



PHD

How and in what ways is international university students' learning mediated by technology on a pre-degree programme academic skills course?

Martin, Ian Lea

Award date:
2025

Awarding institution:
University of Bath

[Link to publication](#)

Alternative formats

If you require this document in an alternative format, please contact:
openaccess@bath.ac.uk

Copyright of this thesis rests with the author. Access is subject to the above licence, if given. If no licence is specified above, original content in this thesis is licensed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs 4.0 International (CC BY-NC-ND 4.0) Licence (<https://creativecommons.org/licenses/by-nc-nd/4.0/>). Any third-party copyright material present remains the property of its respective owner(s) and is licensed under its existing terms.

Take down policy

If you consider content within Bath's Research Portal to be in breach of UK law, please contact: openaccess@bath.ac.uk with the details. Your claim will be investigated and, where appropriate, the item will be removed from public view as soon as possible.

How and in what ways is international university students' learning mediated by technology on a pre-degree programme academic skills course?

Ian Lea Martin

A thesis submitted for the degree of Doctor of Education

University of Bath

Department of Education

28 November 2023

Copy right notice

Attention is drawn to the fact that copyright of this thesis/portfolio rests with the author and copyright of any previously published materials included may rest with third parties. A copy of this thesis/portfolio has been supplied on condition that anyone who consults it understands that they must not copy it or use material from it except as licenced, permitted by law or with the consent of the author or other copyright owners, as applicable.

Declaration of Any Previous Submission of the Work:

The material presented here for examination for the award of a higher degree by research has not been incorporated into a submission for another degree.

Candidate's signature:

**Declaration of Authorship:**

I am the author of this thesis, and the work described therein was carried out by myself personally, with the supervision of Dr. Shona McIntosh and Reka Jablonkai

Candidate's signature



Table of Contents

Acknowledgments	vi
Abstract	vii
Chapter 1	1
Overview and structure of thesis	1
1.1 Introduction	2
1.2 Research context.....	6
1.2.1 Research setting.....	6
1.2.2 Participants and classes	7
1.2.3 My position	7
1.2.4 Learning management system.....	8
1.3 Research aim and research questions	9
1.3.1 Research question.....	9
1.4 Clarification of terms	10
1.4.1 Educational technology.....	10
1.4.2 Learning.....	11
1.4.3 Task	11
1.4.4 Participants, user and student.....	11
1.4.5 Object.....	11
1.4.6 Tool	12
1.4.7 Rupture and disruption.....	12
Chapter 2	13
Literature Review	13
2.1 Historical socio-cultural theory	13
2.2 ‘Technology-mediated’ learning	16
2.2.1 The importance of mediation in ‘technology-mediated’ learning.....	16
2.3 Mediation.....	18
2.3.1 Intermental and intramental plane of mediation.....	20
2.3.2 Multivoicedness, privileged voice and semiotics.....	22
2.4 Engagement	26
2.4.1 The five phases of engagement	27
2.5 Activity Theory	29
2.5.1 Tools and Signs.....	30
2.5.2 Subject and object	32
2.5.3 Outcomes	33
2.5.4 Community.....	33

2.5.5 Division of labour and rules	33
2.6 Critique of activity theory	34
2.7 Summary of literature review	35
Chapter 3	36
Methodology	36
3.1 Introduction	36
3.2 Case study approach	36
3.3 Ethics	40
3.4 How participants were recruited	40
3.5 My position in the research	41
3.6 Reflexivity and the researcher	42
3.7 Insider researcher	44
3.8 Reflection on ethical issues.....	46
3.9 Data collection methods	47
3.9.1 Group interviews.....	47
3.9.2 Verbal protocols.....	49
3.9.3 Student diaries	50
3.9.4 Course online tasks	51
3.10 Data analyses	52
3.11 Research aim, theory, methodology and methods	55
3.12 Validity and Reliability.....	56
3.13 Summary of Chapter	57
Chapter.....	58
Findings	58
4.1 Introduction	58
4.2 Data analysis	58
4.2.1 Navigating challenges: from routine operations to overcoming challenges	59
4.2.2 Moving between different processes: technology use and task completion	60
4.2.4 Ruptures in mediation and disruptions in learning	63
4.2.5 Participants persist despite the challenges of technology and disruption to learning	64
4.2.6 Participants devise strategies when navigating unfamiliar technology	66
4.2.7 Instructions and technology hinder learning.....	67
4.2.8 Technology shapes the participants actions.....	69
4.2.9 Collaborative strategies: forming a community	73
4.2.10 The Influence of Teacher Expectations and Institutional Norms on Student Task Completion.....	74

4.3 Engagement with technology	76
4.3.1 Exploring Student Engagement with Technology	76
4.3.2 Exploring participant’s perception of engagement and technology	84
4.4 Summary of findings	87
Chapter 5	89
Discussion of findings	89
5.1 Activity Theory and Engagement Theory	89
5.1.1 Activity theory	89
5.1.2 Engagement theory	93
5.2 Summary of Chapter	97
Chapter 6	99
Conclusion	99
6.1 Introduction	99
6.2 Summary of main findings	99
6.3 Implications and recommendations	101
6.3.1 Unpacking assumptions of engagement	101
6.3.2 Challenges of technology-mediated learning and the impact on educational equity, creativity and learning	103
6.3.3 Evaluating the role of technology in higher education: prioritizing content-centric learning, technology design and design standards	105
6.3.4 Exploring multisensory design, collaborative learning and peer to peer interaction	106
6.3.5 Teacher and institutional pressures shape student’s motivation	107
6.3.6 Summary of implications and recommendations	108
6.4 Limitations of the study	109
6.4.1 Participants	110
6.4.2 Learning management systems	110
6.4.3 Data collection and generalisability	111
6.5 Critical reflection: activity theory and engagement theory	112
6.6 Contribution to the field of technology-mediated learning	113
6.7 Future research	114
References	116
Appendix 1	126
Emails sent to students	126
Appendix 2	127
Participant information sheet	127
Appendix 3	130
Participant consent form	130

Appendix 4.....	132
Verbal protocol	132
Appendix 5.....	136
Appendix 6.....	138

Table of Figures

Figure 1: Example of the five engagement phases and the experience threads	29
Figure 2: Stages of participant recruitment	41
Figure 3: Learning management system daily schedule of online tasks	51
Figure 4: Pre-course discussion board with task questions and instructions	60
Figure 5: Online pastoral tutorial checklist question 2	68
Figure 6: LMS home page of the 4-week university preparation course	70
Figure 8: Ethnographic observation quiz question 4.....	72
Figure 9: A Typical LMS view of the participants’ daily online tasks	77
Figure 10: Exercise 1, an interactive infographic where participants can adjust information balance by moving a slider.....	78
Figure 11: Exercise 2, a 55 second video that had animated information	80
Figure 12: Exercise 3, a paragraph analysis with highlighted areas that were triggered by clicking a hyperlink button	81
Figure 13: Exercise 4, a drag and drop the correct answer for synthesising in the right order ..	82
Figure 14: A representation of poly-motives and the subject-object relationship	90
Figure 15: Activity theory framework for analysing engagement.....	92
Figure 16: Summary of the five points of engagement	94
Figure 17: Summary of experience threads when using the LMS and third-party resources.....	96

Acknowledgments

I wish to express my heartfelt gratitude to the individuals and institutions that have played a pivotal role in shaping my academic journey and in the successful completion of this thesis. Their consistent support, encouragement, and invaluable guidance have been fundamental to this endeavour. My academic journey commenced at the Higher Colleges of Technology in the United Arab Emirates, continued through my time at Cambridge and Anglia Ruskin University, and ultimately culminated at the University of Birmingham. I am deeply thankful to my line managers for their support, which has been instrumental in enabling me to complete this thesis. Above all, I owe a profound debt of gratitude to my wife, Shameem, whose unwavering support has been the bedrock of my journey and ultimate achievement. Lastly, I am immensely appreciative of my two supervisors, Shona and Reka, for their guidance and mentorship throughout the complex process of achieving my doctorate in education. Their expertise and encouragement have been invaluable to me.

Abstract

Technology-mediated learning research in higher education tends to give attention to the technology tool rather than the detail of mediation. However, the interaction between a user and technology is complex and cannot be simplified to notions of tool use. Understanding mediation is of importance as it lies at the heart of the interaction between a user and educational technology. Consequently, this research investigated the mediation process of students' interaction with educational technology and the learning management system and third-party resources being used at the University of Birmingham. The research employed a case study approach which applied qualitative methods that focused on the context, thoughts and actions of the user. Verbal protocols, group interviews and student diaries were used to obtain data from a sample of 11 international student participants that were taking a 4-week university preparation course at Birmingham University. Activity theory framework and additional concepts of multivoicedness, privileged voice and engagement theory were applied to analyse the qualitative data collected. Analysis of the data highlighted several determinates of student interaction with education technology that indicate educational technology is a means to access content and learn rather than a technology that motivates the learner and drives learning itself. The analysis of data also informed and shaped four notions that help to describe the mediation process and what takes place when students use educational technology: poly-motives, super-objective, privileged voice and stimulus means. The four notions provide a language that helps to explain the process of user mediation with technology that identify moments of struggle and tensions that students' experience when using technology. There is an urgency to extend research on mediation when students use technology and a better understanding of what is actually taking place for learning to occur is needed. This research is a starting point that questions the assumptions being made with educational technology and the systems used to engage the user.

Chapter 1

Overview and structure of thesis

This Chapter lays the groundwork for the thesis by defining the research purpose within the context of higher education and student engagement with educational technology. It opens with a review of existing studies on engagement and technology mediated learning, highlighting the current focus of mainstream research. As will be discussed, much of the literature centres on the features and functions of technology rather than examining how it shapes user behaviour and engagement through the concept of *mediation*. Moreover, while engagement research often addresses areas such as university involvement, academic study, or the motivations for using technology, it overlooks the mechanisms underlying engagement with technology itself. This Chapter establishes the research rationale by identifying this gap and advocating for a deeper exploration of technology mediation through a historical socio-cultural lens.

The Chapter then moves on to a description of the contextual backdrop against which the study was conducted, that includes, who the participants were and my integral role as researcher. A comprehensive discussion of the research aims and questions that served as effective guiding principles throughout the research process is then presented. The concluding section provides an explanation of the terminologies utilised within this research, aiming to foster the reader's comprehension and alignment with the nuanced interpretations of specific terms as they are used within this thesis.

In anticipation of the ensuing thesis, a succinct explanation of each Chapter is provided here to orient and acquaint the reader with the forthcoming thesis. Chapter 2, the literature review, explores pertinent theories, concepts, and ideas that closely align with the research objectives, with a specific emphasis on activity theory and engagement theory within the context of technology-mediated learning. The Chapter serves to substantiate the rationale behind the research and explain why mediation is important when researching student engagement with technology, while situating the research within an underexplored area of technology-mediated learning. Importantly, the literature review engages with current published research and discusses the applicability to long standing notions and concepts of mediation and language that can find a refreshed purpose within the field of technology-mediated learning. In Chapter 3, an exploration of the methodology is presented, highlighting the use of a case study approach and emphasizing its significant merits in application. The Chapter discusses the intricacies of the data analyses and the thematic framework employed when analysing the data. Additionally, considerable attention is dedicated to clarifying my dual role as both manager of the insessional programme and researcher within this research

context. The focus shifts in Chapter 4 towards the analyses of the research data and the themes that emerged in answer to the research aims and questions. This Chapter entails a comprehensive presentation of the activity being researched, accompanied by the emergent findings from the applied analysis of activity theory, engagement theory, multivoicedness, privileged voice and stimulus means. The final section of Chapter 4 consolidates the findings that informs the discussion in Chapter 5.

Chapter 5 provides a comprehensive discussion of the research outcomes, highlighting the crucial findings derived from the study. Lastly Chapter 6 addresses the implications that emerged from the findings and provides recommendations where appropriate. Additionally, Chapter 6 concludes the research and critically reflects on activity theory and engagement theory, the contribution this research makes, limitations of the research and potential avenues for future research.

1.1 Introduction

Over the past two decades, higher education has undergone a transformative journey driven by technological advancements that have reshaped the dynamics of teaching and learning (Gumport and Chun, 2015). The integration of technology has become an integral part of pedagogy, ranging from lecture capture and learning management systems to attendance tracking and polling tools, to name but a few. The significance of educational technology is underscored by the Office for Students (OfS), the Teaching Excellence Framework (TEF) and the learning support criteria outlined in the National Student Survey (Office for Students, 2023). As a result, universities establish comprehensive educational technology policies that are cascaded to various departments that prompt a paradigm shift aligning technology with the everyday teaching and learning cycles. Amid the prevailing educational policies is an overriding assumption that technology inherently fosters student engagement. The presumption is guided by an excessive dependence on numerical data extracted from university surveys, coupled with the promotional initiatives of educational technology enterprises aimed at selling products to universities (Noble, 2009). An often underestimated and overlooked facet in the formulation of educational policies and the application of technology in higher education, is the students' perspective on how effective or ineffective technology is at engaging them. Therefore, it is important to understand the challenges students face when using educational technology and how these impact their engagement before formulating and implementing educational policies that promoted the use of technology in higher education.

There exists a wealth of published research studies that explore the specific features of educational technology such as discussion boards, quizzes and videos (Bond and Bedenlier, 2019). The principal objective of a significant portion of the research is to provide educators with valuable guidance on harnessing technology to engage students in the process of learning, which could be characterised

as motivating the student rather than fostering a genuine engagement with the technology itself. Osborne et al. (2018) illustrate how the use of discussion boards can effectively engage students in learning within a higher education context. Their findings indicate that integrating discussion boards with module learning enhances students' critical thinking skills. They provide guidance on setting up discussion boards, as well as strategies for academics to maintain student engagement and maximise the effectiveness of discussion boards. What Osborne et al. (2018) research does is give details on how to motivate, encourage and develop academic skills which can be improved through the correct use of discussion boards alongside a degree programme module. However, their research does not explore the specifics of the student engagement process and the interaction between the user and technology.

In another study Gunuc and Kuzu (2014) identify key factors that influence student engagement with university. Their findings indicate that campus involvement, classroom dynamics and the strategic use of technology are crucial in fostering a sense of belonging and active participation among students. They emphasise the importance of using technology in promoting university engagement and highlight factors that support and enhance student engagement. While their research is valuable, the focus on engagement primarily centres on factors that contribute to participation in university life, equating engagement with involvement in university activities. However, the nuances of how engagement with technology occurs are not explored or detailed.

As noted in both Osborne et al. (2018) and Gunuc and kuzu (2014) published research papers, engagement is interpreted in different ways which suggests various perspectives of what engagement means. For instance, Osborne et al. (2018) use it to describe methods for involving students and developing their critical skills through discussion boards, while Gunuc and Kuzu (2014) define it as participation in university life. Published research papers that attempt to define engagement often concentrate on the contextual factors influencing engagement, rather than on how technology intrinsically engages the user. For instance, Blommaert (2005) presents a typological model of student engagement examining how online and on campus domains facilitate learning. He emphasises methods such as collaborative learning, participation in challenging academic activities and communication with academics. While these recommendations on engagement are valuable, they fail to identify the mechanisms that drive individual engagement or the core factors underlying it. Blommaert's (2005) research, focuses on the observable, surface-level factors that engage students but does not explore the deeper processes of engagement, an oversight that is common across much published research on student engagement with technology.

The lack of insight into how technology engages the user through the study of *mediation* may also contribute to the constrained depth of understanding held by individuals responsible for shaping institutional policies regarding the student experience and the elements that foster student

engagement with technology. In response to the lack of research noted above on student engagement with technology there have been several published review papers that systematically examine published research with the intention of proposing a framework for measuring engagement (Henrie et al., 2015; Bond et al., 2019; Nkomo et al., 2021). Henrie et al.'s (2015) published review paper on measuring student engagement attempts to posit a measurement framework drawn from a collection of 113 published research papers which focus on the features of engagement rather than the mechanisms. They aimed to operationalise engagement through the application of Fredricks et al.'s (2004) three descriptors of engagement framework; cognitive, emotional, and behavioural. Henrie et al. (2015) evaluated each published research paper and assigned perceived factors that engendered student engagement into one of the three descriptors. In using Fredricks et al.'s (2004) descriptors of engagement however, there is a lack of acknowledgment of the intricate interplay between the cognitive, emotional and behavioural descriptors of engagement. For instance, the emotional state of a student can significantly impact their cognitive engagement and vice versa; an aspect not accounted for when the descriptor framework was applied to the systematic review (Kahu, et al., 2015). Furthermore, the proposed framework falls short of presenting additional reasons a student might engage with technology as the framework is limited to defining a reason for engagement into three descriptors, highlighting an oversimplification of a complex interaction. It is important to acknowledge the complexity of student engagement and the intricate processes underlying the interaction between students and technology, a facet that their corpus of reviewed research papers seems to omit.

Student engagement transcends the confines of the three descriptors framework applied to Henrie et al.'s (2015) exploration of engagement as it has been argued that engagement is intricately shaped by a multitude of *mediational means* (Wertsch, 1993): *mediational means* is extensively explored within the literature review chapter. In essence, *mediational means* serves as a conceptual framework that illuminates the mechanisms by which both tangible and intangible elements exert influence over human activity (Vygotsky, 1989). The lack of a comprehensive exploration into the mediation processes, or at the very least, the rationale behind the exclusion of the notion of mediation from Fredricks et al.'s (2004) descriptor framework of engagement, could be perceived as a constraint within Henrie et al.'s (2015) systematic review paper. Consequently, their findings might not adequately capture the factors that drive student engagement with technology, but instead offer an analysis of superficial motivations for student interactions with technology.

In a similar attempt to delineate student engagement with technology, Bond et al. (2019) conducted an analysis of more than 200 published research papers within the context of higher education. Notably, their study bears striking resemblances to that of Henrie et al. (2015), yet they omit an explicit connection between the two reviews. As with Henrie et al.'s (2015) review paper, the focus of Bond et al (2019) published systematic review was to categorise what engaged

students with technology into the three descriptors of engagement, i.e. cognitive, emotional and behavioural, which they also assumed underpin a student's interaction with technology. It is important to note that Bond et al.'s (2019) review, while shedding light on the subject of engagement, hinges on collated findings from external sources that emanate from various scholarly voices, and not from the authors' own empirical exploration of the proposed understanding of what engagement is, as with Henrie et al.'s (2015) review. Furthermore, there is a lack of recognition of *mediation* in both Henrie et al.'s (2015) and Bond et al.'s (2019) systematic reviews, and there is no discussion of why they omitted the notion.

A strong criticism of the published review papers by Henrie et al. (2015) and Bond et al. (2019) is the lack of insight into the weakness of their approach to understanding engagement and a justification as to why Fredricks et al.'s (2004) descriptors framework was used over other notions of engagement. Furthermore, both reviews rely on a framework that was developed specifically for application within a school environment that looked to understand why students engage or disengage with school learning (Fredricks et al., 2011). The criticism of both Henrie et al. (2015) and Bond et al. (2019), whilst discussed separately, can be levied at both systematic review papers as the authors followed the same foundation of categorisation of engagement and presented similar interpretations of published research used for their review. Much could be said as to the areas that both Henrie et al.'s (2015) and Bond et al.'s (2019) papers fall short off, but what suffices for the purposes of this introduction is the idea that notions of *mediation* lack a representation in both papers, and it is argued that a focus on *mediation* is necessary when explicating student engagement with technology.

It is important to recognise that engagement is not a monolithic construct but rather a dynamic interplay of *mediational means* which Fredricks et al.'s (2004) descriptors framework does not account for: *mediational means* is discussed in Chapter 2. Thus, a comprehensive understanding of student engagement necessitates an exploration of the developmental dynamics that shape engagement, warranting a more detailed exploration of the mediating role of technology. Moreover, by applying concepts of mediation when exploring technology-mediated learning, valuable insights can be extracted from the interplay between a student and technology, in turn, shedding light on the mechanisms and processes guiding user actions and what facilitates engagement. In the pursuit of the research aims, which is discussed below, there is an underlying assumption that *mediation* plays a central role in the examination of engagement. An assumption that is subject to empirical scrutiny within the framework of this research and discussed in subsequent Chapters of this thesis. Furthermore, the thesis also assumes significance in researching engagement by the application of a theory of mind which is discussed in detail in the literature review.

The limited exploration of student engagement within the field of technology mediated learning has faced much criticism due to the lack of in-depth studies into how engagement occurs (Boekaerts, 2016; Kahu et al., 2015) and the quality of research (Lawson and Lawson, 2013; Trowler, 2010). There is a need to move beyond the simplistic engagement dichotomy and instead focus on examining the interactions between users and technology, with a deeper analysis of how these interactions unfold. In making this shift, it calls for an understanding of the mechanisms and processes that take place between the user and technology and how it operates on the user's mind. *Mediation* has longed been used to study how intermediaries influence and facilitate interactions between humans and the objects they engage with (Vygotsky, 1931; Engeström, 1987). It is argued that *mediation* is a precursor to engagement and a crucial area for study if we are to understand how a student engages with technology. Engagement, whether with an object or an individual, emerges through a mediation process and an examination of how this occurs can illuminate the essence of what engages a student with technology.

1.2 Research context

This section provides an overview of the research setting, the participants, my role as researcher, and the specific educational technology focus of the research. The intention is to give the reader insight into the context of the research giving a valuable backdrop to the research and forthcoming chapters.

1.2.1 Research setting

The research was conducted at the Birmingham International Academy (BIA), which is a language department specialising in English for academic purposes at Birmingham University in the West Midlands, England. The BIA offers three distinct programmes for incoming international students whose first language is not English: a foundation programme, a pre-sessional programme, and an in-sessional programme. The foundation programme is designed for students who need to study both academic English and a specific subject area. The pre-sessional programme focuses solely on academic English. Students enrolled in either the foundation or pre-sessional programme must pass a language assessment to progress to their chosen degree path at the university. The in-sessional programme, which was the focus of the research, differs from both the foundation and pre-sessional programmes as the students that attend the courses have an unconditional offer to start their main degree programme or are already studying at the university.

The research presented in this thesis focused on students taking a 4-week course on the in-sessional programme called the *University Preparation Course* in the summer of 2019. The course aims to prepare students for university life, including the academic English they will encounter, academic skills they may need, UK academic culture, student life on campus and in Birmingham City. Several reasons contributed to selecting the 4-week university preparation course: Firstly, students on the

course were not required to pass an assessment at the end of the course. Secondly, the course had recently been redesigned to include online independent tasks. Thirdly, student attendance was historically high. Fourthly, the students enrolled on the course had a high level of English proficiency compared to students on other BIA programmes. Lastly, the students had already secured admission to their chosen degree programme at the university and did not need to pass the 4-week course to progress. It is important to note that the foundation and pre-sessional programmes were not part of the research and did not interfere with, influence, or overlap with any aspect of the research.

In the summer of 2019 when the research took place, the United Kingdom was steadily lifting COVID-19 lockdown measures. Meanwhile, various other countries maintained diverse regulations, with some still under stringent lockdown protocols. A few students had to undergo quarantine in their accommodation on campus before being allowed to engage in their daily activities in line with the social guidelines in England. It is important to highlight that these conditions had minimal impact on the research methods or data collection, as the quarantine measures were limited, typically requiring students to quarantine for seven days after arrival into the United Kingdom.

1.2.2 Participants and classes

The 4-week university preparation course consisted of postgraduate students from various countries who had unconditional offers from a variety of programmes. The students were living in university accommodation and had access to all the facilities the university had to offer.

The 4-week course was made up of three classes with each class accommodating 15 students. At the beginning of the 4-week course two classes commenced with a mixture of online and in class students due to quarantine regulations, while one class started on campus. As the course progressed, students gradually joined the class on campus and transitioned to attending classes in person. All students of the 4-week university preparation course were invited to participate in the research and the details of their involvement are further elaborated upon in the methodology Chapter. Upon completion of the 4-week university preparation course, the students proceeded to pursue their chosen postgraduate degree at the university. It is important to reiterate that the students had already received unconditional offers and were not required to fulfil any additional conditions for their progression onto their respective postgraduate programme at Birmingham University.

1.2.3 My position

As the manager of the in-sessional programme, I maintained a clear distinction between my roles as a researcher and as an employee of the University. Instead of taking on a managerial position of the 4-week course, I engaged with participants strictly in my capacity as a researcher. While students were aware of my affiliation with the University, I did not openly disclose my prior role as

the manager of the 4-week course in previous years. During the research period, I deliberately stepped away from all managerial responsibilities. It is important to emphasise that I did not engage in any teaching, assessment, or class attendance before, during, or after the course due to my involvement in the research.

To effectively manage the 4-week course, I conducted weekly meetings with the teachers and colleagues overseeing the course establishing a primary communication channel should any concerns or issues arise. By keeping a clear distinction between my role as a researcher and the manager of the 4-week course, I aimed to preserve the study's objectivity and impartiality, minimizing the potential for research outcomes to be influenced by my managerial position. Reflexivity and positionality are discussed in detail in the methodology chapter.

1.2.4 Learning management system

The 4-week university preparation course was delivered to students using the University's learning management system (LMS), known as Canvas. Canvas is a web-based platform extensively used across the University for teaching and learning purposes. The LMS offers a wide range of customisable course creation designs, learning management tools, student analytics, communication tools and various teaching and learning tools such as quizzes, discussion boards, and assignments. A collaborative effort between material writers and learning technologists that worked at the BIA took place several weeks before the 4-week course commenced to prepare the Canvas learning management system (LMS) course. Preparation of the LMS course included developing and designing teaching materials and tasks within the LMS environment. No paper-based materials were utilised as all course content was exclusively accessible via the LMS.

Throughout the research, participants engaged with various LMS features within the 4-week course. The LMS features used on the 4-week course included discussion boards, standalone quizzes, videos with integrated quizzes, reading texts accompanied by quizzes, webpages containing information and activities, online checklists, tutorial feedback information, class announcements, third-party hyperlinks and attendance monitoring. Furthermore, the Canvas course incorporated essential information that students required while undertaking the 4-week course which included student timetable, online task schedule, technical support resources, digital coursebooks, student handbooks, assignment details, and communication channels. Students were assigned daily tasks via Canvas that needed to be completed online before, during, or after classes. The teachers had the ability to monitor online task completion and review student answers, providing feedback accordingly. By utilising the technology features of the LMS, the 4-week university preparation course was effectively administered and delivered to the students, offering a learning experience that relied solely on technology. As there was much educational technology

used on the 4-week course the focus of the research was narrowed down to include the LMS and third-party resources only.

1.3 Research aim and research questions

Published research often highlights potential learning enhancements achievable through the utilisation of various LMS features, yet frequently omits an in-depth examination of mediation and the nuanced interactions between a user and technology. The prevailing focus within current research centres on how the features of technology can be used, as mechanisms for heightening student engagement and falls short of exploring a comprehensive understanding of what constitutes engagement or the intricate mediation processes involved. While researching the features of technology holds merit, an inadvertent oversight emerges, which is the neglect of delineating the very essence of engagement and the interplay with mediation. The oversight brings attention to valid concerns about research credibility, as unaccounted variables could conceivably influence a user's interaction with technology. To investigate student engagement with technology, it becomes paramount to investigate mediation as the notion is intrinsically intertwined with understanding engagement: the assumption made on engagement and mediation is discussed in the literature review. This study aimed to investigate student engagement from the student perspective and the role of technology in the mediation process. It sought to challenge the common assumption that technology automatically leads to student engagement and consequently, learning, with the intention of uncovering the factors that either hinder or facilitate learning through technology. Furthermore, the research strived to establish a reference point in the field of technology-mediated learning and to shed light on hitherto neglected avenues of inquiry.

Beyond the previously mentioned research aims, this study sought to offer insights into how students interact with and utilise technology, intending to inform policymakers involved in shaping higher education policies and practices. Moreover, the research set out to offer content creators valuable perspectives on engaging students, discerning the clear distinction between subject matter expertise and technology's educational utility. Educational technology developers and designers play a crucial role in molding students' technological experiences. With a comprehensive understanding of factors contributing to engagement, that this research aimed to elucidate, developers and designers can intentionally create technology that fosters interaction, sustains motivation, and facilitates continued student participation and learning (Oh and Reeves, 2014; Kahu, 2013).

1.3.1 Research question

An essential factor that shaped my research focus and question for this thesis was the completion of three of the four taught modules in the Doctor of Education programme at the University of Bath. For the module Educational Research, I conducted research on technology use in the classroom,

while the module Learning, Pedagogy and Diversity, I explored mobile phone use for learning. For my final module Reading Paper, I wrote on Vygotsky's theory of the mind and activity theory. These three modules underscored the importance of studying *mediation* of activity to me and highlighted concepts and ideas applicable to my forthcoming thesis. The combination of the Doctor of Education taught modules, along with my professional interests and work-related interest, directed my research questions and emphasis on the mediation of activity and theory of mind.

Main research question

How and in what ways is international university students' learning mediated by technology on a pre-degree programme academic skills course?

Research sub-questions

- What does it mean to engage the learner when using educational technology?
- In what ways do students struggle to use technology, particularly in ways they perceive fail to engage them?
- What aspects are the most important when designing technology to support students' ongoing learning?

1.4 Clarification of terms

Given the inherent ambiguity of language and the precise manner in which certain terms are employed within this research, it is important to establish clarity regarding the interpretation and application of some terms for the reader. In doing so, I was guided by a careful consideration of the research's aims and objectives, as well as the underlying notions and concepts that are in the literature review.

1.4.1 Educational technology

The broader meaning of technology refers to the "... application of scientific knowledge to the practical aims of human life ... to the change and manipulation of the human environment." (Britannica, 2023). The Britannica definition encapsulates the extensive array of technological and scientific advancements that integrate into our daily lives. However, the scope of this research necessitates a more refined perspective. In the context of this research, the term *technology* was narrowed down to include the learning management system (LMS) of the university and third-party resources only. Third-party resources include freely accessible, web-based platforms developed by various universities and educational companies for learning purposes. The inclusion of third-party resources was driven by the rationale to offer a discussion for comparative analysis alongside the learning management system. This approach aimed to elucidate potential variations in engagement when students interacted with diverse technological features and platforms. All other forms of technology are excluded from this research and are not referred to when using the term *educational technology* and *technology* in this thesis.

1.4.2 Learning

The research did not explore the intricacies of learning or assess whether participants gained knowledge when using technology. Instead, the research considered *learning* as an implicit process occurring when students engage with task content via technology. Consequently, technology can be perceived either as a hindrance or a facilitator to this process. The inquiry into whether participants achieved the learning objectives outlined by the material writer is not addressed or referenced in this thesis.

1.4.3 Task

Students were given online tasks from the 4-week university preparation course to complete each day using the LMS. The instructions and content of the tasks was not part of the research and is not discussed as the focus was on the mediation and engagement of technology from the student perspective. However, reference is made at times to the materials contained in an assigned task as the task was intrinsically connected to technology. The tasks were authored by material writers and then organised within the LMS environment by learning technologists, both of whom worked at the BIA. Conversely, third-party resources were created by external material writers and developers unaffiliated with the University.

1.4.4 Participants, user and student

The central focus of this research revolved around the complex interplay between the participants and the technology they engaged with to fulfil various online tasks from the 4-week course. The participants comprised of international students who were enrolled on the 4-week university preparation course. Throughout the paper, the term *student* is intermittently used to encapsulate the entire student body, functioning as a collective representation. Furthermore, the terminology *user* is recurrently utilised in this study, encompassing a broader spectrum that includes any individual who interacts with technology, regardless of their specific role or context.

1.4.5 Object

Given the historical sociocultural underpinning of this research, which is discussed later in the literature review, and the integration of activity theory as an analytical framework for analysing mediation, the term *object* assumes a specialised meaning confined to the theoretical paradigms employed within this thesis. In cases where object pertains to a tangible entity, the term has been intentionally avoided and an alternative term is used, such as physical object or item. A conscious delineation is drawn between the concept of object as theorised in this study and the broader representation of tangible items or entities, ensuring a clear distinction and preventing any inadvertent confusion of the distinct use of the term object as it is understood in activity theory.

1.4.6 Tool

The concept of *tool* is approached from dual perspectives within this thesis. The initial interpretation entails the functionality inherent in the LMS whereby a tool serves as a means for generating online tasks such as quizzes or discussion boards. Conversely, *tool* is a concept connected to the historical sociocultural position taken in this research, as extensively examined in the literature review. To facilitate clarity for the reader, a deliberate distinction has been made between the two definitions of tool in the context of technology. Specifically, the term *feature* has been used when discussing technology's functions within the LMS and not *tool*, avoiding any potential confusion. In contrast, the term *tool* has been exclusively reserved for the application within the historical sociocultural framework guiding this research. Clarity is given when using the term *tool* by adopting a nuanced linguistic approach, keeping both terms separate.

1.4.7 Rupture and disruption

It is important to clearly differentiate between the terms *rupture* and *disruption* in this thesis, as they represent distinct processes, even though they are interconnected. When a rupture occurs in *mediation*, it highlights a significant and consequential disjunction in the *mediation* process, ultimately resulting in the breakdown of learning processes that necessitate a realignment of the subject-object relationship. Rupture is elaborated on extensively in this research. Conversely, a disruption in learning indicates an interruption, disturbance, or impediment to the smooth and uninterrupted continuation of the learning process.

Chapter 2

Literature Review

This Chapter presents a series of concepts and frameworks associated with activity theory, engagement, mediation and voice, recognising the critical importance of these notions in understanding interactions between a user and technology. Given the relative scarcity of research that specifically explores the mediation occurring between a user and technology, this Chapter seeks to address this gap by offering a detailed examination of relevant theoretical constructs. It aims to articulate how these constructs can effectively describe and explain the nature of the mediation process between a user and technology. Additionally, the Chapter draws on insights from other fields of research that have applied notions of multivoicedness, privileged voice, and attempted to develop a framework of engagement. By highlighting the versatility and applicability of these notions across different fields, the Chapter provides a comprehensive understanding of the dynamics of engagement and mediation relevant to this study. Consequently, the Chapter contributes to a more nuanced understanding of how a user's interactions with technology are shaped and how they can be studied within the broader field of sociocultural theory.

The Chapter starts with a discussion on the epistemological and ontological stance that underpins this research, as the notions, concepts, and frameworks expounded upon in this thesis stem from the theoretical foundation I have adopted. For this reason, I have provided a succinct yet encompassing overview of historical sociocultural theory and the rationale behind adopting this particular ontological and epistemological stance. Therefore, this Chapter also adds to the current debate on epistemological and ontological perspectives when carrying out research on activity, although such a contribution is not the primary aim of this literature review.

2.1 Historical socio-cultural theory

As the Chapter above relating to the aim of the research explained, the intention of the research was to understand student engagement with technology, how learning occurred when using technology, the struggles the student encountered when using technology and how technology mediates learning. In addressing the research objectives, capturing the student perspective emerged as imperative. Accordingly, I required an epistemological and ontological approach that took into consideration how I was going to obtain the students' thoughts, feelings and emotions while they used technology. Importantly, I wanted to ensure that the research focused on real interactions the students were having with technology to provide a more nuanced understanding of the complexities and intricacies inherent in technology mediated learning. With that said, an

approach that had a range of concepts, notions and flexible frameworks that could be applied to the phenomena being investigated in the real world was vital.

A historical sociocultural approach is rooted in the belief that reality and knowledge are historically and socially constructed and maintained, emphasising the significance of historical, cultural, and social domains in shaping human behaviour, communication, interactions, and the emergence of meaning (Daniels, 2017). Rogoff explains the focus of a historical sociocultural approach in the following statement:

In contrast to theories of development that focus on the individual and the social or cultural context as separate entities (adding or multiplying one and the other), the cultural-historical approach assumes that individual development must be understood in, and cannot be separated from, its social and cultural-historical context. According to Vygotsky's theory, the efforts of individuals are not separate from the kinds of activities in which they engage and the kinds of institutions of which they are a part. (Rogoff, 1990, p.50)

Rogoff's definition positions the intentions of this research, which is a focus on the user and the activity they are part of when using technology. Cartesian theories, in which the emphasis lies on individualism, foundationalism and the certainty of individual reason (Wendt, 2006), do not take into account the mediation process of the individual as culture, society and institutional domains are separated and excluded from an individual's actions (Mendie and Udofia, 2018). Furthermore, Rogoff's (1990) explanation highlights the rejection of isolating an individual from their environment and treating development as an outcome of a linear interaction between isolated elements. In contrast, a historical sociocultural approach places significant emphasis on the context of mediation. It posits that an individual's behaviour is inherently shaped and influenced by the broader societal and cultural contexts in which actions occur (Daniels, 2017). These societal and cultural influences are elucidated through the utilisation of various established notions, conceptual frameworks and theories within a historical sociocultural approach.

Wertsch states that, "The goal of a sociocultural approach is to explicate the relationships between human action, on the one hand, and the cultural, institutional and historical situations in which action occurs on the other." (Wertsch, 1993, p.120). Wertsch (1993) statement highlights that when studying an individual's activity, effort should be made to *explicate the relationship* with reflection on how the cultural, institutional and historical domains shape an individual's action. A historical sociocultural approach attempts to unveil the intricate and complex connection and interplay between an individual's action and the broader contextual factors that shape and influence activity. It is of significance to underscore that the separation of historical, cultural, social, and institutional domains is undertaken solely for the purpose of facilitating discussion in this thesis. The domains,

in actuality, are profoundly interwoven into a cohesive and indivisible existence (Leontiev, 1978). I elaborate below on the aforementioned domains, elucidating the key points that are integral to each of them.

Culture is a complex phenomenon that is formed by humans that have agency where the power of culture is in the activity of people that operate in society, consequently giving culture existence (Valsiner, 2014). The institutional, social, and historical domains emerge much like culture, as they are shaped by the actions and interactions of individuals and groups within a given context. Cultural, social, historical and institutional domains are taken into consideration when researching activity, as the use of technology is not confined to simple cognitive operations but involves a complex array of processes that need to be captured and understood within the environment it takes place (Nardi, 1996).

Expounding on the *institutional* domain of historical sociocultural theory, Mehan (1993) illuminates the way in which the institutional domain mediates the actions of an individual in profound and indiscernible ways. Central to his perspective is the idea that bureaucratic structures and processes in schools determine the way an individual is perceived, and that "... the choice of a particular way of presenting events gives them a particular meaning." (Mehan, 1993, p.224). At the time of Mehan's research, he noted that schools defined students with certain disabilities according to legal procedures and processes. In doing so, staff, students and parents viewed students in specific ways, which shaped the action of the individual that the bureaucratic processes were aimed at helping. This is an example of how a policy acquires meaning and mediates how people within an institution perceive each other, which influences people's actions in powerful ways. Mehan's point is an important one as it underscores the relationship between institutional frameworks, policies and individual actions. Institutional policies, including those related to technology use in higher education, shape educational experiences and the interactions among stakeholders within the institution. To pay attention to the institutional domain is important as it can reveal the influences that bear on an individual's actions.

