has to be taken into account in the interpretation and discussion of the results. Nonetheless, the JISC survey has been widely tested and the construction of the questions provide enough detail to contextualize the question and clarity of writing to limit the extent to which students may misinterpret questions.

The final section of this chapter seeks to make recommendations that can be implemented to support the online learning experience for students and the way the institution supports practices that will lead to the development of lifelong learning literacies.

Recommendations for Research and Practice

My interest in undertaking a descriptive analysis was due to the capacity of this methodological approach to provide breadth and some depth on the way in which online learning is, or is not, working in my institution and for me to be able to make recommendations for future practice. This section outlines four recommendations for future research and practice emerging from my study.

Recommendation 1: Assess Student Organizational and Learning Activities in Relation to the Heutagogy Networked Learning Model. Data from this study showed students as operating in the instructional environment in ways that are described by the networked learning Heutagogy model, namely:

- The instructor's role is mainly that of content provider
- The student negotiates their own path through the content
- Learning is an adaptive skill
- Learning emphasizes a sharing, not hording of knowledge.

From this study, it was clear students were seeking their own paths to achieve outcomes set by the instructor: they were sharing resources with peers, they were making choices to seek their own resources and were showing awareness of what they thought they needed for future success. A difference between what this study finds, and the instructional and learning models found in Heutagogy is that in Heutagogy the learning environment and institutional priorities do not require an OBE model where outcomes are defined by the institution and instructor and meeting these is emphasized over the process of learning. Qualitative research should be conducted to assess how students respond to an online course designed with Heutagogical principles. Such a study would benefit from reference to data from this study relating to student activity outside the LMS and the technologies they used.

Recommendation 2: Conduct Research Into Emerging Instructional Environments. Another area of research would be to categorize the types of activities students undertake inside and outside of the digital platforms currently used. Uncovering the extent to which these activities are operational/administrative or more associated with learning will help instructors rethink where their learning content is located as well as the design of the LMS learning software. Furthermore, finding out in more depth where students may be gathering learning resources, how they do it, and how this is supported or constrained by their instructors/the institution/the learning platforms can identify and potentially support the development of new instructional environments that may be more appropriate for heutagogical approaches to instruction and for developing the essential skills employers ask for.

Recommendation 3: Transform the Notion of Where Learning Takes Place in Online Courses. The previous section described the need to enhance the support architecture for all students and to create in-person and online structures that actively develop lifelong learning literacies and provide on-demand resources linked to specific workplace skills. Such enhancements also require instructors and administrators to see the LMS as a place for the administration of learning, for example as the location of access to the instructor, key learning resources, assessments, and grades rather than as the primary instructional location. As discussed in Chapter 3, the instructional locations are already more networked and contain indexed, on-demand multimedia resources accompanied by instructor and institutional support targeting the development of essential skills and lifelong learning literacies – as can be seen in the emergence of a better funded and focused teaching and learning department in my own institution, when it recently changed names to the Centre for Innovative Learning. This new centre combines digital and in-class supports for instructors and students as well as research, flexible learning, and program planning and development under one umbrella. This new centre provides a space for students to work with instructors in researcher projects as well as training in the multimedia and other learning services the institution provides. Supporting this shifting notion of *learning everywhere* (not just in your course) is significant as it helps to begin to describe the type of pedagogic support instructors need, the learning support students need, and the instructional or organizational purpose of the LMS currently central to the provision of online learning. Future research into where students are accessing learning resources and engaging in learning activities will be of value in helping instructors employ these resources in their courses. Such research will also support the notion of expanding learning beyond the LMS in online and hybrid teaching and learning modalities.

Recommendation 4: Post-Pandemic Institutional Support for College Teaching and Learning. Students and instructors need skills training in how to search for, organize, use, and self-assess the range of learning resources available to them. This lifelong literacy training should be provided to all students in a required first or second semester course and be combined with one of the current literacy or breadth electives. The course should be developed centrally, perhaps facilitated by one of the current Ministry-approved bodies such as Ontario Learn, Contact North, or eCampus Ontario, as well as in collaboration with employers across the province. This course should be offered online and outside of the institutional LMS in a platform that students can return to throughout their studies and after graduation. The central element of this course would be training in how to search and find learning objects in a province-wide, indexed, database of resources. Students would be able to access these resources on-demand, even after graduation, and these resources would be primarily those types of training that can be offered through self-guided multimedia resources, or learning objects constructed in software like H5P (https://h5p.org/). The intention of this recommendation is to provide all lifelong learners with free access to an open database of resources targeting workplace skills. Updating the architecture for providing on-demand online support for students in the coming years also relies on a change of emphasis in online teaching.

