THE EFFECTS OF MOBILE DEVICES ON STUDENT LEARNING IN A NEW ZEALAND-BASED UNIVERSITY PREPARATION COURSE: A CASE STUDY

A thesis submitted by

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Abstract

Activity Theory provides the theoretical framework underpinning this qualitative exploration into the effects of mobile devices on student learning within the context of a New Zealand-based, university preparation course. Situated within a constructivist paradigm, this thesis presents student and teacher perspectives in relation to four research questions.

The first research question focuses on how students, within a blended mode, university preparation course based in New Zealand, use their mobile devices in relation to learning. The second research question aims to identify factors that influence the use of mobile devices, while the third research question investigates if any value is added to learning and teaching practices when using mobile devices. The final research question explores any challenges associated with the use of mobile devices within this academic context.

Key findings identified that students in this study use mobile devices to support their learning by exploiting tools accessible on their devices to complete course-related tasks. They also use mobile devices to access lexical support, maintain social connections and manage workflows. Factors that positively influenced mobile device usage in the pre-degree context included pedagogical approaches, teacher influence, task completion and social influences. However, not all influences were positive. Students' perception that their attention spans were shortening and a lack of technical proficiency were factors that negatively impacted on learning.

Other key findings indicated that value was seen to be added when mobile devices were used appropriately within this pre-degree context. Value was notably added with regard to the facilitation of collaborative, supportive and personalised learning through the convenience of instant access and increased connectivity. However, with the prevalence of mobile devices within the classroom, there were aspects that were

challenging and presented as contradictions within the Activity Theory framework. These challenges consisted of distractions and difficulty in maintaining focus on tasks. The use of mobile devices by classmates was also found to have a negative effect on those around them.

This thesis concludes by outlining areas where noteworthy contributions to theoretical, methodological and practical knowledge have been made. It contributes to the growing body of literature by exploring the use of mobile devices within the pre-degree context and identifying potential areas of future study. By embarking on these areas of investigation to understand the effects of mobile devices on student learning, educators and other stakeholders will have a clearer idea of ways in which the capabilities inherent in mobile devices can be harnessed to best support student learning.

Certification of thesis

This thesis is entirely the work of Emily Kate Saavedra except where otherwise acknowledged. The work is original and has not previously been submitted for any other award, except where acknowledged.

Principal Supervisor: Associate Professor Henriette van Rensburg

Associate Supervisor: Associate Professor Warren Midgley

Student and supervisors' signatures of endorsement are held at the University.

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He aha te mea nui o te ao. He tangata, he tangata, he tangata
What is the most important thing in the world? It is the people, it is the people, it is the people
(Māori proverb)

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Chapter 1: Introduction to the study

Mobile devices have become increasingly ubiquitous. However, research into the extent to which mobile devices affect academic settings is still in a nascent phase (Madrazo, 2011). Within an academic context, some teachers lament the intrusion of students being constantly connected (Bennett, Maton, & Carrington, 2011; Garaj, 2010; Geist, 2011; Perkins & Saltsman, 2010) and have remarked on the distraction element offered by these devices, which has led to some institutions attempting to adopt versions of mobile free zones within learning areas. Yet others have embraced the affordances offered by these constantly connected devices (Churchill, Fox, & King, 2012; Park, 2011; Traxler, 2009) and have introduced learning opportunities based upon them to highlight the opportunities of having access to information available at our fingertips. One of the affordances of mobile devices is that the traditional four-walled classroom is now able to be expanded far beyond the physical confines and students are able to explore, albeit virtually, other possibilities in which to test their knowledge, theories, hypotheses and other ideas discussed within the classroom context. This has resulted in the term *mobile learning*, which for the purpose of this thesis refers to the portability of the mobile device, not only the mobility of the learner, to enable both formal and informal learning, in and outside of the classroom (Hockly, 2013). This mobility has the potential to inform pedagogical practices and empower students by harnessing their interest. Mobile devices have arguably become prevalent in many classrooms from primary, to secondary, through to tertiary settings. This thesis explores how students are choosing to use mobile devices within a pre-degree, tertiary academic context. These mobile devices can be defined as any portable device that allows the user to connect to the internet. This includes, but is not limited to, laptops, tablet computers, and smartphones.

1.1 Background

The introduction of mobile devices has been documented in different educational contexts (Kennedy, et al., 2009; Rolls, Northedge, & Chambers, 2017; Steel & Levy,

2013; Sung, Chang, & Liu, 2016; Traxler, 2007). Their introduction has been met with a multitude of responses from different institutes. Working as a teacher, I have found that the introduction of mobile devices into the classroom environment has provoked a variety of responses. I have observed some colleagues actively resist the inclusion of mobile devices in classrooms as they perceive mobile devices to be an intrusion, whilst others relish the perceived opportunities offered by the inclusion of mobile devices in their classes. As a researcher, I have been interested in ascertaining the extent to which students are using their mobile devices to support their learning.

As a researcher, and as a teacher, I hold strong beliefs that knowledge and understanding are social constructs. I believe education should be a socially constructed experience and that both teacher and learner are part of that construction (Gray, 2018). Therefore, in this thesis, I will refer to the researcher in the first person as I was an active participant in the activity of researching and the findings, with subsequent analysis, are part of this experience.

This research project has focused on how students were using their mobile devices within a pre-degree academic context. The chosen site of this research project offers the opportunity for all students enrolled in their courses to connect to free, high-speed wi-fi while on campus. This ensures that, while on campus at least, students have the ability to be constantly connected to the internet and other online services via mobile devices. Anecdotal evidence would suggest that the majority of students avail themselves of this service but what they access is unclear. Even though students currently appear to live in a social world of permanent connectedness (Perkins & Saltsman, 2010), how this connectivity translates from their social to their academic lives has been, to date, under-explored. The research presented in this thesis pertains to a case study that investigated how students enrolled in a university preparation course at a New Zealand university utilised their mobile devices for academic purposes.

1.2 Research questions

If we accept that the pervasive ubiquity of mobile devices is unlikely to change, then understanding this phenomenon has become increasingly important in the area of education. Having witnessed first-hand, the growing number of devices being used in my own classrooms I was interested in how students were using their devices. Were they being used to support learning or distract from learning? Lively discussions were had with colleagues debating the merits and perils of allowing mobile devices into classrooms. These discussions indicated to me a need to understand the various perceptions of the impact that students' use of mobile devices was having on learning and teaching activities within the pre-degree, university preparation courses I was teaching. As a social constructivist, I wanted to work with students and teachers to explore this further. It was from this perspective that the four questions emerged that underpin this thesis. The four research questions that were explored in this study are the following:

> RQ1. Within the context of a pre-degree, university preparation course in New Zealand, how are students using mobile devices in relation to learning?
>
> RQ2. What factors influence the use of mobile devices within this academic context?
>
> RQ3. From the teachers' and students' point of view, how do mobile devices add value, if any, to learning and teaching practices within this New Zealand context?
>
> RQ4. What challenges, if any, do teachers and students in this context face when using mobile devices in the classroom?

It is contended that by developing an understanding of the responses to these questions, based on data gathered in this case study, a greater understanding of the effect of mobile devices in this context, and in similar contexts, can be developed. This understanding can inform pedagogical decisions to ensure that appropriate skills are acquired by teachers, students and other stakeholders.

1.3 Key terms

Throughout this study, a number of key terms are used. These have been listed below for ease of reference. All terms have been listed in alphabetical order with a definition or explanation of how the term is used in this thesis.

TERM	DEFINITION / EXPLANATION
blended learning	The combination of face-to-face learning and technology enhanced or mediated learning.
CALL	Computer Assisted Language Learning
course	An individual, credit bearing module. A selection of specific courses can make up a programme in order to complete a qualification.
e-Learning	Electronic Learning. Used to describe the use of electronic devices to support learning.
ELT	English Language Teaching
EAL	English as an Additional Language
ESOL	English for Speakers of Other Languages (sometimes used interchangeably with ESL, English as a Second Language)
FACE	Foundation and Continuing Education
Foundation education	Pre-degree courses that support students to gain necessary numeracy, literacy and independent study skills for university admission. Sometimes referred to as 'bridging education' or 'enabling education'.
LMS	Learning Management System
Learning and teaching	Teaching and learning has regularly been used in the literature to refer to activities in and out of the classroom. However, the term learning and teaching has intentionally been adopted throughout this thesis to highlight a paradigmatic shift towards emphasising learning.
m-Learning	Mobile Learning
mobile device	A portable device connected to the internet (including but not limited to, laptops, tablet computers, and smartphones).
NVIVO	Qualitative analysis software used to aid analysis by enabling easy identification, indexing, or retrieval of data during analysis.

TERM	DEFINITION / EXPLANATION
off-task	Not attempting the assigned activity at the designated time.
on-task	Working on the appropriate assigned activity at the designated time.
programme	The qualifications (e.g. certificates, diplomas, bachelors) that students are enrolled in. A programme consists of a set number of courses.
Stream	In-house name for the Learning Management System (LMS), used at the site of this particular study, operated through Moodle.
Voice Record Pro	Professional voice recorder software used to record the interviews. Available through the iTunes Apple app store.

Table 1.1: Key terms and definitions used in this thesis

1.4 Theoretical framework

Activity Theory (Engeström, Miettinen, & Punamäki-Gitai, 1999) was chosen as a theoretical research framework for this research project. A number of previous studies (e.g. Gedera, 2014; Liaw & Huang, 2011; Park, 2011) have used Activity Theory to investigate the use of technology in academic contexts. This study applies Activity Theory to the context of pre-degree, university preparation, a context not previously examined with Activity Theory. Activity Theory supports a constructivist paradigm which aligns with the epistemological basis of this research project. Activity Theory was used to guide data collection and analysis, and subsequently inform interpretations. The application of Activity Theory within this study is explored in more detail in sections 3.1.1 – 3.1.2.

1.5 Context of study

Within the tertiary education sector in New Zealand, there are a number of post-secondary education options. The Tertiary Education Commission (TEC) is the administrative authority responsible for steering and funding the tertiary sector to

achieve goals and strategies as outlined by government-devised Tertiary Education Strategies. The 2014-2019 Tertiary Education Strategy, which identified six priority areas for the direction of tertiary education in New Zealand, acknowledges that "[H]ow people approach learning – including goals, pathways and providers – can vary substantially over time as technology and the needs of society and the economy change" (Ministry of Education, 2014, p. 3). The then Minister for Tertiary Education, Skills and Employment, Steven Joyce, wrote in the Minister's foreword to the 2014-2019 Tertiary Education Strategy document that in order to achieve the expectations for tertiary education, educators must consider "our existing modes and means of delivery – including new and emerging technologies – and identifying opportunities as they arise" (Ministry of Education, 2014, p. 2). This study was therefore undertaken to formulate an understanding of the effects of mobile devices on student learning in a New Zealand based tertiary setting.

The context of this study is multifaceted. Firstly, Foundation and Continuing Education (FACE) is an area that provides support for students gaining core skills necessary for sustained success in university studies. The New Zealand Tertiary Education Strategy (Ministry of Education, 2014) identified the need to assist individuals to gain core skills and "embed the development of literacy, language and numeracy skills within a vocational or topical context that is relevant to the learner" (p. 22). At the site where this study was located, FACE courses were offered to provide a systematic and explicit pathway for students who did not have the linguistic or scholastic background to be eligible for entry into degree level programmes or for students who were returning to an academic programme after a prolonged hiatus from formal study. Students with these diverse backgrounds contribute towards a complex, academic context. As an educator within the context of FACE, I am passionate about contributing to the expansion of research in this area.

This study investigated students and teachers involved in pre-degree courses on an urban campus in New Zealand. The pre-degree courses aim to support students to

acquire the necessary skills and strategies to become successful, autonomous learners in the New Zealand tertiary context. All courses were designed to prepare students for undergraduate study and provide the opportunity, and support, to gain admission to university degree programmes across a variety of disciplines. Student entry eligibility criteria differ for each programme, and teachers often teach across the programmes. As some of the enrolled students require additional English for Speakers of Other Languages (ESOL) support, in addition to the development of academic skills, the minimum employment requirement for staff teaching these courses is that they hold a teaching qualification with a specialization in adult ESOL education in addition to a Master's degree.

This study investigated Foundation and Continuing Education (FACE) courses delivered in face-to-face classroom contexts. Elements of blended learning, which combines face-to-face teaching with technology enhanced or mediated learning and teaching activities, were a core component of these courses. Therefore, all course content was available via a learning management system (LMS) that could be accessed online. Although not a course requirement, students were encouraged to bring a mobile device to all classes in order to complete in-class learning and teaching activities.

Technology usage within classrooms has been widespread as access to wi-fi connections is no longer an optional extra but an expectation in New Zealand universities (Research New Zealand, 2015). Research has focussed on potential future uses, new innovative approaches to learning and teaching, or specific learning and teaching activities. Little research has been conducted into how students are using the technology and how that is impacting their learning. Whilst on campus, students and teachers at the site of this study had reliable access to free wi-fi at all times.

This study intended to investigate how mobile devices, as specific technological tools, are being used in the FACE context. The findings from this study will illustrate how

mobile devices affect student learning within the context of blended learning in foundation and continuing education courses. The intention is to contribute to a collective understanding of factors that influence the use of mobile devices as well as looking at any potential value or challenges faced by using these devices in this context.

1.6 Ethical considerations

This research sought to understand perspectives, experiences and multidimensional views of human participants and as such was subject to human research ethics processes. Subsequently, as with all research involving people, there were a number of ethical considerations necessary when conducting this research. These considerations are described in the following section.

Prior to the collection of any data, full ethics approval was obtained from the University of Southern Queensland's Human Research Ethics Committee (USQ HREC reference number: H15REA158). As the research was to be conducted within a higher educational institute, research ethics approval was also sought through the educational institute where the data was collected and the researcher was employed. The study was approved by Massey University's Human Ethics Committee (MUHEC reference number: MUHECN 15/038). The research was conducted in accordance with both USQ and Massey University's code of ethical conduct for teaching and research involving human subjects. As both institutes have robust ethics approval processes, the timeline was more extensive than originally projected. At the conclusion of a rigorous procedure, both committees granted full ethical approval for this project.

As part of the ethics application, it was important to reflect on the axiological dimensions, principles and standards of ethics. As a researcher operating from an interpretivist perspective, it was important to acknowledge the potential presence of

bias to exist within the research design. Assumptions as a member of a socially constructed (Gray, 2009; Wiersma & Jurs, 2005) paradigm, where an individual's worldview is influenced by the context or the institute within which they operate, were an important consideration. This included, but was not limited to, interactions between students and teachers in the classroom and colleagues in the wider academic setting of the university.

1.6.1 Personal bias

Prior to undertaking this research, it was important as a researcher to reflect upon my own assumptions and potential bias with regard to the use of mobile devices within the classroom (Coombes, Danaher, & Danaher, 2004). In 2012, I was part of a major federally led implementation of mobile devices in the United Arab Emirates (Gitsaki & Robby, 2013). This initiative saw approximately 7,000 mobile learning devices (Apple iPads) brought into Foundation classrooms as the primary learning and teaching method of delivery (Saavedra & Murray, 2015). As an early adopter, a colleague and I put together professional development sessions for teachers. These sessions ranged from how to use the device through to integrated cross-disciplinary projects. I personally enjoyed the challenge of integrating these devices into my professional practice and of providing technical, pedagogical and moral support to my colleagues on campus and on sister campuses nationwide. It is, therefore, important that my enthusiasm for adopting innovation in the use of technology, specifically the potential use of mobile devices for learning and teaching, does not create a bias in the collection or analysis of data in this project.

1.6.2 Social risk

The potential for risk, inherent in any human research, was also foremost in my considerations for the research design. One pre-identified risk with this research, both with student participants and with the teacher participants, was the potential

for social risk. In the case of student participants, it was important to consider the potential power dynamic with the researcher being an academic involved in the programme they were enrolled in. To mitigate this as far as possible, written responses were completed, collected and collated anonymously. In the case of the focus groups where anonymity was not possible, the researcher was not a designated teacher of the cohort of students. Student participants were reassured that no grades would be affected by participation or non-participation in the sessions.

It was also important to acknowledge the potential risk with teacher respondents and the researcher working in the same institute, sharing the same employer. As with the dual relationship mentioned in the previous paragraph, it was important that respondents did not feel coerced into responding to the researcher's questions. This was achieved by surveys being administered online so that all participants, both students and teachers, were able to choose whether to participate or not. In addition, the extent of their individual contribution was at the discretion of the participant.

With both student and teacher participants, there was the risk that some of the responses were filtered and respondents may not have felt able to fully disclosed their reality. Information sheets were distributed to all participants that outlined the purpose of the research, specific requirements for involvement in the research, including time commitments and identified risks and benefits of participation, as well as aspects concerning confidentiality, usage and storage of data collected. Tacit consent was sought for the submission of any online surveys and written consent was obtained in the case where anonymity was not possible such as the face to face meetings.

1.6.3 Time imposition

Participating in the research required participants to take time to complete the various phases. In an effort to minimise the time imposition, research instruments

were delivered independently of each other so that participants could decide how much, or how little, time they were willing to invest. Surveys were open online so participants could choose a time that suited them to respond. Options for extended written or verbal responses were also provided. By accommodating this flexibility of timing, amount and extent to which a participant took part in this study, any time imposition could be controlled by the participant.

1.6.4 Benefits

There were a number of intrinsic benefits of participating in the research. Questions raised during data collection (specifically in the case of the survey and the discussion groups) encouraged participants to self-reflect. This offered a potential benefit for personal growth.

Responses to some of the questions have also helped, and continue to help, inform course development and improvements. Feedback emerging from this research can be used to further enhance strategic directions and practical applications within the area of FACE and may have applications in similar academic contexts.

1.7 Quality assurance: Trustworthiness

The framework for quality assurance I have used is *trustworthiness* as described by Lincoln and Guba (1985). To ascertain trustworthiness a qualitative study must adhere to four principles: (1) credibility; (2) transferability; (3) dependability; and (4) confirmability. These are discussed in the following sections.

1.7.1 Credibility

Credibility of the student discussions was ensured by using member checking. Transcripts and field notes were returned to participants for verification of authenticity. Students were given the opportunity to amend the transcripts and notes to confirm accuracy prior to analysis.

1.7.2 Transferability

Transferability is the degree to which a study can be replicated in similar contexts. By making decisions explicit and by providing enough detail in the coming sections, future researchers will be able to collect and analyse data using the same approaches. Also, through the provision of detailed descriptions, based on reasonableness of claims given that assumptions and evidence are acceptable (Wiersma & Jurs, 2005), readers can come to their own conclusions as well as potentially transfer those descriptions to their personal experiences.

1.7.3 Dependability

All data collected has been maintained by the researcher using electronic means to record, store and retrieve data (Cohen, Manion, & Morrison, 2007). NVivo was used throughout the study, maintaining a digital copy of all research collected. In addition, all versions of data analysis, consent letter, participation information sheets and drafts of writing have also been preserved in electronic formats, which would enable auditing should it be required (Amankwaa, 2016).

As described in the section on credibility, the returning of transcripts to student discussion participants increased the dependability of what had been transcribed. At any time throughout the research process, participants were able to amend the information held.

1.7.4 Confirmability

One technique that can be used to enhance confirmability is triangulation. Triangulation of data was possible through the use of multiple data collection instruments which enhanced internal reliability. In the case of this study, data was collected from multiple surveys, discussion groups, observations and documentation. By collecting data from multiple perspectives using different data collection methods, findings can be juxtaposed to ascertain how widespread a phenomenon may, or may not, be. For example, when investigating how students are using their mobile devices, teachers reported their observations in the teacher survey which was then compared to student's self-reported uses in the student survey.

Confirmability is related to the neutrality of interpretations throughout the research process. One strategy implemented during this study was to keep a research log where, as the researcher, I journaled my thoughts and observations throughout the research process. This has been a useful tool in analysing data. Prior to the commencement of the research project and throughout the data collection process, thoughts, queries, considerations and issues were noted down so they could be reflected upon or incorporated at the time of data analysis.

1.8 Limitations and delimitations of study

This study is a case study pertaining to a specific context. As such findings should not be generalised. However, findings of this localised case study may be transferable (Lincoln & Guba, 1985) to other programmes in similar contexts under similar conditions. Using data gathered from this case study, educators may be able to let their pedagogical decisions be informed by that data to ensure appropriate skills are acquired by both teachers and students. In addition, this research may assist in demonstrating areas where mobile devices can be utilised to enhance learning and teaching opportunities.

1.9 Significance of study

Mobile devices have become increasingly common place in many of the teaching environments that I have been involved in. The extent to which I have observed mobile devices being integrated into learning and teaching activities within the curriculum, and the extent to which mobile devices have been actively opposed, has differed between classes, cohorts and institutions. In some cases, these differences have been perpetuated by strategic directions within institutes whilst in other cases the differences may come down to individual preferences and experiences. What was clear was that to date little research had been conducted into the use of mobile devices within the context of Foundation and Continuing Education. Therefore, one of the objectives of this current study was to investigate and report on the use of mobile devices within this specific academic context.

In researching this area, a broader understanding of how mobile devices are being used within this context to support learning can be investigated. Subsequently this research contributes to the growing body of literature surrounding not only the potential uses of technology but also the current uses of mobile devices from the perspective of students and teachers. When we have a clearer understanding of the effect mobile devices have on learning and teaching we are in a better position to evaluate and engage in curriculum design discussions and, where necessary, plan and provide appropriately structured professional development opportunities.

This research has also contributed to my own professional development as I have explored the research process and have been able to use this process to inform my own teaching practice within this context. The research process, culminating in the writing of this thesis, contributes to the literature regarding practices and experiences with mobile devices within the context of Foundation and Continuing Education.

1.10 Outline of thesis

This thesis is divided into six chapters. This first chapter has provided an introduction to the background and some of the initial considerations of this research project.

The second chapter outlines the literature that informed the direction of this study. The literature reviewed has been divided into six key areas starting with developments in e-Learning. Access to and use of mobile devices is then explored prior to an examination of some of the available literature involving key pedagogical trends. Examples of how mobile devices are currently being integrated in classrooms and the impact that mobile devices have on pedagogical practices as presented in peer-reviewed literature is subsequently explored. The chapter concludes with some of the challenges of using mobile devices in learning and teaching as identified in the literature.

The third chapter looks at the methodology implemented in this study and expands on some of the concepts introduced in chapter one. More detail is given about the epistemological background of this study and the use of Activity Theory as a theoretical framework. The sampling procedures used throughout the research process are then investigated prior to a description of the participant pool.

Chapter four offers a detailed explanation of the demographic information collected by using the survey research instruments. Findings are then outlined according to the research instruments and as they relate to each research question. Data presented in chapter four is then analysed and discussed in chapter five. Chapter five juxtaposes emerging literature with the analysis and discussion of pertinent findings across all research instruments in relation to the four research questions.

Chapter six brings together the key findings and considerations in response to the research questions posed at the beginning of this research process. Identified contributions to knowledge, further potential areas of investigation and limitations of the study are also outlined in the final chapter.

In addition to the division of chapters, navigation prompts have been added to guide navigation of this thesis. These are summarised in the following table:

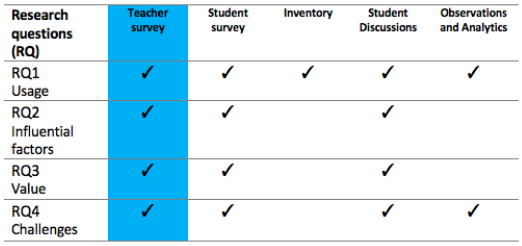
Navigation prompt / signpost	Purpose
	The yellow highlight signifies the research question focused on in that particular section of the thesis. When a section refers to research question one, this symbol is present. When referring to research question two, the RQ2 ball is highlighted.
	Evaluation crosswalks have been used to indicate which research instrument has been used to investigate each research question. A blue column is used to highlight which research instrument is being discussed in that section.
Focus 1. xxx 2. xxx 3. xxx	Key thematic findings are highlighted using text boxes with a blue border.

Table 1.2: Navigation prompts used in this thesis

1.11 Chapter summary

The purpose of this chapter was to give a brief introduction to the background that has informed this study. The chapter has introduced the research questions, key terms and theoretical framework implemented in this research project. The specific

context, ethical considerations (including risks and benefits) were also briefly outlined. Issues regarding quality assurance were then described, while limitations, delimitations and the significance of this study were delineated in sections 1.8 and 1.9. An outline of this thesis was presented at the conclusion of this chapter.

Chapter two will provide an overview of the literature that has informed the direction of this study.

Chapter 2: Literature review

This chapter outlines some of the literature that informed my original interest in the area of mobile device usage in classrooms. At the onset of this research project a number of topics resonated with me as a researcher and teacher. As I read more widely and deeply the literature shaped my approaches and as a result the research questions were further defined and refined. The literature presented in this chapter has informed and shaped this study.