The *historical* domain brings attention to the past experiences of using technology where the student has interacted with different types of technology in different contexts: for example, gaming, social media and purchasing online goods. The user engages in actions that align with their existing knowledge and draws upon prior experiences to facilitate the utilisation of new technology, as emphasised by Bennett and Maton (2010). It is essential to recognise that present experiences are perceived as an outcome of historical activities, a notion underscored by Vygotsky (1978). Taking into consideration the historical domain can help to reveal how a user has developed their processes of technology use and can present a view of use from the perspective of the user.

Furthermore, the historical domain can feed into the explanations of how a user struggles with technology and why.

To perceive the concept of mediation, it becomes imperative to consider the processes of change that shapes an individual's actions. By positioning the research within the perspective of historical sociocultural theory the intricate relationship between an individual and their sociocultural contexts can be observed and the influences on activity delineated.

2.2 'Technology-mediated' learning

Technology-mediated learning is discussed in this section with emphasis on the importance of researching mediation as it is intrinsically connected to the study of engagement. The section relies on concepts of mediation articulated by Wertsch (1993) Cole (1996), and Minick (1985), which stem from the work of Vygotsky (1931). While Cole and Wertsch contribute to my research perspective on mediation, they differ in the emphasis they place on the role of dialogue, developmental aspects and the notion of mediation in their writing. My own position on mediation is clarified and distinctions are made where necessary due to the subtle differences between Cole and Wertsch. The debate is extended in this section to suggest that a student mediates technology within the historical, social, cultural and institutional context in which technology operates, which shapes an individual's action (Wertsch, 1993). Mediation gains further clarity through an exploration of both intermental and intramental planes of mediation, as well as the concept of stimulus response.

2.2.1 The importance of mediation in 'technology-mediated' learning

Numerous published research papers have extensively covered a range of technology and provided guidance on how to effectively involve learners through features such as discussion boards, quizzes, and videos (Bond et al., 2020). While exploring the features of technology and its effectiveness, the published research papers have, however, overlooked the concept of mediation and the connection to comprehending learner engagement. Furthermore, some published research papers use the term *mediation* in the research title, such as Henrie et al. (2015) and Oliver and Herrington (2003), yet fall short of delivering a comprehensive explanation of the underlying principles of mediation. There is currently a limited understanding on mediation in many published research papers that claim to research student engagement. The term seems to be commonly assumed that technology has a facilitating role in communication between educators and students, resulting in some form of learning, as pointed out by Bower (2019) in his explanation that *mediation* pertains to situations where technology is utilised to convey information and foster interconnectedness among individuals. To highlight the inadequacy of research in examining the notion of *mediation*, Bond et al. (2020) conducted a systematic review of 243 published studies on educational technology in higher education, filtering from an initial pool of 77,508 papers. Surprisingly, none of the 243 papers they reviewed included analyses of mediation. Additionally, in discussing the results of their

systematic review, Bond et al. (2020) themselves did not address mediation, but instead focused on descriptors of engagement with little reflection on mediation or why they omitted the notion in their published review paper.

In addition to published research papers, some theorists attempt to describe technology-mediated learning without sufficient empirical research to support their claims. Bower (2019), for example, acknowledges the need for a theoretical framework to analyse technology-mediated learning but fails to explicitly emphasise the importance of understanding mediation in relation to the user and technology. He suggests that research should analyse the processes and relationships "... between goals, beliefs, practices, environments and learning designs on outcomes and experience ..." (Bower, 2019, p.2). Bower's (2019) paper acknowledges that technology-mediated learning requires a theoretical referent for analyses yet fails to emphasise the need to understand mediation with regards to technology. Nonetheless, Bower indicates the need to examine the process of mediation due to the influence technology has on the user, suggesting that the user's experiences and perspectives should inform the design and application of educational technology in context. By analysing the process of mediation, researchers and theorists can begin to comprehend the implications of technology on learning and start to establish a theoretical foundation, as Bower notes is needed yet fails to emphasise.

Kaptelinin and Nardi (2012) affirms the significance of researching mediation, "... the potential of technology to promote [learning] is directly related to the role of technology as a mediator of human activity." (Kaptelinin and Nardi, 2012, p.47). Kaptelinin and Nardi (2012) statement implies the need to understand how humans mediate technology to effectively utilise its potential to promote learning. Wertsch (1993) adds to the importance of understanding mediation, highlighting that human action is typically constructed through *mediational means* such as tools and language, that significantly influences human action, "... human action typically employs "mediational means" such as tools and language, and that these mediational means shape the action in essential ways." (Wertsch, 1993, p.12). While the discussion of *mediational means* and *tools* will be addressed in later sections of this Chapter, it is important to highlight that Wertsch's statement underscores the significance of mediation in comprehending human action.

Analysing the process of mediation enables researchers to understand a student's actions, identify factors that engage or disengage students and gain insights into the challenges and possibilities technology brings to the user. Moreover, prevailing research on technology mediated learning frequently overlooks the need for an analytical and critical approach to mediation. Failing to account for the mediation process means overlooking essential observations that can shed light on the dynamics between the user and technology, including the challenges, constraints, and advantages technology brings to learning. Mediation serves as a fundamental antecedent to engagement, and

by researching user mediation, the understanding of student engagement can be significantly enriched given the inherent and intertwined nature of the two concepts.

Given the dearth of research on the mediation of technology, the following section introduces key concepts and ideas that have been applied in the study of mediation. The discussion shifts from the justification and rationale for studying mediation to an exploration of mediation within the context of technology mediated learning. This focus is particularly relevant because the field of technology mediated learning is still emerging, and there is a clear gap in research specifically examining the mediation process between users and technology. By focusing on concepts and notions that have been used in the broader study of mediation, this section aims to fill a gap and provide a more comprehensive understanding of mediation and how it can be applied to an individual's interaction with technology. By doing so, the review sets the stage for a deeper analysis and discussion of the dynamics between technology and the user, highlighting the importance of understanding mediation and what takes place when a user interacts with technology.

2.3 Mediation

It has been argued that the concept of mediation emerges as a crucial research point in the investigation of technology-mediated learning and student engagement allowing a more nuanced exploration, unveiling intricate dynamics that underpin the process of engagement with technology. In presenting ideas on mediation in this section, I reflect on the works of Vygotsky (1931), Wertsch (1993), Cole (1996), and Rogoff (1995) who have contributed valuable insights into the multifaceted nature of mediation and its implications for understanding human activity. Attention is given in this section to the dynamic interplay between individuals, their social and cultural environments, and the mediating tools and signs that shape actions.

A fundamental assumption of a historical sociocultural approach to mediation which separates it from other approaches is that mediation is not a process where structures of systems are independent of a mediating process. Rather action is inherently socially orientated (Wertsch, 1993). An individual's actions are derived from social activity where physical objects and nonphysical objects shape how they act on the world, "... higher mental functioning in the individual derives from social life ... and the claim that human action, on both the social and individual planes, is mediated by tools and signs." (Wertsch, 1993, p. 32). Wertsch's statement underscores the development of higher mental functioning resulting from interactions with physical and nonphysical objects within a social context, with language being an example of a nonphysical object. To illustrate how physical objects shape thoughts and actions, Vygotsky's (1978) forbidden colours experiment is relevant. In the experiment, children were asked questions about the colour of items, with the condition that they could not use the same colour twice and forbidden from using two specific colours. The children were given a set of coloured cards to use but not told how they could

use them to help answer the questions. Vygotsky found that older children used the coloured cards to remember what colours they had already mentioned in their answers and the forbidden colours they were told not to use. Vygotsky's experiment demonstrates how meaning is attributed to a physical object (in this case, a card) which regulates thought and behaviour. Vygotsky affirmed the idea that physical objects mediate thought and action through the idea that a knot tied around a finger can help to remember something (Vygotsky, 1930) or in the way that an abacus can aid the remembrance and manipulation of numbers (Vygotsky, 1930). What is of importance in Vygotsky's observations and significant for this research, is the fact that a mediation process takes place between an individual and physical objects which shapes an individual's actions. Transferring the notion of mediation to technology is challenging, as technology does not operate in the physical world, but in a virtual world where various features mediate a user's actions. The idea that mediation takes place in a world void of speech and physical objects has prompted an inquiry into the processes that underpins mediation where dialogue is not used, an aspect of which has been introduced by Rogoff where speech was not utilised as a primary means of mediation (1990).

Rogoff's (1990) inquiry into cultures relying on non-verbal modes of communication sheds some light on how mediation might occur when using technology. Rogoff (1990) highlights how mediation moves beyond dependence on tangible items, instead emerging through contextual elements. Rogoff (1990) introduces the notion of *context manipulation*, which entails engaging in an activity without explicit verbal instructions. For instance, an apprentice carpenter observing a skilled master craftsman sculpting an intricate chair leg exemplifies the idea that mediation occurs by observing others. However, it is important to acknowledge that *context manipulation* is restricted to situations where an experienced individual is present. In contrast, when utilising technology, a user often lacks an expert to emulate. Technology mediates action through virtual objects displayed on a digital screen, employing a complex array of design features developed by developers and designers of technology void of the user's presence. Effective utilisation of technology necessitates a thorough understanding of how the design features manipulate the user's actions.

Gillespi and Zittoun (2010) expand on the concept of mediation, shedding light on how tools and signs bring about distinct transformations in individuals: tools are used to act upon the world and signs are used to act upon the mind, both concepts are expounded upon in greater detail within this Chapter. They introduce the idea of two modes of mediation: reflective and non-reflective. In non-reflective mediation, individuals immerse themselves in the task at hand, driven by the goal of their activity, often unaware of the tools or signs they are employing. On the other hand, reflective mediation involves a process of contemplation that introduces new ways of acting and restructuring activity, "Their mind is focused upon the resource being used and the mode of use". (Gillespi and Zittoun, 2010, p.48). An individual's reflective state occurs when they deliberate on their actions within a goal-oriented activity. The individual fluctuates between non-reflective and reflective

mediation as they engage in activity, showcasing varying levels of awareness and contemplation regarding their choice of actions.

Reflective mediation in the context of technology entails a heightened level of cognitive comprehension and thoughtful consideration by the user. It extends beyond mere utilisation of technological features to encompass deliberate choices on how technology ought to be employed (Gillespi and Zittoun, 2010). The user might reflect on the effectiveness of different features of technology, explore alternative methods of using technology and think critically about how technology needs to be used in atonement of a goal. Thoughtfully, a user may deliberate between progressing by clicking a hyperlink for the next page or inputting specific details into an on-screen text box to complete an online task. The essence lies in their conscious decision-making process while navigating various options.

The distinction between reflective and non-reflective mediation in the context of technology-mediated learning highlights how a user's engagement may differ. Reflective mediation involves a deeper understanding of the tool's purpose, its impact on activity and the ability to adapt and reorganize methods of using technology based on the resources present. While non-reflective mediation highlights a seamless use of technology where the goal is the focus and not the conscious decisions of using technology.

2.3.1 Intermental and intramental plane of mediation

The discussion now moves to a more nuanced exploration of mediation through the separation of mediation into two intricately interwoven concepts: the intermental and intramental planes of mediation. The two planes are integral when examining mediation, as mediated activity first takes place between individuals on the *intermental* plane, which is characterized by communication and social interaction, and subsequently within an individual's mind or consciousness on the *intramental* plane (Wertsch, 1993). The intermental and intramental planes are based on the assumption that mind is distributed and developed with others rather than developed within an individual's mind free from environmental influences, as cognitive and computational theories assume (Wertsch, 1993; Nardi, 1996). The two planes of mediation are discussed below and the distinct features of each drawn out with the intention to present a deeper insight into mediation.

Intermental plane

The intermental plane assumes importance in research on mediation as it directs attention toward the development of an individual's action which is influenced by social and cultural systems. Minick (1985) emphasizes the point as follows: "...the intermental action and the social interaction that makes that action possible will be defined and structured in certain respects by the broader social and culture systems." (Minick, 1985, p.257). Minick highlights the idea that individual thought, action and interactions are not isolated from the society and culture an individual is part of. Rather,

they are intricately connected and influenced by the norms, values, beliefs, and practices of the broader social and cultural systems which play a role in defining and structuring how an individual thinks, what actions they may take, and how they interact with others (Vygotsky, 1978). Exploring mediation on the intermental plane can inform researchers of the external factors that surround an individual and shape their actions.

Published research that applies the concept of intermental plane of mediation tends to focus on various forms of communication, including language (Tomasello, 2003), gestures (McNeil, 1992), facial expressions (Izard, 1994) and the transmission of communication between individuals and groups (Wertsch et al., 1995). Users of technology employ alternative forms of communication to construct meaning on the intermental plane, an area that currently lacks insight. Therefore, it is essential to explore how technology transforms and shapes a user's actions on the intramental plane by delineating how communication takes place and how it shapes actions.

Intramental plane

The intramental plane involves internalized cognitive processes that have been initially directed on the intermental plane that emerge as a direct consequence of an individual's engagement in an activity (Wertsch et al., 2007). The dynamic interplay between external activities and the subsequent internalization on the intramental plane highlights the intricate ways in which human cognition is shaped and moulded through interaction with the external world. Wertsch et al. (1995) and Minick (1985) argue that by studying an individual's interactions within a social context on the intermental plane, insights can be gained into an individual's internalized intentions on the intramental plane. Consequently, an individual's thoughts, perceptions, interpretations, and cognitive activities that collectively contribute to the accomplishment of goal-directed behaviours can be deciphered. Language has often been the focus of research, exploring how speech is internalized and processed on the intramental plane (Mercer, 2000). While it is not the aim of this research to delve into the psychology of a student, the intermental plane of mediation can assist in identifying essential cognitive processes on the intramental plane that may offer insight into the mediation of technology and the struggles of the user.

A fundamental principle underlying the intermental and intramental planes of mediation is that mediation cannot be decontextualized. The two planes are intertwined and part of the same mediated activity, building upon prior and subsequent interactions within an activity itself (Wertsch et al., 2007). As a result of mediation occurring on both the intermental and intramental planes, the concept of tools and signs emerge which are concepts that give insight into how an individual's actions are regulated, shaped and directed (Engeström and Pyorala, 2021). Considering activity within the intermental and intramental planes of mediation enables a deeper exploration of mediation and the details that surround it.

2.3.2 Multivoicedness, privileged voice and semiotics

The concepts of multivoicedness (Bakhtin, 1981; Wertsch, 1993) and privileged voice (Wertsch, 1987) are significant as they offer a means to explore the distribution of power by analysing how individuals communicate and how certain forms of communication are given privilege. Additionally, the proposition of semiotics provides a viable notion for explaining the process through which technology conveys its messages to the user, highlighting the often unidirectional nature of communication between the user and technology. In the subsequent discussion, I will expound upon the notions of multivoicedness, privileged voice and semiotics with the overarching objective of extending the exploration of mediation to support the research objectives. By examining how power dynamics and communication patterns influence user interactions, a better understanding of the factors that either foster or hinder student engagement can be achieved, ultimately providing deeper insights into how students connect with and are impacted by technology in educational settings.

2.3.2.1 Multivoicedness

The concept of multivoicedness refers to the specific utilization of language that situates the self within a dialogic interaction (Wertsch, 1981; Bakhtin, 1986). Bakhtin (1986) explains that when we communicate, language carries traces of multiple voices which shape our speech, i.e. "The word in language is half someone else's" (Bakhtin, cited in Wertsch, 1981, p.293). Bakhtin's insight emphasises how language evolves over time, deriving meaning via the dialogical experiences that individuals have with each other. Appropriate words are chosen to match our intentions, infusing them with extra significance and claiming them as our own. Considering how a student mediates technology, it is essential to recognize that technology lacks intentions and cannot decide how to interact and communicate with the user. Consequently, the features of technology are saturated with the voice of the individuals that developed and designed it. Much like Bakhtin's conception of language, technology embodies a multivoicedness. However, a dialogue is lacking, necessitating users to apprehend meaning from what they see and interact with.

To recontextualize the aforementioned statement of Bakhtin in relation to technology, one might say, *the language of technology belongs to someone else*. The statement seems to fall short of Bakhtin's enriched meaning on language. However, the statement highlights the fact that the mediation of technology is imbued with the voice of others which does not include the user, others being the array of individuals that collaborated to develop technology. The user must comprehend how to utilize technology effectively, as direct dialogue and observation of a master user, as with Rogoff's (1995) *context manipulation*, are often unavailable. The notion of multivoicedness has significance when researching technology-mediated learning as the notion can also account for non-traditional methods of communication. This brings to the fore how the features of technology echo the voice of others, illuminating how the interaction is controlled by the individuals that made

the technology where the student is directed to use various features where dialogue does not take place.

Bakhtin's statement "the words in language are half someone else's" (Bakhtin, cited in Wertsch, 1993, p.59) brings attention to another question raised by Bakhtin: "Who is doing the speaking" (Bakhtin, 1986, p.95). Important to Bakhtin's question on who is doing the speaking is the idea that discourse is dialogical. This cannot be said about technology, as it directs communication and meaning in a stream of information that is intended to be received and then acted upon (Seargent, 2019). Notably, human activity is characterized by a dialogical interplay of voices, where communication occurs between participants striving to achieve a shared goal (Wertsch, 1993). Thus, when answering Bakhtin's question as it refers to technology, the answer might be that the individuals that created the technology are doing the speaking. In the words of Holquist (1981),

I can mean what I say, but only indirectly, at a second remove, in the words I take and give back to the community according to the protocols it establishes. My voice can mean, but only with others: at times in chorus, but at the best of times in a dialogue. (Holquist, 1981, p.164).

Holquist's eloquent statement underscores the collective nature of communication and extends Bakhtin's idea of the dialogical nature of language. Individuals establish communicative contexts through dialogical experiences contributing meaning to words in turn, empowering the individuals present in the dialogue. However, does the same occur when using technology? When communicating through technology developers and designers are the ones *doing the talking*, as they have created the means of communication employed by the user where the user cannot contribute meaning or augment the communication. Technology disrupts the multidirectional dialogical process of communication and assumes the role of both voice and communication source which is directed at the user. The communication lacks dialogicality, and users must rely on their own experiences and judgments to decipher the communication and navigate technology accordingly. Conversely, rather than being a dialogical experience, technology seems to create an experience that is monological.

Multivoicedness has been widely applied across various fields, including literary studies (Emerson, 1984; Holquist, 1990), linguistics and discourse analysis (Gee, 1999; Tannen, 2007), education and pedagogy (Mercer, 2000; Wegerif, 2011), and political science (Mouffe, 2000; Fraser, 1992), among others. The common thread across these fields of research, and in the application of Bakhtin's theory (1986), lies in the exploration of the complexities of dialogue, interaction, and meaning-making between individuals and groups. Multivoicedness has yet to be applied to the study of technology mediated learning and has the potential to uncover how technology influences and shapes an individual's actions.

2.3.2.2 Privileged voice

Acknowledging the multivoiced nature of technology, which is argued as operating within a monodirectional framework where reciprocity of meaning seems to remain elusive, gives rise to inquiries concerning the notion of *privileged voice*. Privileged voice denotes the use of a specific speech genre to achieve specific goals within a particular context (Labov, 1978). The notion pertains to how and why, “... a particular voice occupies centre stage, that is, why it is “privileged” ... in a particular setting.” (Wertsch, 1993, p.27). As the term ‘privileged’ suggests, the central focus of research utilising the concept of privileged voice is on addressing issues of equality and inclusion (Fairclough et al., 2023; Gaiger and Jordan, 2014; Weirich, 2022). By identifying and analysing privileged voice researchers have brought attention to inequitable practices and policies with the goal of changing those practices.

Spencer et al. (2020) used the concept of privileged voice to critically examine the representation and legitimacy of children's voices in qualitative health research, highlighting how it often reinforces existing power dynamics and social inequities. Their study challenges the assumption that merely 'giving children a voice' guarantees authentic representation, emphasising that adult frameworks frequently determine which voices are amplified and how they are interpreted, what Spencer et al. (2020) describe as privileged voice. Adult frameworks refer to the perspectives, values, and assumptions that adults use to interpret and understand the world. In research, these frameworks often shape how adults perceive and interpret the voices or experiences of others, particularly children, potentially imposing adult-centric interpretations and limiting the authenticity of children's voices. The authors call for more reflexive research practices to avoid reinforcing hierarchies by privileging voices that align with adult perspectives, while marginalising those that dissent or deviate, such as children's. Spencer et al.'s (2020) research underscores how the concept of the privileged voice exposes where power resides and who has access to a voice within a given context.

As has been argued in the section on multivoicedness, technology is assumed to have a voice that shapes the user's thoughts and actions; technology takes *centre stage* and needs to be accessible to the user to ensure that learning is not impeded. In an educational context, the disadvantages of privileged voice are highlighted by Scribner and Cole (1981), who argue that formal instruction and language acquisition are crucial factors for student success. Without having access to the language of formal instruction, learning is obstructed. Educational settings employ specific speech genres for learning various subjects, and Wertsch (1993) asserts that students must extensively engage with and master specific speech genres to avoid being disadvantaged. Educational technology has become a ubiquitous aspect of higher education, raising the question of whether it assumes a privileged voice that limits access for some learners, potentially hindering their learning (Spencer et al., 2020). Technology encompasses underlying modes of communication that users must learn.

To a significant degree, technology serves as an intermediary for learning. Users are prompted to navigate a communicative landscape that is intricately woven into the very essence of technological features, enabling them to interact with the technology proficiently and purposefully.

The interplay between multivoicedness and privileged voice naturally steers this section toward the concept of semiotics, offering a lens through which to dissect the mechanisms by which meaning is conveyed to the user in the absence of dialogue.

2.3.2.3 Semiotics

Wertsch (1985) argues that a comprehensive understanding of human mental action necessitates an exploration of the semiotic devices employed to mediate such action, i.e., “to understand human mental action, one must understand the semiotic devices used to mediate such action.” (Wertsch, 1985, p.26). Wertsch underscores the function of semiotic devices in facilitating and shaping cognitive processes and mental activities within individuals. Consequently, it is essential to examine how the features of technology shape and direct users' thoughts and actions. Numerous studies have explored the relationship between technology and semiotics, including Juul's (2005) research on gaming and interactive media, Finnemann's (2011) work on cybersemiotics, and Heim's (1988) studies on virtual and augmented reality. Karanasios et al. (2021) explore the role of signs and symbols in digital environments. Their research examines how symbols, seen as 'psychological tools' within activity theory, mediate human interactions by shaping internal cognitive processes. They note that initially, activity theory distinguished between tools (external, physical) and signs (internal, symbolic), but this distinction has evolved to recognise the interconnected roles of tools and signs in mediating human activity. In the digital age, symbols have become integral to digital technologies, which often merge symbolic systems with tools, fostering new forms of interaction and communication.

As indicated by Wertsch et al. (2007), an outsider introduces a *stimulus means* to trigger an action within an activity. The stimulus means encompass tools or signs that possess a tangible presence, evident to those engaged in the activity (Wertsch, 1993). Tool and sign are elaborated further in the section on activity theory. The introduction of a tool or sign enables individuals to organize mediation, thereby leading to an apparent change in both the individual and the corresponding activity (Engeström, 2014). The identification of the stimulus means allows researchers to pinpoint user challenges and discern the origins of those challenges within the virtual environment. Thus, the understanding of how tools and signs mediate action becomes pivotal, as users respond to visual cues on screens and navigate through various interfaces to achieve objectives and outcomes. Consequently, designers of technology and learning environments cultivate online platforms that incite users to act in alignment with their intentions: the voice of technology. The scrutiny of students' technological behaviours through the identification of stimulus response mechanisms can

give insight into the intended action versus the action taken by a user. An examination of stimulus means emerges as a valuable tool, facilitating a deeper comprehension of interactions on the intermental plane as it aids in discerning how students structure mediation when using technology and illuminates the catalysts that prompt their actions.

By recognising the interplay between semiotic features of technology and the user, researchers can gain insights into the intricate connections between technology's influence on users and their subsequent responses. Such an examination illuminates the nuanced relationship between the directives embedded in technology and the actual actions undertaken by users, elucidating the complex dynamics of human interaction with technology and the potential barriers and enablers to learning. The concepts of multivoicedness and privileged voice present a compelling argument that technology imparts a distinct voice, influencing the user's engagement with technology which is facilitated through the utilisation of semiotic devices and stimulus response mechanisms.

2.4 Engagement

The discussion has so far primarily centred on mediation and the relevant notions that can be applied to researching technology-mediated learning. As one of the research aims was to explore engagement and how it occurs, it was also deemed important to discuss engagement considering current research. In this regard, Bond et al. (2020) correctly assert that the study of engagement is a multifaceted and intricate construct. Attempting to explain how students engage with technology for learning purposes cannot be approached through a single concept due to the complex nature of the phenomenon, hence the extensive literature review given in this Chapter and the notions and concepts put forward. This section proposes ideas on conceptualising engagement and how it can be used in concurrence with the notions presented on mediation and the framework of activity theory. Activity theory is discussed in later sections of this literature review where it is argued that activity theory can accommodate a multi-notion approach to researching technology-mediated learning.

Bond et al. (2019) note that the ongoing debate on student engagement with technology primarily revolves around the affective/emotional, cognitive, and behavioural elements of engagement. This is not necessarily the case, as there have been other attempts to decipher what engagement consists of, such as the engagement theory of O'Brien and Toms (2010) and Kearsley and Schneiderman's (1998) engagement theory of learning. While Bond et al.'s (2019) perspective on engagement is valuable, it remains limited as there is a lack of a direct perspective from the user and the authors constrict engagement to three descriptors, which oversimplifies the complexities of human action by reducing the user's interaction with technology to a set of objective viewpoints. Furthermore, their paper fails to capture the intricacies and nuances of the various factors that influence engagement with technology which this research aims to shed light on.

In contrast to Bond et al.'s (2019) approach, this research adopts a markedly different proposal to investigating engagement. I deliberately refrain from using one notion or framework to investigate the phenomenon of technology-mediated learning, as doing so would introduce bias from the outset, potentially hindering the exploration of alternative viewpoints. Instead, the research aimed to combine multiple notions that offer a language for describing how students engage with technology. Consequently, this section will build upon the understanding of mediation already presented and clarify the terminology used to elucidate how students become engaged with learning when utilizing technology whilst addressing the current dearth of insight in the area of technology-mediated learning. To achieve this objective, this section presents O'Brien and Toms' (2010) engagement framework and its applicability to this research. The initial part of the section describes the five distinct phases of engagement proposed by O'Brien and Toms (2010), emphasizing the significance of the phases in understanding the user's experiences and resulting engagement with technology. Additionally, the concept of experience threads is introduced as a means to shed light on how technology effectively or ineffectively engages the learner. Finally, the section discusses how the framework aligns with the broader objectives of the research and its applicability to the ongoing discourse on technology-mediated learning.

2.4.1 The five phases of engagement

Point of engagement

Point of engagement refers to the critical moment when a user decides to utilize technology that is typically driven by factors that resonate with their interests. The user's decision is influenced by the aesthetic appearance and the informative content of technology.

Sustained engagement

O'Brien and Toms (2010) identify several essential elements that contribute to sustaining user engagement: novelty, interest, challenge, feedback, and user control. The intensity of each element serves as an indicator of the level of user engagement. For instance, high levels of interest, novelty, and feedback result in increased engagement, whereas low levels of these factors correspond to diminished engagement.

Disengagement

Disengagement occurs when the user decides to discontinue their engagement with technology. Factors influencing this decision include a loss of interest, time constraints, the need to attend to other tasks, the realization that technology has negative impacts on their life, external distractions, interruptions, a lack of novelty and usability issues.

Reengagement

Reengagement marks the moment when a user returns to using technology after a period of disengagement. The reasons for reengagement depend on the factors that initially led to disengagement and the point of engagement. For instance, users may return to a technology if they had to pause to attend to pressing needs or if they had a positive experience, such as having fun, receiving rewards, or gaining new knowledge that motivates further exploration.

Nonengagement

Nonengagement occurs when a user ceases to use technology without any intention of returning. Various reasons contribute to nonengagement, such as a preference for completing activities physically rather than online, time constraints, disinterest in the content, or usability barriers that hinder technology usage.

The five engagement phases outlined above highlight the distinct stages a user may undergo when interacting with technology. The acknowledgement of distinct engagement points is of paramount importance as it reveals the triggers and influences that contribute to user engagement, highlighting a significant divergence from the research of Bond et al. (2019). To further understand the triggers and influences, O'Brien and Toms (2010) introduce three experience threads into their framework: the sensual thread, the emotional thread, and the spatiotemporal thread. The three experience threads shed light on the reasons behind a user's decision whether or not to engage with technology at the various phases of engagement. The sensual thread encompasses the visual, auditory, and interactive components of the user experience. The emotional thread encompasses the user's interactions, motivations for technology usage, and reasons for continued engagement. The spatiotemporal thread encompasses the user's perception of time and spatial context. A user may prioritize one experience thread over another as they experience multiple experience threads at the same time.

Figure 1 below provides an example of the engagement framework results in O'Brien and Toms' (2010) research context and the interplays between the points of engagement and experience threads.

Experience threads	Point of Engagement	Engagement	Disengagement
Sensual	<ul style="list-style-type: none"> • Aesthetic elements are pleasing or attention getting • Novel presentation of information 	<ul style="list-style-type: none"> • Graphics that keep <u>attention</u> and <u>interest</u> or evoke realism • "Rich" interfaces that promote awareness of others or <u>customized views</u> of information 	<ul style="list-style-type: none"> • Inability to <u>interact</u> with features of the technology or manipulation interface features (usability) • Lack of/too much challenge

Emotional	<ul style="list-style-type: none"> • Motivation to accomplish a task or to have an experience • Interest 	<ul style="list-style-type: none"> • Positive affect: enjoyment, fun, physiological arousal 	<ul style="list-style-type: none"> • <u>Negative affect</u>: uncertainty, information overload, frustration with technology, boredom, guilt • <u>Positive affect</u>: feelings of success and accomplishment
Spatiotemporal	<ul style="list-style-type: none"> • Becoming situated in the “story” • Ability to take one’s time in using the application 	<ul style="list-style-type: none"> • Perception that time passed very quickly • Lack of <u>awareness</u> of physical surroundings • Strong <u>awareness</u> of others when the engagement revolved around social interaction • <u>Feedback</u> and <u>control</u> 	<ul style="list-style-type: none"> • Not having sufficient time to interact with or time to devote to the application • <u>Interruptions</u> and <u>distractions</u> in physical environment

Figure 1: Example of the five engagement phases and the experience threads (O’Brien and Toms, 2010, p.948)

The engagement framework proposed by O’Brien and Toms (2010) shows potential in shedding light on a students' motives for engaging with technology and evaluating the level of learner engagement that technology fosters. The framework offers valuable terminology to articulate the drivers of engagement and can be effectively integrated alongside the concept of mediation. Moreover, when combined with activity theory, the points of engagement and experience threads not only complement but also expand the analytical scope, providing a fresh perspective on the phenomena of technology-mediated learning. Furthermore, in integrating engagement theory, a more detailed exploration of the subject-object interaction within the activity theory can be achieved, further enriching the understanding of how technology influences the user and learning. It is for this reason that activity theory is now introduced as a viable framework that can potentially bring the ideas mentioned so far in this Chapter together and solidify the research analyses framework.

2.5 Activity Theory

The preceding sections of this Chapter have underscored the significance of mediation in the investigation of technology-mediated learning from the user’s perspective. Concepts rooted in historical sociocultural theory have been elaborated upon, encompassing notions such as intramental and intermental planes of mediation, multivoicedness, privileged voice, semiotics and stimulus means. Engagement theory has been presented as a conceptual framework, providing a cohesive vocabulary for elucidating the factors that captivate a user with technology and a theoretical perspective that harmoniously aligns with the notions and ideas of historical sociocultural theory. Building on what has been presented so far, this section now shifts the focus to activity theory which serves as a comprehensive framework that is qualified to integrate the notions and ideas presented while providing further elucidation on the nature of student and technology mediation by focusing on activity. The first part of this section provides an overview of activity theory after which, the elements of the framework are discussed. I finish the section by

answering some of the criticisms levied at activity theory, with the intention of strengthening the research.

Activity theory's evolution is closely linked to the theoretical foundations of historical sociocultural theory developed by Vygotsky (1931), Leontiev (1978) and more recently Engeström and Pyorala (2021). The theory offers valuable insights into the interplay between an individual, society and culture in shaping human activity, in turn allowing for a deeper understanding of how individuals interact with their environment and the social structures that influence their actions (Engeström, 1999). Activity theory challenges the perspective of development, which perceives individuals as isolated entities, disconnected from the cultural and societal context enveloping them. Such a perspective confines development to the realm of the mind, seemingly unaffected by the intricate interplay of influences that shape the human experience (Detlefsen, 2012). By contrast, activity theory serves as a lens through which the dynamic interactions between individuals and technology can be comprehensively understood and meaningfully analysed (Engeström, 2014). To do so, the theory encompasses several interconnected key elements that shed light on how an individual's activity is shaped. The elements of activity theory include subject-object relationship, tools, rules, community and division of labour. By analysing the contributing factors of activity through the lens of activity theory, insights into the complex interaction between a student and technology can be uncovered, thus elucidating the influences driving their actions and evaluating their engagement. The core elements of activity theory are discussed more fully below.

2.5.1 Tools and Signs

Tools

Engels states, "The specialization of the hand - this implies the tool and the tool implies specific human activity, the transforming reaction of man's nature" (Engels, 1940, p.172). Engels' explanation of what constitutes a tool highlights the pivotal role tools have in transforming an individual's action and guiding specific activities that are entwined with the culture and society from which they originate (Engeström and Pyorala, 2021). To illustrate the interrelation between individuals, tools, culture and society, we might consider the example of a baby learning to use a spoon. Initially, the baby might struggle to use the spoon correctly, influenced by the development of their motor skills as much as the cultural context of tool use. With time, the baby gradually gains knowledge of how to use the spoon in the appropriate manner mirroring the behaviours of those around them. The baby's journey of using the spoon imbues the spoon with significance and meaning within the cultural framework that surrounds the child's upbringing. Companies have also played their part in shaping the spoon for monetary purposes. Take the various types of spoons to eat different foods in Europe as an example: the soup spoon, the dessert spoon and the sugar spoon (Wierzbicka, 2015). It can be assumed that cultural, social, institutional and historical

domains have merged to give the spoon meaning and value, albeit differently in various cultures and contexts. It is crucial to emphasize that the spoon does not inherently possess meaning, but rather it acquires meaning through its situatedness in a social and cultural environment that has evolved over time.

Another facet to contemplate in relation to tools and the transformative impact on an individual's activity is the potential for tools to shape intentions. If we assume tools as a mediating force in human actions, it logically follows that tools mold the user's intentions through the necessity of adhering to the intended manner predetermined by the tool's designers. The spoon example can be elaborated. Consider a cake fork-spoon crafted with a specific purpose in mind. Presented with a choice between forks and spoons for consuming cake, the individual will adapt their intention based on their past experiences and opt for the utensil that aligns best with their context, each utensil being infused with distinct intentions of use by the designer. Choosing the soup spoon may not be appropriate whilst the cake fork-spoon directs the user to the spoon to achieve their goal. However, the individual may not know what the spoon's intended cultural purposes are and may struggle to eat the cake using an inappropriate implement or without an implement at all.

Similarly, technology is developed by developers and designers with the explicit purpose of shaping a user's intentions and subsequent actions through the application of virtual tools rather than physical tools. In doing so, technology inadvertently triggers shifts in user behaviour, owing to the inherently distinct uses of the various technology features: whether it's a hyperlink, an icon, a precisely chosen word, or navigation pathways, among others. It is important to highlight that, while tools wield the potential to influence a user's intentions, the ambitions and goals of individuals equally influence the tools they choose and employ which underlines the mutual interplay between tools and intentions (Engeström, 1999).

In the contemporary landscape, technology's impact extends beyond mere tools and techniques. As posited by Blunden (2015), "... technology not only transforms the production and utilization of tools but also operates on the mind, giving rise to new social structures that shape individual and collective actions" (Blunden, 2015, p.6). Blunden's perspective hints at a nuanced interaction wherein a user might not solely develop their intentions and where the reciprocal relationship may not exist but instead there is an interaction that is akin to a unilateral form of mediation. Gaining a deeper understanding of the intricate interplay between users and virtual tools presents a valuable standpoint for comprehending how individuals navigate technology's landscape. Furthermore, such insight may unveil whether the original intentions of developers manifest themselves within the dynamics of interaction, potentially side-lining user considerations.

Signs

Tools serve as mediators in the physical world enabling individuals to interact with their environment and manipulate physical objects in pursuit of goals. Conversely, signs operate within the domain of the psychological world, influencing cognition, perception, and communication (Vygotsky, 1978). The distinction between tools and signs within the domain of technology bears profound significance, a notion elaborated upon by Blunden (2015) in his scrutiny of the shift from physical to virtual tools. In the context of technology, the locus of operation moves from tangible tools to virtual tools that operate on the mind. The virtual world holds power, exerting an influence on cognitive processes and shaping mental states (Blunden, 2015). Attention has shifted from the physical manipulation of tools to the psychological processing of signs, where meaning, representation, and interaction occur. The role of signs gain prominence, intertwining with the user's cognitive processes and influencing how individuals navigate and engage with technology. The integration of signs with the user's cognitive processes is aptly emphasised by Wertsch, who states, "... signs represent an integral part of an existing and independent stream of communicative action that intertwines with other goal-directed behaviours" (Wertsch et al., 2007, p.191). Wertsch et al.'s (2007) perspective further underscores the symbiotic interplay between virtual tools, signs, and human activity that elucidates how signs emerge organically through interactions with virtual tools, reinforcing the profound influence that signs exert on the way individuals engage with and respond to their technological environment.

Considering the importance of signs expands the understanding of mediation beyond the physical manipulation of tools to encompass the intricate interplay of psychological cues and responses in the virtual world. The nexus between virtual tools and signs assumes a connection with the notion of engagement, acting as pivotal elements that reveal concealed anomalies exerting a direct influence on how a user navigates and interacts with technology.

2.5.2 Subject and object

The subject-object relationship is an essential concept of activity theory as it offers a perspective through which researchers can explore the interplay between individuals, their goals, mediating tools and signs, and the broader cultural and social context. The subject is the individual or group participating in an activity and the object is the reason the action is being carried out, which is goal orientated (Engeström, 1987). The subject inevitably has motives for engaging in an activity, with the object being the purpose of the activity and the goal-directed behaviour which results in an outcome. Knowing what the subject-object relationship is can shed light on why the subject has engaged with technology. Furthermore, the path undertaken by the subject to attain the envisioned outcome offers valuable insights into the elements and concepts presented in this literature review,

forming a foundational framework for the analysis of activity that can possibly extend beyond the elements suggested by Engeström (1999).

2.5.3 Outcomes

Outcomes within the activity theory framework encapsulate the sought-after or anticipated consequences of an activity, representing a targeted state or condition that users strive to realize (Engeström, 1999). Understanding the outcomes resulting from interactions with technology significantly contributes to the analysis, serving as a metric to ascertain whether the user's intentions were fulfilled and if meaningful learning transpired.