Supporting professional lifelong learning for instructors also needs to be facilitated in approaches such as creating a Domain of One's Own (Watters, 2017), through supporting the infrastructure around providing instructors with time and the knowledge to create a personal learning environment (Attwell, 2007). In particular, the use of socially-constructed artifacts such as e-Portfolios may be relevant here, whereby the instructor is able to organize, archive, make reflections and observations, as well as providing a sandbox for experimenting with new technologies (Ehiyazaryan-White, 2012). This paper surveyed student experiences of their online environment and, although responses described the instruction, the investigation did not include instructor perspectives. The JISC organization provides a complementary survey (Teaching Staff Digital Experience Insights Survey) that gathers data from instructors on similar themes, thereby enabling a cross-analysis of the instructional and learning context. I hope to run this survey in the coming years to gather insights from instructors in my institution and make a comparative analysis between the data sets.

The recommendations above represent the conclusion of this research study and the following final section summarizes this chapter.

Summary

This chapter opened by describing the research context and followed this with a synopsis of the overall argument and the main themes from the literature review. The chapter then summarized the descriptive analysis method of inquiry, why it was used and how the results were presented and analyzed. I then described the purpose of this research and what I hoped to achieve when I set out, as grounded in my hypothesis. This was followed by presenting the implications of the research results which subsequently formed the basis of the three major conclusions. The next section was then given over to the significance of the results emerging from this research project. Following this I outlined how I would approach the participant sample and survey timing differently in future research and how to overcome some of these limitations. The chapter closed with four recommendations for institutional practices in relation to online teaching and learning and the deployment of digital education technologies, namely: research into how students respond to online courses designed using Heutagogical principles, the transformation of the way we currently focus on online learning, revisiting OBE models, research into activity type in LMS, and the creation of student digital and on-demand support architecture.

I look forward to participating in the necessary work to address these challenges.

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Appendix A: JISC Survey Privacy Notice

This survey is being carried out by [institution name] in conjunction with JISC. We will ask you questions about your [for students: course and your experiences of digital learning] or [for staff: use of digital tools and the digital infrastructure in your teaching]. Your participation in this questionnaire is voluntary and you can stop at any point without your responses being included in the dataset. More information regarding data protection can be found here. [add link to institution's data protection policy]. The data is used to help improve staff and students digital experience. JISC will use anonymized aggregated data for analysis, public reports and presentations.

Appendix B: Student Information Letter

Student Information Letter

Dear student,

This letter gives you information about a survey I am asking you to participate in, and why the data I collect from the survey will be useful to you and future students at Humber.

I am conducting this research as part of my Doctoral Program called "Avoiding Technological Monocultures". I am looking at the way students use digital technologies and resources in their learning. I am also looking to find out your attitude to these technologies.

To help me collect the data I have chosen to use an online survey called: The Student Digital Experience Insights Survey. This is survey is designed to find out more about your experience of online learning. I have chosen to use the Insights survey because it covers issues we know are important to you. The Insights survey will allow me to:

Know more about how students study and learn online and find out what helps you to succeed

Understand how you use the online learning environment and services and how we could improve these

Better understand how we can support your digital capability and employability needs

Work collaboratively with you to improve and shape your digital experience

Help you reflect on your own digital experience and highlight areas you may wish to develop further

The student insights survey is delivered and managed in JISC online surveys, an online survey service specially developed for the education sector. The survey template is based around a concise core set of questions that have been intensively tested with students in education for relevance, readability and ease of response. The survey asks 75 questions around these four themes:

The digital lives of students

Digital in the institution

Digital at course level

Student attitudes to digital

Upon completion of the research project, I will provide IGNITE (Humber's student federation) with an infographic that shows the combined results of the survey. This will help you and Humber see how students work in online environments and will help Humber to develop support and educational services to improve your experience.

The survey will take approximately 20 minutes to complete. I am asking you to please make time to complete the full survey as the data is very valuable to support you and your fellow students in the future. All students who are invited to complete the survey will be placed into a lottery with the chance to win one of 10 x $25 Starbucks pre-paid cards.