The literature review is divided into six sections. The first section looks at the current access to and use of mobile devices within a generic context, and more specifically within an academic setting. The second section looks at current important developments in educational technology within higher education. The third section discusses key trends within higher education, looking at different types of learning. The fourth section highlights a few current examples of integration of mobile devices within educational settings. The final sections look at the documented impact of mobile devices on pedagogical practices, followed by challenges faced by those who have used mobile devices within academic contexts. As research is a process, I have, throughout this project, continued to explore newly published findings alongside my own research. These connections are explored and juxtaposed with my own findings, in chapter five.

2.1 Developments in e-learning

E-learning has been documented within educational settings since as early as the 1960s. Changes in technology have seen a gradual shift from e-learning through to m-Learning (Murphy, 2011), followed by a focus on ubiquitous learning. The use of mobile devices is now so widespread that they have become an integral part of our lives and, if we can harness this potential, learning could become more dynamic and flexible (Park, 2011) through enhanced accessibility, thus blurring the line between

learning and living. However, there is a noticeable lack of sustained research into the use of mobile devices (Adams & Hayes, 2009; Brand, Kinash, Mathew, & Kordyban, 2011; Freeman, 2012; Park, 2011; Traxler, 2007) within tertiary academic contexts.

In the field of further education, *The Horizon Report: 2012 Higher Education Edition* (Johnson, Adams, & Cummins, 2012), which is a collaborative research venture that uses the Delphi method to identify and highlight key drivers of educational technology adoptions within the higher education environment, identified Apple iPads specifically as a "category-defining phenomenon" (ibid, p.14) within the area of tablet computing. Since then important identified developments in educational technology have included "Bring Your Own Device (BYOD)" (Johnson, Adams Becker, Estrada, & Freeman, 2015, p. 36; Johnson, et al., 2016, p. 36), and mobile learning (Adams Becker, et al., 2017, p. 40). All of these developments indicate a continued focus on the use of mobile devices to support higher education.

The pedagogical model that is regularly referred to in the literature is the seminal work of Koehler and Mishra (2009), which investigates the TPACK model, outlining the relationship between technology, pedagogy and content knowledge. They stipulate that at the heart of effective technology integration is a mutually inclusive link between the three variables. Research has found that with firm pedagogical and content knowledge, technology can be successfully integrated into activities to ensure active, engaged and stimulated learning opportunities (Balanyk, 2013; Burden, Hopkins, Male, Martin, & Trala, 2012). However, as highlighted in research conducted into the technology integration of 313 full- and part-time teachers at a nursing institute, teachers who lacked pedagogical content knowledge, had not effectively integrated technology into their teaching practices (Yu et al., 2014). However, while their study provided insight into this particular institute, some of the questions in their questionnaire were potentially misleading. For example, the term *user friendly* was too ambiguous in the context of the questionnaire to garner a

complete understanding from the respondents. When formulating research instruments, it is important that these terms are unequivocal.

2.2 Access to and use of mobile devices

There is little doubt of the increasingly ubiquitous nature of mobile devices (Cheng, Hwang, Wu, Shadiev, & Xie, 2010; Elliot & Adams, 2011; Murphy, 2011; Park, 2011; Perkins & Saltsman, 2010; Sung, Chang, & Liu, 2016). Data from the Worldwide Institute (2015) has indicated that most people in developed and developing countries own a mobile phone and earlier predictions indicated that the number of mobile phone subscriptions would surpass the world's population in early 2014. Data available from Statistics New Zealand (2017) indicated that 80% of New Zealand households had internet connections, up 15% from 2006, with 83% of individuals having internet access at home. Mobile device usage in New Zealand is also increasing with "three out of four New Zealanders owning a smartphone and half with a tablet" (Wynn, 2014, para 3). A study conducted into New Zealanders' use of smartphones and other mobile communication devices in 2013, and replicated again in 2015, reported a 46% increase in smartphone ownership over three years (Research New Zealand, 2015). This number is expected to continue to increase with the research organization Frost and Sullivan (2013, para.1) predicting "[B]y 2018, New Zealand will have 90% smartphone and 78% tablet ownership levels". Given the increasing ubiquity of these and other mobile devices, such as tablets and iPads, studies have been conducted regarding the acceptance of mobile devices in academic settings (Elliot & Adams, 2011; Khalid, Chin, & Nufher-Halten, 2013; Wang, Wu, & Wang, 2009). However, many of these studies claim research in the field of mobile technologies in academic settings to be in its infancy. This is perhaps to be expected given the newness of the devices themselves; nevertheless, study into this area is vital as the devices become increasingly more accessible to an ever-expanding community.

Research conducted into the use of personal computers for academic purposes as compared to non-academic purposes has shown that although undergraduate students may widely use technology, they are not necessarily digitally literate (Sims & Butson, 2014). Kirschner and De Bruyckere (2017) acknowledge that whilst many students currently in classrooms have grown up with access to technology, they categorically denounce the idea of digital literacies and digital competencies being linked to any generational division. They go on to explore the "pervasive myth that people can multitask" (ibid, p. 138) and what this might mean for teachers and teacher training.

One of the ways in which mobile devices are used is as part of blended learning. Blended learning, which combines elements of technology enhanced learning outside class time and face-to-face learning and teaching has become commonplace in many higher education institutions (Drysdale, Graham, Spring, & Halverson, 2013; Porter, Graham, Spring, & Welch, 2014). The inclusion of Computer Assisted Language Learning (CALL) is now seen as "completely complementary to almost all classroom language teaching and learning activities" (Beatty, 2010, p. 17), with learning management systems, virtual learning environments and mobile technologies making it easier for the English language teaching (ELT) practitioners to introduce a blended component (part online, part face-to-face) to purely face-to-face teaching. This trend is likely to continue as we see an increase in the number of teachers implementing this into regular classes (Dudeney & Hockly, 2012). It is perhaps as a result of this normalisation of CALL in ELT that we have seen a growing number of mobile devices being used in the classroom. This increase has also contributed to the formulation of a body of research investigating Mobile Assisted Language Learning (MALL). Research into the integration of different mobile devices into curriculum has identified opportunities for an increase into student-centred constructivist approaches to learning languages (Burston, 2014). The possibility for students to access and create learning opportunities outside of class has allowed for exploration of personal and social aspects of MALL (Solé, Calic, & Neijmann, 2010). This use of

mobile devices to facilitate self-reflection in language practice and production has encouraged student-centred language learning experiences.

2.3 Key pedagogical trends

A further area of interest is the expansion of online learning opportunities as many institutes are incorporating blended learning initiatives into their courses, whereby traditional face-to-face learning is supplemented with online or digital resources (Contact North, 2015; Owston, York, & Murtha, 2013). These initiatives facilitate the potential for students to leverage their online skills they have already developed in their social arena and to integrate them in the world of academia (Johnson, Adams Becker, Estrada, & Freeman, 2014). In addition, the New Horizon Reports between 2015 and 2017 have all identified blended learning as a short-term trend, over the next year or two, driving the adoption of education technology in higher education (Johnson, et al., 2015; Johnson, et al., 2016; Adams Becker, et al., 2017). It is therefore important to investigate how students are using their devices within the academic context as research conducted by Kennedy et al. (2009) has done with a specific focus on the use of technology by the net generation. Other studies, such as those looking at how mobile devices are being used in a variety of settings, including Australian universities (Murphy, Farley, & Koronios, 2013; Murphy, Farley, Lane, Hafeez-Baig, & Carter, 2013), a Vietnamese university (Murphy, Midgley, & Farley, 2014) and American universities (Gikas & Grant, 2013), highlight the fact that students are using their mobile devices to access and facilitate both formal and informal learning opportunities. By understanding how students are using technology to access education, teachers and curriculum developers are in a better position to harness opportunities to develop digital literacies, improve future course delivery, and improve professional development.

Frey, Faul and Yankelov (2003) created an inventory of online learning strategies, entitled *Value rating checklist for web-assisted technology*, to examine how

undergraduate students on a Bachelor of Social Work programme perceived the value of 18 online learning strategies. Frey, et al. (2003) investigated whether learning styles and comfort level with computers influenced students' perceived value of web-assisted learning strategies. No association was found to show these influenced the perceived value of online learning strategies. Their research indicated that undergraduate students perceived the posting of grades and detailed assignments online, the provision of feedback regarding assignments, and email communication with the teacher as the top four most valuable online learning strategies. Frey, et al. (2003) further found that strategies most commonly used by teachers in their context were not necessarily the strategies that students perceived to be the most valuable. McSporran (2004) replicated this study with post-graduate, Master of Science students in New Zealand and found that whilst both cohorts valued clear online instructions, other strategies were not in alignment. McSporran's (2004) findings indicated that online announcements, having lecture notes posted online, and being able to communicate with peers were perceived to be of greater value for the post-graduate students than the undergraduate students. Both of these studies indicated having an alignment between the online learning strategies that educators use and the online learning strategies that students perceived to be valuable could greatly improve a student's learning experience. Exploring the perceived value of online learning strategies for pre-degree students, studying in a university preparation course in New Zealand, has not been investigated before.

Education paradigms are shifting to follow more collaborative models in order to include a larger percentage of online learning and blended learning opportunities (Dudeney & Hockly, 2012; Johnson, et al., 2012). This is placing a new emphasis in the classroom on more challenge-based and active learning alongside a blended learning approach that places emphasis on students learning outside of the traditional classroom space. Those who have become involved in teaching with mobile devices quickly notice it matters which devices learners are using (Kukulsha-Hulme, 2009). Therefore, it is important that there is an understanding of what different devices are being used for and the different purposes that these devices

serve. Then any necessary professional development can be tailored to ensure teachers are confident with the skills, strategies and approaches required to integrate appropriate technologies (Stephenson & Harold, 2008) into the classroom and curriculum. This research contributes, in part, towards highlighting potential areas of professional development.

Research in the area of higher education and mobile devices has been primarily qualitative, consisting mostly of case studies where mobile devices have been used in face-to-face environments (Butcher, 2014; Nguyen, Barton, & Nguyen, 2014). Much of the research has looked at developing a particular academic skill such as reading (e.g. Culén & Gasparini, 2011; Grace, 2011; Shepherd & Reeves, 2011; Sheppard, 2011; Stewart, 2012), and has highlighted affordances of reading in a non-linear fashion through the use of hyperlinked and interactive texts, which in turn encourages the development of multimodal literacies (Garrett-Rucks, Howles, & Lake, 2015; Grace, 2011). Others have explored the use of mobile devices with content subjects (e.g. Freeman, 2012; Manuguerra & Petocz, 2011) and the role of teachers (Adams & Hayes, 2009; Churchill, Fox, & King, 2012; Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012).

2.4 Examples of current integration of mobile devices in the classroom

Research conducted by Ertmer et al. (2012), Churchill et al. (2012) and Adams and Hayes (2009) has examined the role of technology in the classroom combined with the role of teacher's beliefs, confidence and attitudes towards technology in the adoption and adaption of technology integration and innovation. These studies have focused on how the teacher approaches the delivery of courses through blended learning techniques, utilizing face-to-face classroom-based teaching with elements of e-learning and m-learning.

Mobile devices are now ubiquitously embedded, as an integral part, in our everyday lives (Dudeney & Hockly, 2012; Hockly, 2013; Kukulsha-Hulme, 2009; Mulholland, 2011; Park, 2011). If the potential integration of these devices into our curricula can be harnessed, learning could become more dynamic and flexible (Park, 2011). The iPad is an example of this more ubiquitous use of technology with over 170 million iPads sold worldwide by 2013 (Jones, 2013) and the "iPad now accounts for 97% of all tablet-based web traffic in the U.S. and 46.8% of all mobile web traffic." (Johnson, et al., 2012, p. 14). However, there is a noticeable lack of sustained research into the area of iPad use for educational purposes (Adams & Hayes, 2009; Brand et al., 2011; Freeman, 2012; Park, 2011; Traxler, 2007). Research into the integration of mobile devices in classroom teaching focuses predominantly on mainstream education with ELT related research studies being "few and far between" (Hockly, 2013, p. 81). The apparent lack of research in the area of language teaching is perhaps attributable to the rapid evolution of these devices. However, given the ubiquity of these devices, this is an area of research language educators cannot ignore (Godwin-Jones, 2011).

If the use of iPads in educational settings was as revolutionary as anticipated, there should have been a flurry of associated research since its launch in 2010. However, despite a preliminary search for keywords including "iPad, teaching, learning, m-learning, mobile learning and e-learning" (Nguyen, et al., 2014, p. 4) obtaining 2674 hits, only a fraction constituted robust empirical studies. According to a systematic literature review (Nguyen, et al., 2014) of articles addressing the use of iPads in higher educational settings, only 20 studies were found to be completed, peer-reviewed, empirical papers. If iPads are to be seen as an example of a particular mobile device for learning and teaching, this would suggest that research in the area of mobile devices in the education context is still in its embryonic state despite the appearance of widespread adoption.

The individualised mobile technologies being used in classrooms have been documented as the social context of learning diversifies (Brand & Kinash, 2010;

Brand, et al., 2011; Burden, et al., 2012; Johnson, et al., 2012; Manuguerra & Petocz, 2011; Solé, et al., 2010; Traxler, 2007). This phenomenon has also moved into language classrooms as more technologies are integrated into courses (Averinova, 2011; Chun, Kern, & Smith, 2016; Steel & Levy, 2013; Solé, Calic, & Neijmann, 2010), both formally and informally, and e-learning initiatives, such as virtual learning environments and learning management systems (Dudeney & Hockly, 2012), are increasingly introduced. With the development of m-learning and ubiquitous learning, teachers are able to promote accessible, anytime, anywhere learning including the implementation of multimodal delivery methods (Garaj, 2010; Traxler, 2007). Manuguerra and Petocz (2011, p. 61) stated that the latest technologies could change the way we teach and learn, "greatly favouring constructivist and collaborative approaches to learning, and flexible and adaptive approaches to teaching". As these technologies are evolving, published empirical evidence regarding their use value is still underrepresented.

Some studies have looked at how devices were used in the classroom and how they supported learning and teaching. The Longfield Academy study (Heinrich, n.d.) conducted research into the use of mobile devices, taking into account student (n=51), teacher (n=14) and parental (n=55) perspectives. Keane, Lang and Pilgrim (2012) conducted research on two year groups who were using iPads and Netbooks in suburban mainstream Catholic schools in Melbourne, Australia. Results of that study indicated that iPads were used for more interactive tasks and were seen to have greater potential for innovation and student engagement. Interviews with teachers in both studies revealed that the use of these devices inspired them to develop more student-centred pedagogies, such as cross-curricula problem-based learning, and to improve collaboration between staff members. The studies concluded that the mobile devices were a "motivating influence" (Heinrich, n.d., p. 33) for students. This was echoed in studies conducted by Kukulsha-Hulme and Traxler (2007, p. 187) who concluded that devices such as iPads and Netbooks have "considerable … unique pedagogic potential".

In the area of tertiary education, a study at Abilene Christian University (Perkins & Saltsman, 2010), where students were provided with an Apple device, was one of the few published studies which looked specifically at the Apple mobile computing ecology in an andragogical context. The study looked at the different choices made by students regarding their preferred mobile device. It reported overall positive responses highlighting iPhones as an attractive learning platform to promote student engagement and academic relevance as long as device ubiquity, for faculty members and students, is enforced. Students' attitudes towards mobile devices have been further explored in Australian universities by the work of Brand et al. (2011) who looked at devices that students brought with them into the classroom and they extended the application of the Unified Theory of Acceptance and Use of Technology (UTAUT) model (Venkatesh, Morris, Davis, & Davis, 2003; Wang, Wu, & Wang, 2009), which tests students' attitudes towards m-learning and whether this had any bearing on their academic performance. Although Brand et al. (2011) identified a positive correlation between iPad use and academic performance, it is important to be wary of the Hawthorne effect according to which novel stimulus, in this case the loaned iPad, can generate better performance.

The 'Step Forward' Pilot Project in Melbourne, Australia (Jennings, Anderson, Dorset, & Mitchell, 2011), where staff and students at Trinity College Foundation Studies (TCFS) were issued with iPads to assess the "technology and pedagogy of iPad use and to recommend whether or not iPad adoption would be worthwhile in the wider TCFS program" (ibid p.1), is another example of iPads being used in a tertiary context. Data were collected, similar to Brand et al.'s (2011) study, from self-selected participants by means of surveys, meetings and 1:1 interviews. The resulting recommendation of this pilot was to go ahead with the usage across the wider programme in 2011 and 2012. The report identified an overwhelming endorsement of the use of iPads with 80.0% of students and 76.2% of staff recommending their use to other classmates and colleagues.

Jarvis and Achilleos (2013) investigated in their study how non-native speakers of English use mobile digital devices outside the classroom. Thirty-two participants were enrolled in foundation language courses prior to entering undergraduate or postgraduate studies in a British university and an additional 24 were already enrolled in their undergraduate or postgraduate courses. The study reported that participants utilised a range of devices to support language acquisition. All participants (100%) considered computer and other digital mobile devices as essential tools in their everyday life. Many referred to increasing their world knowledge, supplementing study and maintaining communicative networks. Jarvis and Achilleos (2013) proposed a shift towards mobile assisted language use as English language learners use a variety of mobile devices to access or communicate information on an anywhere/anytime basis in a variety of social and academic contexts.

2.5 Impact of mobile devices on pedagogical practices

As approaches to learning and teaching change, it is important for researchers to examine the impact these changes are having. Stephenson and Harold (2008) maintained that new technologies were enriching classroom instruction by making it more individualised, valid, economical, and accessible. This was further supported by Shewell (2008) who stated “technology truly plays an important role in education”. However, simply including technology into any curriculum merely for the sole sake of using technology is not effective. Studies must be conducted into how the technology is used to add value. Therefore, it is important to document how pedagogical practices are implemented so that mobile devices can be integrated in a way that leads to enhanced learning opportunities (Hockly, 2013; Kukulsha-Hulme, 2009).

The ubiquity of mobile devices is prompting teachers to decide the extent to which they wish to adopt these emergent technologies in formal education (Kukulsha-Hulme, 2009). There is no doubt that learners are using mobile devices to support

some aspects of their learning already (Godwin-Jones, 2011; Jarvis & Achilleos, 2013), for example accessing information on the internet, checking translations on smartphones, or utilising GPS to find their way around foreign locations. Agnes Kukulsha-Hulme (2009, p. 161) also states that "teachers' pedagogical expertise will continue to play an important role, but it needs to be re-examined and expanded to address the specific attributes of mobile learning."

From a practical perspective, students are developing an expectation that technology will be used where appropriate to help them gather knowledge and understand concepts whilst developing the necessary information and technology literacy skills for their specific subject domain (Contact North, 2015). This offers the potential to enable opportunities for collaborative learning, not just between peers, but also between teacher(s) and student(s) where collective efficacy can be fostered (Tilton & Hartnet, 2016). The opportunity for more collaborative classroom practices would allow for a more constructivist approach to pedagogical practices (Doolittle & Hicks, 2003; Falloon, 2015; Liaw & Huang, 2011). As education paradigms appear to be shifting to follow more collaborative models, a larger percentage of online learning and blended learning opportunities are being included (Dudeney & Hockly, 2012; Johnson et al., 2012). This places an emphasis on more challenge-based and active learning in the classroom alongside a blended learning approach that emphasises students learning outside of the traditional classroom space.

Results from a study assessing the impact of iPads (Heinrich, n.d.) were very positive and concluded that iPads were clearly valuable as educational tools, playing a valuable role in learning and teaching. This impact on learning and teaching was expected to ultimately be reflected in student achievement and attainment. Student motivation was also found to have been positively impacted in a study into the use of Facebook in a Vietnamese university (van Rensburg & La Thanh, 2017). The researchers reported that a heightened sense of community was created by teachers through the use of social networking via mobile devices. The ability to share

information fostered an openness to learning outside the confines of the traditional classroom setting, which indirectly enhanced learning outcomes.

Manuguerra and Petocz (2011) reported on the use of iPads to enhance engagement in statistics and biostatistics classes over a 15-month period with 'internal' lecture-based students and 'external' distance-based students. The study described more dynamic lecture presentations made possible by the ability to annotate PDFs and presentations during lectures for internal students and as part of self-study for external students. Information provided in the research paper did not explain the way in which the iPad was used other than as an annotating device. It did, however, attract an overwhelmingly positive response to the 'new lecture style' but it remains unclear as to whether this positivity stemmed from the iPad device or the lecturer's more engaging style. The findings that were attributed to iPads could also possibly be attributed to a well-structured online asynchronous course with a bank of online resources. One pertinent question this article raises is the extent to which faculty members can influence students' usage of this device.

Other researchers have investigated the affective domains of engagement and motivation. At Southern Polytechnic State University, Georgia, Khalid et al. (2013) substantiated that mobile devices were considered important for student engagement and learning following a survey of 88 faculty members and 1500 students. This positive effect on student engagement was also reiterated by a pilot study of secondary school students in which mobile devices were found to have a positive effect on student motivation, progress and engagement (Heinrich, n.d.). Madrazo (2011) examined the use of technology with 375 at-risk high school students who were given federally funded laptops. Whilst this auto-ethnographic research offered vivid descriptions of classroom observations and interviews, it is unclear how transferable these results would be for other demographic groupings given the contextual uniqueness. Exactly how these devices are being used continues to be under-documented.

The aforementioned researchers investigated pedagogical approaches to classroom teaching using mobile devices. A historical look, by Dudeney and Hockly (2012), at Information and Communication Technology in an English as a Foreign Language context showed that throughout these changes in approach the teacher's role has remained constant. A teacher's role is that of facilitating and guiding students in the language learning process, providing them with the best materials and approaches. However, the extent to which mobile devices have impacted on pedagogical practices in tertiary ELT classrooms was not investigated as part of their study. Therefore, this study makes a contribution towards developing a more in-depth understanding of how ELT practitioners are integrating innovative mobile technologies into their teaching methodologies and personal pedagogical stances. Indeed, an investigation into exactly how that is being done and how it could be done in similar contexts is one of the objectives of this study.

2.6 Challenges of using mobile devices in learning and teaching

Published research appears to highlight the strengths and successes of programmes delivered through mobile devices and platforms. Prior to beginning this study, very few articles focused on any challenges with the exception of two pilot studies (Culén & Gasparini, 2011) conducted in Norway. They conducted ethnographic studies on the early adoption of iPads in two different contexts: one, a tertiary geology class, and the other a fourth-grade elementary class. Culén and Gasparini (2011) identified four key challenges: organisational, physical space, academic and technological. Concluding comments indicated a non-acceptance of the mobile devices in the tertiary classroom, in contrast to the positive experiences in the elementary school where families, children and teachers believed the "iPad enhanced teaching, learning and play" (ibid, p. 207).

Furthermore, Jennings et al. (2011) noted that staff considered devices to potentially be a problematic distraction although they acknowledged that this was only one of

many potential distractions within the confines of a typical classroom that required refined classroom management skills by teachers. Nguyen et al. (2014) and Sheppard (2011) considered non-educative usage of iPads within the classroom to be a challenge for teachers to manage as well as having a detrimental effect on learning. Madrazo (2011) concurred by noting that the myriad of websites and applications could be more interesting to students than classroom content.

In addition to the key trends and important developments originating from the New Horizon Reports mentioned previously, the reports also investigate significant challenges that potentially impede the adoption of technology in higher education. The reports classify challenges into three categories: *solvable challenges*, which are challenges for which there is an understanding of how to solve them; *difficult challenges*, which are understood but solutions are elusive; *wicked challenges*, which are complex to define and even more difficult to address. The 2014 Horizon Report identified low digital fluency of teaching staff as a solvable challenge (Johnson, et al., 2014). This has been reiterated in the 2015, 2016 and 2017 reports but has been generalised into "improving digital literacy" (Johnson et al., 2015, p. 24; Johnson et al., 2016, p. 24; Adams Becker et al., 2017). This included preparing students for increased digital literacies that expand upon simply using technologies. An additional solvable challenge for the same timeframe was blending formal and informal learning in the 2015 and 2016 reports (Johnson et al., 2015; Johnson et al., 2016), which transformed into integrating formal and informal learning in the 2017 report (Adams Becker et al., 2017). The concept of lifelong learning, and the role that mobile devices can play in the integration of formal, informal and lifelong learning, was also included.

Further to the development of digital literacies, the age of the students within the context of this study may be significant according to some of the literature. There is a growing body of literature that claims some students will have inherent abilities to use technology because their generation has been exposed to ever-increasing, ubiquitous access to digital technologies. Many students involved in pre-degree

studies are typically of an age that would indicate that they were considered digital natives, net-generation or millennials (Kennedy et al., 2009; Prensky, 2001). According to Prensky (2010), who first coined the terms “digital natives” and “digital immigrants”, age is a defining aspect that determines how able we will be when it comes to ability to navigate the digital world. However, it is important to consider Kennedy et al.’s (2009) findings:

> In summary, the findings from the published empirical research into Net Generation or digital native students show that, while their access to and use of computers and some ICTs may be high, this does not necessarily mean they want to use these technologies constantly and in all the contexts of their lives. It appears, therefore, that there could well be a mismatch between what Net Generation commentators and university staff expect from students – in terms of their digital literacy and preferences for technology use – and students’ own capabilities and preferences (p. 10).