2.5.4 Community

The term community denotes a collective of individuals bound by shared goals and objectives within an activity (Engeström, 2014). A community embodies an intricate web of relationships, that converge upon the object central to a given activity (Sannino et al., 2009). Within the sphere of technology, the community takes the form of students who employ technology as a tool for learning, thereby constituting a community. Although much discourse surrounding communities within activity theory sidesteps the idea of multiple communities interweaving across boundaries, Engeström (2014) does explore the idea of multiple activity systems. Demonstrating this concept, technology fosters various activity systems encompassing developers, designers, materials writers, and learning technologists. These entities operate within a community where the dynamics of the subject-object relationship might diverge from one another, leading to a misalignment of the object. This disparity often generates tensions and constraints within the system (Engeström, 2014).

It is important to note that the concept of community is often regarded as a monolayer, focusing on a particular facet of culture and social engagement, rather than an intricate stratum of diverse communities that exert influence on activity (Bakhurst, 2009). Consequently, comprehending the contextual tensions that underpin these communities substantiates a more profound understanding of activity and the subject-object relationship.

2.5.5 Division of labour and rules

Within an activity, each community operates under the influence of division of labour and rules. Division of labour signifies the balance of exchanges among individuals and/or objects within the activity, entailing a complex interplay of power dynamics within the community (Engeström, 1999). The division of labour entails the allocation and organization of tasks among participants within the activity where the allocation of labour and rules manifests in two distinct aspects: one pertains to the distribution of tasks among individuals in a group, while the other explores power dynamics, individual statuses, and roles assumed within the activity (Burnard and Younker, 2008). The intricate perspective on the division of labour brings to light the intricate roles, interactions, and

dynamics of a user's engagement with technology and offers insights into the influences of technology on learning and the myriad of participants that contribute to the dynamic interplay of activity.

Embedded within any given activity are a set of guiding principles that shape the decisions and actions of both individuals and the broader community. The principles are often referred to as *rules*, and are products of societal norms, cultural values, and institutional frameworks (Engeström, 2014). Rules possess a historical lineage, having evolved over time, with some rules becoming deeply entrenched within the fabric of the activity, while others maintain a more peripheral role of development. An individual's daily life is intricately interwoven with regulations that profoundly influence both individual and group behaviours. Engeström (2014) astutely emphasizes that human activities consistently transpire within a communal framework, characterized by a division of labour and a framework of governing rules. In these communal settings novel rules and divisions of labour can arise as a result of an activity, consequently influencing both the activity itself and the individuals involved.

2.6 Critique of activity theory

There has been some criticism of activity theory contending that the foundational tenets espoused by Vygotsky (1931) and Leontiev (1978) do not find a faithful representation within the framework, as activity theory tends to dissect into discrete units rather than embody the essence of social existence (Blunden, 2015). To address this criticism, it is vital to consider the distinctions Vygotsky, Leontiev, and their predecessors focused on when probing the intricacies of the human psyche, i.e. the psychology of an individual or groups of individuals. In contrast, Engeström's (2014) perspective on activity seeks to clarify the complexities inherent in human activity, allowing for explanation and enhancement, rather than a psychology of the human mind. His view can be seen as an advantage of activity theory, as the theory can be applied to various contexts allowing for a detailed exploration of activity without having to delve into the complexities of human psychology. Perhaps this why the separation between the original ideas of Vygotsky and Leontiev and the contemporary ideas of Engeström occurred. Bakhurst (2009) agrees that Engeström's approach to activity entails a shift from the study of the mind's theoretical aspects towards an empirical methodology for dissecting activity in the practical sense.

The transformation from the original ideas of activity by Engeström (2014) involves encapsulating multifaceted constructs within a structured framework that can accommodate broader comprehension. Consequently, the accessibility and user-friendliness of activity theory have facilitated its pervasive adoption across various domains. The simplicity underpinning the framework of activity theory also underlies its widespread integration across diverse fields of research. Nursing, as evidenced by Lei's work (2019), leverages activity theory to streamline patient

care and medical processes. Mobile phones, too, have harnessed the potential of activity theory, as demonstrated by Kamaruddin et al. (2011), wherein activity theory is used to examine user experience and functionality. Moreover, activity theory's influence extends to the realm of education, as exemplified by Plakitsi's exploration (2013), where activity theory was used to assess pedagogical innovation. Even the intricate domain of engineering has witnessed the transformative power of activity theory, indicative of its versatility and adaptability (Hite and Thompson, 2019). In essence, while critics argue for the potential disparity between original theoretical foundations of activity (Leontiev, 1978) and Engeström's activity theory framework (Engeström, 2014), it is crucial to appreciate Engeström's strategic simplification as a means to enhance comprehension and application across diverse disciplines.

Adding to the aforementioned criticisms, activity theory has been questioned for its effectiveness in fully addressing power imbalances (Bakhurst, 2009). In response, the discourse on multivoicedness and the concept of privileged voice within this Chapter can leverage such criticisms, allowing to conduct a thorough analysis of the intricate power dynamics at play, thus further emphasizing the adaptability of activity theory and the unique contribution this research brings.

2.7 Summary of literature review

The literature review presented the epistemological and ontological stance of this research which is rooted in historical sociocultural theory. The theoretical approach taken emphasises the interconnectedness of historical, cultural, social and institutional contexts in shaping human behaviour, interactions, and meaning making. The discussion on mediation highlighted the pivotal role researching mediation has in understanding technology mediated learning and student engagement. The intramental and intermental plane extended the discussion on mediation, delineating the different planes of mediation and the influences that bear on activity. Multivoicedness and privileged voice provide additional notions, bringing attention to the voice of technology and the intricate dynamics of power. The discussion also introduced the concept of virtual tools and signs, emphasising the role semiotic devices have in mediating cognitive processes and activities that take place in the virtual world where stimulus means are utilised to shape a user's actions. Engagement theory was also explored to expand the discussion of mediation to provide a comprehensive understanding of what engages an individual with technology. Collectively, the ideas presented in this Chapter offer notions that can aid in understanding the process of mediation when an individual uses technology.

Chapter 3

Methodology

3.1 Introduction

The overarching goal of this Chapter is to provide a clear and transparent presentation of the research methodology and data collection methods. In doing so, the credibility and authenticity of the research can be assessed by the reader and an evaluation of the methodology's validity and reliability can be made in light of the overarching objectives of this research. As previously discussed in Chapter 1, this research was founded on an epistemological and ontological position firmly grounded in historical sociocultural theory. The philosophical standpoint taken influenced the shaping of the research methodology and the selection of research tools that are presented in this Chapter. In the sections to come, I extend the exploration of knowledge, reality, and the values that underpin this research by providing a transparent description of the methodological decisions made. I first explore the rationale behind the application of a case study approach, offering a robust justification that aligns with the research objectives. Ethical considerations are then presented and the guiding principles that steered the research discussed. After which, I address the critical issues of reflexivity and insider research, emphasizing the measures taken to mitigate potential biases resulting from my dual role as a researcher and a university employee where the research was conducted. Subsequently, I elucidate the methods used for data collection, grounding the choices made in the current debates surrounding research methods and my philosophical stance. Finally, the discussion transitions to a detailed explanation of the data analysis method used and how data was gathered and analysed by applying a thematic approach as outlined by Braun and Clarke (2008). The omission of the research context from this Chapter was a deliberate choice. Consequently, I direct the reader's attention back to Chapter 1 for a comprehensive overview of the research context as it was deemed more appropriate to set the context at the start of this thesis to position the reader within the research setting.

3.2 Case study approach

Prior to the 1980s, the term case study was primarily associated with descriptions of participation and predominantly used within the field of anthropology and ethnographical studies (Platt, 1992). It was not until after the 1980s that case study research started to expand beyond its narrow confines. Subsequently, case study emerged as a more refined methodology with notable publications that explicitly focused on the application of case study design to research (Yin, 2014). The result of this was, an increased commitment to real time phenomena, with the primary goal of comprehending complex situations and seeking ways to understand them (Yin 2014). Given the

specific objectives of this research, which centred around gaining insight into the student's perspective of what engaged them, it became imperative to select a methodology that placed a strong emphasis on understanding user actions while the participants were interacting with technology. This section examines the particulars of applying a case study approach to the research, offering a thoughtful reflection on the rationale behind the choices made.

A comparative analysis between a case study approach and an experimental approach is useful in elucidating the rationale behind adopting case study methodology for this research. In an experimental approach, researchers seek to isolate participants from the real world, assuming that by doing so, the phenomenon under investigation can be separated from contextual influences and examined (Skinner, 1938). Furthermore, an experimental standpoint posits that by removing extraneous context and variables, it becomes possible to uncover the fundamental essence of the phenomenon being studied with enhanced clarity and precision (Bell, 2009). However, the detachment from real-world context poses a significant drawback, since it can lead to a limited understanding of the phenomenon being studied as the context is removed. Furthermore, the approach overlooks the fact that we exist and act within the complexities of the real world, where context is inseparable from a network of interconnected factors that influence individual actions and thoughts (Wertsch, 1985). Experimental research, due to its inherent design, lacks a comprehensive perspective on a phenomenon or draw out the complex interplay among the diverse contextual factors that affect the observed outcomes of human behaviour (Paparini et al., 2020). As Zellmer-Bruhn et al. (2016) contend, experimental research tends to observe discrete parts of the whole, thereby falling short in providing a comprehensive understanding of the underlying dynamics of what is being observed, an approach that this research consciously sought to avoid. In contrast to an experimental approach, a case study methodology acknowledges the rich tapestry of real-life interactions and avoids the isolation of phenomena, making it appropriate for capturing the nuanced interplay between users and technology. As the research objectives underscore in Chapter 1, the goal of the research was to capture authentic interactions between the user and technology. Therefore, a case study approach directed the research methodology as value was given to context and the real-life action of the student.

Yin (2014) gives a two-fold definition of case study as "... an empirical inquiry that investigates a contemporary phenomenon in-depth and within its real-world context [and that] the boundaries between phenomenon and context may not be clearly evident." (Yin, 2014, p.16). The importance of this research was situated in context. Rather than isolating individual phenomena, I embraced the complexities of what was being observed with the view of explaining the process of mediation in depth, as noted by Yin (2014).

Zeller-Bruhn et al. (2016) build on Yin's definition above and argue that case study has a focus on a specific phenomenon from multiple perspectives that attempts to understand particularity and complexity. This is similar to Foster et al's (2000) definition that highlights a case study approach as being committed to extracting an extensive depth of insights from a singular, specific phenomenon, with the overarching aim of comprehending contextual intricacies. The assertions of both Zeller-Bruhn et al. (2016) and Foster et al. (2000) underscore the significance assumed by this research, as it was vital that all parts of the context were undisturbed and not isolated. An experimental approach would not have given the depth of investigation required, potentially overlooking many nuanced interactions that case study values.

Becker and Ragin (1992) emphasise the importance of defining boundaries. Without clearly delineated boundaries, research could spiral into an obscuring of the phenomenon amid a multitude of diverse situations and contexts (Becker and Ragin, 1992), a point that is also been a criticism of case study (Hyett, 2014). Yin (2014) notes the point made by Becker and Ragin (1992) as the potential *blur* between the context and the phenomenon, thus emphasising the imperative of well-defined parameters within research design. The descriptions of Yin (2014) and Becker and Ragin (1992) are essential for preserving research integrity and coherence, a point that this research rigorously adhered to. Yin further notes:

A Case study inquiry copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as a result relies on multiple sources of evidence, with data needing to coverage in triangulating fashion, and as another result benefits from the prior development of theoretical propositions to guide data collection and analysis. (Yin, 2014, p.16).

Technology-mediated learning occurs within specific and unique settings and circumstances. As a result, there are numerous aspects worth investigating. However, I opted to narrow my focus in order to establish clear boundaries and maintain a specific aim aligned with the objectives of the research. I concentrated on observing how students interact with technology, their emotional experiences, their thoughts and their reflections on the interactions with technology. Aligned with Yin's (2014) advice above, I strategically applied triangulation to the collection of data to ensure that there was a clear focus of interest. Triangulation encompassed the utilization of multiple data collection methods, specifically: group interviews, verbal protocols, and student diaries. The deliberate choice of triangulation was a strategy aimed at enhancing the overall credibility, reliability, and validity (Bell, 2009) of the research. Moreover, the utilization of multiple data sources broadened the scope of data analysis and served to mitigate the likelihood of inaccuracies or biases.

Zellmer-Bruhn et al. (2016) argue that employing a case study methodology entails a trade-off between the attainment of a detailed sample and the potential decrease in the capacity to formulate broad, generalizable assertions. Contrarily, Yin (2014) challenges this perspective by contending that case study research possesses the inherent capability to yield insights of broader applicability and thereby enhance comprehension of phenomena, particularly when extending to comparable research settings. Key to Yin's (2014) argument is that research should have a theoretical stance before and during the research process as it aids the generalizability of lessons learned. Yin (2014) backs up his assertion by making a clear distinction between analytical generalization and statistical generalization. Statistical generalization makes inferences based on empirical data which has been collected from a sample population. Polls are an example of a method that can inform statistical generalisability. The results of a poll are formulated and then an inference is made of the general population with reflection on the research aims and literature. A case study rejects this line of enquiry as statistics do not transfer into making claims of a specific context and would inadequately represent the context being studied. Analytical generalisations are more appropriate for a case study approach as theoretical prepositions that are part of the initial literature review, and which have also guided results, will be either modified, added to, rejected or corroborated to form new theoretical propositions (Yin, 2014). Furthermore, to validate generalisability, similar research can be replicated in other contexts thereby strengthening case study findings (ibid).

Reflecting on generalizability, Morse (1999) remarks that a case study can give insight to those in similar contexts and with similar concerns to understand the essence of their own situation. To strengthen Morse's argument Beach and Pedersen (2016) note that,

... causes work only as part of more complex conjunctions, or only within a particular bounded context, we need to capture that complexity in our casual explanations instead of aiming for parsimonious explanations that would be incorrect in many instances. (Beach and Pedersen, 2016 p.231).

Beach and Pedersen's (2016) observation adds to this research's stance and justification of a case study approach, in as much as the phenomenon of technology-mediated learning cannot be explained by using quantitative data collection methods just to acknowledge that the findings and implications can be generalisable to the research community. Avoidance of overly simplistic and reductionist explanations of phenomena were avoided when considering the research design, and complexity and the recognition that context is part of what is being researched was embraced. Chapter 4 and 5, which are dedicated to the analysis and findings, underscores the profound level of contextual understanding illuminated by applying a case study approach. Moreover, the findings of the research give valuable input for shaping decision-making policies and fostering awareness of

the intricate dynamics between humans and technology, thereby reinforcing the justification for selecting a case study methodology.

3.3 Ethics

As the manager of the 4-week university preparation course, it was imperative to explore the literature on ethics, reflexivity, and my position as an insider researcher in order to ensure the credibility of the research. Data collection methods were aligned with the British Educational Research Association (BERA, 2018) guidelines with regards to the participants, research tools and research context. In addition, I completed the University of Bath ethical implications of proposed research form, which detailed my participant sample, confidentiality, privacy, deception and exploitation avoidance, methods and permission for the research. Both the BERA guidelines and University of Bath's ethical implications form ensured that my research conformed to current research practice in an educational setting. In the rest of this section, I discuss ethical considerations with the objective of making the research transparent and ethically acceptable. Subsequently, discussion is made of researcher positionality, reflexivity and insider research.

3.4 How participants were recruited

A participant information form was emailed to all students on the 4-week course detailing the research and what it meant to be a participant in it (Appendix 1 and 2). The email also contained an invitation to attend, if they wished, a presentation on what the research was and what a participant's involvement would be. I organised the presentation to give students the chance to ask questions, hear other students' questions and responses from me and receive clarification on the participant information form. The presentation included:

- An overview of the research and its goals
- My position in the research
- Why I was recruiting participants from the 4-week university preparation course
- What participants would be asked to do
- The benefits of taking part in the research
- The risks of taking part in the research
- Where data would be stored and who would have access
- The voluntary choice of participating
- How to withdraw from the research

20 students attended the online presentation which was recorded and distributed to all 45 students on the 4-week course to ensure that all students had an equal opportunity to participate in the research if they wished. The presentation was a useful addition to the participant information form as students that attended asked for clarification to points on the form which would not have been possible if an email alone was sent. A second email was sent one day after the presentation. This

consisted of an attached consent form, an explanation of the consent form, a link to the recorded presentation done the day before and information on how to complete the consent form (Appendix 3). Students were notified in the email that if they participated in the research, they would have the opportunity to use English in a natural setting, giving them the chance to improve their research communication skills. Additionally, students were reminded that in participating they would gain experience in how research is conducted which would help inform their own research that they may need to carry out once they started their postgraduate study. A total of 11 students (41%) agreed to participate in the research and completed and returned the consent form. This was a great success, as I was anticipating a low response rate of 15-20% of the student cohort. Consent forms were collected in electronic form and stored on a secure drive. No names were used in the collection of data and pseudonyms were used when referring to participants where necessary. Figure 2 details the 4-step process of recruiting participants for the research.

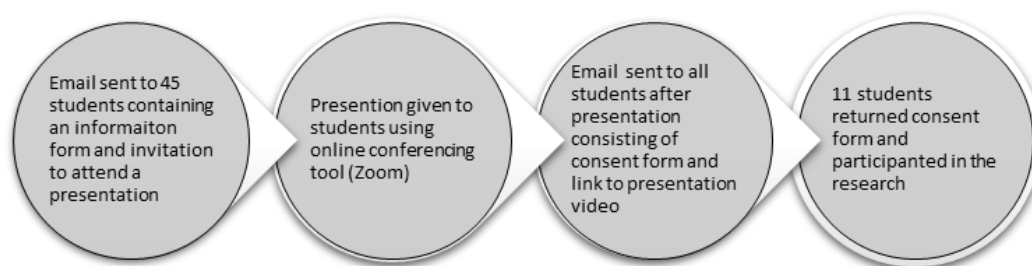


Figure 2: Stages of participant recruitment

3.5 My position in the research

A significant challenge faced was to establish a distinct identity as a researcher rather than being seen as the manager of in-session programmes. As manager of the various courses on the in-session programme my interaction with students is generally limited. I may at times cover classes due to a teacher being absent or follow up on student issues. However, for the 4-week course specifically I removed myself from the managerial actions that may have put me in contact with students, details of which are noted as bullet points below. The reasons for removing myself from front-facing interactions with students, was that I did not want the students to feel coerced to participate in the research, as they may have viewed participation as a duty and a request from the course manager. Contrastingly, knowing that I was manager may have had an opposite effect in as much as students might not have participated if they felt they did not want to be observed by the course manager. There was also the consideration of power conflicts and power imbalance if I was seen as the manager, which may have had negative effects on the participation process.

Therefore, I put several protocols in place to emphasise my identity as a researcher and not the programme manager of the 4-week course.

- I did not meet any of the students taking the course before or during the course as programme manager
- Students had direct access to a shared email box that both myself and administration had access to
- I did not teach on the course or cover classes
- I was not involved in the voluntary assessment period
- Teachers on the course were asked not to refer students to me but refer them to a colleague and the shared email for contact purposes
- I did not attend welcome and induction presentations

Upon reflection of the protocols I had put in place, I realised that not informing students about my withdrawal as the course manager at the time of the research could be perceived negatively and as unethical. During the presentation stage, while explaining to possible participants my research role and employment at the university, I should have clarified that I had previously managed the 4-week course but had relinquished this managerial role to focus on the research. In hindsight, providing a clearer explanation of my role at the university and my decision to step back from managing the 4-week course would have been more appropriate. This oversight relates to issues of positionality, student recruitment for the research and transparency with participants. However, the integrity, validity, and reliability of the research, as well as the soundness of the recommendations and implications, remain intact and were not affected by this oversight.

3.6 Reflexivity and the researcher

Research conducted within a specific time and place is inevitably influenced by the researcher's subjective perspective on the unfolding complexities being studied (de Laine, 2000). Debates surrounding whether a researcher can genuinely perceive what has occurred within a study, taking into account their personal beliefs and values, are tied to the broader ontological and epistemological stance when carrying out research (May and Perry, 2017). As discussed in Chapter 2, this research was steered by historical sociocultural theory. Consequently, the primary focus of the study revolved around the notion that, by exploring the contextual factors that shape individual behaviour, we can significantly improve the understanding of the phenomena being observed (Dodgson, 2019). Thus, it was essential to establish clarity regarding the research context and my position in relation to it, ensuring transparency and facilitating a critical examination for the reader. While the research context has been outlined in Chapter 1, the primary focus of this section is to present insights into reflexivity and how and why it was applied to this study.

The term 'reflexivity,' is a notion that served as a guiding principle in this research, underlying the commitment the research had with regards to transparency and impartiality. Berger (2015) gives a clear definition of reflexivity:

... reflexivity means turning of the researcher lens back onto oneself to recognize and take responsibility for one's own situatedness within the research and the effect that it may have on the setting and people being studied, questions being asked, data being collected and its interpretation. (Berger, 2015, p.20).

Reflexivity offers a framework that enhances the clarity, rigor, quality, and trustworthiness of research (Teh and Lek, 2018), all of which were goals I aspired to achieve. As a researcher of qualitative methods, it was essential to adhere to the description of reflexivity noted by Berger (2015) to mitigate any negative effects that I might bring to the research. Reflecting upon my own perspective and role as researcher, 'turning the researcher's lens back onto ones self', was an ongoing process I consistently embraced throughout the entire research journey, from the inception of ideas to the culmination of the thesis. Berger (2015) presents several elements that are essential to reflexivity which I actively practiced while conducting the research:

- Describe contextual relationships with participants in research.
- Focus on cultivating self-knowledge and sensitivity.
- Explore one's role in shaping knowledge creation.
- Engage in reflective analysis of personal biases, beliefs, and values.
- Examine personal experiences in research and their impact on bias formation.

(Adapted from Berger, 2015)

The elements highlighted by Berger (2015) not only guided the trajectory of this research, but also laid the foundational groundwork that influenced the way in which the study was conducted and how I perceived both the research process and the participants. I regularly engaged in self-assessment to mitigate the potential impact of my own beliefs, values and preconceptions. The self-assessment process was a vital consideration, as it minimalised bias that might have arisen from my expectations and personal perceptions of the observed phenomena (Buetow, 2019). Finlay (2002) also notes that self-assessment can identify areas where a researcher's own cultural perspectives might inadvertently contribute to stereotypes and preconceptions of the participants (Finlay, 2002). An example would be my role as the manager where I had preconceived ideas of the students taking part in the research. Therefore, I remained acutely aware of the power dynamics and imbalances inherent in the researcher-participant relationship and how I perceived the participants. To further increase my awareness of reflexivity, when interacting with the participants, I made an effort to create an environment where they felt comfortable discussing any concerns related to the research, adhering to the principles elucidated by Berger (2015), Buetow (2019) and Dodgson (2019).

Finlay (2002) raises a cautionary note with regards to the application of transparency in a research context, highlighting the possible inadvertent concealment of certain aspects of research results and claims. Concealment of certain details of the self, she argues, can obscure underlying inequalities that may be present in the research. Finlay (2002) supports her stance with a

perspective drawn from her own experience, emphasizing that researchers must acknowledge their inherent interests, which can stem from factors such as gender and social class, before others can rightfully point to potential bias, commenting that "... researchers 'claim their stake' by acknowledging their interests, stemming for example from their gender and social class, before others can point to 'bias'." (Finlay, 2002, p.18). Finlay's argument regarding concealment of the researcher's position, interests and social class carries weight. Her insight underscored how I critically assessed my own positionality and was cognisant of my background and biases that might have influenced the interpretations of the findings. Therefore, I remained aware of the findings and how I interpreted the research to ensure I did not overlook any possible perspectives and resulting biases (Finlay, 2002).

What resonates throughout Finlay's (2002) critique, and a recurring theme emphasized by proponents of reflexivity, is the researcher's need for self-awareness and openness. This extends to acknowledging unconscious biases, perceptions of participants and the self, the research context, participant relationships, and power imbalances. Such awareness was pivotal to this research, ensuring a transparent and equitable research process was practiced. Detailing reflexivity offers the reader the opportunity to evaluate the validity and credibility of the research by taking into account the contextual factors and the position of both the researcher and participants when evaluating the findings.

3.7 Insider researcher

Brannick and Coghlan define insider research as "... research by complete members of organizational systems and communities in and on their own organizations." (Brannick and Coghlan, 2007, p.1). In the case of insider research, the researcher is an intrinsic part of the context they are studying. For example, a lecturer conducting research on students within their own teaching environment or investigating a process within their institution would be considered insider research. Contrastingly, outsider research is disconnected from the organisation where the research is being carried out and/or where the researcher is not a member of the group being researched (Hayfield and Huxley, 2015). A key distinction between outsider and insider researchers lies in the familiarity with the research context. Insider researchers possess an inherent understanding of the intricacies of the context since they are an integral part of the process being studied, thus granting them a notable advantage (Bonner and Tolhurst, 2002). This is in contrast to outsider research, where the researcher has to make effort to understand many of the inherent intricacies of the context being studied.

A substantial body of literature explores the merits and drawbacks of outsider and insider research methodologies (Kite 1999; Miles and Huberman 1994; Preiss et al., 1974; Schatzman and Strauss, 1973; Tom-Orme, 1991). The fundamental distinction between the two approaches lies in the

insider researcher's privileged access to the research context and their intimate understanding of the participants, whereas outsider research lacks this inherent connection (Bukamal, 2022). Consequently, the insider perspective provides a distinct advantage by offering a deeper contextual understanding that can support the design of the research and the interpretation of collected data. What held significance for this research was the clear delineation of the drawbacks associated with insider research and how I mitigated the limitations inherent in the insider approach. Bonner and Tolhurst (2002) note seven disadvantages of insider research:

- Some perceive the researcher more as an advocate than a true researcher.
- Researcher biases can influence the interpretation of findings.
- Initially, the researcher may encounter challenges in reconnecting with the local culture.
- Uncertain or undisclosed researcher attributes.
- A tendency to rely on participants with whom the researcher feels at ease.
- An inclination to emphasize dramatic events rather than routine occurrences.
- Encountering conflicts related to one's roles and responsibilities.

(Adapted from Bonner and Tolhurst, 2002)

It was essential to reflect how the concerns raised by Bonner and Tolhurst (2002) were addressed in this research to enhance the credibility of the findings and provide transparency. Additionally, it was imperative to rebut the assertions of those who contend, in alignment with Morse (1998), that insider research lacks credibility due to the intrinsic duality of the researcher's role as both employee and researcher. The viewpoint posits that the dual role is incompatible where the researcher may find that they are in an academic position that is not defensible (Morse, 1999). Brannick and Coghlan (2007) provide a valuable counterargument by suggesting that researchers should embrace reflexivity, a concept discussed above, acknowledging both the strengths and weaknesses it introduces to the research process. By doing so, the research design can be adapted to reframe what is being studied and observed, thereby mitigating the concerns raised by Morse (1999).

Brannick and Coghlan (2007) emphasize the importance of effectively managing the dual roles of employer and researcher, maintaining clear distinctions within oneself when operating in both capacities. The concerns raised by Bonner and Tolhurst (2002), and the observations made by Morse (1999), were addressed in this research by considering reflexivity as discussed earlier and by adopting the following processes and procedures:

1. I was neither a course participant nor a student during the study.
2. I identified myself as a researcher specializing in technology-mediated learning to the participants.
3. I remained separate from the participant culture and had no contact with the students after the 4-week course concluded.
4. I consistently reflected on my positionality throughout the research process, including during the thesis writing stage.
5. I was conscious of my dual role throughout the study.
6. In this thesis, I have provided a comprehensive account of my role within the research.

7. The research was not pursued for financial gain; there were no monetary incentives involved.

In summary, to ensure transparency and impartiality, the concept of reflexivity and the concerns raised by insider research guided the research design and processes. Key elements of reflexivity included describing relationships with participants, self-awareness, recognising biases and understanding my personal experiences while conducting the research. The research also considered the cautionary note raised by Finlay (2002) regarding the inadvertent concealment of certain aspects of the researcher, emphasising the importance of acknowledging the researcher's interests and potential biases. It was also noted that insider research had clear advantages that increased the credibility of the research. Additionally, it was important to note that, as a researcher stepping back from my role as manager, I should have communicated this change to the participants. Failing to do so may have been perceived as intentionally deceiving the participants, though that was not my intention. In my effort to preserve the integrity of the research and accurately capture observations, I overlooked this aspect and the potential harm it could cause if participants discovered that I had not disclosed this information.

3.8 Reflection on ethical issues

The sections detailing my position in the research, reflexivity, and insider research were established to ensure that the study adhered to the ethical guidelines set by University of Bath and BERA. Each section addressed the ethical implications of the research process comprehensively. In this section, I will provide a reflective account of the research and my role as a practitioner, examining the impact of my position on the study and the ethical considerations involved.

Ensuring confidentiality and anonymity was paramount in the research, particularly given the personal and introspective nature of the diaries and verbal protocols shared by the students. I made sure to obtain informed consent from all participants, clearly explaining the study's purpose, procedures and their right to withdraw at any time without facing any consequences. During the group interviews, I was particularly mindful of the power dynamics at play, striving to create an environment where every participant felt comfortable and their voices were equally respected. Maintaining the integrity of the data was also a critical focus, as I endeavoured to avoid any misrepresentation or bias in my analysis of data. I recognized an ethical issue in not fully disclosing my role as the course manager to the participants, even though I had stepped back from managing the 4-week course at the time of the research. The lack of full transparency may have influenced their willingness to participate, as they might have felt pressured or concerned about potential repercussions. Moving forward, I am committed to addressing this oversight by ensuring complete transparency in future research endeavours, fully informing participants of all relevant details, including my role and position, to uphold ethical standards.

3.9 Data collection methods

In line with a case study approach, qualitative research methods were used for the collection of research data. It was not the aim of the research to collect quantitative evidence as this would have fallen short of understanding the student's interaction with technology in real life contexts, which has been argued in the sections above. It was important to use data collection methods that revealed the interactions participants were having with technology. Questionnaires were not used, as the collection of data would not have reflected the context of the interactions. Additionally, participants may have forgotten what took place, may have been dishonest in answering the questions, misinterpreted the questions being asked and/or may not have been able to convey feelings and emotions within a questionnaire (Richardson, 2004). There was also the consideration of the lack of personalization, accessibility issues and questionnaire fatigue when assessing whether to use questionnaires or not (Hammersley, 1992). To answer the research questions a detailed examination of real context was needed where I could collect data that included participants' emotions, feelings, actions and their immediate responses to using technology and completing online tasks. In the next section, the data collection methods used are explained, consisting of group interviews, verbal protocols and student diaries.

3.9.1 Group interviews

Vaughn et al. (1996) note that integrating focus group interviews with other qualitative methods can significantly enhance the validity of data interpretation. In the context of this research, group interviews not only supported the interpretation of verbal protocols but also revealed additional insights into participants' perspectives on technology. Vaughn et al. (1996) stress that, "Focus groups can introduce novel dimensions to data collection by virtue of their emphasis on dynamic group interactions" (Vaughn et al., 1996, p.13). Group interviews gave a valuable avenue for delving deeper into participants' utilization of technology and for gaining insight into the group's sentiments', emotional responses, and opinions with regard to technology. Moreover, having multiple participants present in the group interview aided the intersubjectivity of a reality shared by individuals (Schütz, 1980), dissimilar to one-to-one interviews, where statements are definitive with no-one present to affirm or question the statements being made.

Group interviews were scheduled to take place one week before the course commenced and on the final day of the course. Participants were invited to attend two group interviews 5 days before the start of the 4-week university preparation course and in the last week of the course. The first group interview was conducted online using a conferencing application as one participant was still preparing to come to the United Kingdom and a few were self-isolating in student accommodation due to COVID restrictions. The interview was recorded using a conferencing recording platform called Zoom. Participants had the opportunity to post questions in the chat, use any of the available

emojis, and choose to have their cameras and microphones on or off. Of the 11 students who agreed to participate in the research, 8 actively participated in the pre-course group interview. Subsequently, the post-course group interview was conducted during the last week of the course and on campus, with 7 of the 11 students taking part. It is worth noting that participants had the opportunity to become more acquainted with each other by the time of the second interview, which significantly contributed to a more relaxed and less tense interview atmosphere compared to the initial group interview. The on campus group interview was recorded using a high-quality sound recording device. Both the pre-course and the post-course group interviews spanned a duration of approximately 60 to 70 minutes. Employing both the conferencing tool and the recording device to document the interviews offered ample opportunities for in-depth analysis of the students' responses to my questions and the unfolding discussion, enabling a comprehensive exploration of their perspectives and insights.

The inclusion of group interviews as a point of data collection played a pivotal role in shaping the interpretation of verbal protocols by providing a diverse perspective on the phenomenon being researched. Moreover, the group interviews yielded invaluable insights into the practical realities of educational technology, as seen through the collective lens of the participant group. The strategic addition of group interviews not only bolstered the data collection efforts, but also gave substantial support to the interpretation of verbal protocols and diary entries.

Within the forum of group interviews, the multi-voiced nature of the participants became pronounced and enabled the group to engage in dynamic exchanges, where ideas were bounced off one another; various opinions were voiced; agreements and disagreements were aired; responses were refined through collective efforts; statements were elaborated upon, and individual perspectives on technology use were passionately presented (Preiss et al., 1974). Crucially, the use of group interviews fostered a rich atmosphere of a shared reality among individuals. As elucidated by Schütz (1980), *group context* underscores the collective nature of understanding, unlike one-to-one interviews, where statements are definitive and unilateral, group interviews enabled the affirmation and questioning of statements in the presence of peers. The interactive setting of group interviews added depth and nuance to the exploration of participants' perceptions and experiences with technology.

The questions presented during the group interviews were exploratory in nature, intentionally designed to encourage participants to openly discuss their opinions and feelings regarding the use of technology in the course (Appendix 4). While I had initially outlined several key topic areas to guide the group interview, I also provided participants with the freedom to introduce additional topics if it was deemed relevant. This freedom allowed participants to uncover and explore aspects of technology-mediated learning that may not have surfaced in a more structured interview setting.

By employing a semi-structured interview approach, participants were afforded the opportunity to engage in in-depth conversations about technology that held personal significance to them in the context they were learning in, enabling them to share their perspectives, insights, and concerns. The collaborative dialogue not only enriched the quality of the data collected but also heightened the study's overall validity (Hussey and Hussey, 1997).

3.9.2 Verbal protocols

Verbal protocols constituted a data collection method centred on participants and their cognitive processes during their interaction with technology (Yang, 2019). In the context of this research, participants were asked to use their computer to complete an online task while articulating their thoughts, feelings and reflections verbally in real time, as participants explained their actions and thoughts as they occurred. I individually agreed on a date and time with each participant to meet, based on their suggestions, which were outside of their scheduled classes for the 4-week course. I then booked a room on campus and sent an email to confirm the time, date, and location. Upon meeting at the confirmed location, participants were free to sit where they felt comfortable, prepare their computer and get ready to complete the online independent tasks. Once each participant was comfortable and had their computer ready, I briefed them that I would start recording their speech as soon as they began the task. I sat between 1-2 metres away from the participant with the recording device next to the participant. Appendix 4 provides a detailed example of a verbal protocol and the events that transpired.

Shaft (1997) assessed the credibility of verbal protocols and their effectiveness as a data collection tool in her published paper. She conducted research that compared verbal protocols and post-context questioning to determine the more effective method for elucidating a phenomenon within a specific context which, for her research, focused on evaluating computer programme comprehension among users. She concluded that, “[verbal] protocols, are considered a reliable source of data [and that] nothing can match the processing insights provided by a verbal protocol.” (Shaft, 1997 p.322). Supporting the claims made by Shaft (1997), Yang (2019) researched the veridicality of verbal protocols and concluded that the use of verbal protocols can be supported by other data collection methods as a valid approach to understanding a phenomenon. Yang (2019) notes that using verbal protocols by themselves does not adequately represent a context, as her participants found that it was hard to verbalise their feelings at times and could not always find the words to describe their thoughts. To mitigate the limitations that might occur when using verbal protocols, she developed guidelines that aim to increase the validity of using verbal protocols in research. The guidelines consist of: prompting participants to keep verbalising; a demonstration of a verbal protocol before applying it as a data collection tool; explaining what is expected from the participant and adopting other complementary methods where necessary. As suggested by Yang (2019), this research followed the proposed guidelines with an additional process of a practice run.

In doing so, the validity of verbal protocols was increased whilst also adding new guidelines to Yang's already established guide.

During and after the verbal protocols, I made notes which supported the thematic analyses, a topic I elaborate on later in this Chapter. The notes were used when analysing data and before listening to the recordings of the verbal protocols to prepare me for what I was listening to and to refresh any important points noted. Additionally, making notes helped me to follow the playback of the verbal protocols when analysing and interpreting data.

A total of 17 verbal protocols were recorded during the course of the research. Notably, one participant chose to record their own verbal protocol for a task they intended to complete later, as I was unavailable at that particular time. The verbal protocols were predominantly conducted in an on-campus setting, with the exception of three sessions that were facilitated online through an online conferencing platform. The primary purpose of my presence during the verbal protocols was twofold. Firstly, it was to ensure that students effectively articulated their thoughts and actions while engaging in various online tasks related to the course, which allowed for a deeper understanding of their cognitive processes and interactions with the course content. Secondly, my involvement enabled me to prompt participants to express their thoughts. For example, If students became quiet I prompted them by asking questions, such as; what are you doing?; what are you thinking?; why are you doing this?. Prompting questions served to elicit more comprehensive and reflective verbal responses from the participants (Yang, 2019). The duration of the verbal protocols varied, contingent upon the length and complexity of the online tasks assigned by the teacher on a given day. Consequently, the verbal protocol sessions spanned a timeframe ranging from 15 to 55 minutes.

3.9.3 Student diaries

Participants were encouraged to add daily reflections to a reflective diary over the 4-week period, with the flexibility to make entries at any time of the day and from any location. If daily entries were not feasible, participants were advised to add reflections whenever they had the opportunity. Therefore, some participants wrote a daily entry, others wrote a weekly summary and others wrote a mixture of the two: of the 11 participants, 5 had completed diary entries and returned the diaries to me at the end of the course. Appendix 5 shows examples of two of the participants diary entries. Reflective writing differs from verbal protocols and group interviews as it allows participants to express themselves in a thoughtful and candid manner, free from the anxiety of peer judgment (Travers, 2011). Student diaries were an integral part of the triangulation process, offering a unique perspective on the same phenomenon. As Yin (2014) and Yang (2019) note, the use of multiple data collection methods enhances the validity of case study research and supports the interpretation of verbal protocols. Moreover, student diaries provided crucial guidance for interpreting the verbal

protocols, with some diary entries directly linking to the online tasks students engaged in during the day. The alignment between diary entries and daily activities further enriched the data, contributing to a more comprehensive understanding of student engagement with technology.