Important:

I hope you can make time to take this survey, it will provide very useful information. This research project and the data it collects are considered to very low risk to participants. We do not ask for personal information and all data is anonymized. However, please understand that you can decline to take it, or withdraw your participation from the study at any time by simply closing out of your browser without any negative consequences related to your course or program. Once you submit your completed survey, however, data cannot be withdrawn as the survey is completely anonymous. All data collected will be anonymized and deidentified before the data is analyzed. Your individual responses will be combined with all other responses to look at patterns in all responses, not individually. By completing the survey, you consent to the use of your anonymized responses in the research study.

The JISC organization stores personal data for one year, and anonymized data for a maximum of seven years. All data that can identify an individual student or staff member is removed by the JISC survey team prior to analysis. JISC do not re-sell or use the data for marketing purposes. Details can be found here: https://digitalinsights.JISC.ac.uk/our-service/advice-and-guidance/insights-surveys-data-protection-and-management-issues/

If you have any questions about this project, please contact: (Add name of RA)

This project has been reviewed by the Athabasca University Research Ethics Board. Should you have any comments or concerns regarding your treatment as a participant in this project, you may also contact the Research Ethics Office by e-mail at **rebsec@athabascau.ca** or by telephone at 1-800-788-9041, ext. 6718.

This project has also been approved by the Humber Research Ethics Board. If you have any questions about your rights as a research participant, you can contact Lydia Boyko, REB Chair, 416-675-6622 ext. 79322, Lydia.Boyko@Humber.ca

Research Protocol Number: RP-0367

Thank you in advance for your interest in this project.

Researcher: Stephen Allen, Director, English Language Centre

Stephen.allen@humber.ca

Appendix C: Student Recruitment Email

Dear Student,

I am inviting you to participate in a research study called: Avoiding Technological Monocultures.

The research is in the form of an online survey. Please click the link to access the survey. The survey will take approximately 20 minutes to complete.

The purpose of the study is to find out how students use digital resources and tools as part of their education. It will also ask questions on your attitude to digital resources and the kinds of resources and tools you use. You are not asked for any personal details except for your age. All responses will be completely anonymous.

All students invited to complete the survey have the chance to win one of 10 x $25 Starbucks pre-paid cards.

Please review the information in the attached invitation letter. If you have any questions about this project, please contact: TBC

Thank you in advance for your interest in this project.

Sincerely

Researcher: Stephen Allen, Director, English Language Centre

Stephen.allen@humber.ca

Tel: 416-675-6622, ext 73109

This project has been reviewed by the Athabasca University Research Ethics Board. Should you have any comments or concerns regarding your treatment as a participant in this project, you may also contact the Research Ethics Office by e-mail at rebsec@athabascau.ca or by telephone at 1-800-788-9041, ext. 6718. This project has also been approved by the Humber Research

Ethics Board. If you have any questions about your rights as a research participant, you can contact Lydia Boyko, REB Chair, 416-675-6622 ext. 79322, Lydia.Boyko@Humber.ca

Research Protocol Number: RP-0367

Appendix D: Online Informed Consent Text

Principal Researcher: Supervisor:

Stephen Allen: stephen.allen@humber.ca *Dr Debra Hoven: debrah@athabascau.ca*

You are invited to participate in a research study about how students use digital resources and tools as part of their education in online courses.

I am conducting this study as a requirement to complete my Doctor of Education.

As a participant, you are asked to participate in this study by completing a short online questionnaire about your attitude to digital resources and the kinds of resources and tools you use. The survey asks 75 questions around these four themes: the digital lives of students, digital in the institution, digital at course level, and student attitudes to digital. Participation will take approximately 20 minutes of your time.

This research project and the data it collects are considered to very low risk to participants. We do not ask for personal information and all data is anonymized. However, you may withdraw from the study at any time by simply closing out of your browser. Once you submit your completed survey, however, data cannot be withdrawn as the survey is completely anonymous. Please print a copy of this consent form for your records.

Involvement in this study is entirely voluntary and you may refuse to answer any questions or to share information that you are not comfortable with. You will not be asked to provide any personal or identifiable information or data.

All hard copy data will be kept in locked cabinets in my office. All electronic data will be encrypted and kept in a password protected computer by the research analysis. All information and records will be destroyed by confidential shredding; electronic records will be deleted, when all project requirements have been met. This will be approximately the summer of 2021.