Therefore, it is not appropriate to make assumptions about how students are using their mobile devices within the academic context. The findings from this research provide examples of some ways in which mobile devices are impacting teaching and learning activities and affecting students, specifically in a tertiary preparation context.

Sims and Butson (2014) found in their study into students’ use of computers to support learning that students were not as digitally literate, when it comes to academic purposes, as the researchers assumed they would have been. Their research involved capturing computer activity and home-based study practices of students who self-identified as skilled computer users. An assumption was made that the students would exhibit high levels of digital orientated behaviours. However, the data showed students preferred print materials and the use of more traditional study techniques such as highlighting and storing materials in ring binders. Sims and Butson (2014) reported being unsure as to whether this preference for traditional study methods, as opposed to digitally supported study techniques, was a result of a lack

of knowledge about digital tools to do these tasks or an active preference for traditional study techniques.

Integrating mobile devices into curricula has not been easy. This has been acknowledged in the 2017 New Horizon Report, which identified the rethinking of the roles of educators as a *wicked challenge* (Adams Becker et al., 2017). It is therefore my intention to look at this area in more depth to be able to give a clear representation of some of the challenges that faculty members face when introducing innovative technologies and the challenges they may face adapting their personal pedagogical stances.

2.7 Gaps in the literature

As has been identified in this chapter, there is a lack of sustained research into the use of mobile devices within the pre-degree, tertiary context. Published studies claim that research into mobile devices in academic contexts is still in an embryonic stage; thus this research adds to the current body of literature. The extent to which mobile devices are integrated into pre-degree classes and courses has not been examined.

In 2012, the New Media Consortium (NMC) Horizon Report, Higher Education, mentioned mobile apps and tablet computing (Johnson, et al., 2012). However, between 2012 and 2017, Horizon Reports had a noticeable lack of references to mobile devices and mobile learning. Mobile learning returned in the 2017 report in the category of important developments in educational technology for higher education. In addition, the NMC Horizon Reports from 2015 to 2017 (Johnson et al., 2015; Johnson et al., 2016; Adams Becker et al., 2017) identified blended learning as one of the key trends accelerating technology adoption in higher education. This research aims to contribute to the body of research in both these areas.

This research also intends to contribute further to our understanding of how teachers are implementing new pedagogical approaches to learning and teaching activities. Teachers' pedagogical expertise needs to be examined and expanded as they play a significant role in supporting students. This research will also highlight potential areas of professional development that may need addressing.

With the ever-changing landscape within education, the role of educators is also changing. The latest NMC Horizon Report (Adams Becker et al., 2017, p.34) classified the need to rethink the role of educators as a wicked challenge, one that is "complex to even define, much less address", which thus contributes to significant challenges impeding technology adoption in higher education.

2.8 Chapter summary

Despite the ubiquitous prevalence of mobile devices in day-to-day life, the area of research into how these devices are used within the context of face-to-face and blended tertiary classrooms is underrepresented. Research conducted over the past two decades has tended to focus on a particular brand of mobile devices. An example of this can be found in the growing number of studies with an explicit focus on the Apple mobile computing ecology, which includes devices such as iPods and iPads. This could be attributed to familiarity of brand, costs or ease of access to the products, or indeed from Apple's commitment to education programmes. This therefore illustrates a need for research into, the whole area of mobile device usage in higher education, rather than just a focus on specific devices.

Literature reviewed in this chapter underpins a number of influential issues and approaches that subsequently influenced the direction of the study documented in this thesis. My interest in, what I had witnessed to be, a ubiquitously pervasive adoption of mobile devices in all of the academic contexts I had been exposed to whet my appetite as a researcher. Furthermore, there appeared to be a dearth of

literature in terms of the appropriate integration of these devices with respect to content knowledge and pedagogical considerations. What was also apparent from the literature was the lack of research into the area of FACE (including those for whom English is an additional language) with regard to the use of mobile devices to support learning and teaching. This study is situated within this context, from which the research questions also arose. The next chapter outlines the methodological approach taken.

Chapter 3: Methodology

The previous chapter outlined the literature that has informed this study. It reviewed literature that was consulted prior to starting the research process and has informed the direction and design of the study. In this chapter, the methodology that has been adopted to complete this study is explored.

3.1 Background

At the site of the research, four university preparation programmes are offered. One programme is dedicated to the preparation of students for postgraduate study and the other three programmes prepare students for undergraduate study. This study was conducted with students and teachers involved in the three pre-degree certificate programmes. Each programme is designed to enable students to gain admission to degree level programmes. Table 3.1 provides a synopsis of the three pre-degree programmes.

	Programme 1	**Programme 2**	**Programme 3**
Duration	12 weeks	16 weeks	24 weeks
Contact hours per week	17 hours	24 hours	17 hours
Programme structure	2 compulsory core courses (each the equivalent of 150 hours study) covering study skills and academic language preparation. 2 elective courses (each the equivalent of 150 hours study) based on future study direction (for example, math, management, physical sciences).	4 compulsory courses. Two courses aimed at Academic reading and writing and two courses aimed at developing academic language, grammar, listening, speaking skills.	2 compulsory core courses. One 45 credit course (the equivalent of 450 hours study) addressed academic language and skills preparation and the other (equivalent of 150 hours) covered study skills. 4 elective courses (each the equivalent of 150 hours study) based on future study direction (for

	Programme 1	Programme 2	Programme 3
			example, math, management, physical sciences).
Eligibility	Completed Year 13 at a New Zealand secondary school, or equivalent; and have met the literacy and numeracy standards required for University Entrance, or equivalent; and achieved at least 14 credits in at least one approved subject at NCEA Level 3 or above, or equivalent; and have achieved at least 10 credits in at least two other approved subjects at NCEA Level 3 or above, or equivalent. International students require an English language proficiency of IELTS 6.0 overall with a minimum of 5.0 in each band, or a 'B' average in the Direct Entry English Pathway (DEEP) qualification.	Academic admission to their next programme of study; and a minimum 5.0 IELTS in each band or equivalent.	Completed the equivalent of Year 12, NCEA Level 2; and have a minimum IELTS score of 5.5 overall with a minimum of 5.0 in each band or equivalent.
'Good fit' profile	Have completed NCEA Level 3 but narrowly missed gaining University admission. Is over 20 (including those who have had	Have a relevant university entrance qualification but do not meet the English language or literacy admission	Have completed a qualification which is equivalent academically to New Zealand's NCEA Level 2.

	Programme 1	Programme 2	Programme 3
	a gap in education) and keen to develop academic study skills before starting university. Have achieved a 6.0 IELTS (no band less than 5.0) and need additional academic credits for entry to university.	requirements for degree study.	Have achieved 14 literacy credits at NCEA level 1 or higher. Have achieved a 5.5 IELTS (no band less than 5.0) and need additional academic credits for admission to university.

Table 3.1: Foundation and Continuing Education programmes in this study

All courses aim to provide academic and study skills in preparation for entering English medium university programmes. Therefore, all classes are taught in English using a blended learning approach. Students attend between 17 – 24 hours a week of on campus, face-to-face classes and classroom material is accessible through the university's Learning Management System (LMS). To enable continual access, all students enrolled in these programmes have access to free wifi whilst on campus.

All pre-degree programmes are open to both international and domestic enrolments, however, programme two (as outlined in table 3.1) tends to attract predominantly international enrolments, whereas programmes one and three, have a mixture of both domestic and international students. The courses in programme two are designed to support academic literacies and have a focus on developing English proficiency within the context of academic study. The four compulsory courses scaffold students towards acquiring the relevant language skills to enable them to continue onto degree level studies in English-medium universities. These courses focus on English as an additional language (EAL) and are designed for non-native English language speakers. In contrast, the courses in programmes one and three include EAL students as well as students who are native English language speakers. The core courses in programmes one and three are designed to develop academic literacy and study skills alongside a selection of elective courses that are discipline

specific. Elective courses align with courses offered at degree level study and provide pre-degree level content that will staircase students into first-year, university studies in that subject. Students elect courses based on their future degree-level study. Student participants in this study were recruited from programmes one and three only.

Within this context, this study adopts an epistemology that requires a pragmatic, synthesized combination of methods to comprehend and explore the multi-facets of the phenomena of mobile devices in university preparation courses. The epistemology, or the theory of how we investigate knowledge, how know what constitutes valid knowledge and the nature of knowledge (Cohen, Manion, & Morrison, 2007), of this study has been significantly influenced by my epistemological stance as the researcher, which is strongly grounded in constructivism where individuals construct truth and meaning. This allows for multifaceted accounts of the world (Gray, 2018). At the outset of the study, and situated within this epistemological construct, allowing for complexity and contextually diverse interpretations of experiences, two methodological approaches were considered: phenomenology and phenomenography.

Phenomenology contributes to the understanding of dynamic and complex 21st century contexts (Dall'Alba, 2009) by investigating individual experiences. It is a first order perspective that has a role in seeking "to understand the world from the participant's point of view" (Gray, 2009, p. 171) by describing phenomena as they are. Phenomenography seeks to describe phenomena as they have been *understood* and focuses more on collective experiences (Ornek, 2008; Svensson, 1997).

For the purpose of this particular study, it was important to consider the context in which the study was conducted. For example, the university preparation course itself only has meaning when considered in relation to students' experiences of the course. Thus, it was decided that phenomenography was the appropriate paradigm for this

study as it allows for a number of qualitatively different ways of perceiving the use of mobile devices within a pre-graduate course (Souleles, Savva, Watters, Annesley, & Bull, 2014). These multiple perceptions, in addition to the importance placed on the specific context within which the phenomena are experienced, are congruent with the epistemology of this study (Wiersma & Jurs, 2005). A case study approach was adopted as it enabled the investigation of the potentially complex interactions between human relationships, events and how these are perceived or experienced within the context of pre-degree, university preparation courses.

This phenomenographic study is informed by an epistemological, constructivist stance and incorporates the theoretical perspective of interpretivism. A research framework that is compatible with these underpinnings was implemented to support the collection of data throughout the project. Although several frameworks were explored, the research framework that has been adapted for this study is based on Engeström's (1999) Activity Theory. The rationale for this choice is explored in the subsequent subsections of this chapter.

3.1.1 Use of Activity Theory as framework

Activity Theory has been acknowledged as a conceptual approach that can provide a comprehensive framework for "describing the structure, development and context of computer-supported activities" (Kaptelinin & Nardi, 2000, p. vi). Activity Theory has its origins in Soviet cultural psychology with Soviet thinkers such as Vygotsky and Leontyev (Blunden, 2010). In the 1980s, Engeström expanded Activity Theory to include nested triangles where an individual's relationship with their natural environment was mediated or influenced by their social environment and community interactions. According to Engeström's Activity Theory (Engeström et al., 1999), there are seven distinct concepts that form an activity. These concepts include the social context within which actions and activities are represented. Engeström's Activity Theory has been used as an analytic framework that helps practitioners and

researchers understand a subject's (learner) actions on objects (learning materials or learning objectives) mediated through artifacts or tools (such as mobile devices). This interaction takes place in relation to the external (to the learner) community, which is moderated by a set of rules (guidelines or regulations as set by the teacher, course or institute), and distributed by a division of labor (Liaw & Huang, 2011; Park, 2011).

The implementation of Activity Theory in a number of studies has influenced the choice of it as a theory for this particular research project. Doolittle and Hicks (2003) investigated cognitive, social and radical constructivism as a theoretical framework for the use of technology in social studies classes where they identified six principles and subsequent strategies for pedagogical implementation. The authors contended that merely replacing non-technology-based strategies with technology-based strategies would not necessarily improve learning but that a considered integration of technology, aligned with a philosophically, theoretically and pedagogically based constructivist approach, was vital to improve the learning experience. Liaw and Huang (2011) explored the use of Activity Theory to create an m-Learning theory within the context of distance learning. According to Liaw and Huang (2011, p. 145), "m-learning is a relatively new tool in the pedagogical arsenal to support students and teachers as they navigate the options available in the expanding world of distance learning. M-learning is the learning accomplished with the use of small, portable computing devices." Park (2011) also examined mobile learning in the context of distance learning where the mobile device can be seen to mediate communication between teacher and learner. Park's (2011) study used Transactional Distance Theory as a framework. Transactional Distance Theory was used as a framework for understanding the relations of key variables (structure, dialogue, and autonomy) in the context of distance learning and is a framework derived from Activity Theory. Gedera (2014) examined the application of Activity Theory to understand mediational factors that affect student engagement in e-learning in the context of post graduate studies (Gedera, 2014). The researcher used three case studies, each of which used virtual online classrooms and a Learning Management System (LMS) for both synchronous and asynchronous activities, in order to identify

learning activities and examine how different elements within and between the activity systems affected and influenced each other. These studies in particular have influenced the decision to adopt Activity Theory as the research framework as they have three strands that are particularly salient to this study: m-Learning, student engagement, and pedagogical implications.

Therefore, the implementation of Activity Theory as a framework for this research was considered useful for appropriately capturing participants' (students' and teachers') views of their experiences of learning and teaching with technology. The alignment of Activity Theory, based on socio-cultural and socio-historical theories, with my belief as a researcher of knowledge creation and interpretation has allowed for the analysis of both social and individual perspectives of the interaction between mobile devices, students and their learning objectives. This interaction between student and device depicts students as active learners, which is congruent with a constructivist paradigm (Liaw & Huang, 2011; Gedera, 2014). This research offers opportunities to continue to expand on the application of this theory by looking at the context of pre-degree tertiary preparation.

3.1.2 Individual components of Activity Theory

This study applied Activity Theory to investigate participants' (subjects') views of experiences (objects) using mobile devices (as instruments) within a course (community), governed by rules, roles and responsibilities (divisions of labour). The components used in this study have been depicted in figure 3.1 alongside Engeström's original terms.

Throughout the literature, there are a variety of terms that have been used to refer to the seven concepts introduced in Engeström's original Activity Theory diagram. A synopsis of some terms used in research that applies Activity Theory are outlined in

table 3.2. The terms used in such studies have been listed alongside existent terms used to clarify how they are used in this study and thesis.

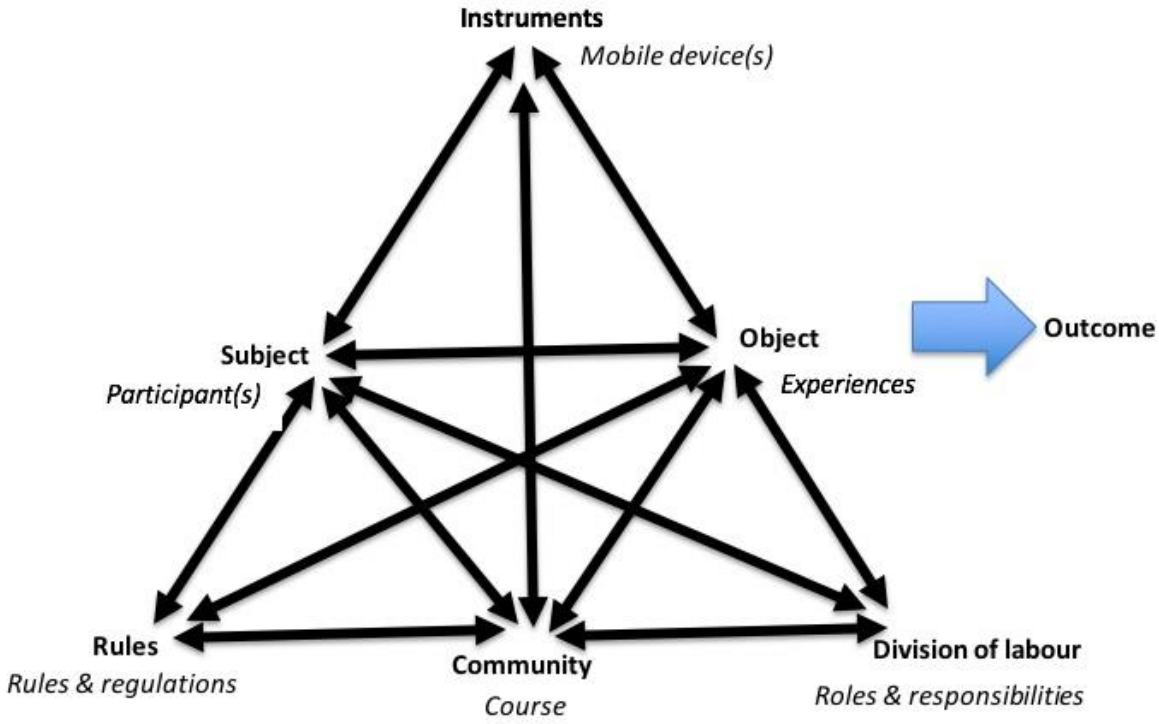


Figure 3.1: Components of Activity Theory in the present study

Engeström's terms (1987)	**Terms used in the literature**	**To be used in this study**
Instruments Mediating artifacts	Tool(s), tangible object	Mobile device(s)
Subject	Learners, Participant, Provider, Creator	Participant(s)
Object	Object, Objective, Receiver	Experiences
Outcome	Outcome, User success	Outcome
Rules	Laws, Constraints, Traditions, Control of learning (learner autonomy)	Rules and regulations
Community	Community, Networks, Context of learning	Course / Peer network
Division of Labour	Roles, Tasks, Responsibilities, Communication of learning,	Roles and responsibilities

Table 3.2: Terms used in this thesis

As outlined in the previous section, Activity Theory has been used to identify connections between the components within a potentially complex system. Upon reflection of Engeström's Activity Theory, it was considered that components of the Activity Theory could be teased out further to enhance understanding of the use of mobile devices in this particular context. Therefore, based on professional, lived knowledge, and experiences in the area of Foundation and Continuing Education, a modification to Activity Theory was deemed necessary. The amended Activity Theory (depicted in figure 3.2) acknowledges the different aspects of explicit/implicit knowledge as well as formal/informal and voiced/unvoiced levels of complexity inherent in human nature. This modified Activity Theory guided the collection of data and was used during data analysis. Hence, for the purpose of this research project, the following framework was subsequently adopted where Activity Theory sits on a base of informal, implicit or unvoiced principles that support the structure:

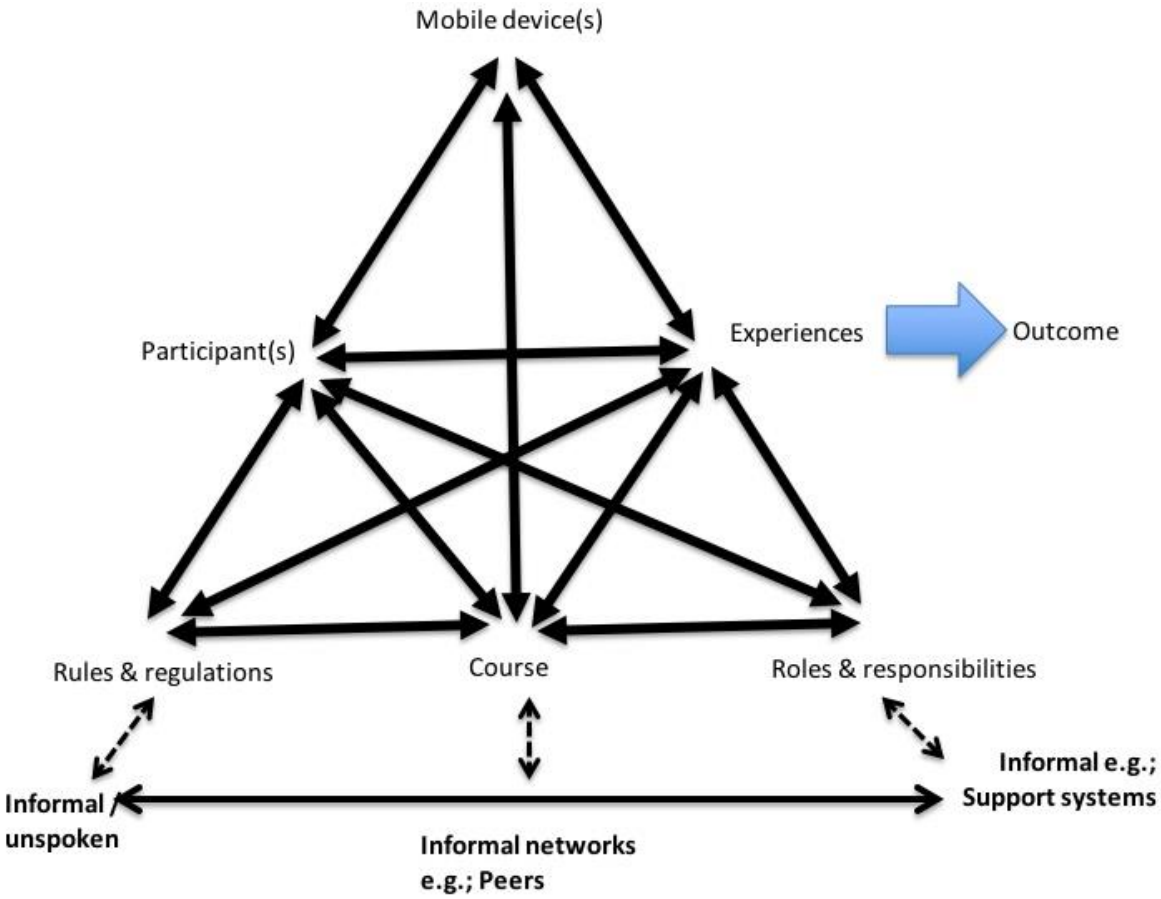


Figure 3.2: Amended Activity Theory

The context of this study is that of a higher education setting where some aspects may not be as explicit as they might be if we were investigating a K-12 setting. For instance, within this context, aspects of rules, regulations, community engagement and divisions of labour were possibly less explicit than they may have been. For example, in many classrooms there were permanent signs forbidding the use of mobile devices in classes (see figure 3.3). This was an explicit rule; however, all courses were designed and delivered using blended pedagogy. The rule was subsequently changed to 'inappropriate use of mobile devices within the classroom is not allowed', rather than the device itself not being allowed. Exploring informal networks was considered important for determining the extent and the ways in which technology was used for educational purposes. For example, in what ways, if any, were students helping and supporting one another?

Figure 3.3: Example of signs in teaching spaces at time of study

3.2 Research process and sampling procedures

Upon full ethics approval and prior to the collection of data reported in this thesis, a pilot study was conducted to test the research instruments and sampling procedures. The pilot study enabled consideration and analysis of the intended process in order to anticipate any potential pitfalls or limitations prior to commencing the data collection phase. Prior to collecting the data described in this thesis, the student survey was piloted with students enrolled in the same programmes over the summer semester preceding data collection. Students were informed that the surveys would

form part of a research project and were asked to complete the survey during class. Students were encouraged to ask for clarification if any question was unclear or potentially ambiguous. Based on feedback from these students, minor changes were made to the survey (as outlined in table 3.3) prior to dissemination to the participant pool.

Instrument	Original questions	Amended questions	Reason for amendment
Inventory	Recognition of peer email and chat.	Online discussion groups.	Students were confused as to what constituted 'chat'. Online discussion groups were used as part of the curriculum so they were used as an alternative.
	Online self-assessed quizzes.	Multimedia assignments and tests to complete online. Compulsory interactive online assignments.	'Self-assessed quizzes' was a term deemed ambiguous during the pilot study. Most students asked for clarification of this term. In the programmes, there is a differentiation between compulsory and non-compulsory assignments. The amended questions were intended to address this differentiation.
Survey	Are you: Male? Female?	Are you: Male? Female? Prefer not to say.	During the pilot study, some students did not answer the original question. It was unclear as to whether students actively chose not to answer, were gender diverse, or did not want to respond to this question. Therefore, an

Instrument	Original questions	Amended questions	Reason for amendment
			option to opt-out was included.
	1st language?	What is your first language (which language are you most fluent in)?	Some students commented on confusion between 'mother tongue', the language spoken in their home and/or the first language they learnt to speak as children. Some students commented that their fluency in languages learnt after childhood superseded their first language. The aim of this question was to understand which language students were most reliant on.
	n/a	When you access course materials (for example, readings, questionnaires, quizzes, etc.) do you prefer to access a digital copy (on your mobile device) or do you prefer a printed copy on paper?	The option to complete the pilot study survey online or on paper was offered to students. During the pilot study, all students requested paper versions of the survey. As most course materials were available online, the question or student preference for digital or printed resources was a growing area of interest and discussion amongst teachers involved in these programmes. Thus a question to address this was added to the student survey.

Table 3.3: Amended questions as a result of the pilot study

By piloting this instrument in class, it was possible to identify potential issues and to have a clear idea of how long students would take to respond to the questions. As a result of the pilot study, appropriate changes were made to the instruments and procedures used to collect the data. The refined procedures are outlined in the subsequent section.