The student diary had guiding questions in the front page to help students think of what to write. The questions were not prescriptive, and it was explained to students that they could write other relevant information if they chose. However, most students used the questions to guide their reflections with a few students writing entries that related to the phenomenon but not the guiding questions.

- What technology did you use today for learning?
- Have you used any of the technology before and when / why?
- What are your reflections on using technology today?
- Did you find any constraints in using technology?
- How was meaning conveyed to you in the tasks?
- Were you able to follow the tasks instructions?
- Did technology help you learn, how?
- Did technology stop your learning, how?
- Any other reflections?

3.9.4 Course online tasks

Paper was not used on the 4-week university preparation course instead; all material content was contained in the learning management system (LMS). Within the online materials there were daily online tasks that needed to be completed independently after or before classes (Figure 3 below). As well as observing the participants as they completed the online tasks, data could be easily accessed and viewed via the LMS to see how participants had answered the questions and how many attempts they had made. The task completion information was referred to when interpreting data as it provided another layer of information on how participants were interacting with technology. This was useful, as I could see how the participants had completed the tasks; how long it took them, and whether they attempted the task more than once.

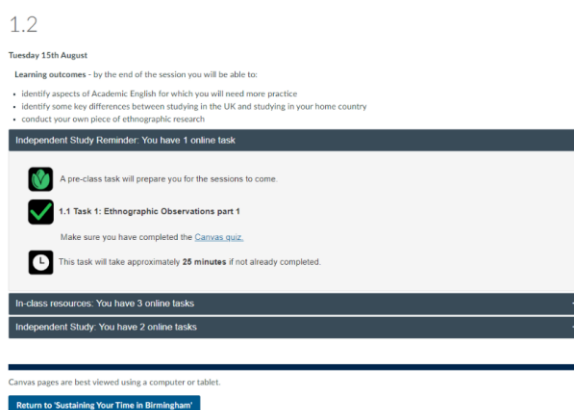


Figure 3: Learning management system daily schedule of online tasks

3.10 Data analyses

It was essential to conduct a meticulous analysis of the data within a structured framework to mitigate unconscious bias; prevent erroneous inferences; maintain consistency in the analyses; avoid overlooking relevant data, and refrain from making unwarranted assumptions regarding the nature of the analyses (Hammersley, 1992). Furthermore, since the data collection comprised of purely qualitative elements, such as recorded group interviews, recorded verbal protocols, and student diaries, it was imperative to extract meaning from what students had expressed across all three data collection sources with the view of answering the research aims. The thematic analysis framework proposed by Braun and Clarke (2008) was considered the most suitable choice for fulfilling the criteria mentioned above and for elucidating the nuances of qualitative data analysis.

The methodological foundation of Braun and Clarke's (2008) thematic framework was a natural selection as it harmonized with the case study approach adopted. Their thematic framework is designed to unearth themes within qualitative data, effectively distilling extensive data into distinct meaningful themes. The authors distinguish between two fundamental approaches for data analysis: semantic and interpretative. The semantic approach primarily involves developing a descriptive account of the findings, with an emphasis on theorising the "... significance of patterns and the broader meaning and implications." (Braun and Clarke, 2008, p. 84). Conversely, an interpretative analysis goes beyond the surface level description, seeking to uncover deeper meanings in alignment with existing theories of the specific field under investigation. An interpretive approach prompts questions such as, *What underlies the semantics?* operating under the assumption that spoken and written words are imbued with meaning grounded in personal experiences and perspectives. Given the research's overarching objective to understand the mediation process, I strove to ensure a comprehensive examination of both the visible and concealed layers of the data. Consequently, I employed a dual approach, combining both semantic and interpretative analyses. At the semantic level, I explicitly identified themes at face value, refraining from exploring beyond the apparent meaning, while at the interpretive level I looked to discover the operations and processes of mediation.

Braun and Clarke's (2008) framework comprise seven phases that directed the research in analysing the data collected from verbal protocols, group interviews and student diaries. Each of the seven phases was applied to each data set in turn, maintaining coherence and consistency across the three data sources. Each phase of the process is elucidated, detailing its relevance and application to the research with examples of the analysis where appropriate.

Phase 1: Familiarising myself with the data

As I had collected the data and had conducted the group interviews and verbal protocols, I was already immersed in the context of the research and the participants' activities. I was present for 16 of the 17 verbal protocols and the pre-course and post-course group interviews, which was my initial exposure to the data. I could not be present for one verbal protocol session because the student was unavailable at the agreed time. Subsequently, the participant recorded the session after the course and forwarded me the file.

Having recorded verbal protocols and the group interviews, I listened to the recordings several times and familiarised myself with them. I also went over the student diaries to familiarise myself with what the participants had written. In being immersed in the raw data, I started to gather my initial thoughts about possible themes and ways of capturing the participants' thoughts. Additionally, I developed a keen interest in capturing moments that illuminated the mediation process, prompting me to explore ways of categorizing the valuable insights. I took notes on how I might describe and code the data during this phase which prepared me for phase two.

Phase 2: Transcription of verbal data

My analytical framework centred on identifying patterns within the elements of Activity Theory (AT) and the mediation process. I transcribed each verbal protocol in a straightforward manner, noting only the speaker's name and their statements. For an example of a transcribed verbal protocol, refer to Appendix 4. Braun and Clarke (2008) acknowledge that what is essential at this phase is, "...that the transcript retains the information you need, from the verbal account, and in a way which is 'true' to its original nature." (Braun and Clarke, 2008, p, 88). At this stage I begin to identify patterns, such as participants' frustration with using technology and their consistent pauses before transitioning to the next technological feature. I also reflected on the mediation process and its alignment with the concepts explored in the literature review.

Phase 2 was informed by the insights I gained during Phase 1, providing me with a deeper understanding of what participants had expressed, felt, and acted upon, as I had reviewed all recordings and diary entries multiple times before beginning Phase 2. At this stage, I also noticed distinct differences between the verbal protocols, group interviews, and student diaries. Each data collection method revealed different aspects and perspectives of the research phenomena, and I began to see how the three data collection methods collectively supported the research objectives. For instance, when participants wrote in their diaries, they provided detailed descriptions of their interactions with technology that day, insights that were not captured in the verbal protocols (see Appendix 5).

Phase 3: Generating initial codes

Coding was directed by the various words and phrases used by the participants in all three data sets. For instance, I assigned code 4 to any instance in the data collection where there was a

noticeable pause in technology use, while code 5 was used for instances where technology-related instructions were given during the online task. It was important that the data was coded in this way to ensure consistency and ease of reference, as there was a large amount of data to work with. The data was extensively read and systematically worked through. This took much time, as I found that I needed to read the transcripts and diary entries several times and listen to parts of the recordings repeatedly to ensure the data was coded correctly and nothing missed. Data was coded in response to the research questions and aims and irrelevant data was left as it bore no interest to the research.

To code the text I used a free web-based software called Taguette (app.taguette.org). Appendix 6 examples a downloaded sample from the software and how it was coded. This proved very useful and efficient as I could upload my notes and then highlight areas and tag sections with reference to my coding system, all within the web-based platform. When the text had been coded, I was then able to download the completed document in Word format. I also had the option to download Excel sheets with the coding and merge the data sets as I wished.

Phase 4: Searching for themes

After completing phase three, I had a list of codes which needed to be analysed to create themes. Braun and Clarke (2008) note that this phase re-focuses the analyses at a broader level, unlike phase 3 which is narrowly focused to identify suitable codes. I used a thematic map to bring together the main themes and sub themes which was completed using paper and pen. For example, in the instances coded as 4, I observed that participants frequently paused to figure out how to use the technology to progress in the online tasks, which led to the emergence of the theme 'navigating technological challenges'.

Phase four was time-consuming, as I meticulously ensured that the themes were precisely aligned with a nuanced understanding of how students interacted with technology. The software application was particularly helpful, allowing me to isolate specific themes; for instance, I could easily access all notes related to code 10, 'technology was easy to use'. This feature provided a valuable overview of the various themes, enabling me to categorise them as needed.

Phase 5: Reviewing themes

In phase five, I reviewed and refined the tagged themes to ensure accurate categorisation. During this phase, I made necessary corrections to the data coding and rearranged themes as needed. This step was invaluable, as it allowed me to enhance and correct my data analysis. I also began connecting the themes to concepts of mediation, activity theory and the interactions occurring between the participants and the technology.

Phase 6: Defining and naming themes

In this phase, I reflected on the emerging themes, such as 'navigating technology challenges' and 'technology previously used and familiar,' and confirmed their final definitions. Key findings were beginning to surface from the data analysis and I started interpreting the themes to explain the mediation process. This was an exciting part of the research, as I was able to relate many of the themes back to the literature review, providing deep insights into technology mediated learning and how students were engaging with technology

Phase 7: Producing the report

Phase seven involved the interpretation and composition of the data analysis and findings Chapter within the research. While developing the findings Chapter, I presented the themes from the participants' viewpoint that gave strong indications of what was taking place when students were mediating technology. The key to phase seven was to answer the research aims and provide an analytical story that was concise, coherent, logical, non-repetitive and interesting (Braun and Clarke, 2008).

3.11 Research aim, theory, methodology and methods

My epistemological and ontological perspective significantly influenced the methodology adopted for this research. As outlined in Chapter 2, Section 2.1 on historical socio-cultural theory, the primary objective of this research was to observe student engagement with technology in real-time and within a natural context. The assumption is that the approach will yield a more authentic and nuanced understanding of the mediation process (Engeström, 1999; Wertsch, 1993; Rogoff, 1995; Cole, 1996), thereby highlighting what specifically engages the students. The research questions were developed to guide the literature review and research methods, aiming to integrate the historical sociocultural context of technology use and address a noted gap in the current literature, specifically the lack of research examining the mediation process between student and technology.

A case study methodology was employed to facilitate the research aim, as it allowed for an in-depth exploration of observable phenomena and provided a comprehensive understanding of complex issues within real-life contexts (Yin, 2014). Given the overarching theoretical framework of historical sociocultural theory, which emphasises the importance of context and social interactions, a case study approach enabled a detailed exploration of student engagement with technology as it occurred naturally. The case study approach facilitated the observation of student engagement within specific environments, yielding rich, contextual insights. By employing data collection methods such as student diaries, group interviews, and verbal protocols, the study was able to capture the multifaceted interactions between students and technology, thereby providing a deeper understanding of the mediation process. Furthermore, the data collection methods provided rich, contextual data that aligned with the historical sociocultural theory of activity (Vygotsky, 1931;

Leontiev, 1978; Engeström, 1987), ensuring a comprehensive understanding of the engagement process.

3.12 Validity and Reliability

The research design addressed issues of validity and reliability through a range of considered strategies that align with qualitative research approaches (Hammersley, 1992). Triangulation was employed as a key methodological tool to enhance both validity and reliability. This was achieved using multiple data collection methods to corroborate findings and ensure that the research captured a more comprehensive and accurate picture of the participants and their interaction with technology. Triangulation consisted of a combination of two group interviews, 17 verbal protocols, and 5 student diaries, all of which provided distinct but complementary perspectives on the participants' experiences with technology. The inclusion of three distinct data sources strengthened the internal validity of the study by reducing the potential for researcher bias or single-method limitations (Hammersley, 1992). The convergence of evidence from the three data collection methods ensured that the conclusions drawn were robust and grounded in multiple layers of data.

Reflexivity was fundamental in ensuring the validity of the research, as it involved a continuous self-assessment of biases and a critical reflection on my role and influence throughout the research process. In the methodology chapter, I detailed how the application of reflexive practices allowed me to critically examine and mitigate the potential influence of personal biases, assumptions, and prior experiences on both data collection and interpretation. Adopting a reflexive stance was particularly crucial to my qualitative research approach, where my own subjectivity could have significantly influenced the outcomes (Finlay, 2002). By explicitly acknowledging and addressing positionality and its potential impact on the research, I introduced a level of transparency that strengthened the credibility and trustworthiness of the findings. Furthermore, reflexivity not only reinforced internal validity but also enhanced construct validity by ensuring that the findings authentically represented the participants' experiences, rather than being influenced by my own preconceptions or biases.

The research also gave attention to reliability through a rigorous and systematic approach to data collection and analysis. The verbal protocols, for instance, were carefully structured according to established guidelines (Yang, 2019), ensuring that participants were able to express their thoughts and experiences in a manner conducive to reliable data collection. Attention to methodological rigor in eliciting and capturing verbal data was critical for ensuring that the research results were consistent and reproducible. Furthermore, by thoroughly documenting the processes involved in data collection and analysis, the study enables replication and invites further scrutiny, thereby strengthening external reliability. Reliability of data interpretation was also enhanced through the application of thematic analysis as the primary method of data analysis. Thematic analysis, allowed

for the identification of patterns across data sets, contributing to the consistency and dependability of the findings (Braun and Clarke, 2008).

The case study approach applied to the research contributed to both validity and reliability as it allowed for an in-depth exploration of the complex phenomena within a real-life context (Yin, 2014). By clearly defining the case study boundaries and justifying the case selection, the research design ensured coherence and relevance, which further bolstered the internal validity of the study. The attention to context-specific details also strengthened the transferability of the findings, a key component of external validity, as it allows other researchers to assess the applicability of the results to similar contexts (Yin 2014).

In summary, the research design effectively addressed concerns of validity and reliability through triangulation, reflexivity, methodological rigor and a transparent case study framework, ensuring that the findings were both credible, dependable and replicable.

3.13 Summary of Chapter

The methodology section has detailed the application of a case study approach, justifying its appropriateness with reflection on the research aims and the epistemological and ontological positionality of the research. A strong emphasis on ethical considerations was highlighted, adhering to the quality and standards set by BERA and Bath University. Additionally, critical reflections on reflexivity and the complexities associated with insider research were noted, underscoring their importance in the research process. The selection of qualitative research methods, including verbal protocols, group interviews, and student diaries, was underpinned by the principle of triangulation, aiming to uncover the intricate dynamics of the mediation of technology. The incorporation of Braun and Clarke's (2008) thematic analysis framework underscored the structured data analysis approach taken, which was geared towards unearthing valuable insights into technology-mediated learning from the student's perspective. The relationship between the research aims, problem, theory, and methods were discussed, highlighting how the overarching historical sociocultural approach guided methodological choices. The data collection methods focused on capturing the mediation process, ensuring the research design effectively recorded real-time interactions and student engagement with technology in natural contexts. This approach provided a comprehensive and nuanced understanding of mediation, aligning the theoretical framework with practical data collection strategies.

Chapter 4

Findings

4.1 Introduction

The primary objective of the research was to investigate how technology mediates learning, what it means to engage learners through educational technology, the challenges students face when technology fails to engage them, and the key considerations in designing technology to support ongoing student learning. This chapter synthesises the findings in relation to the research questions and objectives outlined in Chapter 1 of this thesis. The initial section in this Chapter provides an exposition of the research findings with a specific focus on what took place when participants interacted with technology, their thoughts, feelings and actions. The discussion then moves to a critical analysis of how external forces simultaneously influenced the participants' actions whilst limiting their access to technology utilisation. Subsequently, the discussion transitions to engagement theory, which facilitated the description of engagement from the participants' perspective. Within the concluding section, an examination and summarisation of the findings is undertaken, affording a comprehensive description of the research findings, in turn paving the way for the ensuing Chapter 5 of this thesis which discusses the findings in light of activity theory and engagement theory.

4.2 Data analysis

An observation arising from the research highlights a distinct division in participant performance when it came to completing online tasks and using technology. Some participants seamlessly used technology and on different occasions, the same participants encountered challenges with technology, momentarily switching task focus to a focus on technology as they needed to understand how to effectively leverage technology to complete a task. While the primary object for the participants was task completion, the shift in emphasis toward surmounting technological challenges unveiled a distinct facet of the subject-object relationship. I provide several illustrative examples in this section that illustrate how the participants navigated technological challenges. The vignettes, noted as excerpts, presented exemplify recurring themes identified in the verbal protocols, which were consistently observed across multiple protocols from various participants. The instances presented should be understood as recurring patterns throughout the data collection process, rather than as one-off observation. After presenting the excerpts, I provide a brief analysis of the findings.

4.2.1 Navigating challenges: from routine operations to overcoming challenges

As part of their daily use of technology, participants navigated through several interconnected webpages to access the day's online tasks, consistently following the same specific process throughout the 4-week course, as highlighted by Maryam in excerpt 1.

Excerpt 1

Maryam: I switch on my computer to get to Canvas. I open my browser and sign into Canvas. I am at the dashboard and now I click the 4-week course. Click the week ... click the day Click the task.

Excerpt 1 can be summarised as the following process, 1-7 below, which all students had to do to navigate to the daily tasks.

1. Open up their browser
2. Go to the Canvas (LMS) sign-in webpage
3. Sign into Canvas
4. Enter the Canvas dashboard and choose the 4-week course
5. From the 4-week course homepage select the appropriate teaching week
6. From the teaching week select the appropriate day
7. From the appropriate day select the appropriate online task

After navigating to the online task (steps 1-7 above), participants used additional links and LMS features to answer the questions, which varied each time. Kirk's verbal protocol, excerpt 2 below, demonstrates the daily routine that all participants followed to access tasks, though Kirk did not verbalise the process, as highlighted in excerpt 2, Maryam did at the start of the course: as shown in excerpt 1.

Excerpt 2

Kirk: I am trying to do the next one ... and I have already opened Canvas (LMS) ... and I am now on the quiz page, and I am checking the title ... it reads I have to finish a checklist and there are two questions ... so I have to start here.

Kirk's subject-object relationship was focused on completing the task assigned by the teacher for that day. He followed the initial steps to navigate technology (steps 1-7) without verbalising his thoughts. His actions were sequential and appeared to require little conscious effort, as he had become familiar with the process to access the day's task. The lack of verbalisation suggests that he was using technology in an automated manner. In other words, his actions had become ingrained and routine, transitioning into operations (Leontiev, 1978), a pattern observed with all the participants the more they used the LMS.

At the start of the course, participants like Maryam (excerpt 1) would verbalise the steps they took to reach the day's task, a process that later became automatic, as seen with Kirk (excerpt 2). However, Lilly struggled to navigate to the day's task, suggesting she had not done it before and was

unfamiliar with the correct process. She did not know how to find Monday's week 1 task and required assistance as excerpt 3 highlights.

Excerpt 3

Lily: I am doing something about my course?

Researcher: You need to start on your Canvas [LMS] course.

Lilly: Oh my Canvas course? (Lilly remained silent for a prolonged period of time, and it started to become apparent that she was unfamiliar with accessing the task on her own, following steps 1-7 above)

Researcher: Do you know your task for today?

Lily: Yes, mmm, how to get to it?

Researcher: Open your browser, then type canvas/bham.ac.uk

Lilly: Ah yes I see thank you

Lilly's primary subject-object relationship was to complete the task; however, she needed to familiarise herself with the technology interface and work out how to use it, rather than immediately addressing the task question as with Kirk in excerpt 2. Lilly's verbal expressions conveyed a focus on understanding how to utilise technology to reach the task, her actions had not transitioned to operations and she was focused on how to use technology to arrive at the days task. In contrast, Kirk's subject-object relationship which was centred on accessing the task and answering the question, as his actions had transitioned to operations, requiring little conscious thought (Leontiev, 1978).

4.2.2 Moving between different processes: technology use and task completion

Aliyah participated in a pre-course discussion board activity a few days before the 4-week course began and before meeting her peers and teacher. The discussion board was the first task assigned to participants and marked their initial interaction with the course technology. It included four questions for participants to answer, as shown in Figure 4.

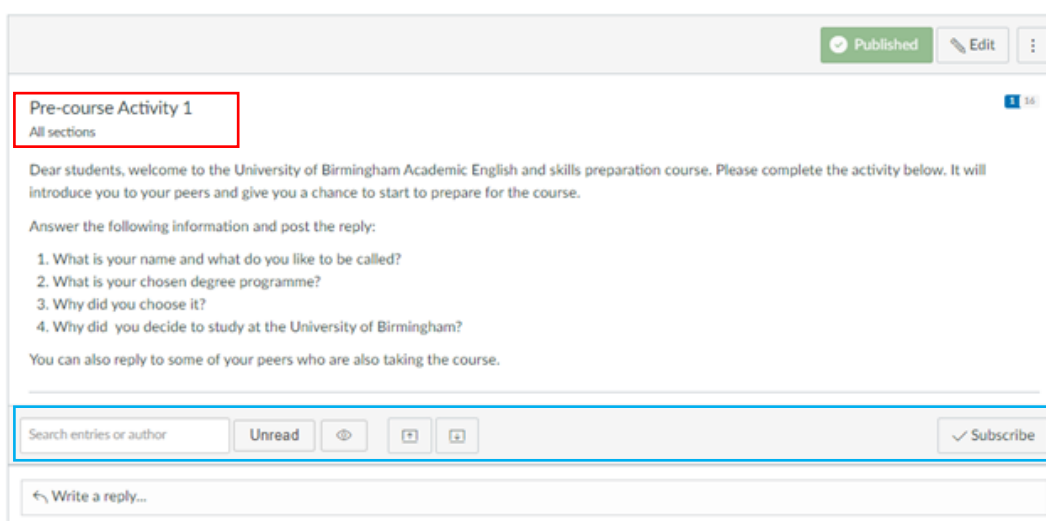


Figure 4: Pre-course discussion board with task questions and instructions

Aliyah navigated the initial webpages to access the day's task in a similar manner to Kirk in excerpt 3, as her actions had become more operationalised. She read each discussion board question and responded verbally, as illustrated in excerpt 4.

Excerpt 4

Aliyah: Now I am trying to read the pre-course activity one. Okay, which says complete the activity one below ... it will introduce you to your peers and give you a chance to start .. ah ... to prepare for the course. Okay, what is your name and what do you like to be called. My name is ... should I answer it?

Researcher: Read it and see what you need to do.

Aliyah: Okay ... My name is [Aliyah] and I like to be called [Aliyah]. What is your chosen degree programme. Er.. my programme is master's degree in microbiology and infection.

After answering question 3 and 4 in the discussion board, the verbal protocol continued.

Aliyah: Em ... okay ... Is that all?

Researcher: Do you think you have done the task correctly?

Aliyah: Yes [scrolling up and down on the webpage]

Researcher: Do you want to read it again to see if you have?

Aliyah: [pause] I think I have to reply to the question and answer it. Like typing, typing the answers not verbally answering I see.

After verbally giving the answers to the 4 questions in the discussion board Aliyah looked at me and asked, 'Is that all?'. Her question demonstrated that she did not realise that she needed type a reply in the text box of the discussion board (Figure 4: blue outline). After a period of silence, I gently prompted Aliyah and inquired whether she believed she had completed the task, she responded 'yes' while scrolling the webpage up and down. I then asked if she could read the task again to see if she had completed it correctly. Thereafter, she redirected her attention towards the discussion board, scrolling both up and down on the webpage. After a pause of sometime she then realised that she had to compose a written response to the discussion board questions and post the answers.

It could be argued that Aliyah's engagement with the discussion board was influenced by the verbal protocol itself i.e., the thought she needed to verbalise the answers. However, upon examining other verbal protocols and her response to my prompt question, a noticeable transition in focus was evident. Her attention shifted from task completion to utilising technology and understanding its features and functionalities. As with Kirk's use of technology (excerpt 3), Aliyah had initially moved through the use of technology that was operationalised. When she arrived at the discussion board, her learning was disrupted as she had completed the task incorrectly due to a lack of awareness of what she needed to do, which required me to elicit a thought from her to see if she had completed the task correctly.

The subject-object relationship, as expounded by Vygotsky (1931), gives attention to the mediation process, where the object serves as the guiding motivation for the subject's actions. Objects of activity shape meaning, wielding significant influence over the way in which the subject makes sense of a situation (Kaptelinin, 2005). This can be seen in the observations made by Kirk, Lilly and Aliyah. Their comments revealed that at times, the object was learning, and at other times the object was using technology, both of these being goal-orientated activities. Examining Aliyah's goals in particular, the object was to complete the task, and her aim was to answer the questions in the discussion board. However, initially she was not aware that she needed to post written replies to the question. In addition to the subject-object relationship, there was a social and cultural meaning (Vygotsky, 1978) attached to the discussion board that implied its function to create discussions amongst the people using it and that there is a need to type and post replies. Knowing how to use the tool comes from historical experiences of using a discussion board. Yet, in this scenario, if a student has not previously engaged with the discussion board, there is a lack of historical reference to draw from, limiting the depth of social and cultural significance.

Throughout the verbal protocols, it became evident that the participants initially aimed to complete the online task, but that the object shifted as they realised that utilising technology was a necessary step in achieving task completion. At first, Lilly's attention was on finding her way to the task, but she later redirected her focus toward the task itself after receiving guidance. The apparent shift in object underscores a significant challenge for both Aliyah and Lilly, where they had to momentarily pause and direct their efforts towards comprehending the intricacies of technology, deciphering the tool's significance to them and mastering its usage for learning to continue. It is significant that learning how to use technology itself was not the primary task. Nonetheless, technology played a crucial role in the task, as participants relied on the effective use of technology for successful task completion, indicating that the integration of technology into the task served as a *hidden* or *unstated* learning objective in itself and introduced an additional layer of learning for the users.

Aliyah's understanding of using a discussion board improved through the duration of the course. As she completed various tasks, she began to appreciate the tool's deeper significance and gained a clearer understanding of its use on the course. With each subsequent encounter, the technology acquired an additional layer of meaning for Aliyah, which she built upon, drawing from her prior experience with the pre-course discussion board. Similarly, Lilly's understanding evolved as she received initial guidance from me in navigating to the tasks, akin to Rogoff's (2005) concept of *context manipulation*, where the novice observes the *master* emulating their actions leading to a heightened level of clarity and comprehension of using the tool and where mediation on the intermental plane transforms to the intramental plane (Werstch, 1993). However, *context manipulation* was not a common observed practice as students completed their online tasks independently.

In the context of activity theory, an individual's participation in an activity is shaped by tools and signs, with the goal of achieving specific objects. The primary object for the participant can vary, sometimes focusing on task completion and other times on the use of technology to access the task. The variation in object suggests that multiple subject-object relationships exist within a single activity. Leontiev argues that activities are distinguished by their objects: "The main thing that distinguishes one activity from another, however, is the difference of their objects" (Leontiev, 1978, p.98). However, in Lilly's case, different objects do not correspond to different activities, revealing a theoretical inconsistency that needs further examination.

4.2.4 Ruptures in mediation and disruptions in learning

Robin's learning was clearly disrupted when the object of activity shifted to using technology to complete the same pre-course discussion board task as Aliyah in excerpt 4 above.

Excerpt 5

Three minutes into the task, Robin fell silent for some time.

Researcher: What are you thinking?

Robin: I don't know where I should post I just have no idea where I need to post my answer.

Robin continued to view the page in silence

Robin: I just scroll down

Robin fell silent

Researcher: What are you thinking now?

Robin: I'm trying to know how this works... and trying to figure out how to complete this activity.

Robin stared at the screen

Researcher: How do you feel?

Robin: I'm a little bit uncomfortable ... because I'm not familiar with this activity... I don't know what I can do.

Researcher: Can I see your screen?

Robin: Yes, can you see now?

Researcher: Yes, thanks. Can you refresh your page? Can you see now what you need to do?

Robin: I think this is a requirement ... answer the following information and post the reply So where do I need to post the reply?

Researcher: Can you see anything that can help you ... scroll down ... does that help?

Robin: Oh here ... sorry ... I need to write my information down.

Excerpt 5 highlights that Robin understood that she needed to post a reply on the discussion board, but she was unsure where to do so. She expressed that she was completely unaware of where to post her answer and continued to view the page in search of the correct location. When asked what she was thinking, she explained that she was trying to figure out how the process worked and how

to complete the activity. After a few minutes, she admitted feeling uncomfortable and unfamiliar with the activity, unsure of what actions to take. As Robin continued to try to understand how to post a reply, she became more emotionally expressive and increasingly frustrated. It became apparent that her relationship with the task was centred around the use of technology, which was hindering her ability to complete the task. This caused a disruption in the learning process, prompting her to reflect on how to resolve the conflict she was experiencing with technology.

After searching for how to post her reply, I asked Robin if I could look at her computer screen, as she was becoming more agitated. Upon seeing her screen, I noticed that she had mistakenly typed the word 'policy' in the search entries or author text box instead of the designated text box for posting a reply. I prompted her to refresh her web browser and asked if she could now see what needed to be done next. Upon reviewing the page again, she noted that the instruction to 'answer the following information and post the reply' was part of the task, but she still did not know where to post her response. She wondered if she should use the search entries or author text box, as she had initially done. I suggested she scroll down to see if there was anything that could help her. It was then that she noticed another text box labelled 'write a reply.' It had not occurred to Robin to scroll down to check for additional information which could have been helpful. Although Robin understood the purpose of the discussion board, she could not find the appropriate text box for typing her reply.

Both Robin's, Aliyah's and Lilly's verbal protocols reveal a noticeable shift in the subject-object relationship. Their primary focus of task completion shifted to grasping how to use technology, in turn disrupting their learning process and causing a transition in the subject-object relationship towards comprehending and effectively employing technology itself. Participants transitioned from merely trying to complete the task to a focus on how to utilise technology effectively in order to achieve the task. These transitions marked pivotal moments in activity, where clear changes in the subject-object relationship were evident, accompanied by ruptures in mediation and a disruption in learning.

4.2.5 Participants persist despite the challenges of technology and disruption to learning

Throughout the verbal protocols, participants encountered technological challenges to varying degrees. Despite the difficulties, they consistently demonstrated resilience by persisting in their efforts to complete the tasks, refusing to give up or abandon the task entirely due to the challenges of using technology. Comments, like those in excerpt 6 below, were made frequently and were a common feature across all 17 verbal protocols and among all participants. These comments were not restricted to specific moments within a given protocol rather, participants often interspersed multiple comments throughout the task, adding more comments as they progressed where

technology disrupted task completion. After initial struggles and expressions of indecision regarding the use of technology, participants eventually overcame the challenges they faced and continued with the task until they encountered a new technological hurdle or completed the task.

Excerpt 6

A collection of comments made by participants during the verbal protocols.

Kyra: I'm uncertain about where to click; It appears to be malfunctioning; I click here, I think.

Kirk: I've located a button and I believe it's the correct one to click. I am confused.

Aliyah: Is this the appropriate link?

Maryam: I don't know what to do here. What should I click?

Robin: I can't find it here. What should I do?

Ainsley: Ah, it seems that I can't see the answers.

Cherry: If I click submit, can I go back again, can I check? I can't find what I read before. I feel frustrated.

The comments made by participants followed a noticeable pattern, often accompanied by pauses. These pauses were intermittent, followed by a return to the task as participants became more accustomed to the features of technology. However, as they adapted, they frequently encountered new technological obstacles, repeating this cycle until the task was completed. The verbalisations participants made indicate their challenges with technology, and after expressing these difficulties, they would then articulate the task itself, as illustrated by Kyra's comments in excerpt 7.

Excerpt 7

Kyra set up her computer in the room and opened the day's task on her laptop. The excerpt begins one minute after she navigated to the task to answer questions to a quiz.

Kyra: I don't know where to click ... I then start reading ... I need to wear my glasses ... I don't want to expand it [webpage] as it becomes difficult to read ... then I read it.

Researcher: What are you reading now?

Kyra: reading instructions ... qualitative approach ... this what we did in class [a long pause]

Researcher: Do you know what to do yet on this task? What is your focus?

Kyra: What qualitative research is and [she reads the text] [a long pause] So ... too ... try to get data from the people kind of ... objective data from people who you get the data from ... I have to read to do the quiz and get a good score.

Kyra examines the web page, reads the information, and tries to understand what the task requires and how to use technology to answer the quiz questions. Fifteen minutes pass.

Kyra: I wasn't very sure what I should do so I just try to click and see what is in there and then try to figure out what I should do [pause] ... amm ... so I [pause] ... am not sure what I ... take a look ... click the links then what should I do ... click take a look and click ... and what then ... then what should I do ... maybe I should go to these articles that read it... which one of these are relevant to ethnographic observations ... now I understand what I should do ... it takes a long time.

Kyra intermittently alternated in and out of technology use and task completion with little sign that she was going to give up. The task took Kyra 40 minutes to complete which was noted in the task instructions as a 20-minute exercise. During technology-related challenges, participants displayed a clear and unwavering focus on mastering technology they were using, drawing from their historical experiences to navigate uncertainties. Their persistence and determination to surmount these challenges were evident, as technology stood as a barrier hindering their task completion. To maintain motivation throughout the technological challenges, there were compelling factors propelling participants to persist, otherwise they might have succumbed to frustration and abandoned their efforts and chose not to carry on (Reyman, 2013).

4.2.6 Participants devise strategies when navigating unfamiliar technology

Intermittent pauses and comments as noted above, underscored moments of disruption in the learning process, prompting participants to reflect on their next steps. During these instances participants would enter a prolonged pause while fixating their gaze on the monitor. To understand what they were thinking when a pause occurred, I would enquire 'what are you doing/thinking now?' The participants responses can be categorised into two main types as follows: A) Reading task instructions and questions to move on in the task; B) Finding out how to use the technology to continue with the task. The research focus was on the mediation of technology and did not primarily focus on task instructions. Consequently, category A response types are not referred to, but response type B are of significance for further elaboration.

An illustrative example of participants pausing and making comments, briefly becoming silent, and then responding when asked 'what are you thinking now?' can be found in Kyra's attempt to complete an ethnographic observations quiz: excerpt 7. At the beginning of the verbal protocol, Kyra voiced her uncertainty about using technology with the statement, 'I don't know where to click,' which was followed by a noticeable pause. She then proceeded to attempt various actions by clicking links and going back to a previous webpage by clicking the *history back icon* in the web browser. Kyra seemed to be demonstrating a trial-and-error approach to find out what to do next with technology. After some time, she clicked the correct link and started to read the instructions in the quiz. There was a long pause as she read the text that appeared when she navigated to the quiz, as she assumed that she needed to read the text and memorise the information before taking the quiz. After navigating through the webpages, she paused to reassess whether she was completing the quiz correctly and using the technology properly. As noted in excerpt 7, she expressed uncertainty about her next steps, clicking various features and evaluating her options as a strategy.

Excerpt 8

Kyra: I am not sure what I .. take a look ... click the links then what should I do ... click take a look and click ... and what then ... then what should I do maybe I should go to these articles that read it...

which one of these are relevant to ethnographic observations ... now I understand what I should do ... it takes a long time.

Kyra alternated between using technology, understanding the task questions, and finding the correct answers. She developed her own strategy to navigate technological challenges, adopting a trial-and-error method. This approach was common among many participants, who were motivated to complete the task despite the difficulties, often devising a 'click and view' strategy to overcome disruptions in task completion.

4.2.7 Instructions and technology hinder learning

The challenges encountered when using technology were sometimes solely related to technology itself or the task instructions. However, on occasions, there was a dual challenge involving both technology and task instructions, amplifying the difficulty of progressing through the task. Kirk transitioned from completing question 1 to beginning question 2 in the tutorial checklist without any interruptions. His focus remained entirely on the task, and technology posed no obstacles until he started working on question 2. Excerpt 9 and 10 details Kirk's frustration with understanding both technology and the task instructions.

Excerpt 9

Kirk had completed question 1 and moved to question 2. There was a long pause before he vocalised his thoughts.

Kirk: Add comments from the tutorial ... its weird I don't see any illustration on this question 2 ... er maybe I should scroll up to find something else ... I feel confused I do not know how to finish question 2 ... I did not read any illustration for this or what to do with this ... like add comments from the tutorial ... What is comments from the tutorial ... I don't think [teacher's name] told us anything about this ... did I miss it .. I am confused ... I might need to check ... I might need to send an email to [teacher's name] ... okay I think I get stuck here ... I don't think this page is going to help me ... maybe I go back to the dashboard ... okay I go back to the dashboard I click the courses I click the 4-week course ... I click the session on the EAP course ... I read announcements ... I get nothing ... I click the Tuesday sessions ... I still not get anything ... I am now on the page of the post class task ... I read it again ... its wired I don't get it ... I don't get any lead to help me finish this test . . .it is completely blank ... maybe I should check my notes I have today ... something comes to my mind ... I am not sure maybe I should stop and make an email to [teacher's name]

Researcher: Have you submitted the quiz yet?

Kirk: No I don't, I haven't finished it yet ... I don't know what to write down ... I get it wrong or right ... ahhhh .. I am confused more

Excerpt 9 highlights Kirk's frustration with the lack of guidance from both the task instructions and technology, as he remarked, 'There is no hint to lead me or help me finish this task ... it is completely blank.' Kirk was referring to the text box where he needed to type an answer to question 2 (Figure 5: green outline). It could be suggested that he believed that the text box should have contain

information and did not acknowledge that he should type an answer to the question *add comments to the tutorial* into the box, as he exclaimed ‘it is completely blank’.

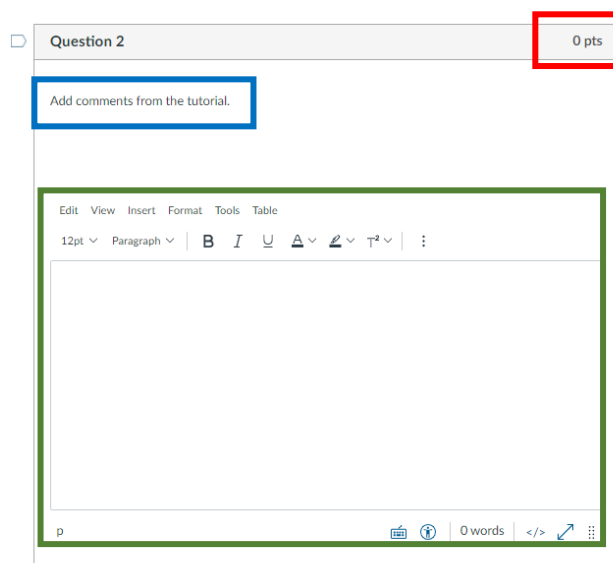


Figure 5: Online pastoral tutorial checklist question 2

Kirk noted that the quiz score also confused him. He thought he needed to write an answer to a question and attain a score, as the question had zero points attributed to it (Figure 5: red outline). His concern was that he did not know what answer he needed to give to attain a score. There was an instruction in the quiz noting that he should type an answer to the question, ‘Add comments from the tutorial’ but he was unsure what answer was needed (Figure 5 blue outline).

Excerpt 10

Kirk: I thought of it for a moment (to type an answer) but I kind of think that it can’t be this easy as I saw zero points here And I think that means [teacher’s name] is going to score me on this question so I naturally exclude the option to write down something more easy ... I think that affect me ... yea ... zero points here affect how I think about the question.

As the quiz had a score attributed to it, kirk thought that question 2 must be an answer related to class work and that the teacher would have told them in class, but he did not recall this. Kirk seemed to be going through his experiences with technology and in class to find a solution to continue with the task. For question 2, he was supposed to write down any issues or concerns that arose from question 1 in the tutorial checklist and type them into the provided text box. This situation demonstrates how unclear instructions and technology can combine to create significant barriers to learning progress. As shown in Figure 5, the blue outline is part of the design and was not added by the material writers. The instructions had limited details and technology did not aid Kirk in making a decision to type in the text box. Kirk did not complete the task in the verbal protocol as he

gave up and said he needed to contact his teacher the next day. The intended outcome was not achieved in this task and Kirk ended up not answering question 2. However, Kirk later gained insight as to how to answer the question as he had submitted an answer at some point in the week.