Upon completion of the research project, I will provide IGNITE (Humber's student federation) with an infographic that shows the combined results of the survey. This will help you and Humber see how students work in online environments and will help Humber to develop support and educational services to improve your experience.

If you have any questions about this study or require further information, please contact Stephen Allen or Debra Hoven using the contact information above.

This study has been reviewed by the Athabasca University Research Ethics Board. Should you have any comments or concerns regarding your treatment as a participant in this study, please contact the Office of Research Ethics at 1-800-788-9041, ext. 6718 or by e-mail to rebsec@athabascau.ca. I also understand that I can verify the ethical approval of this study, or raise any concerns I may have by contacting the Humber Research Ethics Board (Dr. Lydia Boyko, REB Chair, 416-675-6622 ext. 79322, lydia.boyko@humber.ca)

This project has been reviewed by the Athabasca University Research Ethics Board. Should you have any comments or concerns regarding your treatment as a participant in this project, you may also contact the Research Ethics Office by e-mail at rebsec@athabascau.ca or by telephone at 1-800-788-9041, ext. 6718.

Thank you for your assistance in this project.

CONSENT:

The completion of the survey and its submission is viewed as your consent to participate.

BEGIN THE SURVEY

Appendix E: Ethics Approval - Athabasca University

Athabasca University
RESEARCH CENTRE

CERTIFICATION OF ETHICAL APPROVAL

The Athabasca University Research Ethics Board (REB) has reviewed and approved the research project noted below. The REB is constituted and operates in accordance with the current version of the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS2) and Athabasca University Policy and Procedures.

Ethics File No.: **24085**

Principal Investigator:

Mr. Stephen Allen, Graduate Student

Faculty of Humanities & Social Sciences\Doctor of Education (EdD) in Distance Education

Supervisor:

Dr. Debra Hoven (Supervisor)

Project Title:

Avoiding Technological Monocultures and Developing Open Learning Outcomes to Support Lifelong Learning Literacies

Effective Date: October 01, 2020 **Expiry Date**: September 30, 2021

Restrictions:

Any modification or amendment to the approved research must be submitted to the AUREB for approval.

Ethical approval is valid *for a period of one year*. An annual request for renewal must be submitted and approved by the above expiry date if a project is ongoing beyond one year.

A Project Completion (Final) Report must be submitted when the research is complete *(i.e., all participant contact and data collection is concluded, no follow-up with participants is anticipated and findings have been made available/provided to participants (if applicable))* or the research is terminated.

Approved by: **Date: October 01, 2020**

AVOIDING TECHNOLOGICAL MONOCULTURES

Davina Bhandar, Chair

Faculty of Humanities & Social Sciences, Departmental Ethics Review Committee

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Athabasca University Research Ethics Board

University Research Services, Research Centre

1 University Drive, Athabasca AB Canada   T9S 3A3

E-mail rebsec@athabascau.ca

Telephone: 780.675.6718

Appendix F: Ethics Approval - Humber College

October 15, 2020

Stephen Allen

English Language Centre, Faculty of FLA

Dear Stephen,

Your application, *Avoiding Technological Monocultures*, has been approved by the Humber Research Ethics Board for one year, until October 31, 2021. Your protocol number is RP-0367.

If you amend your research methodology in any way, or if you would like to extend your approval, please visit the Humber Research Ethics Board website (www.humber.ca/research/REB) to locate the appropriate form.

Upon completion of your project, please submit a Project Completion Form, which can also be found on the Humber Research Ethics Board website.

Best wishes as you pursue your research interests.

Sincerely,

Dr. Lydia Boyko

APR, FLMI, BJ, MEd, PhD

Chair, Humber Research Ethics Board

Appendix G: Samples of Substantive Comments from Qualitative Short Answer Questions