3.2.1 Participants

In accordance with phenomenographic research design, participants were selected through purposive sampling (Caliskan, 2014). All students who were enrolled in a university preparation certificate course at the site of the research were invited to participate. The procedure used for each respondent group is outlined in the following sections. For each of the two recruitment phases of the research, the method for recruiting participants varied depending on the instrument or task. Survey participants were recruited via online forum postings to closed groups available only to students enrolled in the course (see appendix A). Student discussion group participants were invited, by an academic staff member not involved in the research, to volunteer to participate. Discussion group participants were also encouraged to invite other participants to join the research project allowing for elements of snowball sampling (Somekh & Lewin, 2005).

Participants in this study came from multilingual, multiethnic, and multicultural backgrounds (refer to sections 3.2.1 and 4.1). To be eligible to enroll in the courses for students who spoke languages other than English, there was a minimum requirement of an International English Language Testing System (IELTS) level of 5.0 with no band below 5.0. According to the IELTS website, a score of 5.0 indicates a moderate user who “has a partial command of the language and copes with overall meaning in most situations, although they are likely to make many mistakes. They should be able to handle basic communication in their own field” (IELTS, 2017, p. 1). Although the cohort was linguistically diverse (see figures 4.1.4 and 4.1.5), all

students were enrolled in courses that were taught in English so all data collection instruments were collected in English. Students could have responded to some question types, for example open ended questions, in their native language but no students did.

3.2.1.1 Teacher Survey Respondents

Fifteen invitations to participate in the research were sent out to teachers who were involved in the teaching of university preparation courses at the site of study. The invitation consisted of an email to explain the purpose of the study and a hyperlink to the online survey. The survey was constructed using Google forms. Participation was entirely voluntary and the participants' responses were anonymous. Twelve academic staff members responded to the survey entitled *The Effects of Mobile Devices on Learning and Teaching* (see appendix B).

3.2.1.2 Student Survey Respondents

In week 4 of the semester, a forum post (see appendix A) inviting participation in the research was sent to 153 students enrolled in the pre-degree, university preparation programmes at the study site to which 144 students responded. The invitation included participation in a survey entitled *The Effects of Mobile Devices on Student Learning* (see appendix C). Students were also invited to complete the *Inventory of Online Learning Strategies* (see appendix D) and the *Use of Technology* (see appendix E) survey. Forty students completed the inventory and 68 students completed the *Use of Technology* survey.

Student participants came from a variety of linguistic and cultural backgrounds, including a number of students for whom English was their second or third language. Demographic information collected is explored in section 4.1.2 and discussed in section 5.1.2.

Respondents to the surveys were anonymous, responses were numbered using the range 1-144. These codes have been used in reporting student responses in the survey. However, in the case of the student discussions, where the respondents were known to the researcher and the other discussion participants, pseudonyms have been used. This is further expanded upon in the next section.

3.2.2.3 Student Discussion Group Participants

Sixty-two students who were enrolled in a Foundation Certificate at the site of the study were invited to participate in group, or individual, discussions. These students were also part of the participant pool recruited to respond to the surveys as described in section 3.2.1.2. Classroom teachers were asked to distribute Information Sheets and Consent Forms (see appendix F) for the Student Discussion Groups. Students were asked to return the consent form to their classroom teacher who would then return it to me, as the researcher. In adherence with ethical approval, students were under no obligation to participate in the research project. If a student had any questions about the research or required any additional information or clarification, they were directed to come and talk to me personally.

Fourteen students indicated an interest in participating. To set up times for the discussion groups, students were offered the option of five different time slots to allow for minimum impact on their classes and out-of-class obligations. Students did not have to register which time slot they preferred and no further solicitation was sought. Of those who indicated an intention to participate, nine attended the discussions. Demographic information pertaining to the nine students is explored in section 4.5.1.

3.2.2 Data collection procedures

When considering data collection, I considered the range of ethnicities and cultures that were likely to be involved in the study. In previous enrolments, there were a number of cultures that have strong oral traditions. Therefore, it was decided it would be culturally appropriate to have an opportunity to collect data orally. As such, qualitative data collected was both written and oral in order to allow a variety of themes to be explored. Data collection consisted of the implementation of several instruments: teacher survey, student survey, inventory of online learning strategies, student discussion groups, and observations. The procedures involved for each of these instruments is outlined in the following sections.

A summary of which instruments were used to explore each research question is outlined in table 3.4. The following subsections describe data collection procedures implemented for each instrument starting with the teacher survey, and followed by the student survey, inventory, and student discussion groups.

Research questions (RQ)	Teacher survey	Student survey	Inventory	Student Discussions	Observations and Analytics
RQ1 Usage	✓	✓		✓	✓
RQ2 Influential factors	✓	✓		✓	
RQ3 Value	✓	✓	✓	✓	
RQ4 Challenges	✓	✓		✓	✓

Table 3.4: Data collection methods used

3.2.2.1 Teacher Survey

An email was circulated to all teachers who were teaching into the university preparation courses at the time of the study, inviting them to participate in a survey that examined the perceived effects of mobile devices on learning and teaching (see appendix G). As the teacher participants were employed in the same institute as me (the researcher), it was decided that paper versions of the survey would not be

appropriate as participants could feel that anonymity may not have been upheld if they were to respond in potentially identifiable hand-writing. Therefore, an email was sent containing an invitation to participate and a link to the online survey.

It was anticipated that the surveys would take no longer than 20 minutes to complete. No preparation was required prior to responding to the survey but it did require some reflection on current practices so the time frame given for survey completion was intended to allow for this self-reflection.

The questions in the teacher survey mirrored those asked in the student survey. The first questions were designed to collect demographic information with the second set of questions designed to collect qualitative responses to experiences. Research conducted by Churchill, Fox and King (2012) indicated, that teacher's private theories about the value of technology can impede or facilitate the effective use of these technologies in the classroom. Therefore, it was important to investigate teachers' self-reported comfort level and regularity of use of technology in the classroom. Thus, two additional questions were asked to explore this aspect at the end of the demographic section.

This survey was completed using Google Forms so it was possible to export all responses to a spreadsheet. All survey responses were subsequently uploaded to NVivo to enable the coding and classification process. Iterative analysis as discussed by Boeijie (2010) was applied as responses were read and re-read to identify themes that were classified into nodes.

3.2.2.2 Student Survey

Students were invited to participate through an online forum posting that had a link to the online surveys (see appendix A). One survey was entitled *The Effects of Mobile*

Devices on Student Learning (see appendix C) and the other *The Use of Technology* (see appendix E). As outlined earlier in this chapter, and prior to the data collection discussed in this study, the surveys were piloted with a similar cohort of students to identify potential issues with the questions asked and to adjust the suggested timing of the survey.

An online forum post through the LMS used in the pre-degree courses was used to introduce the research to the students. The post explained how to access the research instruments. Teachers were asked to distribute an Information Sheet to students and to mention the forum post in class. They were asked to explain that participation was voluntary, anonymous and grades would not be affected. Teachers were not asked to explain the research. In the case of students having questions, teachers were asked to refer the students to me as the researcher. At this time, as an alternative, teachers also offered students the option to complete the survey on paper. No students took this option and all responses were gathered online.

Survey responses were collected online using Google Forms and students were encouraged to complete the survey in their own time, out of class. The purpose of asking students to complete surveys out of class was to minimise any referential bias that might exist if a student were to think their teacher could see their response. Also, the data collection was not part of the curriculum so I did not consider it appropriate for class time to be used to complete the data collection. The completion of the survey was anticipated to take less than 20 minutes.

The use of Google Forms to collect data meant all responses could be collated and exported on a spreadsheet to enable analysis. Each individual's response was recorded on a separate row. Responses were labelled as received from the first response (S1 = student 1) through to the last response (S144 = student 144). Responses to the closed-end questions included in the survey were tallied to identify the number of responses for each option. Where students were asked open-ended

questions that investigated perceptions and attitudes towards the role of mobile devices in academic contexts, iterative analysis was applied (Boeije, 2010). All responses were uploaded to NVivo to facilitate the analysis.

3.2.2.3 Inventory of online learning strategies

In order to ascertain students' use of online learning strategies, it was important to identify the perceived value of online learning strategies. By using the inventory of online strategies utilised in McSporran's (2004) study, which in turn had emulated research conducted on American Social Work students by Frey et al. (2003), this study has expanded the application of this inventory. McSporran (2004) investigated the perceived value of 18 online learning strategies by New Zealand students studying in a Masters of Computing programme at Unitec, a public tertiary education provider in New Zealand. Frey et al. (2003) investigated graduate students enrolled in a Social Work programme in the USA, while the New Zealand study investigated postgraduate students. The intention in using this instrument was to replicate these studies in order to identify if students enrolled in a pre-university level would have the same perceptions about online learning strategies as those in degree and post-degree courses. Moreover, it was of interest to see if those perceptions change over the academic trajectory.

Students rated web-assisted strategies on a scale from one (no value at all) to seven (very valuable). As with the original studies, some of the phrasing used in the prompts was changed to reflect local usage. In Frey et al.'s (2003) study the phrase *syllabus* was used whereas McSporran (2004) used *course prescription.* In the institute where the current study was conducted the phrase *course outline* was used so this was transferred to the inventory. The same principle was applied to the naming of the local LMS: this study uses *Stream* to refer to its LMS in contrast to *Blackboard* (used by McSporran, 2004) and *Web* (Frey et al., 2003).

In the case of Frey et al.'s (2003) study, it is important to note that all numbers are consecutive and rank from one to 18. McSporran's (2004) research, however, ranked strategies from one to 19, but excluded 18 without any obvious reason. In the current study, 17 of the original items were used and the item that referred to the value of "online self-assessed quizzes" was expanded (see appendix iv for inventory used) to differentiate between the value placed on multimedia assignments and compulsory interactive assignments. Multimedia refers to "the ability to combine text, graphics/visuals, audio and video altogether in the same instructional program, application or Web site" (Chun et al., 2016, p. 72). Students were asked to rank the perceived value of "multimedia assignments and test to complete online" (voluntary completion) and "compulsory interactive online assignments" (compulsory completion). Access and use of online self-assessed quizzes has increased since the previous studies, therefore, the need to differentiate between this dichotomy was deemed necessary. In the original studies, the respondents were not asked to differentiate. The strategy regarding recognition for peer email and chat was removed from this iteration of the inventory as it was felt that "chat" was not a self-explanatory term. Nowadays, "chat" can be interpreted to include many different forums, including but not limited to texting, SMSing, messaging, tweeting, posting, and snapchatting, to name but a few. Therefore, the term "chat" was deemed too ambiguous for the current context and was not included in the inventory.

3.2.2.4 Student discussion groups

In week 10 of the semester, classroom teachers were asked to invite students to participate in the discussion groups or individual interviews. The students were the same as those who had been invited to complete the survey and inventory. Information Sheets and Consent Forms were distributed during class. As the researcher, I felt it would not have been appropriate to personally approach students to participate in this part of the research process. I did not want students to feel obligated to participate and any participation was completely voluntary. Having classroom teachers, who were not involved in the research, approach the students

ensured no coercion occurred and the staff members were fully appraised of, and compliant with, ethical considerations inherent in human research. The rationale for utilizing both techniques, group and individual interviews, is that some students may have been more comfortable sharing their opinions in a more collaborative environment whereas others may have preferred a more individualised approach.

The discussion groups were semi-structured with questions to explore student perceptions, beliefs and rationales for practices regarding their use of mobile devices (see appendix H). The questions allowed exploration in more depth than was possible with the surveys. Questions were provided to the students prior to the discussion and were designed to provoke opportunities for sharing of experiences and reflection. The discussions were audio-recorded, using a software application called Voice Record Pro. The use of this recording was to enable the researcher to fully participate in the discussion allowing for later analysis of the transcript (Gray, 2009; Somekh & Lewin, 2005; Wiersma & Jurs, 2005). Large flip charts and pens were made available to participants in case they preferred to write notes or draw a response during the discussions. No students chose this option.

3.2.2.6 Observations and analytics

Classroom observations and course documentation were also considered as a method of data collection. In-class observations of mobile device usage were conducted by the researcher as part of piloting the instruments to be used in this study. The observations were overt (Gray, 2009) but unobtrusive and constituted part of normal classroom interactions. As I was not teaching these courses, I conducted unstructured observations as a non-participant observer (Gray, 2018). The focus of the observation was on the quantity of devices used by individual students and was intended to encapsulate the purpose for each use.

In order to identify any on-task activity, analytics of the use of the LMS were obtained. The LMS had a function that enabled teachers or administrators of the course to download activity logs. Through this data, it was possible to identify which tasks were accessed online and the length of time that each student spent on a task. However, if a student started a task and then changed to another activity without closing the window, it was not possible to accurately record how long they were actively engaged with an activity. The analytics were only able to represent which learning activities were accessed but did not yield any viable data with regard to how relevant or useful the activities were for active student engagement.

3.2.3 Data analysis

A thematic approach to the data analysis process was employed in accordance with Braun and Clarke's (2006) six phases of thematic analysis: getting acquainted with the data; generative initial codes, finding themes, reviewing themes, defining and naming themes, producing the report. Through the coding process of iterative analysis, responses were read and re-read multiple times during the coding process, making it possible to "provide focus to the process of analyzing qualitative data" (Vaughn & Turner, 2016, p. 50). To facilitate this coding process, *NVivo* software was used to group codes into categories using an inductive approach resulting in identifiable themes.

Survey results from the teacher survey, *The Effects of Mobile Devices on Learning and Teaching*, and the student survey, *The Effects of Mobile Devices on Student Learning,* were collected using Google forms which allowed for the collated export of results in the form of an Excel spreadsheet. The spreadsheet was then imported into *NVivo. NVivo* was chosen to facilitate and support the analysis of qualitative data. It allowed for responses to be coded using multiple categories that could be created as necessary. This allowed for a flexible approach where codes could emerge from the data without using predetermined codes or categories. As more data was collected

it could be analysed using the codes identified earlier in the process in addition to being able to create new ones as they presented themselves.

Each response was read to identify key concepts. In the case of spreadsheet data, each row could be automatically coded to a ‘case’. In the case of the transcripts from the student discussion groups each participant’s contribution was coded to a case manually. This enabled all responses from each case to be looked at individually and offered the possibility of a comparison between ‘cases’.

Each concept or theme presented could be coded to a ‘node’. For example, figure 3.3 depicts a transcript from a student discussion group. Student F said “I will look at my handouts and write notes on the sheet”. This utterance has been coded against the student F case and the study support node as well as the notetaking node, as depicted in the coding stripes at the side of the image.

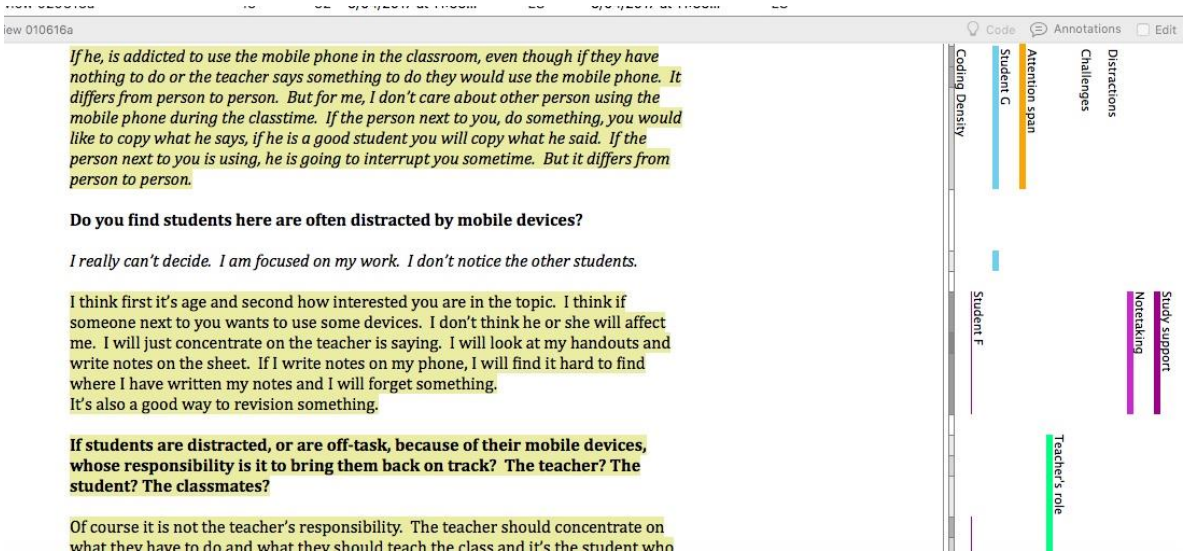


Figure 3.4: Simultaneous coding to cases and nodes

The same process was applied to data collected from the survey, as illustrated in figure 3.4 where “use of online dictionaries from translation, collocation, definitions and synonyms” have been coded as vocabulary.

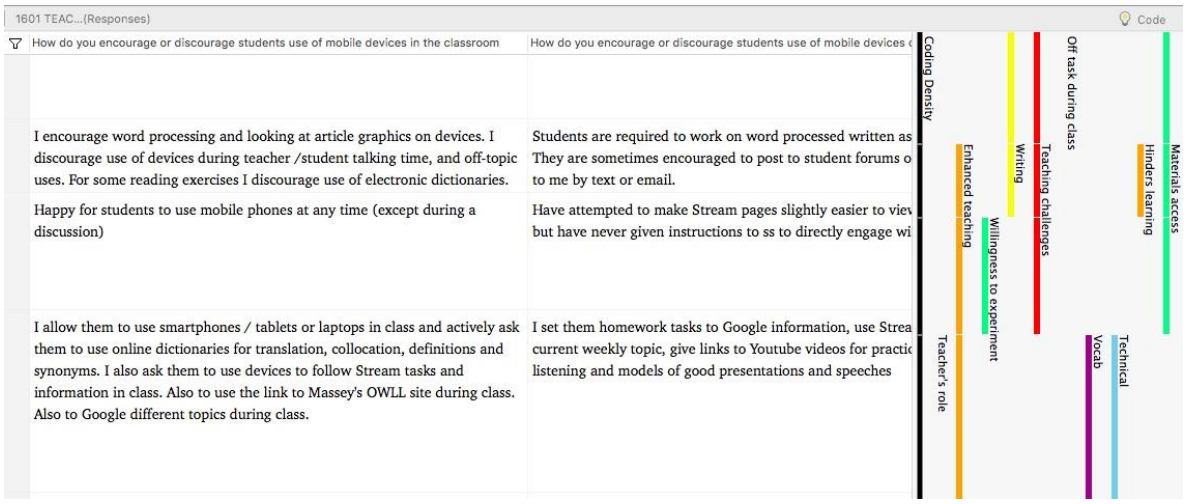


Figure 3.5: Coding of student survey to multiple nodes (for example vocabulary)

All items coded at a node could then be explored further. By way of example, the mention of vocabulary in the teacher survey could be investigated by looking at all coded references to vocabulary either out of context, as in figure 3.5, or in context in figure 3.6.

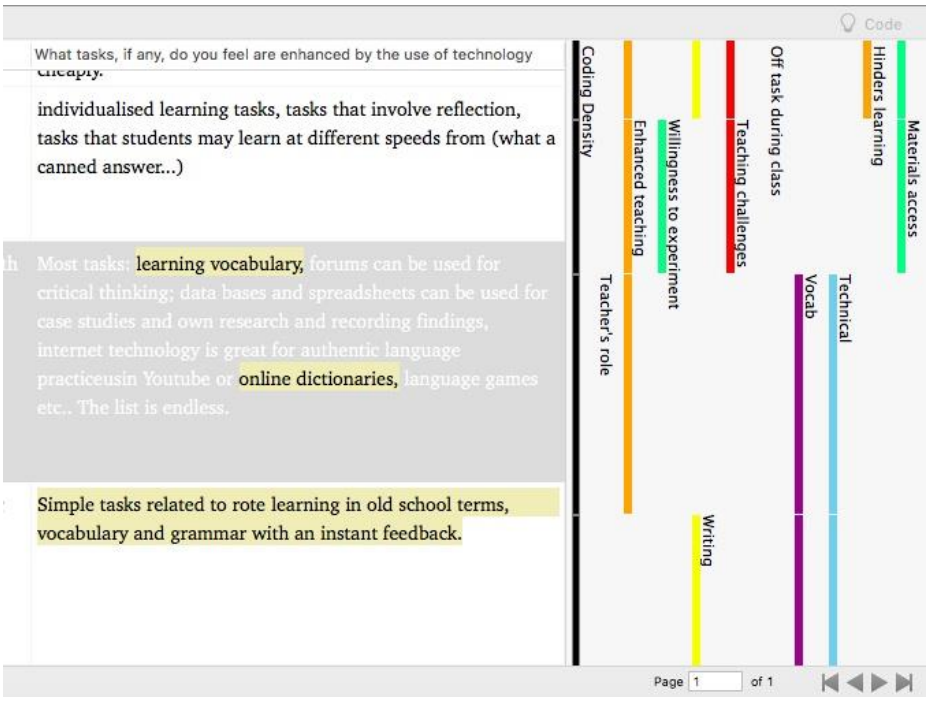


Figure 3.6: Coding of teacher survey (vocabulary in context)

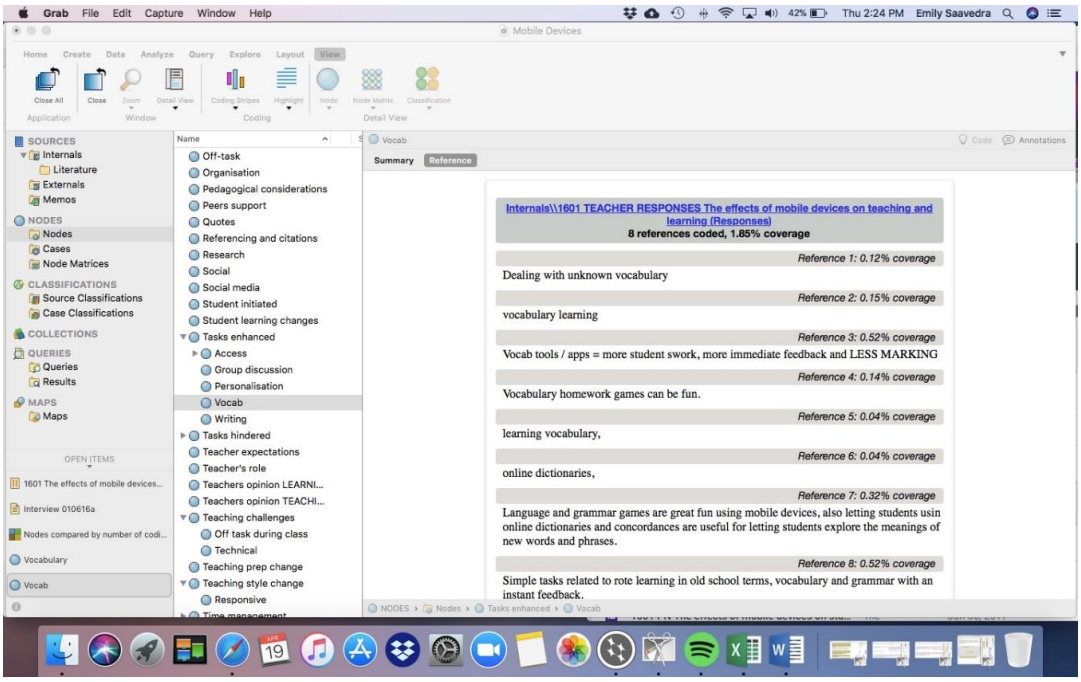


Figure 3.7: Coding of teacher survey (vocabulary out of context)

This offered a quick view of the eight occurrences where the mention of vocabulary was coded at the “vocab” node in NVivo.

After the initial coding process, axial coding (Somekh & Lewin, 2005) was applied. Axial coding requires the researcher to look for commonalities among similar codes in "[t]he process of weaving the data back together around groups of concepts" (ibid, p.50). The process of axial coding required reiterative analysis of all data collected by each instrument. An example of this can be seen in figure 3.7 where chat, messages, phone calls, and text or SMS have been grouped into the category of communication as they are all examples of different modes of communication.

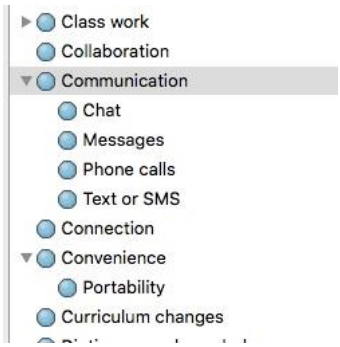


Figure 3.8: Axial coding (communication)

These were initially coded using the mode of communication (for instance, messages), and when the nodes were revised these four modes of communication were grouped into the larger category of communication. Each node could be investigated at macro as well as micro levels.

Once all data collected from the instruments outlined in sections 3.2.2.1 to 3.2.2.6 were imported into *NVivo*, analysis could be conducted into any emergent themes. As all data was coded to nodes, multivariable analysis was possible within and across participant groups and data collection instruments.

3.3 Chapter summary

This chapter has described the context of this study. The methodology described in this chapter was informed by the literature reviewed in chapter two. To give context to the current study, the programmes offered as part of the university preparation delivery options at the site of the study have been presented.

This study has adopted a contextually bound, phenomenographic approach, grounded in a constructivist paradigm to investigate the effects of mobile devices on learning. This chapter has presented considerations made throughout the research process including the choice of Activity Theory as the conceptual framework.