4.2.8 Technology shapes the participants actions

The technology used by the participants consisted of six key features, each producing different outcomes based on the developers' intended design rationale. Within the activity theory framework, these features can be understood as tools and signs.

- **Icons** served as visual representations of concepts or actions, conveying to participants both the meaning associated with them and the anticipated outcome upon clicking them. Icons also provided informative cues about the content on web pages, for instance, utilizing a clock icon to indicate the expected duration of a task.
- **Language** was employed to elucidate the functionality of various features, enabling participants to navigate, access, and complete tasks effectively. Most words or phrases were hyperlinked, directing participants to relevant web pages. For instance, the phrase *post reply* within the discussion board served as a functional link. When clicked, it led participants to a text box where they could compose their replies.
- **Navigation paths** guided participants to specific routes within the webpage to access various features and complete tasks. For instance, to access a quiz for a particular day, participants typically navigated from the LMS dashboard to the course, home page, study week, day, session, and task. Subsequently, they proceeded to interact with the specific feature required for the task, such as a discussion board or third-party resource.
- **Hyperlinks** were strategically embedded within icons, images, and text. Participants were required to click hyperlinks to progress to the next stage or access and complete tasks.
- **LMS features** such as quizzes, assignments, and discussion boards, played an integral role in task completion. Each feature was equipped with specific usage uniquely designed to fulfil its intended function. For instance, the quiz incorporated elements, including a text box, hyperlinks, gap-fill questions, multiple-choice questions, and a submit button. All of these components were specifically designed to enhance interactions within the quiz.
- Participants were provided with **task-specific instructions** authored by the course material writer. These instructions guided participants on how to complete tasks. Notably, the analysis and research did not encompass the examination of instructions due to the inherent complexities of language, necessitating a distinct linguistic approach which was beyond the scope of this research.

As participants interacted with technology, they frequently paused to determine the necessary steps to continue their tasks. These pauses were often accompanied by verbal expressions of their thoughts, which were recorded in the verbal protocols. For example, participants would voice inquiries such as ‘Should I click here?’ or ‘Do I need to click this first?’ They also articulated moments of uncertainty, stating, ‘I don't know what to do here’ or expressing realisation with statements like ‘Ah, this is the link’ and ‘I see what to do now.’ Questions about specific actions, such as ‘How do I reply to the post?’ and ‘Where are the questions?’ were also common. Additionally, participants occasionally expressed frustration with remarks like ‘I'm stuck and don't know what to do’ and ‘I feel uncomfortable’. As has been noted in excerpts 3-8, the participants had to use technology in a specific way and the various comments and pauses were moments where they stopped to process what to do next. Figure 6 shows a typical web page that participants interacted with daily. In the digital interface, each feature had a unique purpose, significantly impacting the participants' cognitive processes as they processed what they were viewing and determine their next steps. Once participants understood the functionality of the digital interface, they were better able to engage with the learning process and complete their tasks.

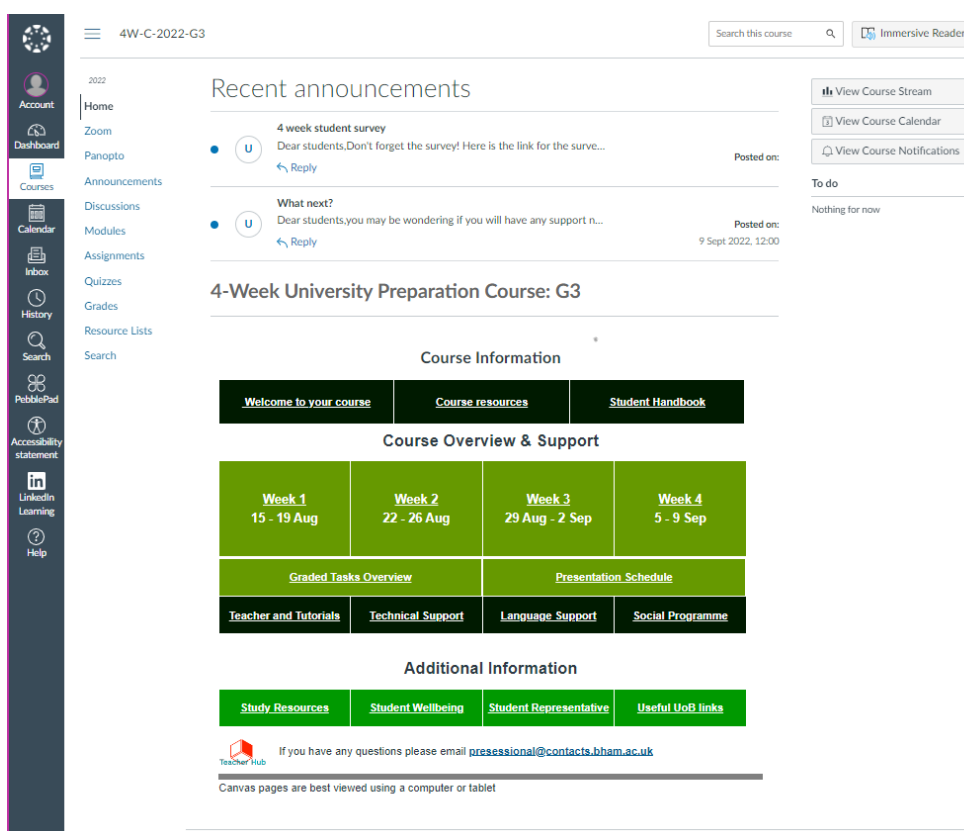


Figure 6: LMS home page of the 4-week university preparation course

Participants were essentially constrained to interpret the intended meaning of the various icons, hyperlinks, language, navigation paths, LMS features and task-specific instructions as failure to do so impeded their ability to continue their learning journey. Comments noted in excerpt 6 highlight marked disruptions in the learning process. Maryam's utterance, 'I don't know what to do here, what should I click?' stemmed from the exploration of a web page and the effort to construct an understanding of her next course of action, a common observation of the verbal protocols. The correctness of her choice determined whether she advanced in the task or remained stagnant until she correctly interpreted what she was meant to do next. Consequently, Maryam had to decipher meaning that was unidirectional, rather than a bidirectional exchange. Moreover, comprehending meaning was imperative for Maryam to progress in her interactions with technology, and any deviation from the intended meaning resulted in a rupture in mediation, leading to temporary or sustained impediments in the learning process.

Participants found themselves in a position of limited agency, unable to modify or alter the prescribed method for completing tasks. When participants misinterpreted what their next move should be, they were compelled to evaluate their initial choices and seek alternatives to progress with the task. Importantly, external interventions by educators or peers were not feasible, as participants engaged in the tasks independently, as part of their autonomous learning experiences. Technology exhibited a lack of responsiveness to the participant's needs, thereby necessitating participants to draw upon their prior experiences and online social experiences to respond appropriately.

An illustrative example comes from Maryam's experience during the *ethnographic observation* quiz while attempting to answer question 4.

Excerpt 11

Maryam reads the instructions for questions 4 and takes some time.

Maryam: It is more difficult ... I am new to this question You need to search for the answer ... confusing ... take a look at research ... view the library article ...

At this stage Maryam does not know that she needs to click on the hyperlinks to answer the questions

Researcher: What do you need to do now?

Maryam: Oh my God I need to open each one [hyperlink] and then decide which answer is right ... difficult and takes time ... boring ... so I need to read the description I think ...

Researcher: What are you looking for?

Maryam: I need to read the question again ... okay ... I think it is an article ... [Maryam clicks on the hyperlink].

Researcher: Do you know where the link has taken you?

Maryam: I think it is the library.

As Maryam addressed question 4, initially she was unaware that she had to click on hyperlinks embedded within the quiz in order to access library resources that could aid her in formulating an answer. The action she needed to preform was indicated by light blue text, accompanied by a small icon at the end, as shown in Figure 7 (outlined in red). Additionally, her cursor transformed from an arrow to a hand when hovering over the text which indicated that she should click on the text (outlined in blue). Maryam needed to recognise that the light blue text was signalling to click on it, thereby redirecting her to a new webpage containing information relevant to answering the question. It took Maryam some time to recognise that this is what was being communicated to her.



Figure 7: Ethnographic observation quiz question 4

Tools and signs play a pivotal role in effecting changes in an individual's actions as both mediate between the subject and object (Engeström, 1999). Maryam's actions were mediated by virtual tools, wherein the mediation process remained concealed from direct physical observation. Technology transforms the utilisation of tools which operates on the mind and not on the physical world (Blunden, 2015). Virtual tools mediated Maryam's actions, steering her toward specific actions and responses, thereby shaping the trajectory of her engagement with technology.

Virtual tools functioned within the participants' cognitive processes, guiding them toward the actions needed to complete tasks. Over time, participants became more proficient with the technology, leading to quicker, more efficient use with minimal hindrance. As they developed a deeper understanding of the virtual tools and their cultural significance, their actions became habitual and predictable, reflecting their improved cognitive skills and fluency with technology. However, when the mediation process was ruptured by unexpected changes, such as a new interface feature, participants had to revert from an operation back to deliberate actions. These ruptures highlight the rigidity of virtual tools, which unlike physical tools, do not easily accommodate creative or alternative uses. As a result, participants had to conform strictly to the intended use of the tool, and even minor deviations from established patterns could disrupt the learning process.

The varying levels of technological proficiency among participants also influenced their ability to adapt to changes, with some able to navigate new features more quickly than others as with Kyra in except 7 and 8 where she took twice as much time to complete the task as what Kirk did. This difference underscores how the prescriptive nature of virtual tools, as designed by developers, can create barriers to effective use, especially when flexibility and adaptability of the tool are limited.

Communication, as Bakhtin (1981) posits, exists within a cultural context to serve the intentions of individuals. The specific cultural context is one where the desires and intentions of others direct the participants actions, as was the case with the excerpts presented. Communication is a means by which individuals express their intentions and goals emphasising the interconnectedness of language, culture, and individual agency in the communication process, a notion that did not take place in the verbal protocols. Maryam's acquisition of meaning within this context confers upon her certain privileges, granting her access to technology and sustaining her learning. However, it is essential to acknowledge that Maryam's path to understanding required time and effort. She needed to interpret visual cues, draw upon her prior technological experiences, and rely on her familiarity with different question types. After eventually clicking the hyperlink, she still required additional time to comprehend the information presented on the library resource webpage and devise her approach to answering the question effectively. She effectively had to access a voice and become part of a privileged community.

A monological relationship existed between the participants and technology, characterized by its unidirectional and authoritative nature, as it instructed Maryam to interact with the virtual environment without providing an avenue for her to contribute meaning. Hence, Maryam found herself compelled to employ technology in a manner consistent with the original intentions of its creators, thereby emphasizing the overarching power dynamic where ownership belongs to others. Within this dynamic, there exists a distinct voice that shaped the participants' behaviour, effectively silencing their own voice. As noted by Wrestch (1981), silence is typically transient in the context of language, but with technology, it often appears more enduring, as participants are unable to become an integral part of a voice. Participants in this study found themselves dominated by others and needed to strive to acquire the necessary voice to access and comprehend the stimulus means (Aveling et al., 2015), highlighting the challenges and disparities inherent in technology and the need to access a privileged voice.

4.2.9 Collaborative strategies: forming a community

In response to the challenges associated with using technology participants devised collaborative strategies, with the assistance and encouragement of their peers. Seeking assistance commonly took the form of asking questions in the classroom the following day or, in some instances, asking friends through social media while actively engaged in the task. For example, Robin employed the

strategy of asking her friends on social media during a verbal protocol when she expressed uncertainty about what to do.

Excerpt 12

Robin: I am not sure as to what I should do... so I ask my friends... and I want to get some help from him... but now I didn't get an answer, so I am waiting for him.'

Robin sent a message to her friend seeking guidance on how to respond to a specific task question. Since she could not complete the task independently, she had to patiently wait until her friend provided the necessary information. The waiting period, despite its time-consuming nature, exemplified the extent to which Robin (and others who acted in a similar way) was willing to invest her efforts in acquiring the required knowledge to proceed with technology and, her commitment to employing specific strategies aimed at achieving a shared objective. As the 4-week course progressed, a community of users gradually formed, providing access to learning in tandem with the acquisition to varying degrees of accessing technology and continuing learning.

The term community refers to a group of individuals engaged in a shared activity (Engeström, 1999). Within a community, participants collectively strive to achieve a common objective through the utilisation of diverse tools and mediated actions that are situated within a particular sociocultural context (ibid). In the context of Robin, the community consisted of the students participating in the 4-week course. Participants also asked their friends in class the following day or at the end of class how a task should be completed.

Excerpt 13

Cherry: If I can't complete a task I ask my friend in the morning and complete it before class.

When considering the community, it is essential to highlight that the community, in this particular context, did not partake in collaborative endeavours directed towards a collective goal. Instead, the members of the community pursued their respective goals independently, highlighting the somewhat isolated nature of the activity. Nevertheless, the isolation of activity resulted in instances where community members sought ways to come together and offer support to their peers on various occasions, as they had to complete the same tasks and access a privileged voice.

4.2.10 The Influence of Teacher Expectations and Institutional Norms on Student Task Completion

In the initial stages of the verbal protocols, participants frequently mentioned that the task had been assigned by the teacher or that the teacher had discussed or referred to the task in class. This was further corroborated during the post-course focus group interviews, where participants explicitly acknowledged the importance of completing online tasks in preparation for in-class

teaching the following day. The link between the assigned online tasks and explicit classroom instructions created a clear and compelling incentive for participants to complete the task. This is evident in the statements made by participants, as in excerpt 14.

Excerpt 14

14 minutes into the group interview, technology and engagement with learning was discussed.

Researcher: What engaged you with technology on the course?

Maryam: Yeah I guess engagement. So we need to apply the material tools and what the teacher gives you for and to work on ... in a real life like ... she will give us essay instructions about the essay structure and so on if we didn't practice this we will not engage in this process.

Robin: I agree with you because for the final essay the teacher will give some comments on our essay and try to improve our final essay through her advice.

Collectively, the various comments made by participants emphasise the substantial influence exerted by the teacher in motivating and directing task completion, ultimately establishing the institutional norms that govern the processes of learning (Kugelmass and Ready, 2010).

Other instances of reflection made by the participants for what the teacher had guided them to complete independently was also present in the verbal protocols.

Excerpt 15

A compilation of participant comments from the verbal protocols, highlighting instances where the teacher provided guidance in task completion.

Kirk: The teacher gave us this in class.

Maryam: I remember the teacher told us what to do.

Cherry: We practice the essay with the teacher, now I need to complete it.

Kyra: We discussed this in class today.

The process of task completion is influenced by multiple motivational factors that participants navigate, creating a dynamic tension within the established norms. These norms serve two functions: they determine what tasks need to be completed and also act as motivators by setting institutional expectations. It is important to note that this study did not intend to obtain the teacher's perspective, as exploring the teacher's involvement was beyond its scope. However, it is evident that the teacher played a critical role with the engagement of technology by distributing tasks and facilitating classroom discussions. The responsibility for completing tasks was placed

squarely on the students. Each participant had to manage their own online tasks to fully participate in classroom activities and discussions, or risk losing standing among their peers and the teacher. This process underscores the significant impact of both teacher direction and institutional norms on student engagement and task completion.

4.3 Engagement with technology

The data presented in the section above highlights significant findings concerning the mediation process, the participants perspective on engagement and their struggles. It could be argued that the findings suffice in meeting the research aims. However, as noted in the literature review, it was considered an advantage to incorporate engagement theory to strengthen and support findings related to engagement, thereby providing an extended perspective (Yin, 2014). Using multiple theories offered a more comprehensive and nuanced understanding of the phenomenon being researched (Gibbert et al., 2008; Yin, 2014), adding an additional layer of analysis. Consequently, this section provides an in-depth examination of a participant's interaction with technology, underscoring their engagement and thereby advancing the research objectives. This approach also enables the reader to gain a thorough understanding of the participant's actions and how technology mediated learning. In the final section data is presented and discussed from the group interviews and student diaries, further supporting the interpretation of data discussed in Chapter 5.

4.3.1 Exploring Student Engagement with Technology

One verbal protocol exemplifying the dynamics of participant engagement and interaction with technology, is provided by Maryam's completion of a third-party synthesising evidence task, as depicted in Figures 8-12. The rationale for selecting data collection from a third-party resource stemmed from the fact that the questions within the web page incorporated interactive elements that were absent in the LMS. In this way, a comparative analysis of two distinct learning interactions and how participants engaged with them was possible. Additionally, Maryam's expressive verbal protocol while completing the third-party resource task provided a particularly rich insight into the cognitive processes and experiences that she went through when mediating technology and the forces of engagement, a shared aspect among participants.

The task that Maryam had to complete was scheduled for Monday of the second week of the course. The third-party resource comprised four exercises, elaborated in Figures 8-12, and its integration into the LMS interface can be observed in Figure 8, indicated by a red outline.

2.1


Monday 23rd August


Learning outcomes - by the end of the session you will be able to:


- Recognise the importance of analysing an essay question
- Understand the key components of an essay question and what they mean
- Introduce and synthesise ideas from a source text in your writing to help build an argument
- Write your own essay question (with help)

Pre-class tasks: Reminder +

In-class resources: You have 1 online task to complete -

 In-class resources are for you to access when attending your classes.

 2.1.3 Task 5: Synthesising evidence

 This task will take approximately 15 minutes.

Complete the [University of New England synthesising evidence](#) activity. Scroll through and read and watch the video. There are also some exercises to complete.

Post-class tasks: None +

Canvas pages are best viewed using a computer or tablet.

[Return to 'Sustaining your Culture'](#)

Figure 8: A Typical LMS view of the participants' daily online tasks

Upon clicking the *University of New England Synthesizing Evidence* resource link, Maryam initiated a new browser tab, whereupon she expressed a sense of surprise and uncertainty. She vocalized her confusion, saying 'I don't know where the question is!'. It became evident that Maryam felt disoriented due to her lack of familiarity with the third-party web page, and the fact that she had been working within a different platform previously. Maryam conveyed her active search for the questions, remarking that she was 'searching for the question.' The webpage did not immediately provide her with clear guidance on the subsequent steps, leading her to comment, 'this is not clear.'

The webpage featured an introductory paragraph at the top and a separate paragraph specifically addressing Exercise 1 beneath it, occupying a significant portion of Maryam's computer screen. Notably, Maryam initially displayed a preference for scrolling through the page to ascertain its content to locate Exercise 1. She did not feel the need to read the introductory text. Her navigation ceased upon identifying an icon corresponding to Exercise 1, at which point she exclaimed, 'okay, exercise balancing your information' (Figure 9).

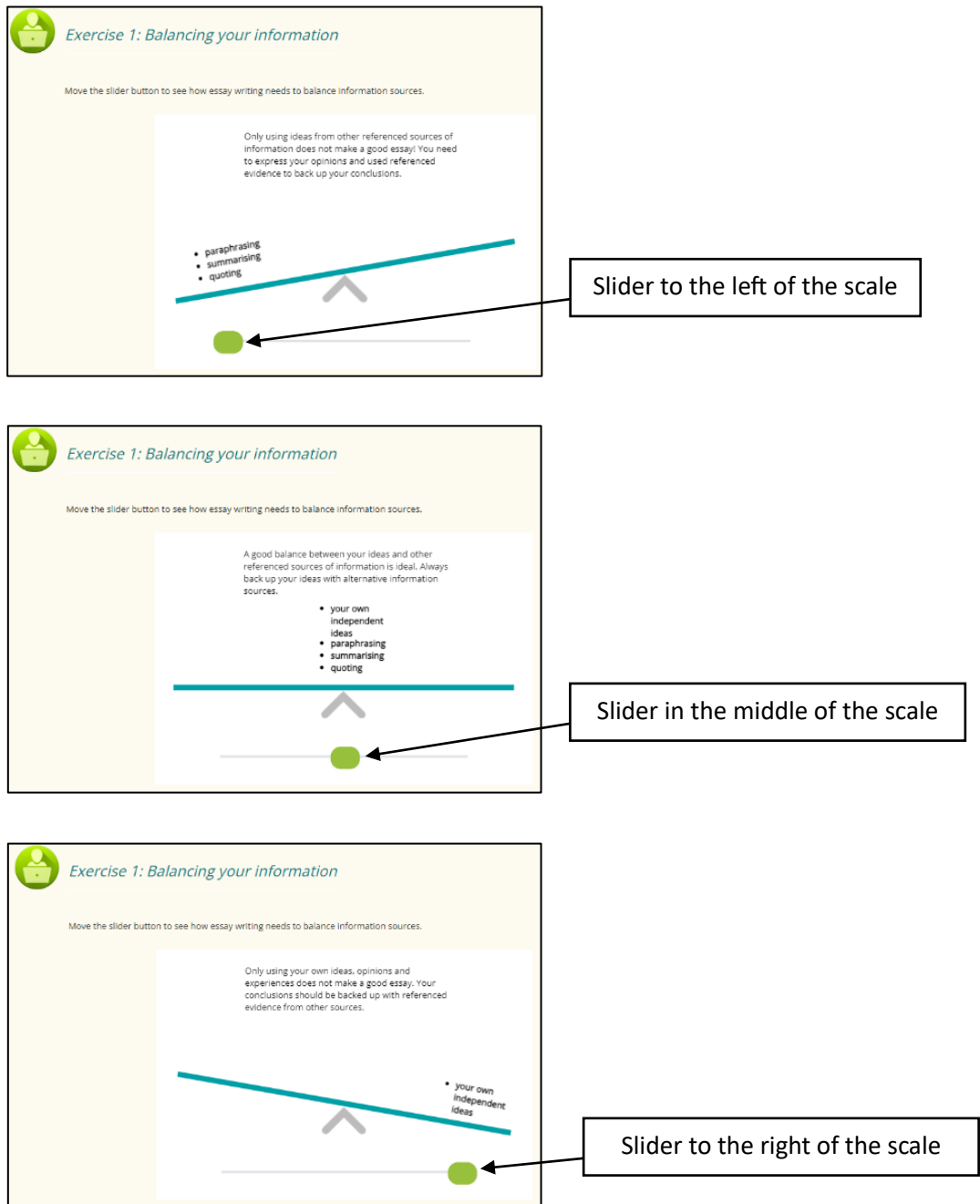


Figure 9: Exercise 1, an interactive infographic where participants can adjust information balance by moving a slider

Maryam’s goal was to streamline her access to the exercise and circumvent any hindrances posed by the necessity to peruse what she perceived as extraneous information on the web page. During this phase, her engagement was primarily directed towards expeditiously locating the exercise, and the technology interface did not appear to captivate her interest or encourage her to thoroughly read and engage with the webpage's content. Instead, her engagement was driven by the subject-object relationship, with a focus on starting the exercise at hand.

Much like Maryam, numerous participants adopted a similar approach when tasks involved reading. For example, Kirk showed a comparable tendency to skim through text when faced with an LMS

quiz. To complete the task, and to answer effectively, Kirk needed to select appropriate words from a provided list by referring to the reading text. In his verbal protocol Kirk mentioned, 'I'm not very into this whole passage... I just try to find the answer and answer it.' His primary focus was on answering the quiz questions rather than fully engaging with the reading material. He admitted, 'I don't think I am engaged with knowledge... I think I am engaged with the items that I have to answer.' Kirk was reluctant to invest time in reading the text. He was willing to skip the reading, at the expense of answering quiz questions incorrectly. Instead of engaging with the reading, he aimed to quickly address the quiz questions and proceed through the task. Technology did not enhance Kirk's cognitive involvement with the content. His main objective was to complete the quiz quickly, avoiding the extra effort of going back to the reading to find answers before returning to the questions.

Returning to Maryam's engagement with the third-party resource, Exercise 1 employed an interactive slide scale, which Maryam could manipulate horizontally (Figure 9). The exercise featured minimal textual content, predominantly relying on visual elements and an interactive component that enabled her to control the information revealed on the screen. Maryam noted that the graphical representation of information, particularly as she adjusted the virtual slider, facilitated her learning process. She articulated this by stating, 'It helped me to learn ... it is a visual thing... when I write an essay in the future, I will remember this kind of example.' The utilization of the virtual tool and the requirement for Maryam to manipulate the balance to unveil information left a lasting impression on her memory. The recollection was easily relatable to her current academic pursuits and the composition of academic texts in her course, analogous to the mnemonic technique of tying a knot in a handkerchief to aid memory, as elucidated by Vygotsky (1931). In this case, the interactive nature of the exercise was what elicited a degree of engagement from Maryam. It is worth emphasising that O'Brien and Toms' (2005) threads of sensual and emotional experience were evident at this stage of Maryam's interaction with technology.

Maryam proceeded to Exercise 2, which included viewing a video tutorial on note-taking techniques (Figure 10). The video featured an animated demonstration of a note-taking method, characterized by minimal spoken language and the incorporation of visual word flashes corresponding to the narrated content, alongside a virtual hand mimicking writing actions. While Maryam watched the video, she directed her attention solely to the screen, concentrating on the auditory narration and the visual information being presented. She did not vocalize any thoughts throughout the 55-second duration of the video as she was fixated on listening and watching. Maryam's propensity to maintain silence during the video was a recurring pattern among participants, indicating a form of immersion wherein they became engrossed in the video content (Lopes et al., 2014). Following the video's conclusion, Maryam expressed that '...the way the video presented the note-taking system was helpful.' The video captivated her attention, and she appeared undistracted while watching it.

Similar to her experience of Exercise 1, Maryam was able to draw connections between the video content and her current academic studies, which enhanced her engagement with the material. The primary distinction between the two exercises lay in the nature of the interaction with technology, one an active watcher of the video, and the other being an active agent, the interactive scales.

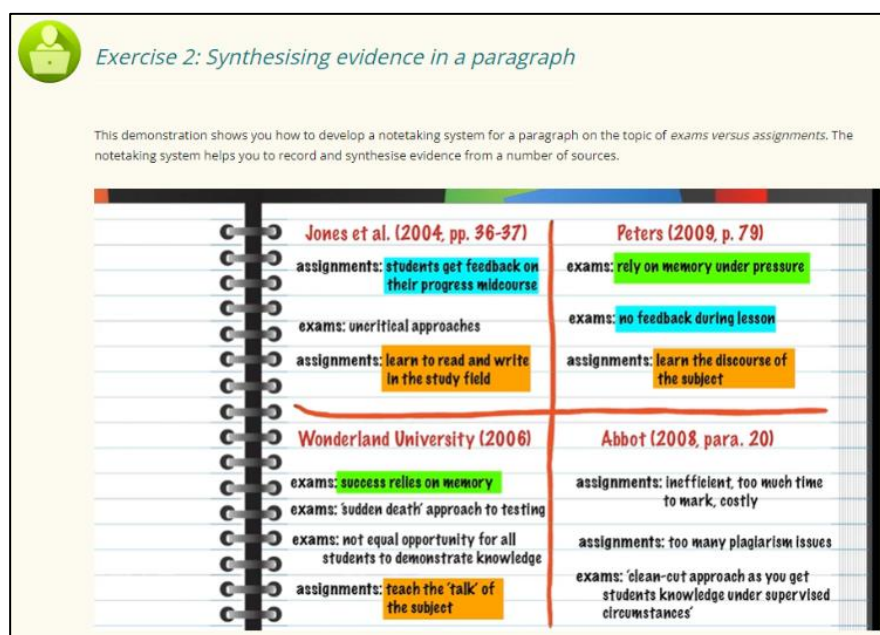



Figure 10: Exercise 2, a 55 second video that had animated information

Exercise 3 presented a paragraph of text featuring a *Start Analysis* button that Maryam was required to click. Upon clicking the button, the text underwent an automatic animation, revealing five sequentially annotated sections of text (Figure 11). Maryam chose to read the primary text before initiating the *Start Analysis* process, vocalizing her reading progress as she navigated the text. The exercise instructions did not clearly explain when the *Start Analysis* button should be clicked. The developer's intended user experience remained ambiguous, leaving uncertainty about whether Maryam should read the text first and then click *Start Analysis* or click the button first and then proceed with reading. After reading the text, Maryam confirmed her comprehension of the material and its potential application to her own academic writing. She remarked, 'He (the writer of the text) expects me to do this, and he now teaches me,' she then clicked the *Start Analysis* button. Subsequently, she engaged with the annotated highlighted text, which provided explanations for various sections of the text. Maryam noted that the annotated text served the purpose of analysing the main text, with the exercise aiming to instil a similar analytical approach in her essay writing. She also mentioned that she had practiced a similar example in class earlier that day, and that the connection between the classroom experience and Exercise 3 facilitated her recall and comprehension.

 **Exercise 3: Integrating synthesised information into an academic paragraph**

The following annotated paragraph has been written from the set of notes and synthesising activities in Exercise 2:

The topic sentence is generally part of your 'line of argument'.
Synthesised information from two different sources. The sentence is a summary of their findings.

Using assignment essays for assessment supports student learning better than the traditional examination system. It is considered that course-work assignment essays can lessen the extreme stress experienced by some students over 'sudden-death' end of semester examinations and reduce the failure rate (Peters, 2008; Wonderland University, 2006). Study skills researchers (Jones et al., 2004; Peters, 2008; Wonderland University, 2006) defend assessment by assignment because research assignments can be used to assess student learning mid-course and so provide them with helpful feedback. They also consider that assignment work lends itself to more critical approaches which help the student to learn the discourse of their subjects. In contrast, Abbot (2009, para. 20) argues that assignments are inefficient, costly to manage and are the cause of plagiarism problems in universities. He states that "Assessment by examination is a clean-cut approach as you get students' knowledge under supervised circumstances". The weight of evidence, however, would suggest that it is a fairer and more balanced approach to have some assessment by assignment rather than completely by examinations.

Information from a single source into a summary sentence and a short quotation
The concluding sentence comes after you have advanced your argument with strong backup evidence.
Synthesised information from three different sources into two summary sentences. Authors are listed in alphabetical order, separated by a semicolon (;).

Figure 11: Exercise 3, a paragraph analysis with highlighted areas that were triggered by clicking a hyperlink button

Reflecting on Exercise 3 and her emotional response to it, Maryam conveyed, 'It is useful but has a lot of words, which I need to read. I don't like this ... I would prefer it if they included a video ... that would be better.' When asked about her preference for learning via videos rather than reading, she elaborated, saying, 'I prefer to learn visually, through pictures and colours, this is more helpful for me.' In response to a question about her experience with reading, Maryam expressed, 'I get confused and stressed ... perhaps I don't have enough time ... when there is no video, I have to read three times ... a video saves me time.' She appreciated the use of colours to highlight parts of the text, as it aided her comprehension of the exercise content. However, while Maryam successfully completed the exercise and acquired knowledge from it, her level of engagement with Exercise 3 appeared to be less pronounced than in Exercises 1 and 2. For Maryam, engagement in Exercise 3 was primarily driven by the content and her motivation to complete the exercise, rather than being predominantly technology focused as in the case of exercises 1 and 2.

The final exercise for Maryam was a drag-and-drop task that required her to arrange six text boxes into the correct sequence. She accomplished this by dragging the text boxes to empty numbered boxes from left to right. Maryam verbally articulated her thought process while interacting with technology, explaining, 'I am putting the steps of making an essay in the right order, so what I will do first and then ... It is helpful, but I think I need to read it more, as some steps are literally the same.' As she attempted to move a text box to an empty numbered box, she commented, 'This is

the correct list, I put it here maybe, yeah, I think, oh, it is stopping me from changing the order. Ah, so maybe this is the right place for this one, I will try it.' Her initial attempt proved incorrect, and she seemed to guess on her second attempt without reviewing why the first one was wrong. Subsequently, she devoted more time to reading the content of the text boxes and expressed her confusion. She needed to discern how technology should be utilized and how she would know if the order was correct or incorrect. She observed that a trial-and-error strategy was possible, noting, 'It is stopping me from getting it wrong and putting one step in the wrong position.' When asked how she determined whether she had arranged the steps correctly, Maryam responded, 'It is all green; there is also no *check my answer* button, so this is the only [indication].' Notably, the drag-and-drop exercise was designed to accept the correct answer in the proper order while rejecting incorrectly ordered responses. An incorrect arrangement caused the technology to automatically return the text to the left column, signifying that it was incorrect and prompting Maryam to try again. The drag and drop feature facilitated Maryam's attempts, as she occasionally guessed the order and dragged the incorrect answer back to explore alternative placements until it turned green.

Exercise 4: Steps for synthesising

Drag the steps for synthesising into the correct order.

Steps for synthesising

1

2 Read widely from your texts on the topic of your paragraph.

3

4

5 Number your 'sets' so you have a strong logical order to develop your argument.

6 Draft your paragraph from your notes. Start with a topic sentence. Reference your sources.

Link common ideas to make 'sets' of information from each source (colours).

Take notes in your own words from each listed source (see above). Put all notes on a single page.

Consider your line of argument and draft a topic sentence for your paragraph.

Figure 12: Exercise 4, a drag and drop the correct answer for synthesising in the right order

Through a combination of educated guesses and familiarity with the order of the steps, Maryam ultimately arranged all the steps correctly. Upon completing the exercise, she shared her thoughts, stating, 'It's useful, but I think they [should] use fewer words ... it would be more useful and helpful.' At the end of the task, Maryam emphasized the value of the task and exercises that involved virtual movement and interaction, as opposed to passive screen viewing and reading. She stressed for her the importance of multisensory engagement, highlighting the need for visual elements, colours, and audio to engage her. She particularly appreciated Exercise 1 for its ability to present both positive

and negative viewpoints and provide a visual representation for her to learn. Maryam also expressed satisfaction with online tasks, noting their convenience for revision and note-taking. Throughout her completion of the four exercises, Maryam consistently reflected on the educational benefits each exercise offered and how she could apply these insights to her own studies and experiences. It is important to highlight that Maryam's level of engagement varied across the four exercises. Engagement was most pronounced in Exercises 1 and 2, where technology included a virtual environment that she could interact with. In contrast, Exercises 3 and 4 saw her engagement shift toward the content itself, with technology serving as a tool for accessing and conveying the content rather than being a primary source of engagement.

In contrast to Maryam's experience with the third-party resource, Ainsley engaged in a quiz task using the LMS features. The quiz required her to complete sentences by filling in the gaps with appropriate words. Given that Ainsley was using the LMS in week 3 and already familiar with its operation, she encountered no obstacles in completing the quiz. She began by reading the quiz instructions, followed by the sentence questions, and was primarily focused on accurately inputting the correct words into the gap-fill sections. Ainsley's interaction with the LMS quiz differed significantly from Maryam's engagement with the third-party resource exercises. The LMS quiz lacked interactive buttons, movable text, or animated visual aids to facilitate learning. Ainsley did not mention feeling engaged by the LMS quiz nor did she recall any specific ways in which the LMS contributed to her content retention, in contrast to Maryam's interactions.

Excerpt 16

Researcher: You can start.

Ainsley: Can you wait for a minute

Ainsley navigated to the quiz and prepares herself

Ainsley: Okay, I will start ... I click the button to start the quiz ... I look at the quiz instructions first ... choose the correct order to complete the sentences ... it seems there are many blanks to finish .. I look at the words try to put them in the right place.

Ainsley focused on answering the questions and submitted the quiz after 4 minutes.

Ainsley: [the quiz] It's quite time saving and it can make you more focused on the text because it has a limitation of time we only have maybe 8 minutes one minute is one sentence, but I only take about 5 minutes to finish it and I won't think about other things or go out to do other things when taking this test.

Ainsley's primary focus was on the content of the quiz questions and the accuracy of her responses. After completing the quiz questions, she submitted her answers and received instant feedback along with a score. Ainsley expressed satisfaction with achieving a perfect score and commented on her

experience, stating, 'It's quite time-saving, and it makes you focused on the text as there is a limitation on time... I won't think about other things when taking this test.' She also noted, 'It is interesting and kind of easy, there was some confusion about some words in the fourth and fifth questions.' The LMS quiz seemed to engage Ainsley in a different way to Maryam's experience with the third-party resource. Although the quiz lacked the use of colours, visual representations, or virtual interactions Ainsley was more focused on answering the questions correctly and directed by the timer, primarily serving as a controlling and time-constraining element.

4.3.2 Exploring participant's perception of engagement and technology

The group interviews conducted both before and after the course provided valuable insights into the participants' perceptions of what engagement signified to them. In the pre-course group interview, participants were asked to elaborate on how technology engaged them and to elucidate their understanding of the term *engage*. Aliyah emphasized that applications played a pivotal role in engaging her with the subject matter. Many participants' prior experiences had predominantly involved applications on their smartphones, which were more analogous to the third-party resource tasks than to the LMS. Kirk articulated that, for him, engagement meant '...breaking down all the barriers between ourselves and the knowledge.' He further asserted that technology facilitates this process through various means. In Kirk's view, technology should function as a conduit for bringing the user closer to knowledge, fostering immersive experiences, and motivating learning. Kyra emphasized that technology had the ability to augment her knowledge, enabling her to tap into the resources available on the internet and establish connections with others using technological tools. The term *enhance* appeared frequently in participants' discussions about their engagement. When probed further to clarify her interpretation of enhance, Kyra elucidated that technology allowed her to acquire fresh knowledge and nurture her sense of curiosity. Technology's role in her own learning process was to expand her understanding by providing diverse avenues for accessing the same knowledge, thereby stimulating her interest to explore topics of personal interest more deeply. It is worth noting that during the focus group interviews, none of the participants specifically mentioned the LMS (Canvas) technology itself when discussing engagement and the enhancement of learning. This absence may be attributed to their prior lack of experience with LMS platforms.

Unlike the individual interviews with participants, the post-course focus group interview shed light on the participants' evolving perceptions of the LMS and how it did or did not engage them. It appeared that their opinions had shifted following the completion of the course, as they had gained more exposure to educational technology-enabled learning experiences. Robin articulated that, for her, engagement hinged on whether the knowledge being presented was relatable to her real-life experiences. In this context, engagement was less about technology itself and more about the

content delivered through technology. Kirk further emphasized the significance of content in fostering engagement, considering technology as a tool for accessing and interacting with it. He asserted, 'The nature of learning is that you always have to engage with the materials in person in a natural way... the method to help you discover the knowledge, and technology helps us discover the materials.' For Kirk, technology's role provided various pathways for accessing and engaging with the content. Ainsley pointed out that engagement, in her view, was directly linked to her '...improvement of essay writing...', stressing her recognition that engagement entails the opportunity for skill enhancement and that content that guides her toward improvement leads to engagement. Although Ainsley did not explicitly mention technology, it is evident that tasks aimed at skill improvement were viewed as engaging content. Similarly, Maryam identified engagement in her ability to practise and enhance her skills, aligning with Ainsley's perspective. The focus group's collective opinions converged on a common understanding of engagement, transitioning from a focus on applications as facilitators of engagement (before the course) to a focus on content connected to improvement and real-life contexts (after the course). Notably, the participants did not specifically reference particular types of technology or discuss their interactions with specific elements of technology, such as discussion boards or quizzes within the LMS, in the post-course focus group interview. Their attention appeared to have shifted towards the broader concept of engagement in relation to content and skill improvement.