A	B	C	D	E	F	G
ID	Q16_a	Q23	Q28	Q34	Q36	Q37
54535815	Instagram	Kahoot or other online quizzes on course material	Post recorded lectures online	At the beginning of every course, take some time on the first class to tour the websites and talk about digital skills	1. For assignments: instead of strict guidelines, maybe have the option to do any format you want (ex. Essay, PowerPoint, presentation). This allows students to be more independent and learn of good ways to deliver information. 2. For deadlines: in the real world with real jobs, there won't be an online posting of when tasks are due. Students should stay accountable and remember their own due dates. Instead of the teacher posting due dates everywhere and constantly reminding, have them record it in a calendar/journal so they're responsible to be independent and remember.	I find when teachers review what we learned the last class, it helps a lot. Asking questions throughout the lessons help the information stick, therefore online quizzes to complete during class on a tablet is helpful. Extra sources online other than blackboard is helpful, like possibly recommending articles or books to read.
54532888	Black board app	He school apps such as HUMBER app and blackboard	Not close the site down for maintenance during school year and do it during reading weeks or when students are off and don't need access to it	Nothing, it is pretty straight forward and easy to navigate through	List of job fairs that are available in the field we graduate from. Giving tips and skills when looking for a first job and tips for interviews	I mind that visuals are most helpful for my learning. And visuals that have a readings to go with it.
54537606	Whatsapp	anything simulation related. Something practical you can apply what you learn in a tangible way, rather than simply quizzez and papers	more variety. Rather than just the same stuff. Every class has the same feel and same structure.		Practical application I see as the best option, which we have some of, but for me personally its the most effective way to learn. In my program we have 2 1/2 hour lectures, and for some students like myself, the ability to sit there, for over two hours and listen to someone talk without getting distracted or zone out, is impossible.	I think my online course is good. I like the discussion board but I feel people are too passive, and just go around agreeing with people so they get good marks and to ensure the other person gets a good mark rather than actually wanting to engage in an educating discussion where you challenge and share your opinions.
54964735	Google Docs	Linda.com			Humber faculty showed us how we can have access to e-learning sites such as linda.com, which is an independent online learning platform.	I use websites such as Youtube and I also use the e-library.
54830318	Lyryx and McGraw Hill Connect	YouTube	Make Blackboard available on all types of devices (mobile versions) and seamlessly, make the app more advanced like the desktop version.	Include more videos for visual learners.	On top of the knowledge I have gained through college, I believe college can prepare me by increasing my time management and self-discipline skills with the online courses. These type of courses push one to be completely independent. Offering more online courses is perfect, and maybe hybrid type of courses.	I use Youtube extensively to summarize and simplify the information that is being taught. I use the humber scholarly articles section.
54532678		Interactive quizzing on the knowledge taught in class.	combine digital learning, with existing course content in a way that is user friendly, but also adheres to all learning styles; visual, auditory, etc.	Implement more digital activities throughout lessons	Not provide classes with slides regarding the course work, students should independently create notes based on chapters found in the text.	If there is a concept that I find to be very challenging, I turn to Youtube for clarification. I am a very visual learner, and a step by step tutorial is very helpful.
54855362	Discord, Facebook	Microsoft Planner, Affinity Designer, anything OTHER than adobe cloud.	Step away from Adobe Cloud. It's not an "industry" standard anymore. move onto	Not put restrictions on tools used if other tools can do the task as well.	encourage exploration of other digital tools because dreamweaver is a dead tool...	Learning from my peers when we explore options to do our assignments that aren't