The individual components of Activity Theory were presented and an amended framework was adopted for the purpose of this study. The research process and sampling procedures have been explored. In this study, there were five data collection phases: teacher survey, student survey, inventory of online learning strategies, student discussion groups, and observations and analytics. Chapter three concluded with an account of the procedures implemented for data analysis.

Chapter four presents the findings from the different research instruments used during the study.

Chapter 4: Findings

As discussed in chapter two, this study utilised a number of different data collection instruments to investigate the use of mobile devices in pre-degree, university preparation courses. Each section of this chapter presents findings corresponding to a particular data collection instrument. Before discussing the findings, the demographics of the participant pools are presented. Pertinent findings have been divided according to each of the research questions in sequence, as outlined in table 4.

Section	Data collection instrument	Research question
4.1	Demographics	Background information
4.2	Teacher survey	RQ1: Within the context of a pre-degree, university preparation course in New Zealand, how are students using mobile devices in relation to learning? RQ2: What factors influence the use of mobile devices within this academic context? RQ3: From the teachers' and students' point of view, how do mobile devices add value, if any, to learning and teaching practices within this New Zealand context? RQ4: What challenges, if any, do teachers and students in this context face when using mobile devices in the classroom?
4.3	Student survey	RQ1: Within the context of a pre-degree, university preparation course in New Zealand, how are students using mobile devices in relation to learning? RQ2: What factors influence the use of mobile devices within this academic context? RQ3: From the teachers' and students' point of view, how do mobile devices add value, if any, to learning and teaching practices within this New Zealand context? RQ4: What challenges, if any, do teachers and students in this context face when using mobile devices in the classroom?

Section	Data collection instrument	Research question
4.4	Inventory of online learning strategies	RQ3: From the teachers' and students' point of view, how do mobile devices add value, if any, to learning and teaching practices within this New Zealand context?
4.5	Student discussion groups	RQ1: Within the context of a pre-degree, university preparation course in New Zealand, how are students using mobile devices in relation to learning? RQ2: What factors influence the use of mobile devices within this academic context? RQ3: From the teachers' and students' point of view, how do mobile devices add value, if any, to learning and teaching practices within this New Zealand context? RQ4: What challenges, if any, do teachers and students in this context face when using mobile devices in the classroom?
4.6	Observations and analytics	RQ1: Within the context of a pre-degree, university preparation course in New Zealand, how are students using mobile devices in relation to learning? RQ4: What challenges, if any, do teachers and students in this context face when using mobile devices in the classroom?

Table 4.1: Data collection instrument used for each research question

4.1 Demographics of participants

Demographic data was collected using two of the research instruments. They collected demographic data on the two main participant pools: teachers and students. The teacher participant pool responded to the teacher survey entitled *The Effects of Mobile Devices on Learning and Teaching*, while participants from the student pool responded to the survey called *The Effects of Mobile Devices on Student Learning*. The demographic data collected are explored prior to the findings to clarify the context around the participant pool.

4.1.1 Teacher participant pool

All teachers, who were employed as academic staff members to teach on any of the Foundation and Continuing Education programmes at the site of the research, were invited to participate in the research. Of the academic staff members who chose to participate in this study, eight were teaching on the undergraduate preparation course, two were teaching on the postgraduate preparation course, and two taught across both the post- and undergraduate programmes.

As the teaching cohort was relatively small, teachers were not asked to identify their gender. This was a conscious decision on behalf of the researcher as there are only a very small number of males employed at the site of the study and a male teacher could potentially be more readily identifiable than a female colleague. Gender identification could have compromised the anonymity of respondents so it was decided to omit any questions referring to the gender of the teacher participants. This has also informed the choice of unisex names (as outlined in table 4.1) as pseudonyms. Teachers self-selected an age range and self-reported the total number of years of teaching. In addition to questions about length of service, teachers were asked to rate their use of technology using a four-point scale. To classify the frequency of technology use in the classroom, teachers were asked to self-report using the scale: always, frequent, casual, or infrequent. Teachers were also asked to rate how comfortable they felt using technology in the classroom using the scale: very comfortable, comfortable, uncomfortable, and very uncomfortable. The responses are shown in table 4.2.

Teacher Pseudonyms	Age group	Total number of years teaching	Self-reported frequency of use	Self-rated comfort level
Morgan	over 60 years	27	always	very comfortable
Harper	30 - 39 years	6	frequent	very comfortable

Teacher Pseudonyms	Age group	Total number of years teaching	Self-reported frequency of use	Self-rated comfort level
Alex	30 - 39 years	15	frequent	comfortable
Andie	50 - 59 years	24	frequent	comfortable
Frankie	50 - 59 years	25	frequent	comfortable
Gray	40 - 49 years	20	frequent	comfortable
Marion	50 - 59 years	25	frequent	comfortable
Stevie	over 60 years	30	frequent	comfortable
Kim	over 60 years	36	casual	comfortable
Charlie	over 60 years	22	casual	comfortable
Lesley	over 60 years	35	casual	uncomfortable
Ash	50 - 59 years	30	always	very uncomfortable

Table 4.2: Teacher's self-reported use of technology in the classroom

Table 4.2, organised according to self-rated comfort levels, clearly shows all teachers were experienced classroom practitioners with an average of 24.6 years teaching experience, ranging from six to 36 years teaching experience. Seven of the twelve teachers were in their first two years of teaching these particular courses although they had extensive experience in the area of foundation education. Nine of the 12 teachers were over 50 years of age at the time of completing the survey.

With regard to the frequency of use of technology in the classroom context, none of the participants identified as being infrequent users. Three teachers indicated a casual use of technology and an additional two teachers indicated that they always

used technology in the classroom. Slightly less than 60% (7 out the 12) of the respondents classified themselves as frequent users of technology in the classroom. One of the two teachers, who indicated they always used technology in the classroom, rated themselves as being very comfortable with using technology. Another rated themselves as very uncomfortable. Four of the teachers rated their comfort level with using technology for learning and teaching purposes as comfortable. Only two teachers indicated any discomfort with using technology in the classroom with one teacher indicating a level of uncomfortable and another of very uncomfortable. The teacher who rated themselves as uncomfortable self-reported being a casual user of technology and the teacher who indicated they were very uncomfortable with the use of technology in the classroom was self-reported as always using technology. This indicated that Ash was accustomed to always using technology despite feeling very uncomfortable.

The twelve teachers have substantial experience in the sector of foundation education and ESOL education. Figure 4.1 shows 84% (n=10) of the teachers surveyed have more than 20 years experience within the context of the study.

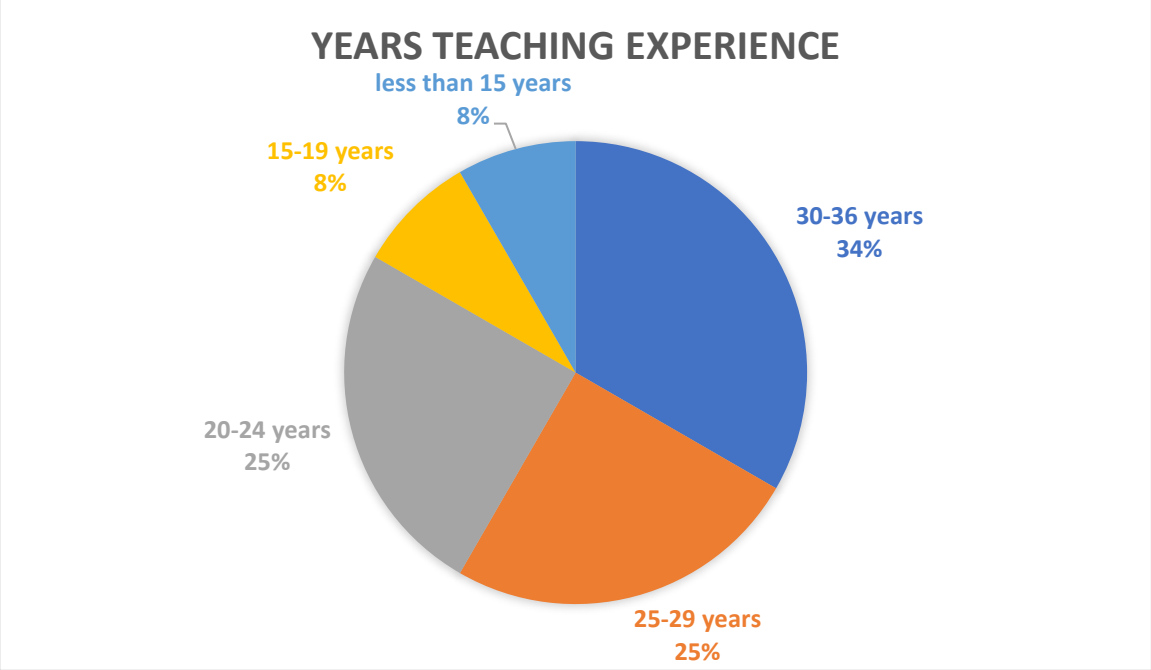


Figure 4.1: Teachers' experience

4.1.2 Student participant pool

One hundred and forty-four students completed the student survey. Of those who participated 52% (n=75) were male, 47% (n=67) were female and the remaining 1% (n=2) chose not to identify a gender. The age of the student participants is represented in figure 4.1.2. Six percent (n=8) did not disclose an age, 11% (n=16) of the students were over 25 years old, 35% (n=50) of the students surveyed were in the 21 – 24 age bracket, and the remaining 48% (n=70) were under 20 years of age. Fifteen percent of students who participated in the study were recent school leavers (aged 17-18 years old at the time of sampling). Half of the students were under 20 years old, while half were over 20 years of age at the time of the survey (as shown in figure 4.2). Twenty was a significant delineator as domestic students over 20 can gain adult entry into New Zealand universities without completing pre-degree studies. Therefore, they did not require these courses to gain university entrance but were electing to enrol in preparatory courses prior to embarking on undergraduate university studies.

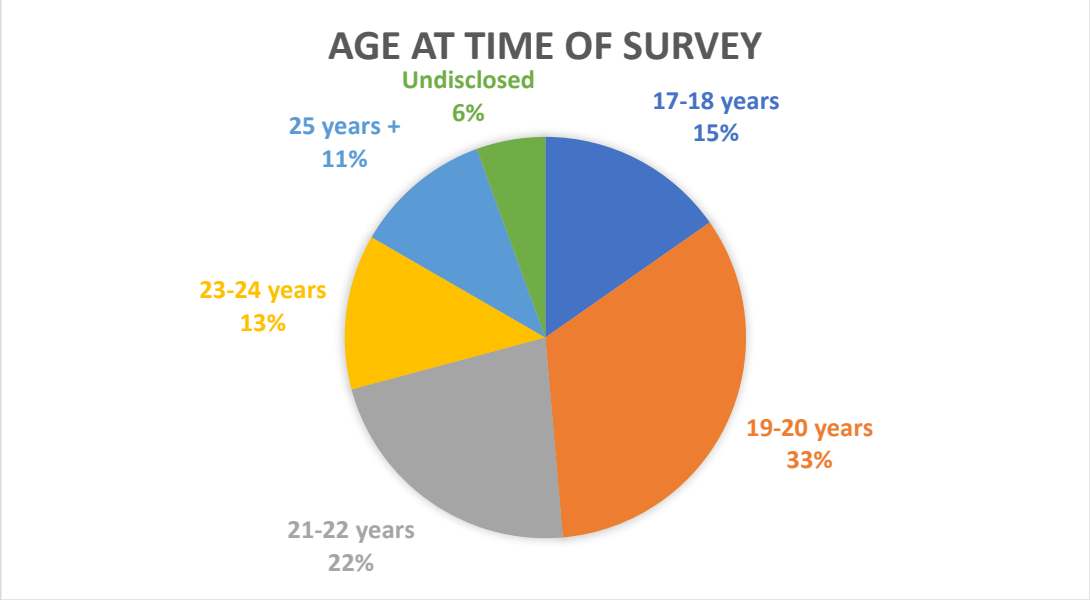


Figure 4.2: Age of student participants

Although all instruction at the institution where this research was conducted was in English, students came from a variety of backgrounds: 45% (n=65) of participants

were enrolled as domestic students whereas 55% (n=79) were international students. However, domestic students include all New Zealand-born students as well as those who hold Permanent Residence status or are New Zealand passport holders so this cannot be used as an indication of language proficiency. Despite their immigration status, many of these students, both domestic and international, came from cross-cultural families and ethnically identify with their 'home country' ethnicity (as shown in figure 4.3) or with more than one ethnic group. Across the student sample, the largest ethnic representation was Asian (47%; n=76), followed by New Zealand European (20%; n=32), then Arab (12%; n= 19), Pasifika (9%; n=14), Māori (5%; n=8), and an additional 7% (n=11) of "other" ethnicities, which included South African, Australian, Irish and New Caledonian.

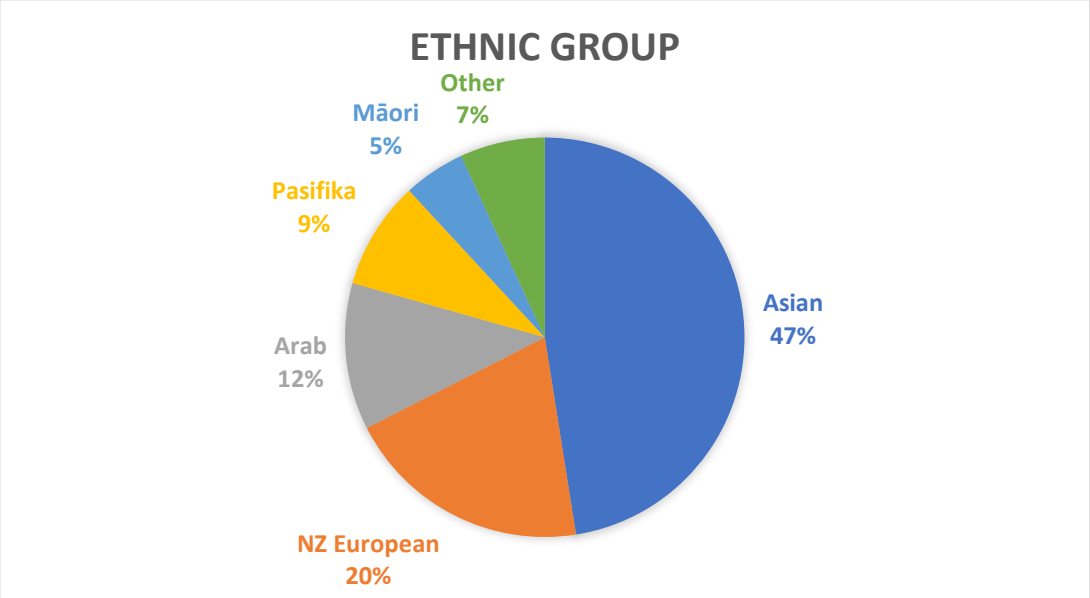


Figure 4.3: Ethnicity of student participants

As well as coming from a variety of ethnic backgrounds, students were linguistically diverse. To identify their first language, students were prompted to respond to "Which language are you most fluent in?" Results indicated the majority of students spoke varieties of Chinese languages (43%; n=62). For reporting purposes, Mandarin and Cantonese have been counted together as some students specified their specific Chinese language whereas others listed "Chinese" as their language. Thirty-five percent (n=50) indicated English was their first language. Arabic speakers made up

the third largest group with 13% (n=19) of the student participants speaking Arabic as their first language. This was followed by Korean (4%; n=5) and Sinhala (2%; n=3). Other languages, including French, Hindi, Tagalog, Tongan and Vietnamese, accounted for the final 3% (n=5).

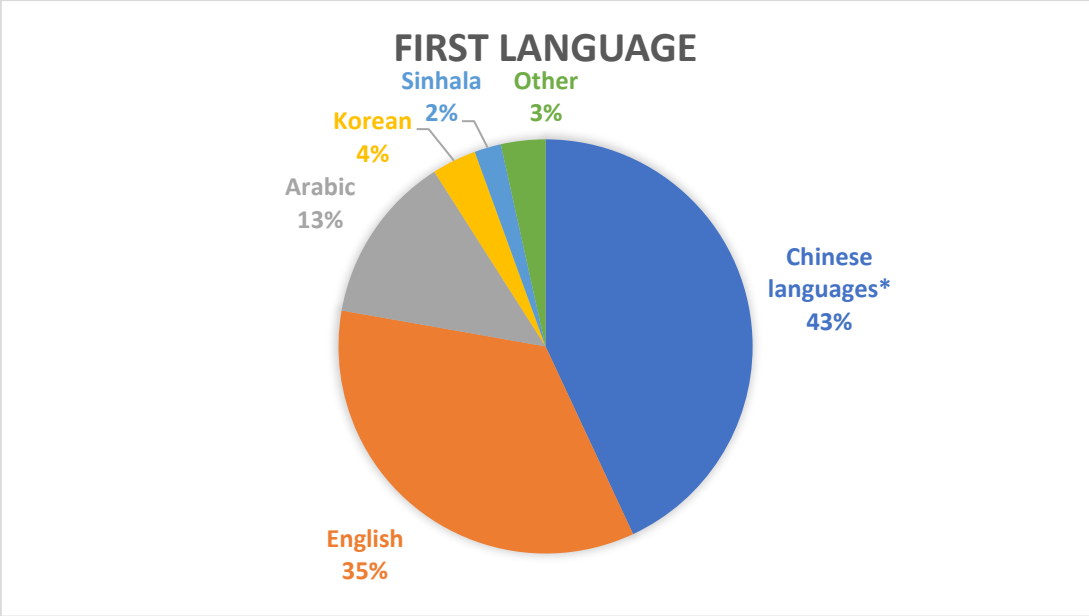


Figure 4.4: First language of student participants

** Note "Chinese" includes speakers of Mandarin and Cantonese as some students did not differentiate.*

Not only did students have a variety of first languages (as shown in figure 4.4) but the majority of the cohort of students was multilingual as can be seen in figure 5.1. Only 19% (n=28) of the students surveyed considered themselves monolingual in English. Slightly under half (49%; n=70) identified as bilingual with almost one in four (26%; n=38) claiming to be trilingual. An additional 6% (n=8) claimed to speak more than three languages. This would indicate that the majority of the students involved in this study were operating in English as an Additional Language (EAL) academic context.

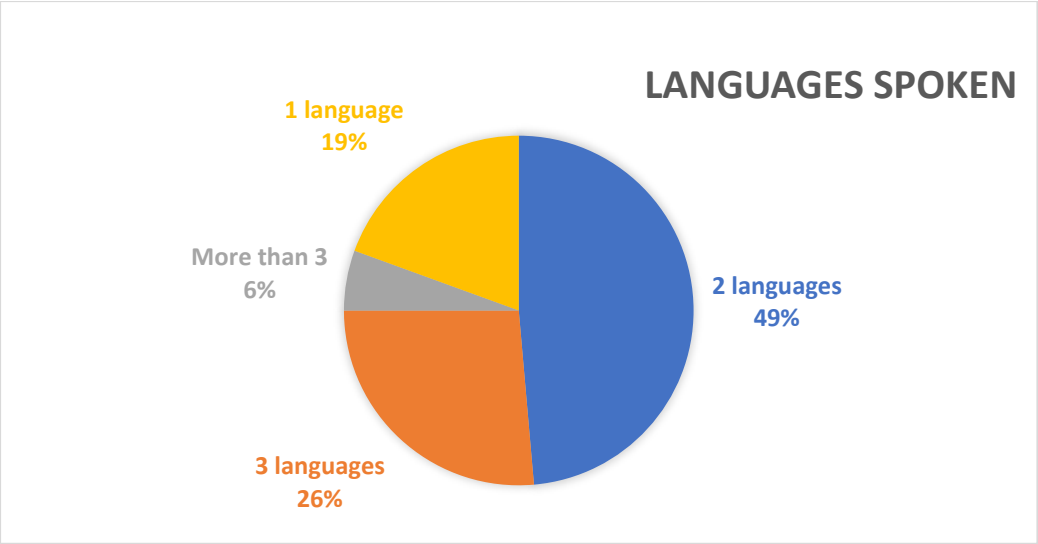


Figure 4.5: Linguistic diversity of student cohort

The student participant pool was ethnically and linguistically diverse. This diversity also extended to the mix of international and domestically enrolled students. Within the New Zealand context, this diversity is representative of similar educational programmes offered in the area of pre-degree, university preparation initiatives (Education Counts, 2018).

4.2 Teacher Survey

Twelve teachers were asked to comment on how learning and teaching had been affected by the use of mobile devices in the pre-degree, academic context. Teachers were asked to complete the survey entitled *The Effects of Mobile Devices on Learning and Teaching*. Comments were sought regarding pedagogical considerations, teaching style, approaches to teaching preparation and any perceived challenges they felt when mobile devices were used in a New Zealand-based, academic context. Teachers were also invited to comment on how they perceived student learning to have been enhanced, hindered or altered by the use of mobile devices. For the purpose of reporting findings, a pseudonym was allocated to each respondent, in an attempt to ensure anonymity of responses. The teacher survey collected data

relevant to all four research questions (as illustrated in table 4.3). Responses are examined in relation to each of the research questions in this section.

Research questions (RQ)	Teacher survey	Student survey	Inventory	Student Discussions	Observations and Analytics
RQ1 Usage	✓	✓	✓	✓	✓
RQ2 Influential factors	✓	✓		✓	
RQ3 Value	✓	✓		✓	
RQ4 Challenges	✓	✓		✓	✓

Table 4.3: Crosswalk showing the research questions and data collection methods used – teacher survey

4.2.1 Within the context of a pre-degree, university preparation course in New Zealand, how are students using mobile devices in relation to learning?

Responses indicated that mobile devices were used for a variety of learning and teaching activities. All teachers described ways in which students were using mobile devices within the learning context. Some teachers claimed that any task could be completed using mobile devices. Two illustrative examples of these comments were:

> *All tasks could be enhanced given willing and skilled users - listening to podcasts, reading up to date material, researching a topic, writing on a computer is better than handwriting (usually), grammar checking, communicating, blogging (if used appropriately)* (Frankie).

> *Learning vocabulary, forums can be used for critical thinking; databases and spreadsheets can be used for case studies and own research and recording findings, internet technology is great for authentic language practice as in YouTube or online dictionaries, language games etc. The list is endless* (Kim).

These comments indicate that teachers and students were regularly exploring the use of mobile devices to enhance learning and teaching activities.

According to the responses from the teacher's survey, it appeared that students were using mobile devices for three main reported purposes: (1) learning support, which included developing autonomous practices; (2) achieving learning outcomes; and (3) avoiding learning activities.

Usage of mobile devices	1. Learning support 2. Achieving learning outcomes and objectives 3. Avoidance of learning activities

4.2.1.1 Learning support

Teachers referred to three main purposes for students using their mobile devices: accessing materials and resources; supporting writing; and learning vocabulary. Eight of the twelve teachers referred to students using mobile devices in class to access materials and resources to support their learning; seven teachers referred to students using mobile devices to support their writing processes and practices; and five referred to students utilizing mobile devices to support learning vocabulary. Teachers were prompted to consider whether they thought having mobile devices in the classroom had changed the way students approach learning. Teachers were also encouraged to elaborate on their observations and perceptions. Nine teachers (75%) indicated that they thought mobile devices had changed the way students learn including a sense of heightened autonomy amongst learners.

> *It transfers ownership for the pace of learning from me to students* (Morgan).
>
> *The expectation is that the device will prove to be a gateway to semi-autonomous learning* (Stevie).

Teachers observed that students were able to autonomously access materials and resources to support their own learning. This use of mobile devices was viewed as advantageous to learning.

4.2.1.2 Achieving learning outcomes and objectives

Teachers expected students to access copies of their own work on their devices in order to review, identify errors, and complete the necessary corrections. This also included work on word processing assignments. Set homework was assigned assuming a high level of connectivity as illustrated by the following comment:

> *I set them homework tasks to Google information, use Stream in connection with current weekly topic, give links to YouTube videos for practice in pronunciation, listening and models of good presentations and speeches* (Kim).

Nine teachers (75%) reported assigning learning and teaching tasks through the in-house LMS, Stream, and four teachers (33%) mentioned using Google Documents, which require connectivity, to complete tasks. This would indicate that students were expected to have access to a mobile device to be able to complete learning and teaching activities both in the classroom and for homework purposes.

It would appear that a number of activities were subsequently designed around the usage of devices to achieve a variety of learning outcomes. This considered approach to lesson planning highlighted an expectation that students would be constantly connected, which was expressed by this teacher's observation,

> *When I walk into the classroom, students are generally immersed in their mobile devices, and I commence the lesson with that perspective in mind, i.e. that students are already somehow "online" and connected* (Stevie).

Indications appear to point towards an assumed ubiquity of mobile devices and a considered approach to how this affects the classroom context.