To gain insight into the participants' emotional responses to technology use and to gauge their level of engagement or disengagement with technology, the post-course focus group interview posed the question, 'What feelings did you experience when using technology?' Robin shared with the group that upon completing certain tasks, she often experienced a sense of accomplishment in using technology and successfully addressing the task's question. Kirk, on the other hand, expressed a deep sense of dedication to technology, noting, 'I feel devoted to technology. I can use it, learn it, and I don't feel that there is much of a barrier when I learn the materials.' For Kirk, technology served as a conduit for accessing educational materials, and he demonstrated a high level of comfort in utilizing various technological tools. However, Kirk also experienced instances of frustration, such as when he was uncertain how to use technology to respond to a question, as in the tutorial checklist noted above. He went on to express, 'Sometimes it is overwhelming... too many clicks I have to learn... I am a person that believes that humans should not have to learn how to use machines, but machines need to be easier for humans to learn and use.' Kirk's frustration with some tasks stemmed from the perception that technology should facilitate, rather than hinder, learning. He believed that technology should be intuitive and not pose a barrier to accessing content. In essence, Kirk advocated for technology to be more user-centric, streamlining the user experience and minimizing the learning curve associated with its use. He emphasized the importance of instant

access to content, as opposed to requiring users to undergo extensive learning processes each time new technology is introduced.

Ainsley's response to the question was characterized by curiosity. Her curiosity was not directed solely at technology itself but rather at how technology provided her with the opportunity to access and review other students' work, particularly the comments in discussion boards. This curiosity motivated her to explore and read her peers' posts and responses, which, in turn, aided her comprehension of the task at hand and clarified her understanding of what was expected. For Ainsley, technology functioned as an enabler of shared learning and peer interaction in some instances. However, Ainsley also acknowledged that technology could occasionally pose a barrier. She expressed feeling confused during certain tasks, either due to difficulty in locating assignment-related information or because technology did not accurately display feedback from her tutor. This highlights the dual nature of her experiences, where technology could both facilitate and hinder her learning, depending on the context. Kyra initially described feeling overwhelmed and challenged when using technology throughout the course. However, her perception shifted over time, and after the course, she experienced a growing interest and curiosity about learning through technology. She recognized that she was acquiring valuable technological skills that would become increasingly normal for her in the future. This transition in her emotions indicated a shift from initial discomfort to a sense of readiness to embrace technology for learning.

As evident from her comments noted earlier in the text, Cherry's initial sentiment toward technology use was one of nervousness, stemming from uncertainty about the correct utilization of technology. However, with prolonged exposure and experience with technology, her discomfort gradually subsided, and she began to feel more at ease and confident in her ability to navigate and utilize technology effectively. A recurring theme among the participants' comments was the positive correlation between increased usage of technology and a growing comfort level with its application. As they became more familiar with technology, their initial apprehension and uncertainty gave way to greater confidence and proficiency in its use, which in turn facilitated learning.

In the post-course focus group interview, participants were asked to identify the two most valuable tools they used for learning. Maryam emphasized the utility of the pre-class task, which she found instrumental in preparing her for the upcoming lessons. She also emphasized that the LMS was a valuable tool for organizing her studies and reviewing course materials. Her remarks closely paralleled those of other students, indicating a shared perception of the LMS primarily as a means for accessing and organizing course content, rather than viewing it as a platform for leisure, entertainment, or diverse experiential activities. Cherry identified Mentimeter and Padlet as tools that significantly contributed to her learning experience and bolstered her confidence in using technology. Her sentiment was shared by the entire group, indicating a consensus among

participants regarding the positive impact of third-party resources on their learning. It is worth noting that Mentimeter and Padlet, unlike the LMS itself, are third-party resources employed by teachers to support teaching and learning within the classroom context. Furthermore, participants expressed appreciation for the digital coursebook's convenience and functionality. They found it advantageous as it eliminated the need to carry physical textbooks to class. Similarly, they highlighted the benefits of having the entire course integrated within the LMS, which afforded them ease of access and organization of course materials. Notably, participants did not explicitly mention the LMS or the tools within it as key resources for their learning, further underscoring their perception of the LMS primarily as a content delivery platform.

When examining the completion of quizzes, discussion boards, and assignments in the LMS, it became evident that students had completed all the prescribed tasks. In some instances, students took certain quizzes multiple times, ranging from two to four attempts, as the platform allowed them to submit their responses repeatedly for revision and improvement. However, there was a notable aspect where students demonstrated limited use, which was the lack of participation in the *reply to peer's posts* function within the discussion board feature. As part of the discussion board tasks, students were explicitly instructed to engage with their peers by responding to their posts. The majority of student discussion board entries did not include responses from their peers. The desired outcome envisioned by the developers, wherein students actively interacted with their peers through technology, did not materialize in practice.

4.4 Summary of findings

Several pivotal aspects of the findings highlight the dynamic subject-object relationship where virtual tools mediated the participants' actions. The participants were required not only to complete the task but also had to learn how to use technology to do so, which at times caused a disruption in learning. Technology's profound impact on learning primarily operated on cognitive processes which influenced actions and forced specific responses from the participants. In this context, virtual tools assumed significance both in conveying meaning and shaping cognitive processes. Technology operated unidirectionally and shaped the participants actions. This unidirectionality silenced the participants, demanding them to conform to technology's intended use and design, in turn presenting challenges in acquiring the necessary actions to navigate technology effectively. The data presented highlights a type of communication unique to technology which led to a dominant perspective, where participants had to align their views and insights with those of the developers and designers to use technology effectively and complete tasks.

With the passage of time, the participants solidified into a closely-knit community, characterised by a collective pursuit of a common objective. Within the community, a notable phenomenon emerged, wherein individuals actively engaged in mutual support mechanisms to use technology.

Their collaboration and assistance were particularly evident when trying to access technology, emphasising the individualistic nature of completing the online tasks, where community members primarily pursued their own goals but occasionally came together to navigate shared challenges both in class and online. Institutional norms and guidelines governed participants' actions and interactions with technology, linking the completion of assigned tasks to classroom participation and progress in learning. This created an overarching goal that drove participants to persist in overcoming technological challenges, highlighting the influence of the teacher and institutional expectations on task completion and motivation. Maryam's detailed verbal account of her engagement with technology strongly supported the research findings by providing valuable insights into the use of third-party resources and the processes involved in engaging with technology. Additionally, group interviews and student diaries revealed that students' perceptions of engagement evolved over the course, shifting from an initial emphasis on technology at the start of the 4-week course to a focus on content and skill improvement by its conclusion.

Chapter 5

Discussion of findings

5.1 Activity Theory and Engagement Theory

The findings presented in Chapter 4 offer numerous points of interest that directly pertain to the research aims and questions. While insights from activity theory and engagement theory have yielded potential explanations of what was observed the following Chapter provides an extended in-depth examination of the findings in Chapter 4 by expounding on the points raised. The purpose of this Chapter is to highlight critical aspects related to the mediation of technology whilst commenting on how participants perceived engagement and the focal points of what their engagement consisted of. This section lays the groundwork for the final Chapter, where I explore the implications of my research findings and suggest recommendations.

5.1.1 Activity theory

Leontiev (1978) notes that the object of an activity gives the subject a determined direction and that, “the main thing that distinguishes one activity from another, however, is the difference of their objects”. (Leontiev, 1978, p.98). In this research, the subject-object relationship distinctly shifted for the participants from task completion to technology utilization, giving the impression that the object shifted. Engeström (2014) notes that the object is a desired outcome and guides and directs the actions and intentions of the subject. The inquiry that arises from the subject-object relationship and Leontiev’s and Engeström’s position on object pertains to whether there existed multiple concurrent activities due to the shift in object or one activity and multiple objects. Proposing the presence of multiple activities within the observed scenarios in this research may unduly complicate the analysis of the mediation process (Murphy, 2022). Analyses of activity would necessarily have to be made for each apparent shift in object, from using technology to answering the task, which would prove needlessly convoluted. Moreover, dividing the activity into multiple objects would fragment the participants' actions, potentially obscuring the primary purpose of the overall activity and disrupting the unity of the users' efforts toward achieving an outcome. These concerns relate to the intricate dynamics of the relationship between the subject and object and the goal-orientated activity. Activity theory falls short in explaining how the object shifts between noticeably different activities while maintaining a clear goal to complete the task.

Another aspect to consider when reflecting on the scenarios presented in the findings is that, in contrast to the expectations presented by O’Brien and Toms (2010) and Reyman (2013), which suggest that users of technology tend to disengage from technology (or not engage with it at all) when they encounter technological barriers, the participants did not stop using technology due to the challenges they faced. Rather, the participants demonstrated unwavering determination to

utilize technology until they had successfully accomplished their daily online tasks, even when confronted with considerable technological obstacles. The concerns and inquiries articulated may find a solution in the notion of poly-motives, as indicated by Kaptelinin (2005) and super-objectives as suggested by Stanislavski (2013) and expanded upon by Vygotsky (1989).

Alternative objects emerged from the activity due to ruptures in the mediation process, resulting in poly-motives while the subject-object relationship stayed constant, in turn shaping the participants' course of action. Participants faded in and out of various poly-motives, being influenced by their level of familiarity with technology, their historical and social experiences and the institutional expectations. Participants who were less familiar with technology experienced more distinct and frequent poly-motives, while those more experienced with technology encountered poly-motives less frequently where actions transformed into operations. Not being able to use technology ruptured the mediating process where participants were forced to reflect on the tool being used which directed them to conscious decisions on how to use technology, what Gillespi and Zittoun (2010) call reflective mediation. Reflective mediation highlights the moment where participants learning was hindered and their ability to effectively utilize technology and accomplish the task was affected, potentially resulting in nonengagement and the cessation of the activity (O'Brien and Toms, 2010). However, within the observed participant cohort of this study, nonengagement did not materialize which underscores the existence of an overarching object which is subsequently elaborated upon further in this section.

Ruptures in the mediation process are graphically presented in Figure 13, serving as a simplified visual representation of the complex cognitive processes unfolding during reflective mediation (Gillespi and Zittoun, 2010). In the participants observed, the subject-object relationship acted as a guiding framework, orchestrating their progression through the task, which was contingent upon their familiarity with technology. As participants navigated the activity, they faded in and out of different poly-motives, as denoted by the brackets encapsulating tasks and technology in Figure 13.

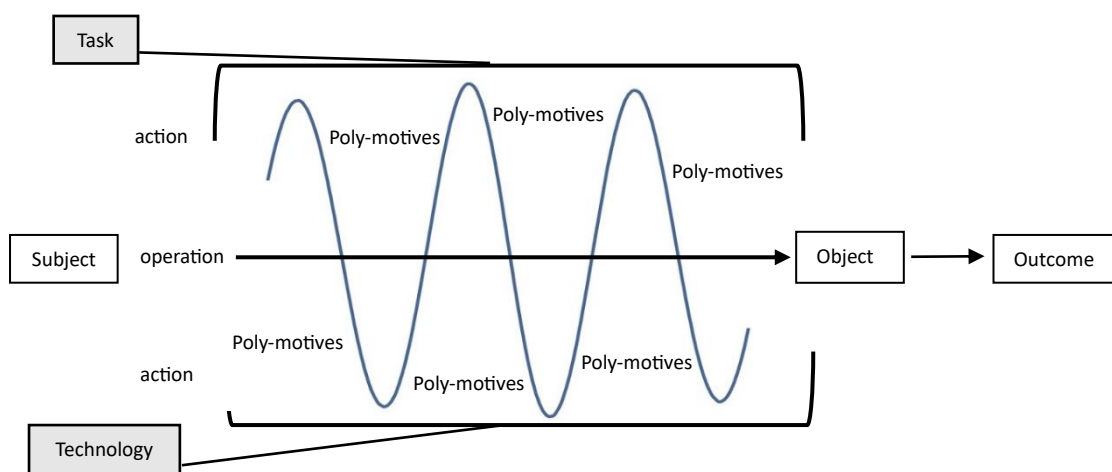


Figure 13: A representation of poly-motives and the subject-object relationship

Participants exhibited a range of technological skills when engaging with online tasks. Some were highly conscious and deliberate in their use of technology, making informed choices and occasionally seeking external guidance from the community. In contrast, other participants transitioned to a more automated and efficient approach to technology use, where mediation had moved from the intermental plane to the intramental plane, in turn reducing the cognitive load and freeing the participant to focus on the task and learning (Leontiev, 1978).

The shift from deliberate and conscious utilization of technology to a state of automated operations, proved to be a fundamental factor contributing to the emergence of poly-motives within the participant group. Actions served as markers denoting the emergence of poly-motives, while operations signified that technology presented no impediment to task completion where poly-motives did not emerge. As illustrated in Figure 13 above, operations are situated closer to the centre of the poly-motive wave, whereas actions are positioned at the periphery, indicating the emergence and intensity of poly-motives. A notable implication of the findings represented in Figure 13, underscores the idea that the process of completing a task may also have generated instances of poly-motives triggering deliberate reflection and cognitive engagement to facilitate effective learning, which presents an intriguing avenue for future research stemming from this study.

The representation of poly-motives in Figure 13 does not encapsulate the broader institutional and educational factors that emerged in the context of rules and the division of labour, as elucidated earlier in the findings section. The concept of a super-objective, a notion rooted in higher-level cognitive functions that acts as an organizing and guiding principle for activity as proposed by Vygotsky (1989), offers a potential solution to address the issue of determining what kept the participants resilient and persistent in using technology and completing the task.

Super-objectives directed participants to actively engage in task completion and to surmount technological challenges, underscoring the perceived significance of the tasks within the domain of classroom learning and institutional requirements. The acknowledgement of super-objectives provides insight into the driving force behind a user's actions and resolves conflicting influences of the subject-object relationship. In the absence of super-objectives, it is reasonable to assume that the impetus to persist and endure challenges would have been lacking and perhaps a cessation of engagement with the task.

An attempt has been made to incorporate the concepts of poly-motives and the super-objective into the conventional framework of activity theory, as depicted in Figure 14 below. While the illustration provides a somewhat simplified representation of the mediation of technology, it serves to provide the reader with an understanding of the mediation process as it is presented in this

thesis. Figure 14, further accentuates the underlying motivations that prompted the participants to engage with technology through the elements of the framework.

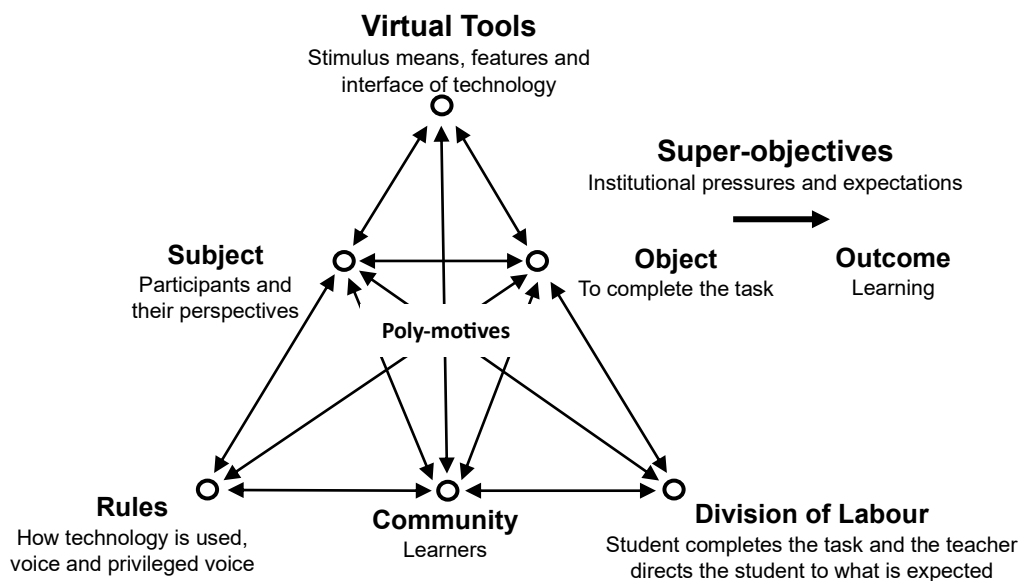


Figure 14: Activity theory framework for analysing engagement

As depicted in Figure 14, virtual tools mediated between the subject and object in turn, shaping the participants' actions as they committed to using technology to complete the task. Virtual tools were developed by others as a stimulus means to shape responses from the participant. The essence of the stimulus means was marked by the unidirectional and linear nature of the virtual tool. Essentially, participants were directed to carry out pre-defined actions using technology, which were essential for task fulfilment. When processing the stimulus means, a trial-and-error strategy emerged as participants sought to develop effective methods to achieve the predetermined use of technology. A trial-and-error approach frequently led to feelings of frustration as participants engaged in multiple attempts to advance in the task, often remaining perplexed about the appropriate course of action. Uncertainty regarding the directives of the stimulus means often led to disruptions in the learning process. Icons, hyperlinks, navigation paths, and textual elements acted as conduits, directing participants toward specific actions prescribed by those who had designed the technology. Consequently, technology assumed an authoritative voice, leaving participants unable to contribute a voice of their own. The ability to navigate and utilize technology effectively was contingent upon integration within a community that had a privileged voice. However, gaining access to this privileged voice often came at the cost of experiencing ruptures in the mediation process, resulting in disruptions to learning.

Drawing upon Bakhtin's insights (1986) regarding the concept of multivoicedness, a parallel phenomenon can be observed within the realm of technology. While words embody

multivoicedness shaped by cultural and societal influences, the multivoicedness within technology follows a distinct trajectory that diverges from the ideas of Bakhtin. Here, rather than constructing meaning through culture and society, meaning is constructed by developers, designers and companies that govern the interpretation and functionality of technology and prescribe how it should be employed. This results in a monological process, where the question of "Who is doing the talking?" (Bakhtin, 1986, p.95) is answered by the dominant voice of technology. There is a one-way interaction that participants must adhere to in order to complete their tasks, ultimately establishing the voice of technology as dominant. When observing the participants in this study, deviation from the prescribed stimulus means transformed technology into an impediment to learning and ruptured the mediation process, often extending the time required for task completion. This frequently prompted participants to seek external assistance from their peers and teachers to gain a better understanding of how to effectively utilize technology. During the completion of online tasks, the learners initially exhibited a fragmented community structure, with participants working independently. However, this fragmentation evolved over time into a more supportive community. When participants encountered challenges in using technology that surpassed their individual capabilities, they sought assistance from the community. Rules in this context played a dual role, both determining the successful completion of tasks and motivating participants to meet institutional requirements. The division of labour was confined to the teacher distributing tasks and the developers organizing the actions of the participants. In this transactional domain, the voice transmitted appeared to be authoritative and not representative, underscoring a unidirectional power dynamic firmly in the hands of technology creators and developers. Consequently, participants needed to assimilate the perspectives of *others* to navigate and engage with technology effectively.

5.1.2 Engagement theory

With reference to O'Brien and Toms' (2010) five points of engagement, the findings suggest that technology was not a reason that students engaged with learning but a means for accessing content with additional features that supported learning in some interactions. Third-party resources held some points of engagement that participants found helped them to learn. However, this was rare and particular to third-party resources. Figure 15 below shows the points of engagement and the reasons participants used technology which includes LMS and third-party resources. A discussion of the five points of engagement follows.

Points of engagement	Process of Engagement
Reason for engagement	<ul style="list-style-type: none"> • Technology contained the daily online tasks • Online tasks were connected to classroom work • A desire to learn the content contained in the task • A desire to feel that participants had accomplished something • Belonging to a community of learners
Sustained engagement	<ul style="list-style-type: none"> • Motivation to answer the task question/s • Desire to learn something new • Improvement of academic skills • Obtain instant feedback with quizzes • Time limit for quizzes • A connection to participants' contexts of study and life in Birmingham • Ability to view other students' work: limited to discussion boards • A sense of accomplishment in using technology and completing a task • Aesthetic presentation of information in third-party resources • The ability to interact with technology in third-party resources
Disengagement	<ul style="list-style-type: none"> • Technology became a barrier to learning • Participants stopped using technology as they needed to attend to other things
Reengagement	<ul style="list-style-type: none"> • Difficulty of using technology was overcome • Motivation to complete the task • Acknowledgement that participants needed to complete the task as it was connected to classroom work the following day
Nonengagement	<ul style="list-style-type: none"> • Answers to task submitted and followed up in class

Figure 15: Summary of the five points of engagement (Adapted from O'Brien and Toms, 2010)

5.1.2.1 Points of engagement

The participants' *reason for engagement* with technology primarily stemmed from the imperative to access and engage with daily online tasks both before, during, and after classroom sessions. Their motivation for using technology was intricately interwoven with the perceived relevance of the tasks within the context of the classroom. The teacher's explicit reference to tasks during classroom sessions underscored the importance of completing tasks. The tasks assigned beyond regular class hours were integral to the overall progression of learning. Non-completion of tasks would have resulted in participants falling behind their peers in their academic journey. Technology, in this context, assumed the role of an indispensable intermediary, facilitating access to tasks and positioning itself as a vital link between the participants and their academic objectives. Consequently, the participants' motivation to engage with technology was rooted in their aspiration to access and complete tasks essential for their ongoing educational advancement, rather than being primarily driven by the specific features of technology itself.

Sustained engagement was characterized by several key factors that played a crucial role in keeping the participants engaged with technology. One significant engagement factor was the recognition that completing tasks would enhance participants' academic skills and equip them with practical skills relevant to life in Birmingham. Technology offered certain additional attractions contributing

to sustained engagement, such as the provision of instant feedback when completing quizzes and the opportunity to review the work of other students in discussion boards. However, it is important to note that technology did not independently sustain participants' engagement. The use of technology complemented the participants' overall experience and provided some additional benefits to learning. The core driving force for sustained engagement remained the perceived academic benefits and the practical skills associated with tasks, while technology had some capacity to contribute to sustained engagement to a certain degree.

The differentiation between the LMS and third-party resources draws attention to some notable distinctions. Third-party resources presented a more intricate experiential pathway of learning that added novelty to the student experience. The arousal of *experience threads* was the result of various interactions that participants had with third-party resources, enhancing their ability to remember content material. Imagery played a pivotal role in creating visual elements, like the sliding scales, which left a lasting impression on some of the participants' memory, facilitating their recall of the presented information: this was noted in several verbal protocols and was not isolated to Maryam. Such imagery and interactive features were notably absent in the LMS. Throughout the phase of sustained engagement, the dominant motivating factor remained the participants' commitment to completing the task, as Figure 15 highlights.

Another aspect to take into account pertains to the participants' perception of goal attainment and their subsequent feelings of accomplishment upon the successful completion of a task. In completing tasks their emotional and psychological responses played an integral role in sustaining their engagement. They actively pursued the satisfaction that came with successfully accomplishing a task, reinforcing the argument concerning the subject-object relationship, underscoring the fact that the primary object was the task itself. The distinction leads to the suggestion that, although technology did provide some levels of sustained engagement, it did not serve as the primary motivating factor for sustaining engagement.

Points of *disengagement* were primarily associated with technology hindering the participants' learning progress, as they grappled with the challenges of unfamiliarity in using technology to advance within the task. Disengagement manifested in the form of pauses, trial-and-error tactics, and the expression of negative emotions and frustrations. If the participants failed to reengage, their last resort was to seek assistance from peers or the teacher in class on the following day. Notably, the technological challenges did not deter participants from using technology entirely, as this would have resulted in nonengagement. Participants exhibited unwavering determination to complete the task, leading them to develop strategies for utilizing technology effectively.

An additional consideration contributing to disengagement was the participants' need to attend to other responsibilities, such as preparing dinner or participating in a seminar. This highlights the fact

that technology did not fully engage participants to the extent that they were compelled to remain solely focused on using technology due to the immersive experience it provided and neglect other responsibilities: an observation noted in published research on online gaming (Ates et al., 2018; Batmaz and Çelik, 2021). Participants transitioned from reason for engagement to sustained engagement, disengagement, and subsequent reengagement, due to their individual commitment to task completion and not due to technology.

The concept of *nonengagement*, as observed in this study, differs from the findings of O'Brien and Toms (2010) where nonengagement was primarily attributed to technological barriers. Nonengagement in this research manifested when participants had successfully completed a task and had received adequate classroom instruction pertaining to it, rendering further engagement unnecessary. There was no requirement to reengage with technology as it did not lure students to return to using it.

5.1.2.2 Experience threads

The experience threads, that were detailed in Chapter 2, will now be discussed. Figure 16 shows comparable experience threads between the LMS and third-party resources, that highlight the lack of experience threads when participants engaged with technology.

Process of engagement				
Experience threads	Point of Engagement	Sustained engagement	Disengagement	Reengagement
Sensual	<ul style="list-style-type: none"> • A sense that others are completing the same task • Completing the task meant that participants could interact more successfully in class • Aesthetic elements are attractive and generate curiosity • Novelty of interacting with something new 	<ul style="list-style-type: none"> • Ability to see other posts • Ability to view feedback • Interaction with interface gave additional benefits to learning content 	<ul style="list-style-type: none"> • Could not use technology 	<ul style="list-style-type: none"> • Discovered how to use technology
Emotional	<ul style="list-style-type: none"> • Motivation to complete task and learn • Compelled to complete task as part of community of learners • Motivation to improve academic skills • Curiosity of task and what it contains 	<ul style="list-style-type: none"> • Sense of achievement to complete task • Viewing peers' posts • Feedback from quizzes 	<ul style="list-style-type: none"> • Feeling frustrated, uncomfortable, confused as technology has stopped progress in task completion 	<ul style="list-style-type: none"> • Discovered how to use technology
Spatiotemporal	<ul style="list-style-type: none"> • Can complete in own time • Part of the course and situated in a time and place within the course 	<ul style="list-style-type: none"> • The task will be re-viewed the next day as part of class 	<ul style="list-style-type: none"> • Need to attend to something else 	<ul style="list-style-type: none"> • External need completed

Figure 16: Summary of experience threads when using the LMS and third-party resources

The use of bold text in the two columns of point of engagement and sustained engagement in Figure 16 serves to emphasize that the experience threads were exclusively associated with third-party resources. In all other instances, the experiences were attributed to a combination of both the LMS and third-party resources, exhibiting varying degrees of influence. Evidenced by Figure 16, the LMS was not a technology that evoked high levels of experience threads across the sensual, emotional and spatiotemporal elements. The LMS lacked aesthetic appeal, novel methods for presenting information, enjoyment, fun, interface feedback, user control and social interaction. The participants' focus was directed at task completion; they were not using the LMS because they were attracted to it and wanted technology to evoke psychological arousal that initiated and sustained their engagement. Noticeably, psychological arousal came from the task itself as participants felt satisfied in completing a task and submitting their answers. Engagement for the participants was with the content and the motivation they had to complete it. The subject-object relationship discussion emphasises this finding as technology served as a tool providing participants access to content.

In contrast to the LMS, third-party resources offered additional interactive elements that heightened participant engagement, subsequently facilitating the learning process to some extent. A level of engagement with technology was achieved through the utilization of semiotics, wherein the incorporation of colours, feedback controls, and interactive interfaces introduced interactive learning methods to the participants.

5.2 Summary of Chapter

This Chapter offers insights into the application of activity theory and its implications for engagement. The subject-object relationship emerged as a pivotal factor guiding users' activities. However, this research has underscored the inherent intricacies surrounding the subject-object dynamics and posits that additional concepts, namely poly-motives and super-objectives, are essential to comprehensively elucidate the nature of students' interactions with technology and fully understand the nature of engagement. By acknowledging and incorporating poly-motives and super-objectives a more nuanced and comprehensive understanding of how technology mediates human activity can be attained.

Bakhtin's (1981) multivoicedness of language finds resonance with the multivoiced nature of technology. However, unlike language, where meaning is a social construct where the individual gives meaning back technology diverges where meaning is imposed by developers and designers leading to a dominant voice. The crux lies in the unidirectional nature of the stimulus means, guiding participants towards predetermined actions essential for completing tasks. This restricted

participation inhibits individual contributions, necessitating integration within a privileged community.

Engagement theory illuminates the factors influencing a user's engagement with technology by exploring engagement phases and experience threads. Engagement is intrinsically tied to the users' educational journey, motivated by the perceived relevance of tasks and how this is connected to academic advancement. Similarly, sustaining engagement is rooted in the recognition that content enriches the users' academic skills and practical competencies, which are directly applicable to their studies. While there were instances where technology engaged the user through certain features (such as feedback, the ability to view peers' work and the users' ability to interact with technology), these were somewhat limited. Additionally, a notable distinction emerges between the LMS and third-party resources, with the latter offering more intricate experiential learning pathways that bolster engagement to a certain extent and improve the recollection of information. When examining experience threads, it becomes evident that sensual, emotional, and spatiotemporal experiences were relatively limited for both the LMS and third-party resources. Access to content remained the primary driver of engagement.

The findings underscore the role of technology in education as a means to access content and facilitate learning, rather than being a direct source of intrinsic engagement where learning occurs. The relevance of content and its connection to academic progress and life experiences proves to be a pivotal factor in engaging the user, rather than technology itself. In essence, technology is essentially a conduit for accessing educational resources, and its use is often compelled by necessity rather than genuine engagement.

Chapter 6

Conclusion

6.1 Introduction

This Chapter centres on answering the research questions and expanding upon the findings presented in Chapter 4 and discussed in Chapter 5. The ensuing discussion presents the implications and recommendations of the research and offers valuable insights into the contemporary landscape of student engagement with technology in higher education. Where appropriate, I suggest practical applications and offer recommendations for potential improvement of the student learning experience when using technology that is directed at institutions, teachers, developers and designers of technology. Following the implications and recommendations section, there is a critical reflection on the limitations of the research, activity theory and engagement theory and a consideration of the contribution the research can make to the field of technology-mediated learning. In the concluding section, prospective avenues for further research is presented.

6.2 Summary of main findings

Below, a concise synthesis of the findings provides an overview of the preceding Chapters. It is essential to note that the summary covers and deliberates the research questions throughout its entirety, and where appropriate research questions are referred to. The research journey began with the formulation of four key research questions, serving as guiding pillars throughout each stage of the research.

Main research question

1. How and in what ways is the 4-week university preparation course students' learning mediated by technology?

Research sub questions

2. What does it mean to engage the learner when using educational technology?
3. In what ways do students struggle to use technology, particularly in ways they perceive fail to engage them?
4. What aspects are the most important when designing technology to support students' ongoing learning?

Aligning with research question 1 and 2, technology operates in a dual capacity, serving as a conduit for accessing learning that must be proficiently harnessed for educational purposes. This duality creates disruptions in the learning process, accentuated by stimulus means (Wertsch, 1993) that channel students toward specific actions that need to be mastered. Consequently, poly-motives

(Kaptelinin, 2005) emerge where the user fades in and out of different objects, completing the task and using technology, depending on their technological proficiency. However, fading does not lead to nonengagement (Toms and O'Brien, 2010), as the super-objective (Stanislavski, 2013) keeps the user on course to complete the task while also directing them to persevere with technology when it becomes a barrier to learning. As poly-motives emerge from activity, the user undergoes a process of reflective mediation (Gillespie and Zittoun, 2010) which informs their choice of action. The choices made by the user are influenced by their institutional (Wertsch, 1993), historical and social experiences (Vygotsky, 1978).

Peer-to-peer and teacher interactions shape the community of learners, which further directs the user's super-objective as rules and division of labour solidify goal-directed behaviour in task completion (Engeström, 1999). Over a period of time, participants coalesce into a community, where they engage in collaborative efforts to access a privileged voice (Bakhtin, 1981), offering one another invaluable mutual support in their use of technology.

In resonance with the exploration outlined in research question 3 and 4, drawing from Vygotsky's foundational work on signs and tools (1962), it becomes apparent that developers and designers of technology play a pivotal role in attributing meaning to virtual tools. Virtual tools are shaped by multiple contributors, infusing virtual tools with a stimulus means (Wertsch et al., 1995), and imparting technology with a multivoiced quality that requires students to strive to acquire a privileged voice to access learning. Ultimately, the interaction with technology is unidirectional and monological in nature, essentially silencing the user. The intentions and choices of the developers and designers of technology regarding the development and design of icons, terminology, navigation pathways, hyperlinks, learning management system, virtual tool design, and web page layout presuppose specific user actions, necessitating the assimilation of their own perspectives with the user for effective technology use. As a result, users are compelled to traverse a continuum, progressing from technological novices to experts, marking a transformative journey from a focus on actions heightened by poly-motives to an emphasis on operations, with a focus on learning (Leontiev, 1978). Mediation on the intermental plane (Vygotsky, 1989) influences the user's interaction, shaping poly-motives, and subsequently transitions to mediation on the intramental plane (Vygotsky, 1989), where experiences accumulate with increased technology use, making future interactions less disruptive.

The response to research questions 2 and 3 was approached through the lens of engagement theory that shed light on how users engage with technology, emphasizing its connection to the user's educational journey, which is driven by the perceived relevance of tasks and their academic progress. Sustaining engagement hinges on recognizing that content enhances academic skills and practical competencies. Access to content takes centre stage in driving engagement, with the

subject-object relationship guided by a super-objective compelling the user to complete tasks. In the domain of education, technology primarily acts as a means to access content and facilitate learning, rather than serving as a direct source of intrinsic engagement. The content's relevance, its connection to academic advancement, and real-life experiences are pivotal in engaging students. Notably, third-party resources offer more intricate and enriching experiential learning paths, leading to enhanced engagement compared to learning management systems. However, it is worth mentioning that sensual, emotional, and spatiotemporal experiences are somewhat limited in both LMS and third-party resources, emphasizing that the essence of engagement lies not in the use of technology itself, but in its role in directing students toward specific actions to access content.

The mediation of technology is a complex and multifaceted phenomenon, involving numerous components that exert significant influence on the user's actions. The research questions played a vital role in directing and maintaining the research trajectory. It can be argued that the research questions have been effectively addressed, providing a comprehensive and detailed understanding of the processes when students engage with and mediate technology.

6.3 Implications and recommendations

Drawing from the findings in Chapters 4 and 5 of this thesis, this section explores the implications of students' perspectives regarding engagement, the influential factors that either facilitate or impede their engagement, and the various challenges they encounter. Additional emphasis is placed on the pivotal role of designing technology for learning. Recommendations are interwoven within the implications to maintain the flow of the argument and discussion. To ensure a coherent reading experience, deliberate efforts were made to refrain from explicitly referencing each research question in this section. The adoption of this approach stems from the intricacy inherent in the research design and the overarching significance of the implications and recommendations, which reverberate across the findings.

It is crucial to distinguish discussions concerning the practical application of educational technology features from the content of this Chapter, as it falls beyond the scope of this research. Specifically, the focus is not on instructional methods like utilizing quizzes or discussion boards. Engaging in discourse regarding instructional tools, as extensively debated in the literature review, detracts attention from the primary argument centred on the mediation of technology and the student's perspective of engagement.

6.3.1 Unpacking assumptions of engagement

In the 4-week university preparation course, student learning is intricately mediated by technology, leading to diverse modes of engagement that challenge conventional perceptions. A considerable portion of research in the field of technology-mediated-learning tends to overlook the fundamental mechanisms of mediation, often presupposing that technology's significance lies in its inherent

ability to engage users, leading to the outcome of learning (Bower, 2019). Additionally, what does exist in the way of published research explores surface-level aspects of technology-mediated learning such as how to use discussion boards, quizzes and videos (Bond et al. 202). What much of the published research omits is an explicit definition of what is meant by engagement and how the process of engagement transforms into learning (Boekaerts, 2016; Kahu et al., 2015). Moreover, the concept of mediation is often not referred to as a valuable framework for defining the essence of engagement.

It becomes evident that a student's completion of an online task is not solely contingent on the specific utilization of technology. By exploring the way technology is mediated, this research has revealed a more intricate and nuanced dimension to engagement, contrary to the somewhat simplified perspective often conveyed by existing literature (Henrie et al., 2015), which appears to hinge on a superficial understanding in which mediation is largely ignored. As a consequence, the credibility of some previous research findings may be subject to scrutiny.

Phrases such as *students engage with technology* or *technology engaged learning* are often used euphemistically. It would serve the research community and educational institutions better to replace such euphemisms by explaining exactly how technology is used in an educational setting. Without clear explanations, such phrases evoke a sense that technology holds in and of itself some valuable attribute whereby students learn, giving technology a level of attention that it perhaps does not deserve. A point noted by Bayne is of importance when he discusses the term *technology enhanced learning*, "...the very term 'TEL' [technology enhanced learning] works to entrench a very particular – and ideologically inflected – understanding of the relation between technology, education, individual and society." (Bayne, 2015, p.18). Bayne's (2015) point underscores the significance of acknowledging the inherent influences and biases that originate from various groups of individuals within the domain of educational technology. What Baynes point suggests with reflection on this research, is that in its usage and implications, the term *technology engaged learning* promotes a particular viewpoint or ideology about how technology and education are interconnected and how the two domains relate to individuals and broader societal contexts. Ideological influences significantly shape how students and educational institutions perceive technology and the underlying assumptions they hold.

It is essential to refrain from making assumptions about students' digital prowess and their status as digital natives (Prensky, 2001). The mere fact that individuals have grown up in a technology saturated world does not automatically imply an innate proficiency in utilizing educational technology (Bennett and Maton, 2010). Moreover, the utilization of educational technology cannot be taken as a direct reflection of how students employ technology in their social lives. These

assumptions do not align with the reality that students' comfort with technology in their personal lives does not necessarily translate into seamless use of educational technology.

While engagement has been defined as the establishment of a profound connection or attachment characterized by a compelling and alluring emotional and sensory appeal that captivates the user's interest in utilizing technology (Toms and O'Brien, 2010), this research indicates that such a description does not adequately describe the student's experience or perceptions of what engaging with technology involves. Instead, engagement emerges from the connection between the user and the subject matter, as well as the relevance to academic study and real-life experiences, with technology functioning as a conduit for content delivery. When a student encounters obstacles in accessing content and learning due to technological barriers, they often find themselves grappling with the need to determine their next course of action. This can lead to feelings of frustration, discomfort, and confusion, which are opposite feelings to the definition of engagement stated above. Over time, as users become more accustomed to technology, their initial discomfort diminishes, underscoring the significance of providing support and training to instil confidence in effective technology use for the student.

A deeper comprehension of how mediation operates within the institutional domain sheds light on the intricate dynamics of student engagement and the decision-making processes regarding educational technology. Consequently, it would be beneficial for educational institutions to undertake a critical assessment of the adoption of technology taking into account the value of engagement from the students' perspective. Selective research that is independent of educational technology companies can direct institutions to making informed choices regarding the adoption of technology and how it can bring benefit to the learning and teaching context. Such considerations about the use of technology can potentially serve as a foundation for refining and optimizing educational policies on technology.