Combined Q16 Q23 Q28 Q34 Q36 Q37 +

ID	Q16_a	Q23	Q28	Q34	Q36	Q37
54533262	WhatsApp	Blackboard	They should all use Blackboard	Teach us useful tips about needed software	How to gain information from academic resources on my own How to access certain softwares that were only accessible as a student	The Humber library Legal databases
54606281			more independent submissions		finding jobs	the internet
54537483		Voice memos	More updates on blackboard, easier to navigate, more . user friendly	Have more workshops on basic and advanced technologies	More online courses perhaps with virtual learning modules (ie actual interactive live online classes as a part of online learning)	The internet
54638643		I love all of the google applications - google docs, google slides, google drive, etc. - because they are easy to use and make group work seamless.	Improve blackboard!	provide classes on cyber security	more info sessions/guest speakers, and more career building support	the internet and the library
54827323		grammally	The timer	reading	DRAWING TOOL	THE LINK AND QUIZ TEST
54496912		Blackboard is the most useful for me to do my assignment. There are ppt, documents, and learning materials that the lecturer provides.	I hope my organization applies to what students really want to learn.		The college can provide different types of e-learning lectures so that the students are able to learn about what they want to improve.	The links that are posted in Blackboard give me opportunity learn more about the lectures.
54542178	Google	Google doc	Provide examples	Provide more details	Hands on experiences Guess speaking	The quiz that you can take multiple times
54783301		google drive	I believe that all lectures should be posted online for students to view	have interactive youtube videos that allow the user to complete the task at hand in a quick and effiecient manner	how to get the job you want.	the recored lectures/classes
54855639		- If we were able to get lectures online. for example; if a class is missed we would have easy access on blackoard	- Show how to actually use the digital things, so were not spending time just guessing how it works	teach us about the ins and outs of technology	Enforce more tech savvy teaching. Technology is only getting stronger and used for majority parts in real world jobs. I think in our careers it would be useful to know how to use that material beforehand.	The resource dictionary is very useful to me in helping me define and learn more words.Also, some educational videos.
54837502					Taxes	Time
54620014	google documents	quilt				tutoring videos
54541126		Microsoft Word	Help us more	Support us better	Give me some resources to help me along the way	Using the computer to complete work online
54877180	google docs		have all staff know how to navigate digitally to students		prepare all students with basic fundamentals towards financial support and stability before and after graduation	using the online library humber provides
54556922	Canva.com	Linda	Better wifi	One on one meeting	Connection and faster one- on- one meeting to go through all each student's portfolio	Video link
54623364		Simulation exercises				video tutorials real-life case examples
54497794					having more people come in to do a presention from people in the field	videos
54918917	Blackboard	Kahoot	Provide more digital activities or exercises	Tutorials on new digital skills	Provide certification workshops	Videos
54557268	Google Docs	Practice quizzes online, chapter summaries (just online), no specific	Have most courses incorporate weekly online quizzes and practice quizzes	First lecture of every course, have professor introduce digital skills. Not	At the end of graduating semester, have an information session about different tools and people that can further	Videos explaining topics, if I still dont understand something from my professor

Combined Q16 Q23 Q28 Q34 Q36 Q37 +

Appendix H: Copy of Survey Questions

Humber College Student Digital Insights Survey 2020
If you tell us, we can improve
Please tell us how you use technology to support your learning, so we can support you better. There are about 30 questions and it should take no more than 10 minutes to complete.
All the questions are optional, but please help us improve by answering as many as you can. Your answers are submitted when you click FINISH on the last page.
This survey was designed for all HE learners. As an HE online learner you may prefer to ignore any questions that relate to physical learning spaces.

By providing information in this survey you agree that Jisc process it as described in our standard
privacy notice. It will be used for the purpose of analyzing responses overall to inform our research
and development and for any technical support needed. It is not for marketing purposes. The information will also be used by your organisation and this should be explained in an equivalent privacy notice produced by them. We will keep any personal data received for up to one year. Jisc
will use anonymized aggregated data for analysis, public reports and presentations.

Please click NEXT to begin.

1. How many years have you studied here?
Less than a year
1 to 2 years
2 to 3 years
Four years or more

2. What level is the course you're studying?
Foundation
Undergraduate
Postgraduate (taught)
Other

3. How old are you?
Under 16
16 to 18
19 to 21
22 to 24
25 to 29
30 plus

4. What gender do you identify as?
Male
Female
Other

5. Do you use any of these assistive technologies? This includes features on everyday devices as well as specific assistive technology devices/software (Tick all that apply)
Screen readers (text to speech)
Dictation (speech to text)
Alternative input devices (eg switches)
Screen magnification
None of these

5.a. Has your organisation offered you any support to use assistive technologies?
Yes
No

6. Which of these PERSONALLY owned devices do you use for learning? Tick all that apply
Desktop
Laptop
Tablet
Smartphone
None of these

7. Which of these ORGANISATIONALLY owned devices do you use for learning? Tick all that apply
Desktop
Laptop
Tablet
Smartphone
None of these

8. Which best describes your attitude to technology?
I enjoy trying out new and innovative technologies
I'm comfortable using mainstream technologies
prefer not to use technology unless I have to

9. Do you actively help others to develop their digital skills?
Yes, often
Sometimes

Never

10. Overall, how confident are you at trying out new technologies?
Very confident
Quite confident
Neutral
Not very confident
Not at all confident

11. Which of these do you have access to at your organisation whenever you need them? Tick all that apply
Reliable wifi
Online course materials
e-books and e-journals
File storage and back-up
Recorded lectures
Online skills training resources
None of these

12. How much do you agree that:
Agree Neutral Disagree
Teaching spaces are well designed for technology use
The software used on your course is industry standard and up to date
The system for submitting work and getting feedback works well

13. How much do you agree that:
Agree Neutral Disagree
You get the chance to be involved in decisions about digital services
Your organisation has told you how your data is collected and used
Your organisation helps you to track your grades/progress

These questions ask about your learning environment.
In your organisation your learning environment is called BLACKBOARD

14. How much do you agree that your learning environment is:
Agree Neutral Disagree
Reliable
Well designed
Easy to navigate

15. In the last week, which of these activities have you used your learning environment for? Tick all that apply
Check course dates or deadlines
Submit coursework

Take a quiz
Discuss coursework with other students
Work with other students on a shared presentation/report
None of these

16. In the last week, have you used any other apps or platforms outside of the learning environment to discuss or collaborate on coursework with other
Yes
No
students?
16.a. If YES, what did you use?