4.2.1.3 Avoidance of learning activities

Not all uses of mobile devices were seen to be supportive of learning activities. Teachers also commented on students using their mobile devices during class time

for purposes other than learning. Teachers mentioned students being side-tracked or their concentration being broken (Charlie), and the need to continually reinforce what was considered appropriate usage (Marion). One teacher believed mobile devices to be a hindrance:

> *If students allow themselves to be distracted by social-media or entertainment functions of their technology* (Gray).

The use of mobile devices as a means to socialise was commented on. Students were observed accessing social networks, and chatting with peers who were not in the classroom.

4.2.2 What factors influence the use of mobile devices within this academic context?

When iterative coding was applied to the teachers' responses, factors that influenced the use of mobile devices within the academic context of pre-degree university preparatory courses were grouped into four key themes: pedagogical considerations, perceived enhanced teaching practices, level of teacher encouragement, and equipment and tacit know-how. These themes are discussed in the following sections.

Influential factors	1. Pedagogical considerations 2. Enhanced teaching 3. Teacher encouragement 4. Equipment and tacit know-how

4.2.2.1 Pedagogical considerations

A key influential factor was the role of pedagogical considerations when integrating technology. A word tree (figure 4.6) was created using data from statements where teachers referred to pedagogy with reference to the use of mobile devices. The word tree (created using *NVivo* software) shows how the word pedagogy was used as you

read from left to right along the branches. The word tree clearly depicts how teachers regarded the necessity for pedagogy to be the driving force behind technology and not technology guiding pedagogical decisions.

Figure 4.6: Word tree (pedagogy)

Of primary concern was the way technology was used within the learning and teaching context. It was important for the teachers to consider what to teach before considering how it was to be taught. This included the use of technology or mobile devices.

> *There should be an emphasis on pedagogy over technology. Pedagogy should be the driver in the class. Technology here is to provide assistance only and to facilitate learning and engagement across all levels. Technology can be used whether it is a student-centred approach (social constructivism and problem based approach) or teacher-centred approach (content transmission) but it can't replace the teacher's role* (Alex).
>
> *The pedagogy has to come first. It is not about the cool tool but rather what I want my students to learn. Only then would I consider how to achieve this which might or might not include mds* (Morgan).

A factor that was considered important was how technology could support learning and teaching. As Morgan's comment illustrated, pedagogic decisions needed to continue to take precedent over decisions regarding the inclusion of mobile devices within an academic context. *What* should be taught or learnt was considered to be of paramount concern when contemplating the *how to*.

Consideration related to how students were going to be engaging with materials was also mentioned. Teachers expressed a need to be cognisant of the intended learning

objectives or lesson goals as well as a need to consider how to enable meeting those objectives most effectively. Some questions that teachers were continually considering were:

> *Does it actually meet the lesson goal rather than time-filling or baby-sitting?* (Lesley).
>
> *Does it support learning or is it distracting from the learning experience? How is the use [of mobile devices] scaffolded or supported by other materials and does it actually benefit the learning and engagement processes of the students?* (Ash).
>
> *Why are they doing this on the phone and not with each other?* (Harper).

Teachers reported that effective curriculum planning took into account maintaining a conscious focus on learning objectives and questions such as those expressed above.

An additional factor to be considered by the teachers was the time required when developing classroom activities. Although some teachers commented that working online could facilitate the retrieval and organization of materials (Frankie, Morgan), which could save some preparation time for subsequent deliveries, it was important to recognise that a substantial amount of time was a necessary investment when designing learning and teaching activities that utilised mobile devices and online resources.

> *Online stream work can take a lot longer to prepare as you have to get all online links prepared in advance* (Kim).
>
> *Well-designed activities can enhance learning. This means more input from teachers* (Charlie).

These comments would indicate that factoring in time to develop an approach to using technology in the classroom was considered vital for sustained integration.

Despite the acknowledgement that designing effective classroom activities may be time intensive, the availability of easily accessible additional resources was perceived to be advantageous when considering classroom-based and out of class activities.

> *I also include support for the course content with external material via the internet, e.g. a picture or video if relevant to assist student learning* (Ash).
>
> *There are more resources available; it is easier to incorporate current events; it is easier to share resources between colleagues* (Gray).
>
> *It has facilitated sharing between teachers* (Morgan).

Teachers made decisions about how course materials were covered based on an expectation that students would be connected to online materials via their mobile devices. This connectivity was utilised to share materials, access engaging contemporary content and contribute to cooperative, collegial practices.

4.2.2.2 Enhanced teaching

Teachers were asked if, in their opinion, mobile devices enhanced or hindered their teaching. Ten of the twelve teachers cited ways in which they perceived their teaching to have been enhanced. Of the two who indicated otherwise, Marion described how the use could enhance their teaching but also mentioned how the use of mobile devices could hinder teaching. Charlie stated mobile devices often interfered with students' concentration in the classroom resulting in off-task distractions.

A word tree (figure 4.7) was created using data from statements where teachers referred to how learning and teaching could be enhanced with the use of mobile devices. The word tree shows the ways in which teachers perceived mobile devices to enhance teaching and ways in which it they could subsequently influence learning. Reading from left to right along the branches commonalities can be seen in the variety of ways teachers perceived teaching to have been enhanced.

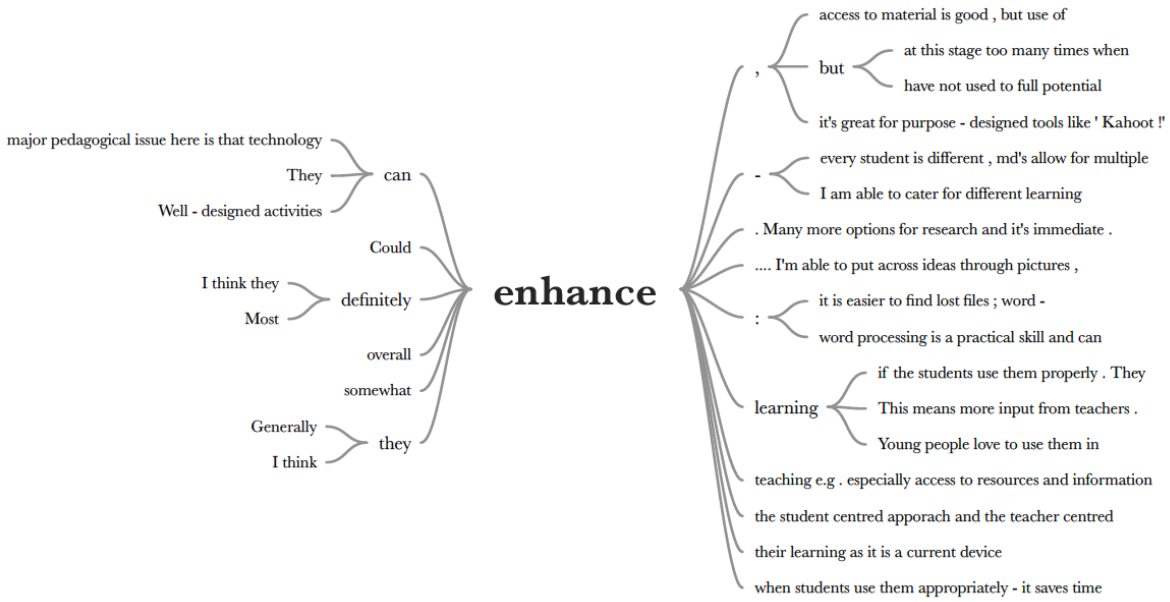


Figure 4.7: Word tree (enhanced)

The themes resulting from the comments made by teachers regarding how mobile devices can enhance learning are further elaborated below.

The ability to cater for different learning styles was identified as an advantage to using mobile devices in the classroom.

> *Definitely enhances teaching as it allows me to provide an option of different formats to engage the students who have different learning styles* (Ash).
>
> *The ability to appeal to different learning styles has been enhanced. So visually I can encourage more discussion in class. So, teaching preparation will include preparing more visual and auditory stimuli* (Alex).

Catering for differentiated learning styles was considered a factor that could enhance teaching opportunities.

The ability to add interactive elements to learning activities is also a factor that influences the use of mobile devices in the class environment. Teachers identified that game-based learning platforms, such as *Kahoot!,* were available to use in class to gauge comprehension of classroom tasks.

> *I designed a Kahoot! quiz that tested students' understanding of the different 'stages' or 'moves' of an 'introduction' for Critical Reading - it allowed for considerable subtlety* (Andie).

With instant feedback available, teachers were able to respond appropriately by adjusting classroom input to ensure that the necessary learning objectives were met. Through the use of mobile devices, teachers commented on being able to make more resources available to respond to individual learning needs. The ready access of mobile devices also meant communication with students was convenient and efficient, which could lead to enhanced learning and teaching opportunities.

Teachers commented on the ease of finding pertinent materials relevant to classroom activities (Charlie); the use of Google Docs so students are able to review, repeat or review tasks as they need (Morgan); and some teachers were able to organise their teaching materials in an effort to become less paper dependent.

> *I expect most of students to have a digital device with wifi in the classroom. Can now email links and worksheets to students and they can read online in class. Can prepare lesson plan on to ppt and then talk through in class. Stds can then be emailed a copy if they want. Makes class time less stressful. Less of a paper war also. No longer interested in keeping paper folders of useful class material - it can be kept electronically* (Frankie).

The ability to facilitate organization was an additional contributing factor considered to enhance teaching.

The ability to engage students was also perceived as a factor that influenced the choice to use mobile devices in class.

> *Young people love to use them in class and so we as teachers have to move with the trend to engage students in terms of what they enjoy and value* (Kim).

> *The change has been more in relation to accommodating and working alongside the experience that the students are bringing into the classroom, in other words, as a response to their pervasive use of mobile devices* (Stevie).

If students are engaged in what they are learning then teachers perceived this to be a factor that would influence their inclusion in learning and teaching activities.

4.2.2.3 Teacher encouragement

One identified factor that could influence the way mobile devices are used by students, is the level of encouragement displayed by the teacher's choice of pedagogical practices within the classroom. When asked how teachers encouraged or discouraged students' use of mobile devices both in and out of the classroom, there were very few instances when teachers discouraged students. There were three instances, described by two teachers, when mobile phones were said to be discouraged.

> *Discourage social chat with people outside of class* (Frankie).

> *I discourage use of devices during teacher /student talking time, and off-topic uses … For some reading exercises I discourage use of electronic dictionaries* (Gray).

The use of mobile devices was actively discouraged when students were off-task or when the use of mobile devices would inhibit the gaining of a particular skill such as the reading example described above.

By contrast, 11 of the 12 teachers reported occasions when they encouraged the use of mobile devices. During class students were encouraged to use mobile devices for communicative purposes, including taking part in forums and messaging or emailing teachers and peers, as well as for completing academic tasks such as conducting independent research, applying appropriate academic formatting skills, and practicing specific learning strategies that required the use of mobile devices. Students were also urged to access online materials and use online tools such as

dictionaries for translation, collocation, definitions and synonyms when learning vocabulary. Furthermore, students were purportedly encouraged to take photos of homework or other material written on the board for revision later, as well as examples of error correction exercises, to assist the development of reflective learning practices.

Out of class, students were encouraged to use technology to facilitate direct communication with their peers and teachers.

> *Forums are used quite a bit and sending out important information on exams, topic (resources) are sent out to students* (Alex).
>
> *Encourage students to communicate with each other; I email info and handouts which I think most received by data on their phone* (Frankie).
>
> *Ask for some tasks to be e-mailed; actively encourage students to email or text if they have a query* (Lesley).

Mobile devices made communication between students, teachers and peers easily accessible and convenient.

4.2.2.4 Equipment and tacit know-how

A factor that influences the use of mobile devices, or any new technology, is the availability of equipment and training provided to support the implementation of any newly available technology. Feeling competent with using technology in the classroom was seen to be vital for a teacher's reputation. Anticipating equipment failure, as well as providing alternative approaches to using mobile devices in class, were identified as important factors when integrating technology in classes. Considerations about availability is also needed, as indicated by these comments:

> *Is there adequate access to devices; what is Plan B in case of technology failures* (Gray).

> *I still make 'hard copy' backups but I've shifted to more online work during the teaching preparation stage with the expectation that this is what will actually happen during the lesson (technical hiccoughs are actually quite rare, so 'online' lessons happen 90% of the time)* (Andie).

Despite the ubiquity of mobile devices and technology within the classroom, factoring in the possibility that activities may not go as planned was considered important. This may be as a result of equipment failure or a teacher's tacit know-how.

Teachers identified the necessity to upskill their own understanding in areas of technology use, which was a factor that often influenced their implementation of learning activities that could utilise mobile devices.

> *I want to see learning objectives be more in line with some of the capabilities of apps and tech available now. I want the students to be rewarded for trying new things. I want them to take advantage of programs and online tools that make student life easier. However, I meet resistance to this from the current curriculum and from colleagues* (Harper).

> *I'm aware that there's a lot I don't know about what I could be using it for* (Marion).

> *I really would like more adaptive tasks with feedback* (Morgan).

Professional development, or lack thereof, could be seen as a factor that influenced the use of mobile devices within the academic context.

Many teachers expressed a willingness to experiment with new approaches to using mobile devices with students:

> *I have also tried group writing on a shared site. This has not been so successful* (Charlie).

> *The next step: I would like to be able to design tasks/materials that utilise more what mobile devices have to offer in and of themselves* (Stevie).

Continued professional development is seen as an area that would continue to affect the use of mobile devices for learning and teaching activities.

4.2.3 From the teachers' point of view, how do mobile devices add value, if any, to learning and teaching practices within this New Zealand context?

As stated in the section on factors that influence the use of mobile devices, 11 of the 12 teachers surveyed indicated that mobile devices could be used to enhance teaching, thus adding value. By contrast, Charlie was the only teacher who did not indicate that mobile devices could enhance teaching, but instead stipulated that mobile devices could interfere with teaching, especially when students were off-task. From the responses where teachers identified value added to teaching practices and learning opportunities, five aspects were identified: (1) the portability of mobile devices; (2) instant access to information, resources and feedback; (3) collaboration between students, peers and teachers as they co-construct tasks; (4) the perceived value added to cognitive and writing processes; (5) a rise in teacher's expectations of students' capability.

Perceived added value	1. Portability 2. Accessibility 3. Collaboration 4. Cognitive processes 5. Rising expectations

4.2.3.1 Portability

Constant connectivity to the internet and easy portability were identified, by teachers participating in this research, as being particularly valuable. Teachers

recognised that students could take advantage of the affordances offered by the portability of mobile devices to enhance learning opportunities.

> *[It is possible to] Leverage learning by moving it into students' everyday lives e.g. vocab learning on the bus* (Morgan).

> *The location of learning has shifted from the classroom to other places. Devices mean that learning can happen virtually anywhere if students take the opportunity* (Kim).

By encouraging the use of devices outside of the classroom, teachers perceived value to be added because students appeared to take advantage of opportunities, such as in the vocabulary example described above, for learning outside of the physical confines of the four-walled classroom.

> *It builds an attitude of learning that continues outside of a classroom and hopefully leads towards independent learning* (Ash).

Autonomous learning is a key focus of pre-degree programmes and the portability afforded through the use of mobile devices is an aspect of added value.

4.2.3.2 Accessibility

The portable nature of mobile devices has resulted in a ubiquitous use of mobile devices in the classroom. Perhaps due to enhanced portability, an additional beneficial aspect identified by five teachers was that of instant access. Teachers perceived the speed and ease of access to information, resources and feedback to be advantageous to meeting learning and teaching objectives.

> *Students have quicker access to online content that they can view at their own speed* (Harper).

> *Looking at a very recent event and looking for current arguments and evaluating those arguments to look at possible reasons and solutions. This information was available then and there and students were able to talk/debate about this in class and then put it down in writing on the forum in*

class. The event that occurred had a direct link with the theory the students were looking at for that week. One of the requirements of the course is to stay current with news and the devices showed just how important a role they played on that given day (Alex).

Instant access to information and resources facilitates opportunities for a more individualised approach to learning as students can control the speed of learning. It can also enable teachers to be reflexive in responding to unplanned teaching opportunities as they arise.

Not only was instant access to information perceived as valuable, but instant access to feedback was also highlighted as being a valuable attribute.

> *Being able to receive feedback before the next class so that they can action it in class. … Students are able to review my lessons, repeat or review tasks as they need* (Morgan).

As was discussed in response to research question 2 (refer to section 4.2.2), game-based learning platforms, such as *Kahoot!* and interactive, feedback-enabled quizzes on the LMS, were mentioned as being valuable for testing understanding and providing immediate feedback to students and teachers. Teachers are able to instantly access data and feedback regarding retention and comprehension of lesson objectives in real time. This feedback feature was identified as a factor that influenced the use of mobile devices in the academic context and was also identified as an aspect that added value to learning and teaching practices.

4.2.3.3 Collaboration

Teachers involved in this study further identified the potential for students to be able to work collaboratively, facilitated by the use of mobile devices, as an aspect that added value to learning and teaching. Teachers referred to facilitating peer-to-peer collaboration in addition to teacher-student collaboration with the class as a whole or with individual students:

Students can contribute to a class document on the class screen and others can improve, edit, add to (Frankie).

I completed a 'synthesis' matrix at the same time as students (on 'blank' screen) and then they compared their versions with mine serving as an exemplar (Andie).

Using quiz software helped to build a positive, collaborative environment (Gray).

Being able to work collaboratively on class materials was seen as a desirable outcome of using mobile devices in the classroom.

4.2.3.4 Cognitive processes

One area for which responses indicated little or no change to the way students learn as a result of using mobile devices was the area of cognitive process. One teacher elaborated on this noting that,

[Stds] probably have the same cognitive process to go through as well as same obstacles but different route and tools e.g. a student who doesn't review notes of the non-technology style probably won't review the photo they take of notes on board (Frankie).

While this teacher's opinion appears to be that students who are not engaged by traditional learning and teaching techniques and strategies are not necessarily going to be engaged with technology enhanced approaches, another teacher considered that having mobile devices in the classroom had changed the way students learn as evidenced by the following observation:

Students who are highly motivated will usually stay motivated. Those that are not, may become more motivated as the topic may become more appealing (Alex).

This indicates that mobile devices may be a motivational factor for some students but not for others.

One cognitive process, writing, was mentioned specifically by four teachers who commented on the value they perceived to be added through the use of mobile devices particularly to support learning. One teacher commented that, based on recent classroom experiences, students appeared more able and more willing to review, draft, and edit work when using mobile devices compared to experiences with more traditional paper-based learning and teaching activities. By using online tools and features available in Microsoft Word students were able to manipulate their writing in a way that facilitated their learning. An example of this can be illustrated in this example from Morgan's class where students were looking at structure and cohesion within a paragraph:

> *Using Google docs allows me to provide immediate feedback to students during drafting. Recently a number of students had quite jumbled paragraphs. By colour coding sentences they could see very easily that they were jumping back and forth across topics from developed to developing and back to developed countries. Once they saw this visually they understood what was wrong. In their next paragraph I asked them to colour code themselves - it was a lightbulb moment* (Morgan).

Although the medium of instruction at the site of this study was English, there were students for whom English was not their first language (refer to figures 4.1.4 and 4.1.5 for a breakdown of languages spoken). Teachers on these courses used mobile devices to include language and grammar games in everyday lessons. Students were encouraged to use mobile devices to access online dictionaries and concordances to explore meanings, collocations, and use of words and phrases taught.

> *For language learning especially it puts the student in a more self-reliant and independent stance and gives lots of examples of authentic models of language use for students to learn and follow … Listening to authentic lectures and videos is really fun and useful and very instructive to widen the scope of the classroom limits* (Kim).

This access to authentic examples of language was considered of value. Students can equip themselves with the tools to further support, enhance and improve their own autonomous learning practices.

4.2.3.5 Rising expectations

With the value perceived to be added by the use of mobile devices in classes, two teachers specifically remarked on an increase in expectations of what students can access and produce. Marion noted an increased expectation of students having access to information and an ability to be constantly connected. Alex articulated this in response to the question of how mobile devices in the classroom have changed the way you teach.

> *Yes. I have higher expectations...not in terms of theory and topic content but rather asking for a practical example where I can see that they have applied the theory. Given that they have been given exposure to different stimuli (visuals, videos etc), I expect them to make arguments and provide justifications. I will facilitate throughout but also expect more collaboration and accountability on their part* (Alex).

As students had access to more readily available resources and information at their fingertips, teacher's expectations of what students could achieve were heightened.

4.2.4 What challenges, if any, do students in this context face when using mobile devices in the classroom?

Teachers identified three key challenges when using mobile devices in the classroom. Firstly, the largest challenge identified by the teachers was in the disruptive attributes, in the form of distractions. Teachers felt mobile devices were often misused in the classroom. Secondly, challenges associated with technical concerns were identified. Thirdly, physical challenges were noted, specifically regarding the

differing sizes of mobile devices used. These three challenges are discussed in the subsequent sections.

Challenges	1. Distractions 2. Technical challenges 3. Physical challenges

4.2.4.1 Distractions

As opposed to the previous section, which outlined findings of aspects of mobile device usage that added value to learning and teaching, one aspect was acknowledged as creating a number of challenges in the classroom context. Six of the teachers identified their biggest challenge as being that mobile devices could be used as a distraction. One teacher quipped that BYOD, an acronym commonly used to mean Bring-Your-Own-Device (Falloon, 2015), stood for "Bring Your Own Distraction" (Morgan). Both Gray and Ash felt the need to monitor students' use of mobile devices.

> *[The biggest challenge is] being able to monitor that all of the students are actually using the device proactively to support their learning and not using it in a way that takes away from their learning e.g. chatting to friends outside of the class* (Ash).
>
> *Yes- I feel the need to monitor student mobile and device use - is it on-task? Is using the dictionary appropriate for the task?* (Gray)

Teachers felt it was necessary to monitor mobile device usage and actively work to keep students on task in order to minimise opportunities for distractions that would adversely affect learning.

Five teachers expressed concern that students were off-task or easily side-tracked, especially when multitasking by engaging with social media or other online activities

not related to classroom activities. This was evident in the word tree distracted that showed teachers felt students were often faced with such distractions.

Figure 4.8: Word tree (distracted)

Stevie also summarised some specific challenges:

> *Plagiarism, unfiltered information, random responses to specific tasks, off-task and on Facebook [are my biggest challenges]* (Stevie).

So whilst having access to a variety of material there are identified challenges when it comes to appropriate use of materials collected and appropriate use of mobile devices within the academic context. Stevie outlined concerns relating to academic integrity as it appeared that students were more able to plagiarise using copy and paste functions on their mobile devices.

The distraction caused by social media, such as Facebook, as mentioned above can further produce challenges with regard to students remaining on task. Engagement, as well as being a pedagogical consideration, was a challenge identified by Charlie:

> *Making the task interesting enough to engage the students* (Charlie).

By minimising the possibility for distractions through maximising opportunities for engagement, these challenges could be diminished.

Although having access to instantly available information was perceived as adding value at times, there were also drawbacks, such as frustration:

> *They seem to want more instantaneous ways of receiving information or answers to their questions. I see this as an extension of the instant way information can be retrieved from the internet. At times I see frustration that*

> *I am asking them to put time and effort into a task rather than providing answers immediately* (Ash).

This frustration can cause difficulties if a student is then reluctant to continue with the task. Working on solving a problem or activity that is not immediately self-evident is a skill that is deemed necessary if a student is to be successful in the preparatory programmes and in subsequent courses.

In order to maximise the potential afforded by the use of mobile devices in an academic context, one teacher considered it necessary to,

> *Ensure that the benefits outweigh the disadvantages: that they are being used in a way that enhances learning, i.e. on-task* (Gray).

By encouraging positive, active engagement with tasks in class, it was possible to counterbalance any distractions by ensuring mobile devices were used in a way that supported teaching and promoted active learning opportunities.

4.2.4.2 Technical challenges

Although teachers acknowledged it did not happen with frequent regularity, five teachers expressed concern over challenges presented when technology did not work as expected.

> *I still worry about IT breakdowns (an audio failing to play or no sound during a listening lesson for example), a quiz failing to open or 'sticking' due to 'buffering'; it's rare, but it still happens, so I always have hard copy backups which means a lot of photocopying that does not get used, it's pretty wasteful but better than a lesson wasted if technology fails* (Andie).

In addition to these technical difficulties identified by Andie, Alex also expressed concern over networking or IT issues and Kim identified reliability of the equipment and the software as being primary challenges.

Corresponding to the challenges associated with technical issues, concern was expressed by Lesley who stated that the biggest challenge was,

> *Wasting time in actually ensuring the devices work in the allocated classroom* (Lesley).

If teachers were able to concentrate on maximising the use of classroom time instead of worrying about whether or not the technology was going to enable them to complete lesson objectives, then they would be able to maximise learning opportunities.

As with the factors that influence the use of mobile devices within an academic context, a challenge described by teachers was not having the necessary technical knowledge or tacit know-how. One teacher implied a lack of knowledge:

> *A mobile device could enhance teaching and learning but I have not used it to its full potential* (Harper).

There is, therefore, an opportunity to further support teachers as they work with the ever changing technological advances.