6.3.2 Challenges of technology-mediated learning and the impact on educational equity, creativity and learning

The findings of this research exemplify that technology has a voice that ensnares students in a monologic interaction characterized by stimulus means. In this context, technology wields substantial significance as it shapes the actions of the student. The findings presented emphasise the necessity to examine the power dynamics at play and the potential homogeneity resulting from privileged voice that is present within technology-mediated learning environments. Consequently, in some instances, technology may engender unidirectional learning experiences, constraining students to adhere to pre-defined patterns of use and limiting both their agency and the ability to adapt their actions. The student has to interpret the intended action of use; failure to do so leads to disruptions in the learning process. More importantly, the notion of voice and privileged voice

presented challenge the principles of active learning (AdvanceHE, 2011) and dialogue (Luster et al., 2019) in higher education, as engagement with technology seems to be based on the principles of rote learning where the user must keep using the same virtual tool before they operationalise its meaning, with little space for user innovation and creativity.

The concept of privileged voice (Wrestch 1987) implies that some students may have an advantage in efficiently navigating and using technology. Those who quickly grasp the intended meaning behind stimulus means navigate the learning environment more effectively. However, this creates disparities in access and understanding, which can impact the inclusivity and equity of higher education. A student may require a period of acclimatization to become proficient with technology where actions move to operations. This acclimatization process often relies on rote learning methodologies, which may not align with the progressive and interactive learning experiences that universities often promote (Advanced HE, 2011). The implication here is that students may need to invest time in mastering technology itself before they can fully engage with the educational content. This may affect the effectiveness of technology for learning. Additionally, technology can sometimes curtail a student's capacity to participate in interactive and dynamic learning experiences, especially when juxtaposed with traditional tools like pen and paper. In certain cases, technology may lack the same degree of adaptability, potentially affecting the overall quality of the learning process: such as discussions and reading texts.

A rigorous examination of the support infrastructure for technology is imperative, demanding a reconsideration and advancement beyond the current scope of technology design to ensure that technology is more inclusive and equitable for all students. Such an evaluation is vital to foster a more resilient connection between the learner and the use of technology. Additionally, initiatives that support students navigating technology use within education settings by incorporating technology literacy alongside subject-specific knowledge can significantly contribute to addressing some of the technological challenges students face. However, this shift may also heighten the onus on teachers to offer support during classes, amplifying their workload and demanding a more comprehensive understanding of technological skills. Consequently, this could potentially raise stress and anxiety levels among educators as they grapple with the nuances and impacts of incorporating technology into their teaching methodologies (Fernandez-Batanero et al., 2021). The onus perhaps should be on educational technology companies to develop and design technology that is more flexible and akin to the needs of the learner when using technology.

It is insightful to engage in a thoughtful evaluation of traditional teaching and learning methodologies and technology, acknowledging the inherent value in enriching a student's overall learning experience, especially in instances where technology might pose challenges and prove less conducive to effective learning.

6.3.3 Evaluating the role of technology in higher education: prioritizing content-centric learning, technology design and design standards

Educational technology companies may resist changing promotional slogans that encourage technology adoption in higher education due to financial incentives (d'Agnese, 2023). Nevertheless, it is imperative to evaluate the prevailing perceptions of technology in the higher education context and its broader societal implications, particularly its impact on pedagogy and learning. It is insufficient to merely assert that technology possesses the intrinsic capacity to engage learning or enhance comprehension without a comprehensive understanding of the mediation process and the underlying motives driving a student's utilization of educational technology. Value lies in the learning content, which is intrinsically linked to a student's educational journey and their quest for knowledge. The role of technology should not overshadow the significance of educational content. Therefore, prioritizing a content-centric approach will not only enhance the learning experience but also underscore the direct connection between content and a student's academic pursuits and university life.

In the process of accessing content, students engage with the subtleties of technology's interface and functionalities, wherein its role exhibits a dichotomy: functioning both as a conduit for accessing learning content and a barrier to learning. Comprehending user responses through stimulus means holds significant importance in developing technology interfaces to mitigate barriers to learning, enhance user experience and maintain seamless learning. Deliberate choices drive the selection of design elements that steer users toward particular actions. By discerning stimulus means and its effects, technology developers and designers can pinpoint user challenges and its underlying origins, informing improved approaches to technology design. Therefore, the grasp of how tools and signs facilitate actions becomes crucial, given users' responsiveness to visual cues on screens as they navigate diverse interfaces to attain objectives and desired outcomes. Transitioning from the prevailing instructional design approach to a historical sociocultural construct of learning and technology design presents challenges due to the foundational ontological and epistemological principles entrenched within technology design. Achieving this shift might prove unattainable as it involves redefining the inherent nature of technology and the ways knowledge is acquired and applied in the design process. (Carr-Chellman and Rowland, 2017; Gourlay, 2021; Reiser and Dempsey, 2012)

The diverse perspectives among designers and developers means that each new educational platform introduces a degree of cognitive conflict before a student's actions evolve into operational routines. This constitutes an inherent lack of consistency in how technology is designed and used. In essence, recognizing the limitations of presuming student's technological competence and acknowledging the importance of consistent design principles are fundamental to the integration of technology into educational contexts. Establishing international standards and agreements for

the use of specific virtual tools in predefined ways could facilitate the use of technology by ensuring consistency across platforms, a challenging but attainable goal if educational companies and institutions work together.

6.3.4 Exploring multisensory design, collaborative learning and peer to peer interaction

Learning experiences that encompass visual elements, interactive features and audio components can heighten user interaction and improve information retention. Developers and designers may wish to consider adopting a multisensory design approach as a potential goal when aiming to create technology that actively engages students. With that said, it is important to underscore that while multisensory experiences play a supportive learning retention role in the learning process, as highlighted in the findings reported, content remains the central focus for the student.

Learning management systems are predominantly designed as platforms for accessing and organizing course content, rather than being designed to actively engage users through a diverse range of experiential activities involving visual and auditory senses. Consequently, it may be useful to reassess the functionality and interactivity of such systems to offer users a more engaging learning experience that incorporates interactive features such as those offered in third-party resources. However, it is relevant to question whether users would continue to utilize educational technology in the absence of relevant or useful content as, based on the findings presented here, content itself stands as the primary driver of engagement and not technology *per se*. When technology evokes specific experiential responses in users, the core of their engagement remains centred on content, with sustained engagement emanating from the process of learning itself.

The community of learners exhibits a marked absence of collaborative learning endeavours geared towards the attainment of a shared object (Engeström, 1999). Instead, each user pursues their respective educational goals, potentially culminating in a sense of isolation. This observation underscores the paradoxical role of technology which, despite the prevalent discourse emphasizing its capacity for facilitating social learning (Beldarrain, 2006), appears to inadvertently nurture an individualistic approach due to the monological, unidirectional nature of the interaction. The online learning context seems to be devoid of the conducive conditions necessary for nurturing a collaborative learning environment and community. The absence of such conditions may hinder the collaborative growth and engagement of learners. To foster a thriving learning community, it is essential to create an environment that encourages active participation and knowledge sharing among students (Castaño-Muñoz et al., 2013), which may seem to be a challenge when using technology.

It is evident that the catalyst for the emergence of a community of learning resides in peer support mechanisms. Students, striving to access a privileged voice, may frequently resort to obtaining assistance by means of inquiries directed at comprehending the nuances of technology utilization

and task accomplishment. This phenomenon underscores the paramount importance of designing and fostering dedicated spaces and opportunities within the context of learning online, wherein students can forge connections and collaboratively work to support each other to overcome challenges in task completion. The organization and design of physical spaces may greatly enhance face-to-face interactions (Bali and Liu, 2018), while technology faces the challenge of replicating such spaces in an online environment.

A fundamental concern within technology in this research, relates to the observed gap in peer-to-peer interaction. While the LMS often incorporates mechanisms to encourage students to respond to their peers' contributions, a notable number of users did not actively engage with these features. This point raises relevant questions regarding the effectiveness of such interactive functionalities and underscores the essential need for strategic interventions aimed at fostering peer interaction when using technology from the perspective of the teacher. Such initiatives will significantly contribute to expanding the skill set required by educators and add to their workload. A substantial body of research exists on the utilization of online discussion boards as tools for promoting peer interaction (Bond et al., 2020). The integration of online discussion boards into an educational setting introduces an additional layer of didactic complexity for the teacher who is expected to know or learn how to operationalise technology. In this scenario, teachers are tasked not only with understanding how to effectively utilize discussion boards but also mastering the nuanced dynamics of technology for learning. This amplifies the spectrum of pedagogical competencies they must acquire, potentially diverting their attention from the fundamental objective of facilitating meaningful content and student learning.

6.3.5 Teacher and institutional pressures shape student's motivation

Rules and the division of labour exert a substantial impact on a student's endeavour to complete tasks, effectively shaping the nature of the subject-object relationship. The super-objective, in this context, assumes the role of a compelling force that aligns students with their educational objectives. Educational technology companies often employ marketing strategies that tout technology's capacity to engage the learner, with the ultimate goal of promoting its adoption by educational institutions (Bennett and Maton, 2010). However, this research underscores that students navigate technology use within the framework of established rules and the emerging division of labour inherent to the learning community which are influenced by institutional and classroom expectations.

The confluence of students' desire to learn and their commitment to task completion serves as a potent motivational factor, augmenting the likelihood of online task fulfilment. Within this context, rules serve a dual function, acting as both determinants for task completion and motivational stimuli. This is because rules prescribe institutional expectations, highlighting the fact that teachers

and institutional pressures exert a substantial influence on students' motivation to complete online tasks. Comprehensive insight of the overarching motivational factors behind online task completion is imperative, offering insights of significant importance when researching technology-mediated learning and the determinants of engagement.

A promising avenue to improve the use of technology within educational contexts involves equipping teachers with the requisite skills to orchestrate student motivation. This would seem more useful than focussing solely on interventions that aim primarily to instruct students on how to use technology tools and platforms. A key factor is that online tasks should be used in class and reflected on by teachers and students. Such training can serve as a foundation for interventions and support systems attuned to student motivation. Moreover, an exploration of the perspectives held by educators and their pivotal role in shaping the division of labour among students within the learning process will enrich the comprehension of student engagement, offering valuable insights into how learning can be enhanced.

6.3.6 Summary of implications and recommendations

The findings in this study prompt several practical implications and recommendations for the field of technology-mediated learning. It is crucial to evaluate existing research findings, recognizing that the intricate dimension of student engagement with technology discovered in this research goes beyond the simplified perspectives often conveyed in the literature. One recommendation is that researchers and educators could dissociate discussions of technology engagement from specific features like discussion boards or quizzes, focusing instead on understanding student engagement as a complex process of mediation. In turn, a more insightful investigation can be appropriated to researching what engages the student. There is a need to challenge euphemistic language and recognize the ideological influences embedded in technology-mediated learning discourse. Replacing vague terms with more precise descriptions of how technology is used for learning can help dispel notions that technology inherently possesses engaging qualities. Furthermore, defining engagement clearly as the connection between the user and the subject matter, rather than being based on technology's appeal, can enhance understanding of the engagement process, directing attention away from assumptions made about technology and a focus on content.

Acknowledging disparities in students' adaptation to technology is essential, as differences between quick learners and those requiring more time to acclimate can impact educational equity. Institutions should consider flexible and interactive learning approaches to mitigate these disparities. Providing support and training to help students overcome technological barriers and employing technology purposefully for specific learning goals are also essential. Shifting the focus towards a content-centric approach in higher education is a key recommendation. Prioritizing

educational content underscores its intrinsic connection to students' academic journeys, emphasizing the significance of content development by educators.

Evaluating the design of learning management systems to offer a more engaging learning experience that complements content delivery is important, as content remains the central focus for users, whereas technology has potential to assist in the recall of information. To optimize the learning experience for students, it is advisable for educational institutions to collaborate with developers and designers, encouraging the creation of more multisensory learning environments through the development of interactive content and design features.

The absence of collaborative learning, often driven by individual goal pursuits, can result in isolation. Technology, despite its potential for social learning, inadvertently fosters individualism due to its unidirectional nature. The lack of collaboration could hinder learner progress, emphasizing the necessity for environments that encourage active engagement and knowledge exchange: a significant challenge in online contexts. The development of spaces where students can form a community might be more suited to face-to-face interactions, bringing attention to traditional methods of teaching and learning.

The practical implications and recommendations discussed offer a multifaceted approach to understanding and improving technology-mediated learning, from evaluating research to challenging discourse and improving the learning experience for students where the focus is on content.

6.4 Limitations of the study

Research limitations can draw attention to areas of the research that may affect internal and external validity (Price and Murnan, 2004). Internal validity is concerned with the limitations of the methodology, methods, data collection and findings, and external validity is concerned with the limitations of the data interpretation, results and generalisability (Greener, 2018). By transparently identifying potential limitations in both internal and external validity within the research, the reader gains insight into the vulnerabilities of the study's assertions.

This section aims to elucidate the research's limitations while presenting counterarguments that aid the reader in evaluating the comprehensive nature of the research. By delineating potential constraints, this section seeks to offer a balanced perspective, acknowledging areas that may affect the research's scope or validity. Moreover, by integrating counterarguments, the discussion below strives to present a nuanced perspective, allowing the reader to engage critically with the research and make a more holistic assessment of the research's overall validity, credibility and impact.

6.4.1 Participants

The research participants comprised of international students who had successfully demonstrated their proficiency in English language, which was a prerequisite for their acceptance onto their chosen postgraduate degree at Birmingham University. All participants had completed the necessary admission requirements and received unconditional offers for their chosen programme. The use of language for the participants in the research context may have introduced a potential source of complexity in their interactions with technology, as the cultural and social mechanisms inherent to their diverse backgrounds might have led to varying interpretations and subsequent actions in response to stimulus means.

Participants came from a range of countries that included Thailand, Saudi Arabia, China, and Japan. Observations of the mediation process seemed to reveal a commonality among all participants, surpassing distinct cultural, societal boundaries, and linguistic differences. The findings derived from this study could be construed as indicative of a universal phenomenon that transcends cultural and societal confines, suggesting a shared pattern of technology mediation irrespective of the participants' country of origin. The research findings did not reveal specific observations unique to participants from particular nations. Rather, observations pointed towards a commonality in the mediation of technology, irrespective of the participants' backgrounds and first language. However, it is important to acknowledge that language might have occasionally posed barriers, particularly when precise comprehension of task-related questions was needed. It is imperative to clarify that the research primarily centred on the mediation of technology rather than explicitly focusing on linguistic aspects. While this acknowledgment is crucial in understanding potential limitations, the primary emphasis of the study remained directed towards exploring the role of technology, mediation and engagement.

6.4.2 Learning management systems

The research focused on a learning management system that was particular to Birmingham University, namely Canvas, with some instances of third-party resources. While one could contend that the research findings may present a limited perspective of educational technology, it is equally plausible to assert that the identified notions of poly-motives, super-objective, stimulus means and privileged voice can be extrapolated to diverse technological domains ranging from educational settings to everyday technological interactions such as those with cash point machines. The broad applicability stems from the inherent non-verbal, monological, unidirectional nature shared by various technological interfaces. Regardless of the specific technological context, users invariably undergo analogous experiences during the mediation processes, thereby establishing a commonality in their interactions with technology. However, the nuances may lie in poly-motives, super-objective and the modalities of stimulus means within distinct technological interfaces.

Consequently, while the findings elucidated in this research may find resonance across diverse technological domains, the manifestations and subtleties of these principles may exhibit notable variations.

Beyond the researched focus, technology involves two additional layers of information that influenced participants' interaction with the task. The first layer of information comprised of instructional guidance added to the LMS by the BIA's learning technologist and the 4-week university preparation course materials writer. The information offered supplemental guidance to students on using technology for task completion. The second layer of information encompassed task design exclusively developed by the materials writer of the 4-week course. The omission within the research concerning the specific nuances of instructional guidance and task design and their potential influence on the participants' task completion abilities was a conscious decision. The research deliberately maintained a clear focus on researching technology itself rather than the informational instructions contained in tasks. It was considered that incorporating supplementary elements would have introduced potential diversions from the central inquiry, potentially obscuring essential findings pertaining to the mediation of technology. Moreover, adding two additional layers of task information to the research focus would have made the research unwieldy and the focus of mediation and engagement with technology blurred. As highlighted in Chapter 3, the case study research section underscores the significance of defining precise parameters and outlining research boundaries when conducting case study research (Becker and Ragin, 1992; Yin, 2014). This study remained dedicated to maintaining such precision.

6.4.3 Data collection and generalisability

The data collection process, extensive in scope, encountered challenges of managing its sheer volume, encompassing three primary sources: two group interviews, seventeen verbal protocols, and five student diaries. The application of thematic analyses to this diverse dataset demanded a considerable investment of time to meticulously extract and articulate the emerging themes. While the expansive nature of the data posed a risk of potentially overlooking finer details during analysis, the outcomes revealed that the predominant themes derived from the data collection were robust, indicating that key themes were not overlooked. In doing so, there was a large time commitment needed to ensure that the analyses were credible and valid.

The research concentrated on a specific educational context, prompting considerations about the transferability of findings to other educational technology contexts. While it may be contended that the outcomes are context-bound, the research's generalizability remains sound, offering valuable insights into other settings where students use educational technology. The theoretical underpinning of the study assumes significance, aligning with Yin's (2014) assertion that a researcher's perspectives influence the acceptance and applicability of results in their own contexts. Operating

within a case study approach framed by a historical sociocultural lens prioritized analytical generalizations over statistical ones (Yin, 2014). Replicating this study in varied contexts holds promise to substantiate its findings, addressing current gaps in technology-mediated learning literature. Such replication efforts would not only reinforce the credibility of the initial research but also enrich the broader discourse in the field.

6.5 Critical reflection: activity theory and engagement theory

Bakhurst (2009) underscores the need to investigate what takes place between the elements of activity theory so that vital observations are not missed. Anchoring activity theory to predefined notions would have limited the research's capacity to broaden observations, potentially overlooking critical aspects, such as the power imbalance and the concept of privileged voice. While Bakhurst (2009) emphasizes that expanding the analytical framework of activity theory is imperative, this research has presented the potential for accomplishing this goal by integrating alternative concepts that offer insights into the dynamics of activity. The adoption of supplementary analytical notions, including multivoicedness, privileged voice, stimulus means and engagement theory, within the framework of activity theory, strengthened the assumption that activity theory is versatile, flexible and adaptable.

Activity theory has a pliability which supported the addition of poly-motives and super-objective into the framework. This in turn gave the theory a new perspective when analysing activity which could be applied to other areas of technology-mediated learning and perhaps other contexts of activity. Engeström's (2014) ideas of activity are framed on the assumption that activity can be analysed giving emphases to practical aspects and real-world outcomes, which this research has successfully accomplished. The implications and recommendations presented in this thesis serve as evidence supporting this assumption, as they underscore the significance of researching activity and the student's mediation of technology.

Applying engagement theory to the analyses of activity theory proved to be a valuable addition, as the two-fold approach expanded the comprehension of engagement. Engagement theory took account of the sensorial, emotional, and spatiotemporal aspects of the participants' experience that would have been overlooked if solely relying on activity theory. The inclusion of engagement theory not only enriched the interpretation of the findings, but also increased the credibility of the claims made in this research. Both engagement theory and activity theory gave insights to the mediation of technology from different perspectives. A significant observation arising from the integration of both theories was the convergence of the findings, which consistently elucidated the nature of student engagement.

The novel application of engagement theory and activity theory worked in synergy, effectively complementing each other. The amalgamation of the two theories underscores the potential

advantage of utilizing supportive theories in research to attain a more holistic understanding of complex phenomena. The application of the two theories makes aligning the ontological and epistemological foundations of research crucial, as any divergence in the perspective taken may give rise to conflicts in the perception of observations and the interpretation of data. In this research, activity theory and engagement theory were grounded in the epistemological and ontological underpinnings of a historical sociocultural approach, firmly anchored in the belief that a comprehensive understanding of real-world contexts requires an exploration of the historical, cultural, social, and institutional domains (Wrestch, 1985). Moreover, the genuine interactions between students and technology, as well as the influence of students' actions, were deemed crucial in comprehending the mediation of technology and engagement.

6.6 Contribution to the field of technology-mediated learning

The utilization of educational technology by students entails a multifaceted interplay of various forces. It is imperative to consider both the underlying motives driving a student's adoption of technology and the intricate dynamics that transpire during their interaction with its features. The examination of mediation assumes significance, as it revealed implicit and overt elements of a student's mediation of technology for learning, shedding light on factors that can guide stakeholders in refining existing educational practices and policies. More importantly, the research highlights the need for caution in technology implementation and dispels the fallacy of technology's deterministic impact on the learning process.

The research has unearthed several determinants of mediation that have thus far remained absent within the existing literature on technology-mediated learning, thereby enriching the discourse and providing a valuable reference for current debates in the field. The case study approach used presents a methodology to examine mediation that not only enhances understanding of the intricate processes involved, but also serves as focal points for further research into technology and learning more broadly, as it offers a standard for addressing contemporary issues and challenges encountered in the field of technology-mediated learning.

This research incorporated activity theory, engagement theory and concepts that have hitherto been underutilized in the examination of technology-mediated learning. The application of two distinct and contrasting theories represents a pivotal aspect, emphasizing the need for a nuanced and comprehensive framework in cases where one theory alone may lack the requisite depth of language and description to adequately elucidate and scrutinize how technology mediates learning. An exemplar of a notion applied to the context of technology-mediated learning was the incorporation of Bakhtin's (1986) concept of multivoicedness, which, in tandem with the identification of privileged voice within language, provided valuable insights into the role of technology and the ensuing power differentials it engenders. The introduction of multivoicedness

and its influence on language structure has proven invaluable, particularly in scenarios where the constraints of activity theory and engagement theory fell short in capturing the intricate interplay between participants and the developers of technology.

This leads to the conjecture that, in the field of technology-mediated learning research, there exists a wealth of additional theories and notions yet to be explored. Such an exploration holds the promise of augmenting our comprehension of how technology shapes individuals' actions and cognitive processes. Therefore, the theoretical contributions of this research extend beyond the immediate findings, fostering the notion that the integration of various theories and concepts bears the potential to unveil fresh and unexplored observations not only in the context of technology-mediated learning but in other fields of research.

6.7 Future research

The findings from this research underscore the need for a clear and nuanced understanding of the term engagement when it is employed to describe a learning process from the student's perspective. A deeper investigation into the multifaceted dimensions of student engagement is necessitated, moving beyond conventional perspectives. This research underscores the imperative for continued inquiry into student engagement, thereby extending the exploration into the complex understanding of engagement and the mechanisms through which technology facilitates this.

The inherent flexibility and descriptive language of both activity theory and engagement theory proved instrumental in facilitating a profound understanding of technology-mediated learning, yielding insights which provided a comprehensive framework for deciphering its complex landscape. The approach applied to this research may serve as a promising point of departure for future studies. Moreover, the synergy of the theories offers the potential for the refinement and expansion of key concepts presented in this research, such as poly-motives, super objectives, privileged voice and stimulus means, which may warrant further exploration and development.

The term enhanced learning warrants a critical examination, mirroring the scrutiny applied to student engagement in this research. There is a need for greater critical examination of the underlying premises of what constitutes learning enhancement in contemporary educational settings and the nuanced interrelation between technology and its impact on learning outcomes. Hence, further research is warranted to unravel the complexities inherent in the concept of enhanced learning, particularly within the context of technology-mediated education. Future research endeavours have the potential to bridge the domains of enhancement by exploring the ways technology mediates and amplifies a student's learning experience, offering substantial benefits to higher education institutions and informing the decisions made when viewing educational technology and its application in a learning context.

The conceptual framework established in this research lays the groundwork for future investigations aimed at improving the learning experiences of students. Future research in allied domains have the potential to validate and elaborate upon the findings presented, fostering a more comprehensive understanding across diverse educational contexts. The prospects for future research are particularly promising within activity theory and the application of poly-motives and super-objective, which present valuable avenues for expanding the breadth of analysis and extending the scope of activity under examination, thereby enriching the depth of inquiry.

References

- Advanced HE, 2011. *The UK professional standards framework for teaching and supporting learning in higher education* [Online]. Advanced HE. Available from: www.advance-he.ac.uk [Accessed 23 April 2021].
- Ates, B., Kaya, A., & Tunç, E. 2018. The investigation of predictors of cyberbullying and cyber victimization in adolescents. *International journal of progressive education* [Online]. 14(5). <https://doi.org/10.29329/ijpe.2018.157.9> [Accessed 1 May 2022].
- Aveling, E.-L., Gillespie, A., and Cornish, F., 2015. A qualitative method for analysing multivoicedness [Online]. *Qualitative research* [Online]. 15(6). Available from: <https://doi.org/10.1177/1468794114557991> [Accessed 7 April 2022].
- Bakhtin, M.M., 1981. *Dialogic imagination: four essays* [online]. Austin. University of Texas press. Available from: Proquest ebook central. [Accessed 1 April 2023].
- Bakhtin, M.M., 1986. Speech genres and other late essays. In Holquist, M., Emerson, C, ed. *Speech genres and other late essays* [Online]. Available from: <https://ebookcentral.proquest.com> [Accessed 11 April 2022].
- Bakhurst, D., 2009. Reflections on activity theory. *Educational review* [Online]. 61(2). Available from: <https://doi.org/10.1080/00131910902846916>. [Accessed 2 June 2021].
- Bali, S., and Liu, M.C., 2018. Students' perceptions toward online learning and face-to-face learning courses. *Journal of Physics* [Online]. *Proceedings of the science and education international conference*, 21 July 2018, Surabaya. Indonesia, Series 1108. Available form: <https://iopscience.iop.org/article/10.1088/1742-6596/1108/1/012094/meta> [Accessed 10 January 2023].
- Bateson, G., 2000. *Steps to an ecology of mind*. Chicago: The University of Chicago Press.
- Batmaz, H., and Çelik, E., 2021. Examining the online game addiction level in terms of sensation seeking and loneliness in university students. *Addicta: The Turkish journal on addictions* [Online]. 8(2). <https://doi.org/10.5152/ADDICTA.2021.21017> Accessed 6 October 2021 [Accessed 229 December 2022].
- Bayne, S., 2015. What's the matter with 'technology-enhanced learning'? *Learning, media and technology* [Online]. 40(1). Available form: DOI: 10.1080/17439884.2014.915851 [Accessed 3 November 2022].
- Beach, D. and Pedersen, R.B., 2016. *Causal case study methods: Foundations and guidelines for comparing, matching, and tracing* [Online]. Ann Arbor: University of Michigan Press. Available from: <http://ebookcentral.proquest.com/lib/bham/detail.action?docID=5124444> [Accessed 13 April 2021].
- Becker, H.S., and Ragin, C., 1992. *What is a case? Exploring the foundations of social inquiry*. Cambridge: Cambridge University Press.
- Beldarrain, Y., 2006. Distance Education Trends: Integrating new technologies to foster student interaction and collaboration. *Distance Education* [Online]. 27(2). Available from: DOI: 10.1080/01587910600789498 [Accessed 24 April 2021].
- Bell, S., 2009. Experimental Design. *International encyclopaedia of human geography* [Online]. Available from: <https://www.sciencedirect.com> [Accessed 19 May 2021].

- Bennett, S. and Maton, K., 2010. Beyond the 'digital natives' debate: Towards a more nuanced understanding of students' technology experiences. *Journal of computer assisted learning* [Online]. 26. Available from: <https://doi.org/10.1111/j.1365-2729.2010.00360.x> [Accessed 10 January 2022].
- Bennett, S. and Maton, K., 2010. Beyond the 'digital natives' debate: Towards a more nuanced understanding of students' technology experiences. *Journal of computer assisted learning*. 26. Available form: <https://doi.org/10.1111/j.1365-2729.2010.00360.x> [Accessed 29 October 2022].
- BERA, 2018. *Ethical guidelines for educational research, fourth edition* [Online]. Available from: <https://www.bera.ac.uk/publication/ethical-guidelines-for-educational-research-2018> [Accessed 02 June 2021].
- Berger, R., 2015. Now I see it, now I don't: researcher's position and reflexivity in qualitative research. *Qualitative research* [Online]. 15(2). <https://doi.org/10.1177/1468794112468475> [Accessed 02 July 2021].
- Blunden, A., 2015. *Engeström's activity theory and social theory* [Online]. Available from: <https://www.ethicalpolitics.org/ablunden/pdfs/Engestrom.pdf> [Accessed 22 March 2022].
- Boekaerts, M., 2016. Engagement as an inherent aspect of the learning process. *Learning and Instruction* [Online]. 43. Available from: DOI: <https://doi.org/10.1016/j.learninstruc> [Accessed 19 November 2021].
- Bond, M. and Bedenlier, S., 2019. Facilitating student engagement through educational technology: towards a conceptual framework. *Journal of interactive media in education* [Online]. 11(1). Available from: DOI: <https://doi.org/10.5334/jime.528> [Accessed 22 April 2021].
- Bond, M., Buntins, K., Bedenlier, S., 2020. Mapping research in student engagement and educational technology in higher education: a systematic evidence map. *International journal of educational technology in higher education* [Online]. 17(2). Available from: <https://doi.org/10.1186/s41239-019-0176-8> [Accessed 8 May 2022].
- Bonner, A. and Tolhurst, G., 2002. Insider-outsider perspectives of participant observation. *Nurse researcher* [Online]. 4(9). Available from: <https://www.proquest.com/docview/200836425/fulltextPDF/EBEE6516135D415BPQ/1?accountid=8630> [Accessed 1 June 2021].
- Bower, M., 2019. Technology-mediated learning theory. *British journal of educational technology* [Online]. 50(3). Available from: <https://doi.org/https://doi.org/10.1111/bjet.12771> [Accessed 2 March 2022].
- Brannick, T. and Coghlan, D., 2007. In defense of being "native": The case for insider academic research. *Organizational research methods* [Online]. 10(1). Available from: <https://doi.org/10.1177/1094428106289253> [Accessed 15 June 2021].
- Braun, V. and Clarke, V., 2008. Using thematic analysis in psychology. *Qualitative Research in psychology* [Online]. 3(2). Available from: <https://doi.org/10.1191/1478088706qp063oa> [Accessed 22 March 2021].
- Britannica, 2023. The editors of encyclopaedia. "technology". Encyclopaedia Britannica [Online]. Available from: <https://www.britannica.com/technology/technology> [Accessed 7 June 2023].
- Buetow, S., 2019. Apophenia, unconscious bias and reflexivity in nursing qualitative research. *International journal of nursing studies* [Online]. Available from: <https://doi.org/https://doi-org.ezproxye.bham.ac.uk/10.1016/j.ijnurstu.2018.09.013> [Accessed 23 July 2021].

- Bukamal, H., 2022. Deconstructing insider–outsider researcher positionality. *British journal of special education* [Online]. Available from: <https://doi.org/10.1111/1467-8578.12426> [Accessed 23 April 2021].
- Burnard, P. and Younker, B.A., 2008. Investigating children’s musical interactions within the activities systems of group composing and arranging: An application of Engeström’s activity theory. *International journal of educational research* [Online]. 47(1). Available from: <https://doi.org/10.1016/j.ijer.2007.11.001>. [Accessed 6 March 2022].
- Carr-Chellman, A.A., and Rowland, G., 2017. *Issues in technology learning and instructional design, classic and contemporary dialogues*. Oxon. Routledge.
- Cole, M., 1996. *Cultural psychology: a once and future discipline*. Cambridge: Belknap Press of Harvard University Press.
- d’Agnese, V. 2023. Educating by slogans: Rhetoric and dominion in educational neoliberalism. *Policy futures in education* [Online]. 21(7). Available from <https://doi.org/10.1177/14782103221093844>. [Accessed 5 January 2022].
- Daniels, H., eds, 2017. *Introduction to Vygotsky* [Online]. 3rd ed. Routledge. Available from: <https://doi.org/10.4324/9781315647654> [Accessed 7 November 2021].
- Davidsson, P., Hunter, E., and Klofsten, M., 2006. Institutional forces: the invisible hand that shapes venture ideas? *International small business journal* [Online]. 24(9). Available from: <https://doi.org/10.1177/0266242606061834> [Accessed 14 January 2022].
- de Laine, M., 2000. *Fieldwork, participation and practice: ethics and dilemmas in qualitative research*. London; Thousand Oaks, Calif: SAGE.
- Detlefsen, K., eds, 2012. *Descartes' meditations: a critical guide* [Online]. Cambridge: Cambridge University Press. Available from: <https://www-cambridge-org> [Accessed 20 November 2021].
- Dodgson, J.E., 2019. Reflexivity in qualitative research. *Journal of human lactation* [Online]. 35(2). Available from: <https://doi.org/10.1177/0890334419830990> [Accessed 22 August 2021].
- Engels, F. 1940. *The British labour movement*. New York: International Publishers.
- Engeström, Y., 1987. *Learning by expanding: an activity theoretical approach to developmental research* [Online]. Helsinki, Finland: Orienta-Konsultit. Available from: <http://lchc.ucsd.edu/mca/Paper/Engestrom/Learning-by-Expanding.pdf> [Accessed 1 June 2021].
- Engeström, Y. 1999. Activity theory and individual and social transformation. In Y. Engeström, R. Miettinen, & R.-L. Punamäki ed. *Perspectives on activity theory*. Cambridge: Cambridge University Press, pp. 19–38.
- Engeström, Y., 2014. *Learning by expanding: an activity-theoretical approach to developmental research*. 2 edn. Cambridge: Cambridge University Press.
- Engeström, Y., and Sannino, A., 2011. Discursive manifestations of contradictions in organizational change efforts: *A methodological framework*. *Journal of organizational change management* [Online]. 24(3). <https://doi.org/10.1108/09534811111132758> [Accessed 11 March 2021].
- Engeström, Y., Pyorala, E., 2021. Using activity theory to transform medical work and learning. *Medical teacher* [Online]. 43(1), pp.7–13. Available from: <https://www.tandfonline.com> [Accessed 10 February 2021].
- Fairclough, L., Brown, G., and Kirchhübel, C., 2023. Reviewing the performance of formants for Forensic Voice Comparison: a meta-analysis of forensic speech science research. in R. Skarnitzl and

- J. Volín, eds. *Proceedings of the 20th International Congress of Phonetic Sciences, 7 June 2023* pp. 3834-3838. Available from: <https://guarant.cz/icphs2023/885.pdf> [Accessed 3 April 2024]
- Fernández-Batanero, J.M., Román-Graván, P., Reyes-Rebollo, M.M., and Montenegro-Rueda, M., 2021. Impact of educational technology on teacher stress and anxiety: A literature review. *International journal environment research public health* [Online]. 18(2). Available from: doi: 10.3390/ijerph18020548. PMID: 33440738 [Accessed 3 May 2021]
- Finlay, L., 2002. Outing the researcher: the provenance, process, and practice of reflexivity. *Qualitative health research* [Online]. Available from: doi:10.1177/104973202129120052 [Accessed 15 June 2021].
- Finnemann, N., 2011. Mediatization theory and digital media. *Communications* [Online], 36 (1), pp. 67-89. Available from: <https://doi.org/10.1515/comm.2011.004>. [Accessed 20 June 2024].
- Foster, P., Gomm, R., and Hammersley, M., eds, 2000. *Case study method*. London: Sage.
- Fredricks, J. A., Blumenfeld, P. C., and Paris, A. H., 2004. School engagement: potential of the concept, state of the evidence. *Review of educational research* [Online]. 74(1). Available from: <https://doi.org/10.3102/00346543074001059> [Accessed 4 December 2021].
- Geiger, A.K., and Jordan, C., 2014. The role of societal privilege in the definitions and practices of inclusion, *Equality, Diversity and Inclusion* [Online], 33(3), pp. 261-274. Available from: <https://doi.org/10.1108/EDI-12-2013-0115>. [Accessed 12 July 2024].
- Gibbert, M., Ruigrok, W. and Wicki, B., 2008. What passes as a rigorous case study? *Strategic management journal* [Online]. 29. Available from <https://doi.org/10.1002/smj.722> [Accessed 23 January 2022].
- Gillespie, A., & Zittoun, T., 2010. Using resources: conceptualizing the mediation and reflective use of tools and signs. *Culture and psychology* [Online]. 16(1). Available from: <https://doi-org.bham-azproxy.idm.oclc.org/10.1177/1354067X09344888> [Accessed 10 July 2021].
- Gourlay, L., 2021. There is no 'virtual learning: the maternity of digital education. *Journal of new approaches in educational research* [Online]. 10(1). Available from <https://doi.org/10.7821/naer.2021.1.649> [Accessed 15 June 2022].
- Greener, S., 2018. Research limitations: the need for honesty and common sense. *Interactive learning environments* [Online]. 26(5). Available from: DOI: 10.1080/10494820.2018.1486785 [Accessed 15 June 2022].
- Gumport, P.J. and Chun, M., 2015. Technology and higher education: opportunities and challenges for the new era. *INSANIA Jurnal Pemikiran Alternatif Kependidikan* [Online]. 12(2). Available from: <https://ejournal.uinsaizu.ac.id/index.php/insania/article/view/255> [Accessed 10 July 2023].
- Günüç, S., and Kuzu, A. 2014. Factors Influencing Student Engagement and the Role of Technology in Student Engagement in Higher Education: Campus-Class-Technology Theory. *Turkish Online Journal of Qualitative Inquiry* [Online], 5(4). Available from: <https://doi.org/10.17569/tojqi.44261>. [Accessed 15 June 2024].
- Hammersley, M., 1992. *Deconstructing the qualitative-quantitative divide*. Routledge.
- Hayfield, N. and Huxley, C., 2015. Insider and outsider perspectives: reflections on researcher identities in research with lesbian and bisexual women. *Qualitative research in psychology* [Online]. 12(2). Available from: <https://doi.org/10.1080/14780887.2014.918224> [Accessed 3 May 2021].