17. How much do you agree that your organisation:
Agree Neutral Disagree
Supports you to use your own digital devices
Lets you access online systems and services from anywhere
Communicates effectively online (eg email, messaging, notifications)
More computers in computer rooms
More laptops/tablets available in class
More laptops/tablets available on long term loan
None of these

18. Which of these would be most useful to you?
Best imaginable
Excellent
Good
Average

19. Overall, how would you rate the quality of your organisation's digital provision (software, hardware, learning environment)?
Poor
Awful
Worst imaginable

20. In your own learning time, how often do you use digital tools or apps to:
Weekly or more
Monthly or less
Never
Make notes or recordings
Access course materials online
Access recorded lectures
Look for additional resources not recommended by your lecturer

21. Who supports you most to use technology in your learning?

Other students
Lecturers on my course
Other support staff
Friends and family
Online videos and resources

22. Which of these would be most useful to you as a learner? More:
Interactive polls/quizzes in class
Time working online with other students
Practice questions available online
References and readings
Course-related videos

23. Please give an example of a digital tool or app you find really useful for learning:

24. As part of your course, how often do you:
Weekly or more
Monthly or less
Never
Use live polls or quizzes in class
Work with data (eg analysis, visualisation)
Work online with other learners
Create a digital record/portfolio of your learning
Get digital feedback on your work
Use simulations, virtual or augmented reality (VR or AR)

25. Overall, how motivated are you to use technology to support your learning?
Agree Neutral Disagree
Very motivated
Quite motivated
Neutral
Not very motivated
Not at all motivated

26. How much do you agree that most of the teachers on your course:
Make good use of digital tools and platforms
Help you with the digital tools you use for learning
Signpost you to useful digital resources
Best imaginable
Excellent
Good
Average
Poor

Awful
Worst imaginable

27. Overall, how would you rate the quality of digital teaching and learning on your course?

28. To improve the quality of digital teaching and learning ... what ONE thing should your organisation do?

29. Which of these skills does your organisation offer support for you to develop? Tick all that apply
Basic IT skills
Data analysis skills
Research and information skills
Specialist software use
Create digital materials
Manage your digital identity

30. How much do you agree that your organisation provides you with:
Agree Neutral Disagree
Guidance about the digital skills you need for your
course
The chance to assess your digital skills (eg for career
planning)
Keeping personal data safe
Online copyright and plagiarism

31. How much do you agree that you are informed about:
Staying safe online
Your health and wellbeing as a technology user
During induction
One to one with tutors
In lectures and classes
With other students
None of the above

32. When have you discussed your digital skills? Tick all that apply
Best imaginable
Excellent
Good
Average
Poor
Awful
Worst imaginable

33. Overall, how would you rate the quality of support you get from your organisation to develop your digital skills?

34. To help develop your digital skills ... what ONE thing should your organisation do?

And finally ...
These last three questions are important and ask about learning you may need to do in your personal or professional life after you have graduated college. For example, this could be in a job or for personal enjoyment like a hobby.
Please try to answer these questions. The information will be very useful.

35. Please select how much you agree with the following statements.
Strongly agree
Agree
Neutral
Disagree
Strongly disagree
I prefer it when someone else organizes what I need to learn.
I prefer to make decisions about what I need to learn and how I will learn it.
If I want to learn something, I am able to plan a way to learn it.

36. What one or two things can the college do to prepare you to be independent after graduating so you can make choices to learn the new skills you might need in your career?

37. Apart from what is provided by the teacher in your online course, tell me which resource(s) you find most useful in helping you learn.

38. What Humber Faculty do you study in?
Faculty of Business
Faculty of Health & Wellness
Faculty of Media & Creative Arts
Faculty of Applied Science & Technology
Faculty of Social & Community Services