4.2.4.3 Physical challenges

Screens were identified by teachers as a physical challenge. Teachers were primarily concerned with the amount of time spent looking at backlit screens and the screen size of mobile devices. Kim expressed concern over the length of time spent looking at screens. It was felt that the amount of time students spent on screens could cause fatigue.

> *Looking at the screen for long periods of time can [also] be tiring* (Kim).

On the other hand, Andie commented on the size of screens that students were using in class:

> *Tiny screens [can contribute to] minor 'challenges' in keeping up with the rest of the class* (Andie).

The physical dimension of the mobile device was perceived as a challenge that could affect learning and teaching.

4.2.5 Summary of teacher survey findings

The findings from the survey, entitled *The Effects of Mobile Devices on Learning and Teaching*, indicated a wide use of mobile devices within the context of university preparatory courses. Teachers specifically mentioned that mobile devices were being used for three main purposes:

- Supporting autonomous learning (including accessing materials and resources, writing support and learning vocabulary);
- Achieving learning outcomes and objectives of classroom activities and tasks;
- Avoiding participation in learning activities.

Analysis of the data produced from the teacher survey identified four themes that emerged as factors that influenced the use of mobile devices:

- Pedagogical considerations;
- Enhanced teaching;
- Teacher encouragement;
- Equipment and tacit know-how.

Teachers were consciously considering the impact of technology when designing learning and teaching activities for integration into courses. The majority of teachers perceived they were able to enhance the delivery of lesson objectives through the considered integration of mobile devices based on pedagogically sound decisions. This came through the ability to cater to multiple learning needs simultaneously and to engage students with interactive learning and teaching opportunities. Course organisation of materials was also highlighted as having a positive effect on teaching.

When teachers were invited to comment on whether or not mobile devices added value to learning and teaching practices, the following five aspects were described as areas where value was perceived to have been added:

- Portability;
- Accessibility;
- Collaboration;
- Cognitive processes, with specific reference to writing processes;
- Rising expectations.

More students were able to access course materials due to the portability of devices that enabled seamless and instant access to learning and teaching activities. Collaborative learning was also identified as a valuable residual effect of using mobile devices. Access to mobile devices was further deemed valuable for supporting student's writing development and supporting autonomous learning practices.

In contrast to value added, teachers commented on challenges that were present when mobile devices were used within the academic context of university preparation courses. Analysis of the data gathered isolated three key challenges:

- Distractions;
- Technical challenges;
- Physical challenges.

Teachers reported that students were often distracted from learning by their mobile devices. The perceived need to monitor these distractions was a challenge for classroom management and had a negative impact on learning and teaching. With ready access to information, some teachers reported observing students getting frustrated when tasks could not be completed immediately and instead of persevering, students would distract themselves with social media on their mobile devices. The challenges present when technology did not function in the intended way was also evident from survey responses. The final challenge was the physical size constraints of mobile devices.

4.3 Student Survey

The findings discussed in this section were collected via online surveys distributed to students enrolled in university preparation courses at a tertiary institute. Students were encouraged to complete the surveys outside the class environment. The purpose of having students complete the surveys away from the classroom environment was to minimise any possible referent power differential, if the teacher or researcher were to be present, that may have affected bias in the data collection. Furthermore, to eliminate any potential bias towards any particular student's response, there was no option for participants to provide their names or identifying information, thus rendering all responses anonymous. As respondents to the surveys were anonymous, responses were numbered as they were received. The first response received was labelled S1 to indicate this was the first student response received. The second response received was labelled S2 through to the last response which was labelled S144. Throughout this section, student responses are attributed using these labels.

The surveys included the collection of demographic information, closed questions, and open-ended questions regarding the usage of mobile devices within an academic context. Open-ended questions allowed students to provide a wider range of responses, which were coded and analysed using iterative analysis. The responses that are discussed in this section have been drawn from questions that aimed to collect perceptual and attitudinal responses and answers were self-reported. The student survey collected data relevant to all four research questions (as illustrated in table 4.4).

Research questions (RQ)	Teacher survey	Student survey	Inventory	Student Discussions	Observations and Analytics
RQ1 Usage	✓	✓		✓	✓
RQ2 Influential factors	✓	✓		✓	
RQ3 Value	✓	✓	✓	✓	
RQ4 Challenges	✓	✓		✓	✓

Table 4.4: Crosswalk showing the research questions and data collection methods used – student survey

4.3.1 Access to devices

Before investigating how mobile devices were being used, it was important to identify how many mobile devices students had access to. The surveys differentiated between the various mobile devices students may have had access to. Mobile devices were described as any device that was portable and could be used to connect to the internet. As students may not always use their mobile devices within an academic context, students were asked to differentiate between the number of mobile devices they owned and the number of mobile devices they brought to class with them. From table 4.5, it can be seen that not all devices that students owned or had access to were brought to class.

Number of mobile devices	Mobile device ownership	Mobile device brought to class
0	-	-
1	10	65
2	66	74
3-4	61	4
5 or more	7	-
unanswered	-	1
TOTAL responses	144	144

Table 4.5: Self-reported ownership of mobile devices

Ninety-three percent (n=134) of students surveyed self-reported owning two or more mobile devices, whereas only 55% (n=79) of students brought two or more devices to class. The data collected indicated that all students reported having access to at least one device when in class. Although many students reported owning multiple devices, 96.5% (n=139) of students brought one (45.1%; n=65) or two (51.4%; n=74) mobile devices with them to class.

In order to ascertain which devices students were bringing to class, students were asked to self-report on their in-class use of three different devices: phones, laptops and tablets. Students were asked to consider their personal use during class of each of the devices they owned. Each device was addressed separately starting with phones, followed by laptops, and concluding with electronic tablets. Responses to the question, *"Do you bring your phone/laptop/tablet to class?"* are collated in table 4.6. Students self-reported on their use by choosing the phrase that best represented their use. Findings indicated that students were utilising mobile phones in class more often than the other mobile devices. Students were also more likely to bring a laptop to class with them than a tablet. Eighty percent (n=116) of students surveyed claimed to have a laptop with them when in class. In contrast, only ten of the 126 students who responded to this question chose *"No, I never bring my laptop to class"*. Tablets appeared to be the least popular device to bring to class with 69% (n=92) of the students responding negatively to the question about bringing an electronic tablet to class.

Access / Use	**Phones**	**Laptops**	**Tablets**
Yes, but I never use/touch it.	**2**	**1**	**2**
Yes, I bring my device to class every day.	**139**	**59**	**18**
Yes, I sometimes bring my device to class.	**3**	**56**	**22**
No, I never bring my device to class.	**0**	**10**	**92**
TOTAL responses	144	126	134

Table 4.6: Self-reported mobile device access in class

Students were also asked about their use of mobile devices in the classroom. The intention with this question was to differentiate between *bringing* (addressed in the paragraph above) and *using* mobile devices. Students were asked how often they used their mobile devices in class. They were invited to identify which description best described their use: *Always – I never turn them off; Frequent – once or twice a lesson; Casual – once or twice a day; Infrequent – once or twice every week.* As can be seen in table 4.7, the majority (44%; n=63) said they frequently accessed their mobile device; 28% (n=40) indicated always; 21% (n=31) indicated casual use; and 4% (n=6) signalled infrequent use. Four students chose not to indicate the frequency with which they accessed their mobile devices in class.

Frequency	**Number of responses**	**Percentage of responses**
Always – I never turn them off	40	28%
Frequent – once or twice a lesson	63	44%
Casual – once or twice a day	31	21%
Infrequent – once or twice every week	6	4%
Unanswered	4	3%
TOTAL responses	144	100%

Table 4.7: Self-reported frequency of mobile device use during class

An additional part of the survey required responses from students regarding their experiences with mobile devices and investigated what they were using their mobile devices for. The findings of the closed-answered and open-answered sections corresponding to the research questions are outlined in the following sections.

4.3.2 Within the context of a pre-degree, university preparation course in New Zealand, how are students using mobile devices in relation to learning?

To identify how students were using their mobile devices, data was taken from two surveys. One survey entitled *The Effects of Mobile Devices on Student Learning*,

collected open-ended, self-reported attitudinal responses. One hundred and forty-four responses to this survey were collected and an analysis of responses to the open-ended questions into perceptions and attitudes towards the role of mobile devices in academic contexts identified the five following themes: (1) social connection; (2) assignments and course materials; (3) research; (4) dictionary and vocabulary; (5) entertainment. These themes are explored in the subsequent sections.

Mobile device usage	1. Social connection 2. Assignments and course materials 3. Research 4. Dictionary and vocabulary 5. Entertainment

An additional survey was also implemented to investigate the activities students used their devices for. Sixty-three students responded to this additional survey. This represented 44% of the total student participant pool. The survey investigated different activities that mobile devices could be used for and explored the frequency with which participants used their mobile devices to complete these activities. Participants were asked to choose the frequency that *best* suited their use from the following options: hourly, every 3-4 hours, daily, every 2-3 days, weekly, every 2 weeks, monthly, every 2-3 months, never used. Students could only choose one frequency, and it is therefore possible that exact usage varies from that reported. It was decided that the times indicated above gave a more accurate picture than using terms such as regularly or often, as such terms could be interpreted differently by individual students.

4.3.2.1 Social connection

Participants were overwhelmingly using their devices for communicative purposes (see Figure 4.8 for frequency of communicative use of mobile devices): 96.8% (n=61) of those surveyed indicated that they used their mobile devices to send SMS and text

messages on an hourly, 3-4 hourly, or daily basis; 92.1% (n=58) indicated that they were accessing emails and equally 92.1% (n=58) indicated they were accessing social networks via their mobile device at least once a day if not more regularly. As it would be considered inappropriate to use a phone during class times, the survey did not ask about using mobile devices to make phone calls.

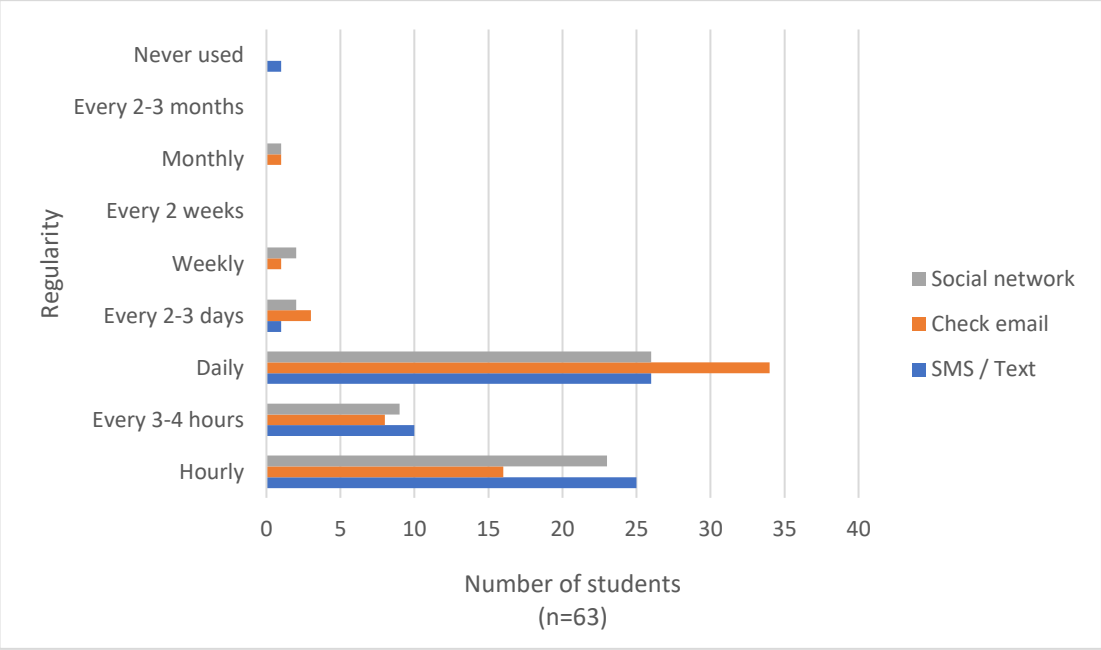


Figure 4.9: Communicative uses of mobile devices

Survey responses concerning the effects of mobile devices on student learning had 12% (n=17) of the students specifically commenting on using their mobile devices to communicate with others during class. Selected comments included:

> *Messages from social APP, such as Wechat, Whatsapp and facebook* (S130).
>
> *Accessing messages from the world* (S93).
>
> *Contacting lecturers and classmates* (S96).
>
> *I believe mobile devices help with my learning, because it helps with communication with teachers and students as well as online sources that help with assessments* (S11).

In addition, five students specifically reported using their mobile device to chat, eight others used messaging apps, and eight more referred to sending and receiving SMS or text messages.

Open-ended responses also mentioned social networks being regularly accessed via mobile devices. Students commented on using their mobile devices to check social media and social network sites such as *Facebook* and *Snapchat*.

> *Sometimes the iPhone will have the social media news, and I always check that* (S60).
>
> *On every mobile device we have access to social networks [such] as Facebook. So it is very easy to be tempt [sic] to go on and chat with friend instead of work* (S62).
>
> *Notifications will come through whilst in class from my social media apps* (S117).

Seven students commented on using *Facebook* during classes and an additional eight comments referred to being distracted by notifications during class. Social networking included communicating through text and through pictures.

4.3.2.2 Assignments and course materials

The second theme that emerged from the data collected via the student surveys was the use of mobile devices to complete assignments and access course materials. Table 4.8 shows mentions of these topics in response to the student survey.

Category	Responses	Numbers of mentions
Classwork		

Category	Responses	Numbers of mentions
	Writing tasks	21
	Reading	14
	Generic in class tasks (follow the teacher)	11
	Notetaking	7
	Vocabulary and language exercises	7
Accessing materials		
	Using the LMS	19
	Researching	5
	Revision	4
	Accessing class materials	4
	Accessing supplementary materials	3
	Lectures online	1
Completing assignments		
	Essay writing	7
	Homework submission	7
	Assessments	5
	Presentations	3
	Writing	2
	Quizzes	2

Table 4.8: Table of mentions – student survey

Sixty students commented on using mobile devices to complete classwork. Twenty-one students mentioned using their devices to complete writing tasks; 14 mentioned reading; 11 students commented on using their mobile device to complete tasks that teachers had set in class; and seven students commented on note-taking or using their mobile devices to complete vocabulary and language exercises. Nineteen students referred to accessing the LMS used at this tertiary institute during classes. All of these tasks were related to accessing coursework and materials. Some selected comments included:

Access information to help with tasks set by the teacher (S63).

I think [mobile devices] help my learning because it gives you immediate access to stream or things like Google to help with whatever you're doing in class. It's very helpful to have it so readily available with a mobile phone, laptop, etc. (S47).

I think it's helpful to have a consistent connection to sources for classes (S81).

Students are regularly accessing course materials in class to be able to complete tasks as prescribed by their teachers.

Thirty six students mentioned they used mobile devices to access materials.

Easy access to learning and slideshows and videos etc (S118).

[Mobile devices] are a fast and convenient way to get course and other information relevant to study (S130).

All students who completed the survey signalled that they had their phone with them in most classes with 96% indicating they had their phone with them in class every day. Convenience was identified as key in the decision to use mobile devices to access course materials.

Twenty six students commented on using their mobile devices to complete assignments.

I would not be able to pass my assignments, I would not be able to submit my homework (S61).

Able to finish assignments faster (S65).

Completion and submission of assignments were identified as ways that mobile devices were used within this academic context.

Students were also asked if they had a preference for digital or printed copies of course materials. Table 4.9 has a tally of responses to the question, *When you access*

course materials (for example, readings, questionnaires, quizzes, etc) do you prefer to access a digital copy (on your mobile device) or do you prefer a printed copy on paper?

Preference	Number of responses
Print	82
Digital	24
Both	17
Either	4

Table 4.9: Preference for digital or printed resources

Six responses were not included in the tally as the students indicated "Yes" (four responses) or "No" (2 responses) and thus did not respond to the question posed.

4.3.2.3 Research

The ability to be able to connect to the internet provides students with access to knowledge and information required to complete academic research. Fifty seven students stated that they used their mobile devices when researching or searching for information and sources to support them to complete coursework and assignments.

Use of mobile device	Number of responses
Research	28
Online sources	12
Search / Find information	12
Clarification	5

Table 4.10: Use of mobile devices (research)

This was evident in comments such as:

[Find] information required efficiently and quickly (S8)

I have constant access to help with my research (S54)

We have lots of research, and it is easy to find information online (S60)

Consistent connection to sources (S81)

Twenty eight students indicated that research (or researching) was a task that they felt they needed to use a mobile device for to be able to complete. An additional 17 students directly mentioned that mobile devices assisted learning by enabling efficient, timely access to information.

4.3.2.4 Dictionary and vocabulary

Of specific mention was the ability to be able to access lexical support. From the demographic information collected, 19% of the student participants identified as monolingual English speakers. Therefore, approximately 81% of students who responded to this survey were speakers of two or more languages. Access to dictionaries and vocabulary support was mentioned by 25 individual students. Some comments are illustrated in the following word tree, reading from left to right across the branches:

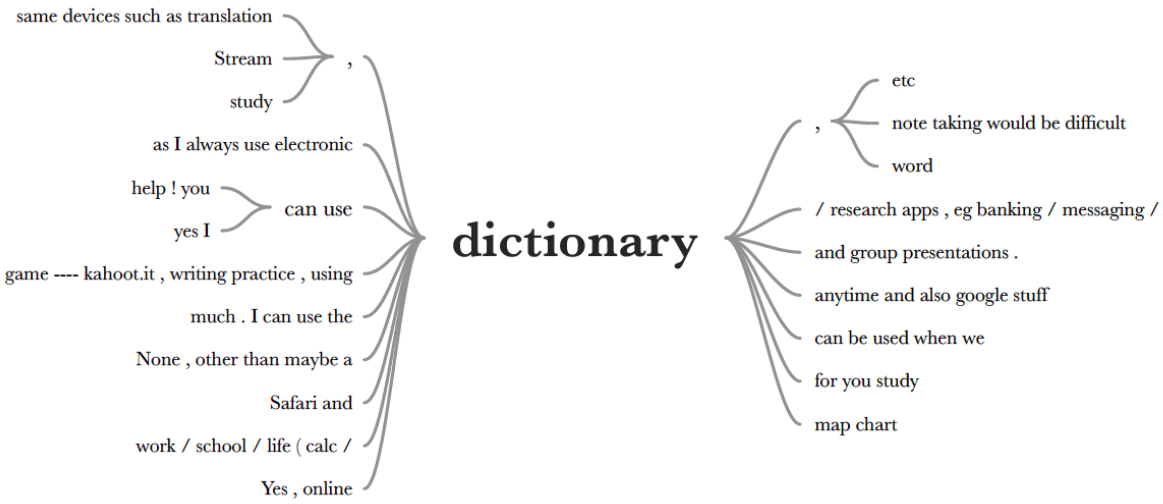


Figure 4.10: Word tree (dictionary)

Other students mentioned lexical support through the use of different tools. A summary of these references is shown in table 4.11.

Lexical support	Number of responses
(Online) dictionary	9
Vocabulary	7
Check word(s)	3
Translate	3
Check definition	2
Grammar	1
Search for synonym	1

Table 4.11: Use of mobile devices (lexical support)

Accessing dictionaries was a feature that students reported using frequently.

4.3.2.5 Entertainment

One student specifically stated:

> *[A mobile device] is a really good tool of entertainment* (S126).

Another student stated:

> *I do non related things for entertainment whilst in class where I should be learning* (S87)

Therefore, entertainment is the fifth theme that has been identified as a use of mobile devices that can have an effect, albeit a negative effect, on learning.

Students also indicated watching online videos as a way of keeping entertained although students indicated that their use of mobile devices to entertain also led to distraction from their studies. Selected comments included:

> *Cannot focus on study when chatting with friend or watching YouTube* (S3).
>
> *I watch video[s]* (S26).
>
> *Listening to music or watching TV* (S93).
>
> *I can use my laptop or phone for music or videos for 20-30 minutes, then I am refreshed and able to keep on studying* (S16).

These comments would indicate that students were accessing audio-visual material from a range of sources. However, it would appear that these materials do not always support learning but can be detrimental to maintaining focus within the classroom context. Some students may be using the device as a break from study, in order to return later more refreshed, as indicated by S16's quote.

In the additional survey that investigated the frequency with which their mobile devices were used to complete tasks, five tasks could be classified as entertainment: reading, downloading apps, playing games, surfing the internet, and listening to music. It is possible that students were reading, searching the internet, or downloading apps for the purpose of research; however, in this survey the purpose of the completion of these tasks was not investigated. Therefore, it is possible that there is an overlap between this theme and the theme of research as identified earlier. As students were not asked to identify the purpose of completing the task, five of these tasks were classified as having the function of entertainment (see figure 4.10) and they may, or may not, have been used to support learning.

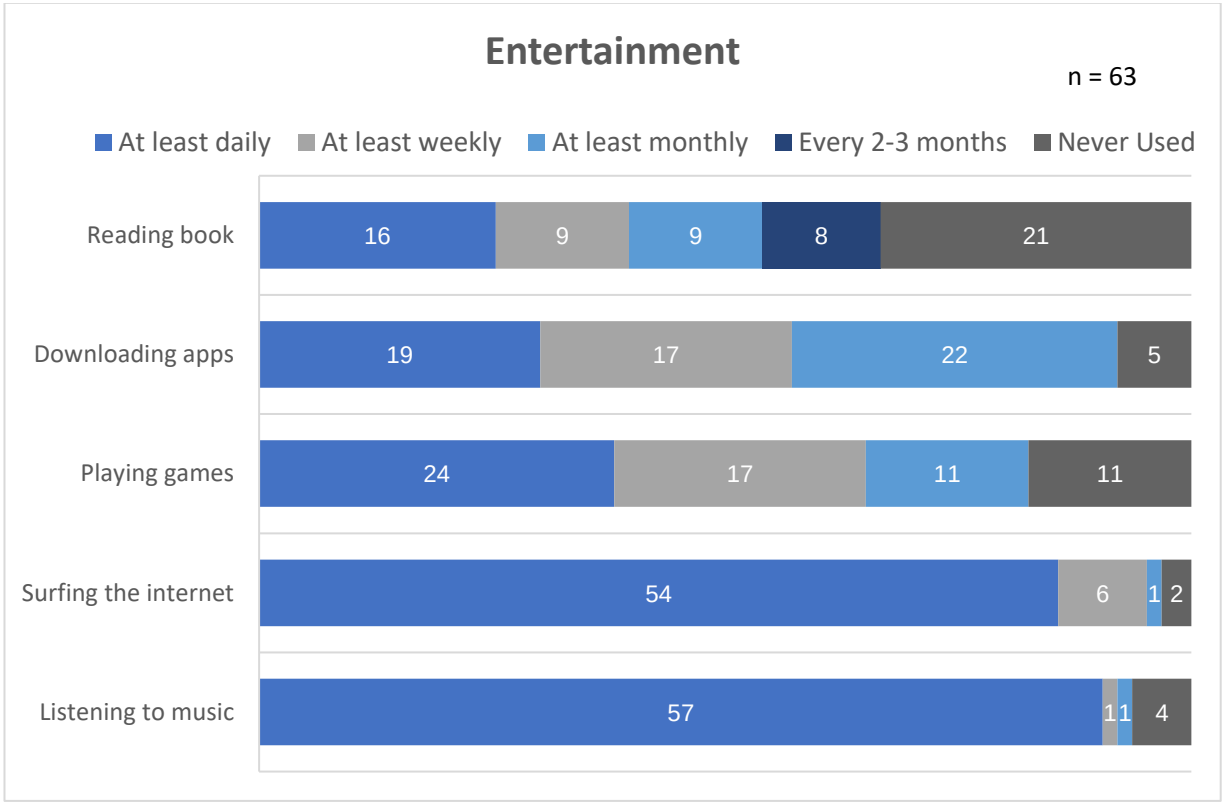


Figure 4.11: Entertainment uses of mobile devices

Listening to music and surfing the internet were the most popular task in this category, with 90% (n=57) of students indicating listening to music via their mobile device on a daily basis and 86% (n=54) of students reporting using their mobile device daily to surf the internet. Applications (commonly referred to as apps) were downloaded on a daily basis by 30% (n=19) of students with an additional 27% (n=17) downloading apps on a weekly or more frequent basis. However, students were not asked to identify the nature of the apps they were downloading. In this study, participants were not asked to differentiate between personal, social, or academic use of the internet or downloaded apps. The purpose, content or focus of internet searches and app downloads might be an area of interest in subsequent studies.

When asked about playing games, 17% (n=11) of students claimed to have never used mobile devices to play games; conversely, 38% (n=24) reported playing games on their mobile device at least daily. Using a mobile device to read a book was the least popular task of the five entertainment tasks. However, one third of the students had never used their mobile device to read a book, while a quarter of them were reading a book on their mobile device on at least a daily basis.