- Heim, M., 1988. The Technological Crisis of Rhetoric. *Philosophy & Rhetoric* [Online], 21(1), pp.48–59. Available from: <http://www.jstor.org/stable/40237531>. [Accessed 22 June 2024].
- Henrie, C.R., Halverson, L.R. and Graham, C.R., 2015. Measuring student engagement in technology-mediated learning: A review. *Computers and education* [Online]. 90. Available from: <https://doi.org/https://doi.org/10.1016/j.compedu.2015.09.005> [Accessed 29 March 2021].
- Hite, R., & Thompson, C. (2019). Activity theory as theoretical framework for analyzing and designing global k-12 collaborations in engineering: a case study of a Thai-U.S. elementary engineering project. *Journal of international engineering* [Online]. 1(1), Article 5. Available from: <https://digitalcommons.uri.edu/cgi/viewcontent.cgi?article=1005&context=jiee> [Accessed 2 April 2021].
- Holquist, M., 1981. The politics of representation. In: S. Greenblatt, ed. *Allegory in representation: Selected papers from the English Institute*. Baltimore: Johns Hopkins University Press, pp. 163-183.
- Hussey, J. and Hussey, R., 1997. *Business research*. Houndmills: Macmillan Press.
- Hyett, N., Kenny, A., and Dickson-Swift, V., 2014. Methodology or method? A critical review of qualitative case study reports [Online]. *International journal of qualitative studies on health and well-being*. 9. 23606. Available from <https://doi.org/10.3402/qhw.v9.23606> [Accessed 10 March 2023].
- Izard C. E., 1994. Innate and universal facial expressions: evidence from developmental and cross-cultural research. *Psychological bulletin* [Online]. 115(2). Available from: <https://doi.org/10.1037/0033-2909.115.2.288> [Accessed 3 January 2021].
- Juul, J., 2005. *half-real*. London: The MIT Press.
- Kahu, E.R., 2013. Framing student engagement in higher education. *Studies in higher education* [Online]. 38(5). Available from: DOI: 10.1080/03075079.2011.598505 [Accessed 2 January 2022].
- Kahu, E., Stephens, C., Leach, L. and Zepke, N., 2015. Linking academic emotions and student engagement: mature-aged distance students' transition to university. *Journal of further and higher education* [Online]. 39(4). Available from: DOI: 10.1080/0309877X.2014.895305 [Accessed 30 September 2023].
- Kamaruddin, K.A., Yusop, N.S.M., and Ali, M.A.M., 2011. Using activity theory in analyzing requirements for mobile phone application. *Malaysian conference in software engineering*, 13-14 December 2011, Johor Bahru. Malaysia: IEE Xplore, pp 7-13. Available from: doi: 10.1109/MySEC.2011.6140636 [Accessed 10 February 2021].
- Kaptelinin, V., 2005. The Object of Activity: Making Sense of the Sense-Maker. *Mind, Culture, and Activity* [Online]. 12(1). Available from: DOI: 10.1207/s15327884mca1201_2 [Accessed 9 March 2021].
- Kaptelinin, V. and Nardi, B., 2012. Introduction: Activity theory and the changing face of HCI. [Online]. In: Carroll, J.M., *Synthesis lectures human-centered informatics* [Online]. Morgan and Claypool, pp. 1-10. Available from: https://tdl.rta.lv/pluginfile.php/103/mod_page/content/5/Activity%20Theory%20in%20HCI_%20Fundamentals%20and%20Reflections.pdf [Accessed 2 April 2021].
- Karanasios, S., Nardi, B., Spinuzzi, C., and Malaurent, J., 2021. Moving forward with activity theory in a digital world. *Mind, Culture, and Activity* [Online], 28(3), pp. 234–253. doi: 10.1080/10749039.2021.1914662. [Accessed 2 August 2024].

- Kay, E., Gillespie, A., and Cooper, M., 2020. Application of the Qualitative Method of Analyzing Multivoicedness to Psychotherapy Research: The Case of "Josh", *Journal of Constructivist Psychology* [Online], 34(2), pp. 181–194. doi: 10.1080/10720537.2020.1717145.
- Kearsley, G., and Shneiderman, B., 1998. Engagement theory: a framework for technology-based teaching and learning. *Educational technology* [Online]. 38(5). Available from: <http://www.jstor.org/stable/44428478> [Accessed 2 February 2021].
- Kite, K., 1999. Participant observation, peripheral observation or apart-icipant observation? *Nurse researcher* [Online]. 7(1). Available from: <https://doi.org/10.7748/nr1999.10.7.1.44.c6103> [Accessed 3 February 2021].
- Kugelmass, H., Ready, D.D., 2011. Racial/ethnic disparities in collegiate cognitive gains: a multilevel analysis of institutional influences on learning and its equitable distribution. *Research higher education* [Online]. 52. Available from: <https://doi.org/10.1007/s11162-010-9200-5> [Accessed 23 April 2021].
- Labov, W., 1978. *Sociolinguistic patterns*. Oxford: Basil Blackwell.
- Lawson, M. A., and Lawson, H. A., 2013. New conceptual frameworks for student engagement research, policy, and practice. *Review of educational research* [Online]. 83(3). Available from: <https://doi.org/10.3102/0034654313480891>. [Accessed 7 December 2021].
- Lei, J., 2019. Activity theory perspective: the case of four Chinese nursing doctoral students. *TESOL quarterly* [Online]. 53(3). Available from: <https://doi.org/10.1002/tesq.501> [Accessed 10 January 2021].
- Leontiev, A. 1978. *Activity, Consciousness, and Personality* [Online]. Englewood Cliffs, NJ: Prentice-Hall. Available from: <https://www.marxists.org> [Accessed 22 February 2021].
- Lopes, A.P., F. Soares and Vieira, I., 2014. The potential benefits of using videos in higher education. *Proceedings of Edulearn*, 7-9 July 2014, Spain, Barcelona,(14), pp. 750-756. Available from: <https://library.iated.org/view/VIEIRA2014POT> [Accessed 20 November 2022].
- Luster, R., Cooper, H.A., Aikman, G., Sanders, K., Jacobs, G., and Tierney, R., 2021. Relational leadership: perspectives of key constructs on diversity, inclusion, and social equity in higher education. *Journal of leadership studies* [Online]. 15(1). Available form: 10.1002/jls.21734 [Accessed 2 October 2022].
- May, T. and Perry, B., 2017. *Reflexivity: the essential guide*. 55 City Road, London: SAGE Publications Ltd.
- McNeill, D., 1992. *Hand and mind: what gestures reveal about thought*. University of Chicago Press.
- Mehan, H., 1993. Beneath the skin and between the ears: A case study in the politics of representation. In: S. Chaiklin, and J. Lave, ed. *Understanding practice: perspectives on activity and context*. Cambridge: Cambridge University Press, pp. 241-268.
- Mendie, J.G., and Udofia, S.N., 2018. The problem of mind-body dichotomy: a critique of the cartesian approach. *An interdisciplinary journal of human theory and praxis* [Online]. 9(1). Available from: <https://link.springer.com/article/10.1007/BF01507702> [Accessed 3 June 2021].
- Mercer, N., 2000. *Words & minds: how we use language to think together*. Oxon: Routledge.
- Miles, M. B., and Huberman, A. M., 1994. *Qualitative data analysis: an expanded sourcebook*. London: Sage.

- Minick, N., 1985. *L. S. Vygotsky and Soviet activity theory: New perspectives on the relationship between mind and society* (cross-cultural) [Online]. Northwestern University. Available from: <https://www.proquest.com/docview/303374793?pq-origsite=gscholar&fromopenview=true> [Accessed 20 November 2021].
- Morse, J.,M., 1999. Qualitative generalizability. *Qualitative health research* [Online]. 9(1). Available from: doi:10.1177/104973299129121622 [Accessed 1 October 2021].
- Moss, L., 2005. *The intent to live: achieving your potential as an actor*. New York. Bantam Dell.
- Murnan, J.,2004. Research limitations and the necessity of reporting them. *American journal of health education* [Online]. 35(2). Available from: DOI: 10.1080/19325037.2004.10603611 [Accessed 19 November 2022].
- Murphy, T., 2022. Exposing the uncomfortable: activity theory and the limitations of the academic in the world of tel and programme development. *Studies in technology enhanced learning* [Online]. 3(1). Available from: <https://doi.org/10.21428/8c225f6e.94adb00d>. [Accessed 19 December 2022].
- Nardi, B.A., 1996. *Context and consciousness: activity theory and human-computer interaction*. Cambridge, London: MIT Press.
- Nkomo, L.M., Daniel, B.K. and Butson, R.J., 2021. Synthesis of student engagement with digital technologies: a systematic review of the literature. *Computers and education* [Online]. 90. Available from: <https://doi-org.bham-ezproxy.idm.oclc.org/10.1016/j.compedu.2015.09.005> [Accessed 16 April 2022].
- Noble, D., 2009. Digital diploma mills: The automation of higher education. *Science as culture* [Online]. 7(3). Available from: DOI: 10.1080/09505439809526510 [Accessed 6 November 2022].
- O'Brien, H.L. and Toms, E.G., 2010. The development and evaluation of a survey to measure user engagement. *Journal of the American society for information science and technology* [Online]. 61(1). Available from: <https://doi.org/10.1002/asi.21229> [Accessed 7 November 2021].
- Office for students, (2023). *National student survey – NSS, Core questionnaire*. Available from: <https://www.officeforstudents.org.uk/advice-and-guidance/student-information-and-data/national-student-survey-nss/> [Accessed 20 May 2023].
- Oh, E.G., and Reeves, T.C., 2014. Generational differences and the integration of technology in learning, instruction, and performance. *Handbook of research on educational communications and technology* [Online]. Available form: https://doi.org/10.1007/978-1-4614-3185-5_66 [Accessed 18 November 2021].
- Oliver, R. and Herrington, J., 2003. Exploring technology-mediated learning from a pedagogical perspective. *Interactive learning environments* [Online]. 11(2). Available from: <https://doi.org/10.1076/ilee.11.2.111.14136> [Accessed 1 December 2021].
- Osborne, D.M., Byrne, J.H., Massey, D.L., and Johnston, A.N.B., 2018. Use of online asynchronous discussion boards to engage students, enhance critical thinking, and foster staff-student/student-student collaboration: A mixed method study, *Nurse Education Today* [Online], 70, pp. 40–46. Available from <https://doi.org/10.1016/J.NEDT.2018.08.014>. [Accessed 3 July 2024].
- Paparini, S., Green, J., Papoutsis, C., 2020. Case study research for better evaluations of complex interventions: rationale and challenges. *Biomed central* [Online]. 18(301). Available from: <https://doi.org/10.1186/s12916-020-01777-6> [Accessed 20 December 2021].

- Plakitisi, K., 2013. *Activity theory in formal and informal science education* [Online]. Boston: Brill. Available from: ProQuest Ebook Central. [11 April 2022].
- Platt, J., 1992. Case Study in American methodological thought. *Current sociology* [Online]. 40(1). Available from: <https://doi.org/10.1177/001139292040001004> [22 May 2022].
- Preiss, J.J., Schatzman, L. and Strauss, A., 1974. Field Research: Strategies for a Natural Sociology [Online]. Available from: <https://doi.org/10.2307/2576031> [Accessed 13 January 2021].
- Prensky, M., 2001. Digital natives, digital immigrants. *Emerald insight* [Online]. 9(5). Available from: <https://doi.org/10.1108/10748120110424816> [Accessed 11 February 2022].
- Reiser, R.A., and Dempsey, J.V., 2012. *Trends and issues in instructional design and technology*. Boston. Pearson Education Inc.
- Reyman, J. 2013. User data on the social web: authorship, agency, and appropriation. *College english* [Online]. 75(5). Available from: <http://www.jstor.org/stable/24238250> [Accessed 20 April 2021].
- Richardson, J.T.E., 2004. Methodological issues in questionnaire-based research on student learning in higher education. *Educational psychology review* [Online]. 16(4). Available from: <http://www.jstor.org/stable/23363876> [Accessed 2 December 2022].
- Rogoff, B. 1990. *Apprenticeship in thinking: cognitive development in social context*. New York; Oxford: Oxford University Press.
- Rogoff, B., 1995. Observing sociocultural activity on three planes: participatory appropriation, guided participation, and apprenticeship. In: J. Wertsch, P. Río, and A. Alvarez, ed. *Sociocultural studies of the mind. Learning in Doing: Social, Cognitive and Computational Perspectives*. Cambridge: Cambridge University Press, pp. 139–164.
- Rogoff, B., 2005. Observing sociocultural activity on three planes: participatory appropriation, guided participation, and apprenticeship. In J. V. Wertsch, P. del Río, & A. Alvarez (Eds.), *Sociocultural studies of mind* [Online]. pp. 139–164. Cambridge University Press. Available form: <https://doi.org/10.1017/CBO9781139174299.008> [Accessed 23 October 2021].
- Sannino, A., Daniels, H. and Gutiérrez, K.D., 2009. *Learning and expanding with activity theory* [Online]. New York: New York: Cambridge University Press. Available from: <https://doi.org/10.1017/CBO9780511809989>. [Accessed 8 January 2022].
- Schatzman, L., and Strauss, A. L., 1973. *Field research: strategies for a natural sociology*. Englewood Cliffs: Prentice Hall.
- Schunk, D.H., 1995. Self-efficacy and education and instruction. In: j.e. Maddux, ed. Self-efficacy, adaptation, and adjustment. *The plenum series in social/clinical psychology* [Online]. Boston: Springer. Available from: https://doi.org/10.1007/978-1-4419-6868-5_10 [Accessed 18 January 2023].
- Schütz, A., 1980. Alfred Schütz's theory of intersubjectivity. *The Polish sociological bulletin* [Online]. 51. <http://www.jstor.org/stable/44816059> Available from: ProQuest Ebook Central. [10 September 2023].
- Scribner, S., and Cole, M., 1981. *The psychological consequences of literacy*. Cambridge, MA: Harvard University Press.
- Seargent. P., 2019. *The emoji revolution: How technology is shaping the future of communication*. Cambridge: Cambridge University Press.

- Shaft, T.M., 1997. Responses to comprehension questions and verbal protocols as measures of computer program comprehension processes. *Behaviour and information technology* [Online]. 16(6). Available from: <https://doi.org/10.1080/014492997119725> [Accessed 22 January 2021].
- Skinner, B.F., 1938. *The behavior of organisms: an experimental analysis*. Cambridge, Massachusetts: B.F. Skinner Foundation.
- Spencer, G., Fairbrother, H., and Thompson, J., 2020. Privileges of power: authenticity, representation and the “problem” of children’s voices in qualitative health research. *International journal of qualitative methods* [Online]. 19. Available from: <https://doi.org/10.1177/1609406920958597> [Accessed 30 November 2022].
- Stanislavski, C., 2013. *An actor prepares*. London: Methuen. Bloomsbury Publishing PLC.
- Teh, Y.Y. and Lek, E., 2018. Culture and reflexivity: systemic journeys with a British Chinese family. *Journal of family therapy* [Online]. 40(4). Available from: <https://doi.org/https://doi-org.ezproxys.bham.ac.uk/10.1111/1467-6427.12205> [Accessed 15 July 2021].
- Tomasello, M., 2003. *Constructing a Language: A Usage-Based Theory of Language Acquisition*. Harvard University Press.
- Tom-Orme, L., 1991. The search for insider-outsider partnerships in research. In H. Hibbard, P. A. Nutting, and M. L. Grady (Eds.). *Primary care research: theory and methods*, Conference Proceedings US Department of Health and Human Services [Online], pp. 229-233. Available from: <https://onlinebooks.library.upenn.edu/webbin/book//lookupid?key=ha002714120> [Accessed 3 May 2021].
- Travers, C., 2011. Unveiling a reflective diary methodology for exploring the lived experiences of stress and coping. *Journal of vocational behavior* [Online]. 79. Available from: doi:10.1016/j.jvb.2010.11.007 [accessed on 24 November 2022].
- Trowler, V., 2010. Student engagement literature review. *The higher education academy* [Online]. Available from: <https://www.heacademy.ac.uk> [Accessed 19 September 2022].
- Valsiner, J., 2014. What cultural psychologies need: Generalizing theories. *Culture & psychology* [Online]. 20(2). Available from: <https://doi.org/10.1177/1354067X14527841> [Accessed 01 January 2022].
- Vaughn, S., Schumm, J., and Sinagub, J. 1996. *Focus group interviews in education and psychology* [Online]. SAGE Publications, Inc., Available form: <https://doi.org/10.4135/9781452243641> [Accessed 6 April 2022].
- Vygotsky, L.S., 1930. *Primitive man and his behaviour* [Online]. (E. Rossiter, Trans). Available from: <https://www.marxists.org/archive/vygotsky/works/1930/man/index.htm> [Accessed 17 January 2021].
- Vygotsky, L. S., 1931. *The genesis of higher mental functions* [Online]. Available from <https://www.marxists.org/archive/vygotsky/works/1931/higher-mental-functions.htm>
- Vygotsky, L.S., 1978. *Mind in society: development of higher psychological processes*. Cambridge: Harvard University Press.
- Vygotsky, L., 1989. Thought and Language. (A. Kozulin, Trans). *Studies in second language acquisition* [Online]. 11(3). Available from: doi: 10.1017/S0272263100008172 [Accessed 7 April 2021].

- Weirich, A.C., 2020. The Privilege of Voice as a Criterion for Sociolinguistic Inequalities. *Nouvelle Revue Synergies Canada* [Online], 15, pp. 1–13. Available from: <https://doi.org/10.21083/nrsc.v2022i15.6500>. [Accessed 10 June 2024].
- Wendt, A., 2006. *Social theory as Cartesian science: An auto-critique from a quantum perspective*. New York: Routledge.
- Wertsch, J. V, 1981. *The Concept of activity in Soviet psychology*. London: Routledge.
- Wertsch, J. V. 1985. *Vygotsky and the social formation of mind*. Cambridge, Mass.: Harvard University Press.
- Wertsch, J.V., 1987. *Modes of discourse in the nuclear arms debate. Current research on peace and violence* [Online]. 10(2/3). Available from: <http://www.jstor.org/stable/40725066> [Accessed 5 November 2021].
- Wertsch, J.V., 1993. *Voices of the mind: a sociocultural approach to mediated action*. MA: Harvard University Press.
- Wertsch, J., Rio, P., & Alvarez, A., Eds, 1995. *Sociocultural studies of mind*. Cambridge: Cambridge University Press.
- Wertsch, J. V, Daniels, H. and Cole, M., 2007. *The Cambridge companion to Vygotsky* [Online]. Cambridge University Press. Available from: <https://doi.org/10.1017/CCOL0521831040>. [Accessed 10 March 2022].
- Wierzbicka, A., 2015. The idea of a ‘spoon’: semantics, prehistory, and cultural logic. *Language sciences* [Online]. 47. Available from: <https://doi-org.bham-ezproxy.idm.oclc.org/10.1016/j.langsci.2014.08.005> [Accessed 9 January 2021].
- Yang, C., 2019. The veridicality of think-aloud protocols and the complementary roles of retrospective verbal reports: A study from EFL writing. *The Asia-Pacific education researcher* [Online]. 28(6). Available from: <https://doi.org/10.1007/s40299-019-00453-5> [Accessed 14 January 2021].
- Yin, R.K., 2014. *Case Study research: design and methods*. 5 edn. Los Angeles, London: Sage.
- Zellmer-Bruhn, M., Caligiuri, P. and Thomas, D.C., 2016. From the editors: Experimental designs in international business research. *Journal of international business studies* [Online]. 47(4). Available from: <https://doi.org/10.1057/jibs.2016.12> [Accessed 15 May 2021].

Appendix 1

Emails sent to students

First email

Sent on 5th August 2021: Participant information sheet

Dear students,

My name is Ian Martin and I am a researcher and employee at the University of Birmingham. I am currently conducting research regarding technology and student engagement on your 4-week preparation course. I have attached an information sheet that explains what a participant in the research will be doing. All participants will be anonymous and no participant details will be used. There will also be a small presentation if you wish to attend that explains the information sheet and will give you the opportunity to ask questions. This will be on the 9th August at 12 am. The Zoom link is below.

Zoom meeting link: <https://bham-ac-uk.zoom.us/j/82582816443>

As a participant in the research you will have the opportunity to see how research is conducted from the perspective of a participant giving you valuable insight. You might also be carrying out your own research when you start your chosen programme of study at the University of Birmingham. In addition, you will also have the opportunity to improve your academic English as discussions and diary entries play a key part of your involvement in the research.

If you would like to participate in this research or have any questions please email me back by replying to this email.

Kind Regards

Second email

Sent on 9th August: Consent form

Dear students,

My name is Ian Martin and I am currently conducting research at Birmingham University. I am currently conducting research regarding technology and student engagement on your 4-week university preparation course. Last week I sent an information sheet regarding your participation in the research and conducted a presentation: please see the video link below if you would like to view the presentation. I have now attached a consent form if you would like to participate in the research. Please date sign and return this back to me as soon as you can: before 11th August if you would like to be part of this research.

Video link: (Zoom recording link was placed here)

Kind Regards

Appendix 2

Participant information sheet

Title of research: How and in what ways are university international students' learning mediated by technology on a pre-degree programme academic skills course?

Name of Researcher: Ian Martin

Contact details of Researcher: i.martin@bham.ac.uk

Name of Supervisor: Shona McIntosh

Contact details of Supervisor: sp25@bath.ac.uk

This information sheet forms part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. All points below are discussed in the research presentation that you are invited to. If you cannot attend the presentation then please contact Ian Martin and a link to a recorded copy of the presentation will be provided.

Please read this information sheet carefully and if you have any questions then you can either email your questions to Ian Martin (email above) or attend the presentation where there will be an opportunity to ask questions.

1) What is the purpose of the project:

This research is part of a final year thesis of a doctorate in education at Bath University. The researcher is interested in improving the current understanding of technology mediated learning and student engagement with technology for educational purposes. The research will inform policy makers, from a student perspective, of choices that can support the implementation of education technology for student engagement.

2) Why have I been selected to take part?

The research is being carried out on the unconditional pre-degree programme course as the course has been designed to incorporate tasks and activities that use technology, most noticeably Canvas, as well as other modes of technology use. Therefore, as a student on the course you have been selected to participate in the research.

3) Do I have to take part?

Participation in the research is completely voluntary and has no connection to completing your course. Before deciding to take part or not there will be a presentation that you will be invited to. If you are not able to attend the presentation a recording will be made which you can view. If you agree to participate in the research you will be asked to sign a consent form which will be sent at a later date. If you wish to opt-out of the research at any time you can do so without giving a reason. You can contact your teacher or the researcher to opt out.

4) What will I be asked to do?

Below is a table of research events that you will be asked to participate in. Dates and time are flexible and can be negotiated.

Date and data collection method	location	Time needed
12 th August 2021 Verbal protocol practice	University seminar room	20-30 minutes
Week 1: 17 th August 2021 Group interviews	A location on campus	1 hour
Week 1: 16 th August 2021 Verbal protocol 1	University seminar room	10-20 minutes
Week 2: 23 th August 2021 Verbal protocol 2		
Week 3: 30 th August 2021 Verbal protocol 3		
Week 4: 6 th September 2021 Verbal protocols 4	University seminar room	10-30 minutes
End of Course: Group interview 10 th September 2021	A location on campus	1 hour
Student diaries End of each day	A location of your own choice, for example your accommodation	Daily reflections of 5-15 minutes

5) What are the exclusion criteria?

All students that are taking the course will be asked if they wish to participate in the research. No student will be excluded.

6) What are the possible benefits of taking part?

As a student of the university participation in the research will better prepare you in using the university's education technology and Canvas. In addition, as you will be a participant in the research you will gain experience of what a research participant experiences, which may inform you of choices in your own research should you carry out qualitative research at the university as part of your programme. You will also have the opportunity to practice your English communication and written skills.

Information that participants provide in this research will help improve current practices when technology for education is used in turn, improving experiences for future students.

7) What are the possible disadvantages and risks of taking part?

There are no obvious disadvantages and risks apart from your normal daily life. You can opt out of the research at any time during the research process.

8) Will my participation involve any discomfort or embarrassment?

We do not expect that there will be any discomfort, anxiety or embarrassment if you take part in the research. If you feel that you wish to withdraw from the research at any point due to feeling uncomfortable then you can opt out at any time during the group interviews and verbal protocols. You can also discontinue using the diary if this also brings discomfort.

9) Who will have access to the information that I provide?

We will not ask for any personal details for the research. We will not record and use your name, email address, location address, student identification number or contact number. Only the researcher will have access to the information that you provide and all records of information will be securely administered and treated with confidentiality.

10) What will happen to the data collected and results of the project?

All electronic data will be kept securely on a double encrypted computer with Microsoft authentication protocols. General data protection regulations (GDPR) will be adhered to when storing and using information. All data will be destroyed on completion and successful passing of the researcher's viva examination. Consent forms will be kept for 10 years after the completion of the research.

11) Who has reviewed the project?

The research has been given a favorable opinion by the University of Bath, Social Science Research Ethics Committee (SSREC). The SSREC reference for this research is S21-097.

12) How can I withdraw from the project?

You can withdraw from the research at any point in the research process and 2 weeks after the collection of data. You can inform your teacher or the researcher if you wish to opt out. If you do not wish to contact your teacher or the researcher, not attending one of the interviews or verbal protocols will be a sign that you may wish to stop participating in the research. You will be contacted before being removed from the research. You do not need to give a reason for opting out.

13) University of Bath privacy notice

The University of Bath privacy notice can be found here: <https://www.bath.ac.uk/corporate-information/university-of-bath-privacy-notice-for-research-participants/>.

14) What happens if there is a problem?

If you have any concerns or questions then please contact the researcher or your teacher. If you are unable to resolve your concern or your questions have not been answered adequately then you can contact the Chair of SSREC at ssrec@bath.ac.uk

15) If I require further information who should I contact and how?

Thank you for expressing an interest in participating in this project. Please do not hesitate to get in touch with us if you would like some more information.

Name of Researcher: Ian Martin

Contact details of Researcher: i.martin@bham.ac.uk

Name of Supervisor: Shona McIntosh

Contact details of Supervisor: sp25@bath.ac.uk

Appendix 3

Participant consent form

Research title:

How and in what ways are university international students' learning mediated by technology on a pre-degree programme academic skills course?

Researcher: Ian Lea Martin i.martin@bham.ac.uk

Supervisor: Shona McIntosh sp25@bath.ac.uk

Please tick the box if you agree with the statement

- 1) I have been provided with information explaining what participation in this project involves.
- 2) I have had an opportunity to ask questions and discuss this project.
- 3) I am aware that my statements and actions will be recorded anonymously for the study.
- 4) I have received satisfactory answers to all questions I have asked.
- 5) I have received enough information about the project to make a decision about my participation.
- 6) I understand that I am free to withdraw my consent to participate in the project at any time without having to give a reason for withdrawing.
- 7) I understand that I am free to withdraw my data within two weeks after data collection has been completed.
- 8) I understand the nature and purpose of the procedures involved in this project. These have been communicated to me on the information sheet accompanying this form.
- 9) I understand and acknowledge that the investigation is designed to promote scientific knowledge and that the University of Bath will use the data I provide only for the purpose(s) set out in the information sheet.
- 10) I understand that no personal data will be collected.
- 11) I understand the data I provide will be treated as confidential, and that on completion of the project my name or other identifying information will not be disclosed in any presentation or publication of the research.
- 12) I understand that my consent to use the data I provide is conditional upon the University complying with its duties and obligations under the Data Protection Act.
- 13) I hereby fully and freely consent to my participation in this project.

Participant's signature: _____ Date: _____

Participant name in BLOCK Letters: _____

Researcher's signature: _____ Date: _____

Researcher name in BLOCK Letters: _____

If you have any concerns or complaints related to your participation in this project please direct them to the Director of Research Ethics Officer:

Department of Education

Dr. Santiago Sanchez, email: hss30@bath.ac.uk

Appendix 4

Verbal protocol

Example of a Verbal Protocol: Maryam's completion of a third-party resource task. Notes from the verbal protocol were taken during an observation with Maryam on Monday at 15:00 in Week 2 of the 4-week course. Below is a transcription of the meeting and observation.

The link to the third-party task being completed by Maryam can be found at the University of New England -Academic Skills-Synthesising evidence: <https://aso-resources.une.edu.au/academic-writing-course/information-basics/synthesising-evidence/>

Start of verbal protocol

Maryam arrived at the agreed campus location and sat down at a desk of her choice. She took her laptop out of her bag and turned it on. I sat approximately 2 meters away on the other side of the desk. I placed the recording device next to Maryam and started recording, informing her that the device was now on. She then proceeded to verbalise her thoughts after switching on her computer. The recording stopped when she finished the task, which lasted approximately 25 minutes.

Maryam arrives at the confirmed location

Maryam: Good afternoon sir

Researcher: Good afternoon, Maryam. Please call me Ian. How was your day today?

Maryam: Good we did lots of tasks in class and I think I have something to do today.

Researcher: Great, lets get started then. I have switched the recording device on. Please complete the task as with the practice verbal protocol we did last week. As you complete the online tasks verbalise your thoughts, feelings and emotions.

The time counter is in minutes and seconds

00:00 - 00:39

Maryam: Okay emmmm... now I will go to in class resources to solve the example because we don't have time in the class today so we were asked to do it at home in class resources or for you to access when attending your class ... scientific evidence ...this will take approximately 15 minutes ... complete in university of New England Scientific evidence. I will open the activity, scroll through and read and watch the video. There are also some exercises to complete.

00:39 - 01:50

I didn't know. Where is the question? So I'm searching for the question? This is not clear [time was taken to find exercise 1. She was also scrolling up and down the web page and bypassed the text at the top of the page] Okay ... exercise one ...balancing your formation .. move the slider button to see how writing needs to balance information only using idea from other sources of animation ... just to make good is you need to express your opinion and us references.

01:50 - 02:52

Okay, so I need to move this [there was slider that needed to move to access the information on 'balancing your information' exercise 1] ... ahh ... this activity shows me, try to shows me the benefits of balance ... and you need to paraphrase not just copy the resource as it is ... put it in

your essay ... this is not going to make your essay look good. You need to express your opinion and use references to back up your conclusion ... so this side we have paraphrasing summarizing, quoting [she moves the slider to reveal new information]

02:52- 03:53

Okay, If we move this green button to the right, we will see the words disappearing and now we have another [she explains the process of using the virtual slider and the balance]. If you use your ... your own independent idea, plus paraphrasing and summarizing a quotation, you have a good balance ... and ... but if you okay, if you just use your own independence idea with that paraphrasing. Study skills research

03:53 - 06:38

It helps me to learn [the virtual slider and balance] because it's a visual thing ... so when I will write an essay in the future. I will remember this kind of example to show your own independence idea, plus paraphrasing, summarize and quote four things ... here we have just one ... here we have three [she moves onto exercise 2]. Synthesising is a complex skill that you use to develop your body paragraphs. It requires you to draw together your ideas, supported by the similar and sometimes contradictory ideas of others. Let's consider the essay topic. Exercise 2 ... this demonstration shows you how to develop a notetaking system for a paragraph on the topic of exams versus assignments. The notetaking system helps you to record and synthesise evidence from a number of sources. [she is reading the instructions] Okay now I will watch the video ... short video [the video plays on note taking skills: 55 seconds].

06:38 - 07:32

That was helpful... ummm... the voice was clearer, also the drawing, the way of this note taking system is really helpful and it's good to practice how you will take any information or evidence from any reading your research you do so doing it in this way will arrange your idea much better and also will help you to make your argument stronger.

07:32 - 09:59

To write and exercise, 2 so that you can find information that's common to all ... and makes your writing more powerful as you are demonstrating that an idea is supported by a number of authorities [she stops as there is much text to read] okay so like I said, but in fact, It's useful, but lot of words that I need to read. You know, I don't like this. I like this. If they just put only that video for me. I prefer to learn visually by picture colours. This is more helpful for me. Ahh reading, I get confused. Yeah. Stressful. if there is a lot of sentences, maybe I don't have time. Even this, you know, if there is no video, I will take this and read it for like three times and underline the key words. So this, save my time. The video saved my time. Exercise three ... academic work. The following has been written as notes [she completes exercise 3 and tries to work out what to do].

09:59 - 11:32

Okay using so for student learning better than the additional examination system is consistent that they can lessen the extreme stress this semester and semester and try to use the failure rate studies because research defined assignment my assignment because research assignment can be used to see since you didn't mind of course. And so provide them with helpful feedback. They also consider work so in contrast or give that assignment or in patient costly to manage problems to that assignment by examination is a clean-cut approach as you get student knowledge.

11:32 - 12:29

And so again, so I would suggest that really and more power tools should have some. He's analysing the information so he is ... he expect me to do this and he now teach me how he ... the I think the highlight is the quotation, not quotation [she explains the exercise]. The word from other research and all this is.

12:29 - 13:34

Yeah. The topic assigned to an argument information from two different sources. The sentence is a summary. This one is information from three different sources to listen to so this is one information from a single source. And to summarize and just short quotation conclusions. We did the same example in class today and now I remember because the teacher told us that when you do the exercise, you will remember this because we do.

13:34 - 14:39

We did the same thing in the class. Exercise, four steps. Right, Right .. drag the steps for into the correct steps [she starts exercise 4]. So we need first in line, then evidence, and then the summary number for link ... link to make sense of information from each sources and then try to grow from your knowledge, starting with a topic sentence. You take notes in your own words from each source [she reads the text boxes she needs to drag in the correct order].

14:39 - 16:19

Consider your line of argument and draft. Make leave from your text on the topic of your paragraph. I'm putting the steps of making an essay in the right order ... so what I will do first and then it's helpful, but I need to, I think, to read it more. Think about the order, because some steps are literally like the same. This is the correct place ... I put it here ... maybe ...yeah ... stopping me from changing the order. So maybe this is the right place for this one. I will try.

16:19 - 17:57

Consider your line argument take notes. Okay read.... confused whys it doing that ... take notes in your own words... it's stopping me from getting wrong in putting the one step in the wrong position take notes after you're taking the notes, you should link. Yeah. Then actually, common idea to make sense information from these sources. Colours number your search and then It's all green ... also, there is no check my answer button ... so this is the only.

18:45 -19:28

It said Here, drag the steps ... yeah ... I did similar on also on canvas activities last week. Don't do this ... don't think of individual ... so consider your case from a multiple or commit to carry a moment ...don't leave out your thinking activity. No, I finish.

19:28 - 20:12

Useful. But I think if you use less words would be more useful and helpful ... that the activities that I need to move my hands or use my hand, you know, not just watch the screen and read helped me learn. You know? Yeah. Involve all the sense.

20:12 - 20:54

I need to watch colours here ... some like this video ... I need to hear .. also, I like this activity because it show me both, negative and bad and negative and positive side of not balancing. Not, no ... yeah, negative ... both sides on negative ... but you need to balance ... and he put the balance in the middle.

20:56 - 21:38

Online tasks are good and convenient and like I did in the weekend, I open all the task from the first week and I make a revision for them ... yeah ... so I can and also I makes note of the important, idea that I can go, yeah, I can go back any time to these activities. It's really good.

Appendix 5

Example of Student Diary: Kirk's diary entry for Monday and Tuesday of Week 1 in the 4-week course.

16th Aug. Monday.		
1.1.3 Task 7	Group discussion The atmosphere in class was very nice, and having a group discussion can quickly push us close to be close. We come up with many different ideas and gathered them together. Everyone was involved totally at least for me, I got a strong sense of participation.	
	In terms of teacher, I really love Ms. Rhannon, everytime I answer question in class, she will give me a clear and positive response, which encouraged me a lot. So I feel I became braver to speak in class than before.	
Task 1 Post-Session	Today's assignment, I've read an article and did a quiz related to that. It's like I have a basic concept about how to find useful information from references.	
17th Aug. Tuesday.		
1.2.2 Task 3	Watch the video We watched a video without subtitles, and did a quiz related to the video. When we were watching the video, all of us were concentrating on what people are saying in the video, which can practise our listening in an efficient way.	
1.2.3 Task 4	Watch a reporting video video This video gave us an example about how to conduct an ethnographical research. I think learning this research method by watching a reporting video is a very clear and direct way. We can just immitate this way and apply it into our own research, which is practical and useful.	
1.2 Task 1	Verbal report It's my first time to make a verbal report. I think it's very interesting, not very familiar with how to report write though. It's like another form of presentation.	

An anonymous entry from a student diary, as the participant did not provide their name. Week 2, Thursday, of the 4-week course.

25th Aug 22:23 Wed

I take the quiz again.
I don't think I understand plagiarism when I first take it in the building this afternoon.
This time, I also use a digital dictionary & a note-taking software with their help. I found myself engage with the learning materials ~~more~~ in a deeper way.
Without having to repeat what's in my mind, I noticed that I have more capable of connecting to those new concepts on the screen.
It raises a question to me. Whether learning is a process ~~you~~ that we are not supposed to catch it consistently or not?

26th Aug 23:35 Thu

We do not have any online tasks today.
So I will go through some thoughts I have using Zoom.
Zoom helps us connect to each other in a more convenient way. While having our pre-session class, Zoom contribute a lot to our cooperation.
However, this kind of connection also has lots of limitations.
like I ~~have~~ always have to guess others' feeling and I have lots of difficulties in understanding other people's intentions.

Appendix 6

A sample of my notes, compiled after transcribing the verbal protocols and group interviews. At this stage, I was in the process of identifying recurring themes across the three data collections. The example below highlights several codes used to categorise themes that were emerging in the data.

Code 4 = Participants pause when using technology

Code 5 = Instructions given for the online task (technology features only)

Code 6 = Feedback from technology confusing

Code 7 = Technology was easy to use

Code 9 = Confusion as to how to use technology

Code 10 = Technology was easy to use

Code 15 = Features known and used before

Code 23 = Confusion on how to complete the task

Code 24 = Participants contact friends for help

All participants found Q4 difficult to do and took time to understand how to go about answering the question. It took some time for students to work out what they should do.

Document: Notes on verbal protocols.docx **Tags:** 4, 9, 23

Students are thinking of what to do and take time to read questions.

Document: Notes on verbal protocols.docx **Tags:** 4

The checklist was understood by all but Q2 took time, and they were confused by the instructions.

Document: Notes on verbal protocols.docx **Tags:** 5, 9, 23

Participants were confused for some time with what was being asked with question 2 (Monday week 1).

Document: Notes on verbal protocols.docx **Tags:** 4, 9

Kirk was consistently trying to negotiate whether he should email his teacher or not.

Document: Notes on verbal protocols.docx **Tags:** 4, 9, 23

Kirk scrolls up and down and goes back to the dashboard and access the task again to see if there is any instruction on the various pages that can help him understand what to do.

Document: Notes on verbal protocols.docx **Tags:** 4, 9, 23

Robin had also asked her friends in class about Q2 and what to do via a message but she had not replied to her yet.

Document: Notes on verbal protocols.docx **Tags:** 4, 9, 23, 24

Should the answer be about her degree programme or the 4-week course.

Document: Notes on verbal protocols.docx **Tags:** 5

She notes that she must submit the quiz before 22:00.

Document: Notes on verbal protocols.docx **Tags:** 5

Robine had to read instructions again to understand Q2.

Document: Notes on verbal protocols.docx **Tags:** 4, 9, 23

Students note they were confused with the feedback, correct and incorrect answers.

Document: Notes on verbal protocols.docx **Tags:** 6

Students commented that it was a nice, clear, convenient and Q1 was easy and quick, Q2 had comments such as confusing and weird

Document: Notes on verbal protocols.docx **Tags:** 7, 9

The video is played and listen to the instructions. She reads the instructions first before playing and is slightly confused how the task should be approached.

Document: Notes on verbal protocols.docx **Tags:** 4, 9, 23

Participants noted that there were 6 points need in the Q 2 but in the text there was just 5. So they go back to find more information.

Document: Notes on verbal protocols.docx **Tags:** 5, 6, 23

Participants were aware of how to expand and click the answers as this was also in the instructions

Document: Notes on verbal protocols.docx **Tags:** 10, 15