4.3.3 What factors influence the use of mobile devices within this academic context?

To identify tasks deemed to necessitate the use of mobile devices, 105 students (73% of the student participant pool) responded to the prompt "what tasks do you feel you could ***not*** do if you were not able to use your mobile device?" Through an inductive coding process the following categories were identified: academic, social, and functional. What tasks students used their mobile device for, but could probably complete without the aid of the mobile device, was also investigated. Ninety responses (86%) were received and the same inductive approach to coding was implemented with the same categories being identified.

Influential factors	1. Academic factors 2. Social factors 3. Functional factors

4.3.3.1 Academic factors

The largest category of influential factors identified was the use of mobile devices to complete academic tasks. Students identified a range of academic tasks that they believed could not be completed without the use of mobile devices. These included accessing materials to complete class work and submitting assignments (refer to table 4.8), carrying out research (refer table 4.10), accurately referencing and citing materials adhering to academic conventions (see screenshot from *NVivo* of coded mentions to using mobile devices for referencing and citations in figure 4.12). The prominence of academic tasks could be attributable to the context within which the research project was conducted.

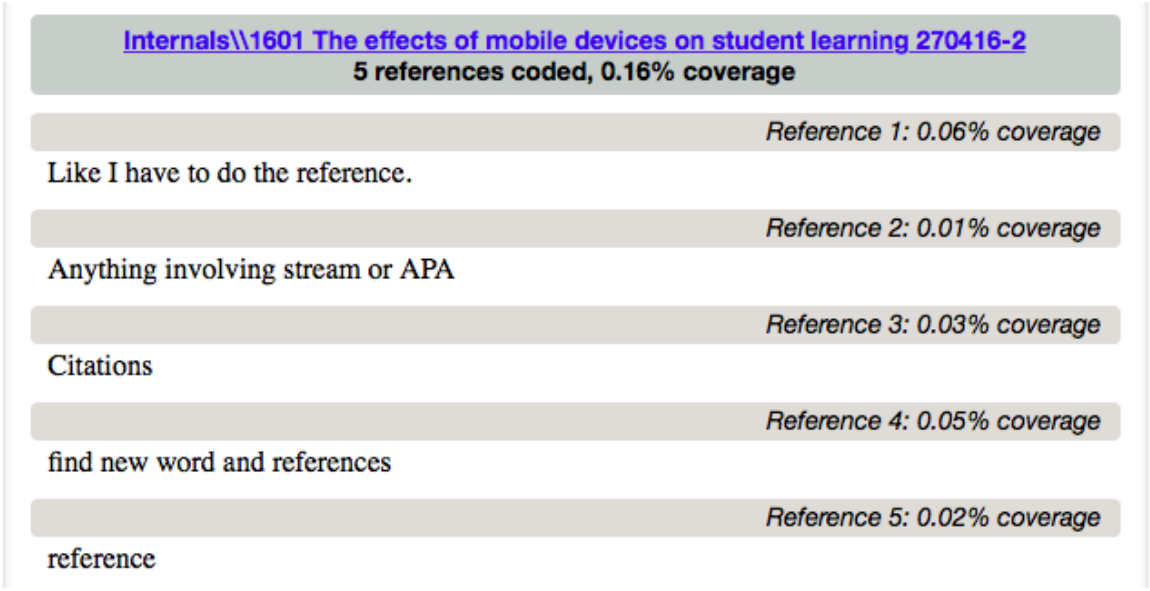


Figure 4.12: Coded references in NVivo (citations and reference)

Students commented on being able to complete some tasks without mobile devices. Students claimed that they could complete academic tasks such as writing tasks, writing essays, note-taking, research, assignments, and class work without the use of

mobile devices. On the other hand, they acknowledged the convenience of mobile devices, which made certain tasks easier to complete. One comment illustrated this:

> *I think some writing tasks, [are easier to complete] since writing on a laptop is very convenient to edit and revise. But I can do it without using a mobile device* (S4).

Of interest were the categories that appeared in response to both "What task do you need your mobile device for?" and "What task can you do without your mobile device?" Within an academic context, the use of mobile devices to complete research and access materials were found to appear in response to both of these questions. Comments regarding the necessity of using mobile devices to access materials and research were made by 30.5% of students (n=44) while 6% (n=9) commented that these tasks could be completed without mobile devices. Within an English as a Second Language context, the appearance of vocabulary on both categories is of interest. Six students claimed mobile devices were necessary when learning and studying vocabulary. By contrast, six students reported they were not necessary.

4.3.3.2 Social factors

Key to forming relationships within the course and community are social factors. The category of social uses included using a mobile device when communicating with peers and teachers and generally being able to connect with others. The methods for communicating were reported in section 4.3.1.1 in relation to how students used their mobile devices. As presented in that section, mobile devices were being used for communicative purposes. It can therefore be proposed that the social factors in turn influenced the choice of mobile devices as a preferred method of maintaining social networks with peers and teachers.

Teacher encouragement was a factor that was said to influence students' use of mobile devices in class. Students were asked if they felt encouraged to use mobile devices in the classroom. Sixty-five percent (n=93) responded "Yes" they felt

encouraged; 11% (n=16) said they "Sometimes" felt encouraged; and 19% (n=28) indicated they did not feel encouraged to use mobile devices. Slightly less than 5% of respondents (n=7) indicated that they were "unsure" as to whether they felt encouraged. Most students (65%) felt encouraged to use their mobile devices within an academic context, making teacher encouragement a factor that influenced the use of mobile devices during class activities.

4.3.3.3 Functional factors

The functional convenience, portability, accessibility and use of mobile devices as a tool were mentioned.

> *There is a good side & bad side to the usage of mobile devices, the good is that we are able to reach information required efficiently and quickly* (S8).
>
> *Convenient to carry [it] with [me]* (S1).
>
> *I believe mobile devices do help a lot. I guess storing work all in the laptop and not having to carry books and papers around is very helpful* (S96).
>
> *My first language is French, so without my computer I couldn't translate as easily the words I don't understand in class. Moreover, making research would take so much more time. Mobile device(s) make us earn time* (S62).

Sixteen students stipulated that mobile devices were not necessary, with one student stating,

> *I don't believe not having mobile devices should effect [sic] any part of studying even though it makes things a lot more [sic] easier* (S11).

These responses would indicate there were divergent, and possibly conflicting, perspectives regarding whether or not functional factors influenced the use of mobile devices within the academic context.

4.3.4 From the students' point of view, how do mobile devices add value, if any, to learning and teaching practices within this New Zealand context?

When students considered, from their personal perspective, what value they perceived was added to their learning, four themes emerged and are discussed in this section.

Perceived value	1. Efficiency 2. Accessing materials 3. Convenience 4. Accessibility to language support

Students were prompted to consider the usefulness of their mobile devices. When students were asked whether mobile devices added value (help) or hindered their learning experiences, the overwhelming self-reported responses were in favour of mobile devices assisting learning, with 89% of students either directly or indirectly stating that mobile devices helped their learning (see Figure 4.13). Some comments that indicated mobile devices were perceived to be beneficial included:

> *Yes it definitely does. Not only can it be a lot quicker to get tasks done but it also saves the weight of carrying around more things such as big folders* (S84).
>
> *Overall, I think they are favourable for me. The main reason is that it is the fast and convenient way to get course and other information relevant to study. Next, I can reserve assignments easily and check them in any time* (S130).

Responses also identified specific areas where value was perceived to be added to support learning.

The majority of students responded that mobile devices were used to support learning when responding to the question "In your opinion, do you think mobile devices help or hinder your learning?" (see Table 4.12 for a summary). Responses

indicated that mobile devices were deemed most helpful when conducting research or accessing information. Dictionary and vocabulary support, access to material, and convenience were also attributed as factors that positively impacted on their learning.

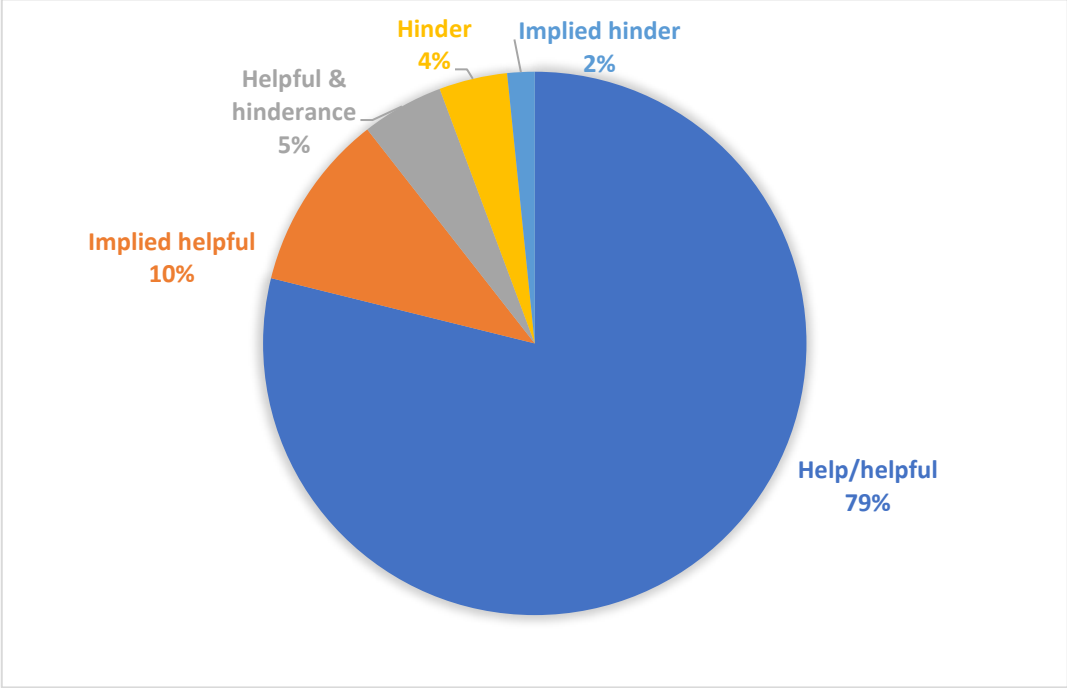


Figure 4.13: Perceived usefulness of mobile devices

In response to the prompt "In your opinion, do you think mobile devices help or hinder your learning?", 29 students explicitly stated that mobile devices helped their learning but did not elaborate on the task or situations that they felt that mobile devices helped them with. Fifty-one students stated that mobile devices helped them with their learning and elaborated on how they helped. These mentions have been captured in table 4.12. In addition, 19 students mentioned ways in which they found mobile devices to be useful or ways that they used mobile devices to aide their learning, but they did not explicitly state that mobile devices helped their learning. These mentions were classified as "implied help".

Responses	Numbers of mentions		
	Stated "helped to" or "helped with"	Implied "helped to" or "helped with"	TOTALS
Gain knowledge / Conduct research	11	6	17
Efficient access to information	13	2	15
Dictionary / Vocabulary	7	3	10
Access class materials / Stream	7	1	8
Convenient to carry	6	1	7
Communicate	3	1	4
Assignments	1	2	3
Useful		3	3
Interactive	2		2
Check answers	1		1

Table 4.12: Table of mentions – student survey (perceived help)

When accessing materials, students commented on the efficiency and convenience of being able to access necessary materials.

> *It is the fast and convenient way to get course and other information relevant to study* (S130).
>
> *If we miss notes or need to make more notes later on so we don't fall behind* (S73).

Students made comments about being able to access materials when they had missed out on content due to absenteeism, as illustrated in the quote above, or as a convenient way to revise course content.

> *[It] lets me go back to past classes to regather info* (S61).

Having access to the materials online, which they accessed using their mobile devices, was highly valued.

What is interesting in the context of classroom-based learning is that the majority of comments indicated that students self-reported to be on-task. With relation to an EAL context, comments regarding how mobile devices could support language learning included:

> *Me as a second language student it helps me a lot as I always refer to Google translator* (S56).
>
> *I can learn the language conveniently* (S128).
>
> *Some grammars and vocabularies are difficult for me, I need to check in the internet* (S20).

These comments suggest that students were using their mobile devices to gain immediate access to language support and reference materials.

By contrast, some students seemed to have reflected on a need to physically process language. One such quote appeared to identify an awareness of a link between kinaesthetic and cognitive processes.

> *I seem to remember more when I'm writing rather than typing* (S96).

This student's quote identified a link between the physical action of writing and the cognitive processes associated with memory.

4.3.5 What challenges, if any, do students in this context face when using mobile devices in the classroom?

Challenges	1. Distractions 2. Notifications

A challenge of having mobile devices in the classroom, as identified by some students, was the potential to be distracted by mobile devices, both their own and those belonging to others. However, approximately half of the 144 received responses

(n=53) indicated that mobile devices were not a distraction. An additional five students reported not using mobile devices in class so did not find them to be a distraction. The remaining responses indicated that the potential to be distracted by mobile devices was a considerable challenge. One student commented:

> *When doing some boring or difficult tasks, it is easy to be absent minded when holding a mobile device* (S4).

More specifically, receiving texts and emails were identified as the main source of distraction with 14.5% of students (n=21) indicating this distracted them during class. Approximately 16% of students (n=23) mentioned notifications, social media, or *Facebook* in particular, as being a distraction. Another five students referred directly to the in-house Learning Management System as a distraction to their learning.

4.3.6 Summary of student survey findings

From the student surveys, which explored the frequency with which students performed specific tasks using their mobile device, and the data collected via the survey entitled *The Effects of Mobile Devices on Student Learning*, five themes emerged:

- Social connection – including the use of mobile devices to communicate and share via social networks;
- Assignments and course materials – accessing materials to complete course work and graded assessments;
- Research – accessing sources and resources to conduct academic research;
- Dictionary and vocabulary – lexical support was particularly important for EAL students;
- Entertainment – including listening to music, surfing the internet, watching videos, playing games, downloading apps and reading books.

Students identified three influential factors that affected their use of mobile devices in the context of a pre-degree classroom:

- Academic – including conducting research, submitting assignments, accessing referencing tools;
- Social – including connecting with peers and teachers;
- Functional – use as a tool, convenience, portability, and accessibility.

The same influences were found to exist when students reported on tasks they used their mobile device for, but could probably complete without the aid of the mobile device.

From a students' perspectives, value was seen to be added in the areas of conveniently and efficiently accessing materials and resources, and in facilitating access to language learning support and reference materials. One student identified value was not added with respect to the development of muscle memory that may be present when physically processing language.

The survey also explored perceived challenges when using mobile devices in the classroom. Students readily identified managing distractions as the largest challenge. Some of these distractions were caused by text messages, emails and automatic notifications from social network sites.

4.4 Inventory of Online Learning Strategies

As many of the communications between student and teacher were in a blended learning space, it was of interest what online learning strategies were perceived as being of value. Therefore, an adaption of the inventory used by Frey et al. (2003) and McSporran (2004) was used. Students were provided with a list of 19 online learning strategies in order to rate the value of each strategy. Sixty-eight students completed the inventory by ranking each online learning strategy on a scale from one (of no value) to seven (very valuable).

The inventory of online learning strategies (see appendix D) was used to examine, from a student's perspective, any perceived value in the use of mobile devices in university preparation courses, with a specific focus on learning and teaching practices pertaining to research question three.

Research questions (RQ)	**Teacher survey**	**Student survey**	**Inventory**	**Student Discussions**	**Observations and Analytics**
RQ1 Usage	✓	✓		✓	✓
RQ2 Influential factors	✓	✓		✓	
RQ3 Value	✓	✓	✓	✓	
RQ4 Challenges	✓	✓		✓	✓

Table 4.13: Crosswalk showing the research questions and data collection methods used – inventory

This study of pre-degree students was conducted in juxtaposition to previous studies that looked at undergraduate (Frey et al., 2003) and postgraduate (McSporran, 2004) students. In the original studies conducted by Frey et al. (2003) and McSporran (2004), the online learning strategies were grouped into themes. Ranking values were tallied before calculating the mean score across the cohort. The mean scores were ranked from most valuable to least valuable. Table 4.14 illustrates the perceived value of each of the 19 learning strategies as indicated by Foundation students (the focus of this study). A ranking of one indicates that students identified this particular strategy as being the most valuable online learning strategy. Colours used in table 4.14 denote the themes as identified in the previous studies: Course information (green); communication (blue); assignments and grading (yellow); and learning resources (orange). These themes are discussed individually later in this chapter.

Online Learning Strategy	Perceived ranking value
Posting of course calendar online.	1
Email communication with the teacher.	2
Submission of assignments via Stream.	3
Posting of lecture/class notes online.	4
Online feedback regarding assignments.	5
Posting of task lists that are linked to reminders.	6
Posting of syllabus/course outline online.	7
Posting detailed assignment instructions online.	8
Posting of grades online.	9
Example tests and exams.	10
Provision of links to online resources.	11
Provision of computerised study guides.	12
Online announcements posted on Stream.	13
Multimedia assignments and tests to complete online.	14
Compulsory interactive online assignments.	15
Online self-assessed quizzes.	16
Online academic discussion groups.	17
Availability of email addresses of all class members.	18
Availability of homepages for posting personal information.	19

Table 4.14: Ranking of online learning strategies

Access to an online course calendar was ranked as the most valuable online learning strategy for these pre-degree students. Direct email communication with teachers and online assignment submission rounded off the top three most valuable strategies. The three learning strategies that were ranked as the least valuable from this list all refer to the creation and maintenance of peer networks. Online

academic discussion groups, access to email addresses for peers, and the ability to post personal information on homepages were considered to be significantly less valuable. The following section explores findings associated with the perceived value of all of the online learning strategies as they relate to research question three.

4.4.1 From the students' point of view, how do mobile devices add value, if any, to learning and teaching practices within this New Zealand context?

All of the students who participated in this study were enrolled in university preparation courses that were designed based on blended learning principles. Each online learning strategy has been further examined as to the purpose of the individual strategy. It can be posited that students are more likely to use an online learning strategy if they perceive the strategy to be valuable. The value attributed to each online learning strategy is discussed in the following sections using the themes identified. In keeping with previous studies that have also investigated online learning strategies using this research instrument (Frey et al., 2003; McSporran, 2004), the identified themes were: (1) course information; (2) learning resources; (3) assignments and grading; and (4) communication. Findings from table 4.14 are discussed according to these four themes, starting with course information.

Perceived value	1. Course information 2. Learning resources 3. Assignments and grading 4. Communication

4.4.1.1 Course information

Within the context of pre-degree academic study, when students were new to tertiary study, course information was perhaps unsurprisingly the theme perceived as overall more valuable than other strategies. Four of the online learning strategies

related to accessing course information (as illustrated in table 4.15). Of the four strategies, information related to time management, such as an online course calendar and linked task reminders, were viewed as the most valuable within the theme of course information. Having a course calendar was ranked as the most valuable online learning strategy overall for the 19 strategies. Accessing information related to the task lists, syllabus, which includes information pertaining to course organisation and what was to be taught, and detailed assignment instructions were ranked sixth, seventh, and eighth most valuable strategy of the 19 strategies respectively.

Course Information	Perceived ranking value
Posting of course calendar online.	1
Posting of task lists that are linked to reminders.	6
Posting of syllabus/course outline online.	7
Posting of detailed assignment instructions online.	8

Table 4.15: Strategies - Course information

4.4.1.2 Learning resources

Following course information, learning resources were also perceived as a valuable online learning strategy (as illustrated in table 4.16). Having access to class notes posted online was perceived to be of high value ranking in the top four most valuable online learning strategies. Access to example tests and exams was ranked as the tenth most valuable online learning strategy. Being able to access links to online resources and study guides was perceived to be of middling value with a rank of 11 and 12 respectively. The use of online self-assessed quizzes was perceived as one of the fourth least valuable online learning strategies (ranked 16th).

Learning Resources	Perceived ranking value
Posting of lecture/class notes online.	4
Example tests and exams.	10
Provision of links to online resources.	11
Provision of computerised study guides.	12
Online self-assessed quizzes.	16

Table 4.16: Strategies - Learning resources

4.4.1.3 Assignments and grading

Formative and summative assessments are arguably a fundamental part of academic study. Being able to submit assignments digitally via the institute's LMS (Stream) was perceived to be the most valuable strategy when it came to online learning strategies related to assignments and grading (as seen in table 4.17). Receiving feedback and grades online were seen as fifth and ninth most valuable online learning strategy in this particular context. The online completion of multimedia assignments and tests was ranked slightly more valuable than compulsory interactive online assignments. Multimedia assignments were ranked 14th while compulsory interactive online assignments was ranked by students as the fifth least (ranked 15th) valuable online strategy.

Assignments and grading	Perceived ranking value
Submission of assignments via Stream.	3
Online feedback regarding assignments.	5
Posting of grades online.	9
Multimedia assignments and tests to complete online.	14
Compulsory interactive online assignments.	15

Table 4.17: Strategies - Assignments and grading

4.4.1.4 Communication

The theme of communication was ranked as the least valuable online learning strategy overall for these pre-degree students as shown in table 4.18. Specifically, the most valuable strategy for students in terms of communication, and the second most valuable online strategy overall, was facilitating email communication with the teacher. Announcements posted on the LMS was ranked 13th. The three least valuable strategies, as ranked by the Foundation students, were access to online academic discussion groups, the ability to contact all class members via email, and being able to share personal information. This indicates that for students who completed the inventory the theme of communication was perceived to be the least valuable online learning strategy.

Communication	**Perceived ranking value**
Email communication with the teacher.	2
Online announcements posted on Stream.	13
Online academic discussion groups.	17
Availability of email contact for all class members.	18
Availability of homepages for posting personal information.	19

Table 4.18: Strategies - Communication

4.4.2 Summary of inventory of online learning strategies findings

Of the online learning strategies included in this inventory, learning strategies related to course information and time management emerged as the most value for students enrolled in pre-degree courses at the site of this study. Strategies associated with learning resources were identified to be the second most valuable. Assignments and grading ranked as the third most valued overall theme with aspects of online

communication being perceived as the least valuable online learning strategy within this pre-degree, blended delivery academic context.

4.5 Student discussion groups

All participants who took part in this phase of the data collection opted to participate in discussion groups and nobody took the option of individual interviews. However, in one discussion group, only one student turned up at the allocated time. She was offered the opportunity to join another group or proceed as an individual. She chose to have a one to one conversation with the researcher.

Discussions were held in a classroom on campus where the researcher and participants sat around a round table. All discussions were facilitated by the researcher to ensure, in keeping with the tradition of constructivism, that the participants and facilitator were able to discuss collective experiences drawing on some of the principles of phenomenography. Any necessity for expansion or clarification could be explored immediately, which also allowed for an exploration of the implicit aspects of Activity Theory as posited in the methodology chapter of this thesis. All discussions were digitally recorded and subsequently transcribed by the researcher. Findings relating to the four research questions are explored in the following sections.

Nine students from the student participant pool volunteered to participate in five discussions with the researcher. At the conclusion of the interviewing phase, the interviews were transcribed. Congruent with my epistemological standing as presented in chapter one, I believe I was active in the construction of understanding within the context of the discussions. As I was intending to understand recurrent themes in the data, it was valuable to listen to the dialogue multiple times in addition to having access to the scripted dialogue (Vaughn & Turner, 2016). The process of fact checking (Tracy, 2013) transcripts of the discussions required repetitive listening

to ensure accuracy of the transcript. Following transcription, and prior to analysis, each transcript was returned to the discussion participants to verify accuracy of the transcript (see appendix I).

Each discussion was transcribed prior to being coded using iterative coding. Themes that emerged are described in the following section. The discussions aimed to expand on the effects, impact and use of mobile devices from a personal student perspective. Findings are presented under each of the research questions.

Research questions (RQ)	**Teacher survey**	**Student survey**	**Inventory**	**Student Discussions**	**Observations and Analytics**
RQ1 Usage	✓	✓		✓	✓
RQ2 Influential factors	✓	✓		✓	
RQ3 Value	✓	✓	✓	✓	
RQ4 Challenges	✓	✓		✓	✓

Table 4.19: Crosswalk showing the research questions and data collection methods used – student discussions

4.5.1 Student discussion group participants

All students were in their first semester of a pre-degree academic preparedness course and came from the wider student participant pool described earlier in this chapter, in section 4.1.2. Five females and four males participated in the student discussions. The age range of these students was between 18 and 23 years old. As there were nine students who participated in the student discussion groups, each was given a pseudonym and data were attributed using the pseudonym. This differs from the student survey described earlier in this chapter, where students were assigned a number (for example, S3 was assigned to the third response submitted in the survey).

Student respondent pseudonym	Age	Gender	Nationality	First language
Olivia	18	Female	American	Spanish
Lin	19	Female	Chinese	Mandarin
Qing	19	Female	Chinese	Mandarin
Georgia	19	Female	New Zealander	English
Joshua	19	Male	New Zealander	English
Fang	21	Male	Chinese	Mandarin
Omar	21	Male	Saudi Arabian	Arabic
Jessica	23	Female	New Zealander	English
Ahmed	23	Male	Saudi Arabian	Arabic

Table 4.20: Student discussion participants

Students who participated in the discussions identified their first language, or mother tongue, to be either English, Mandarin, Arabic, or Spanish (as represented in figure 4.13). Six of the nine students considered themselves to be ESOL students and three were monolingual English speakers. All discussions were held in English as the common language spoken by all participants and the researcher.

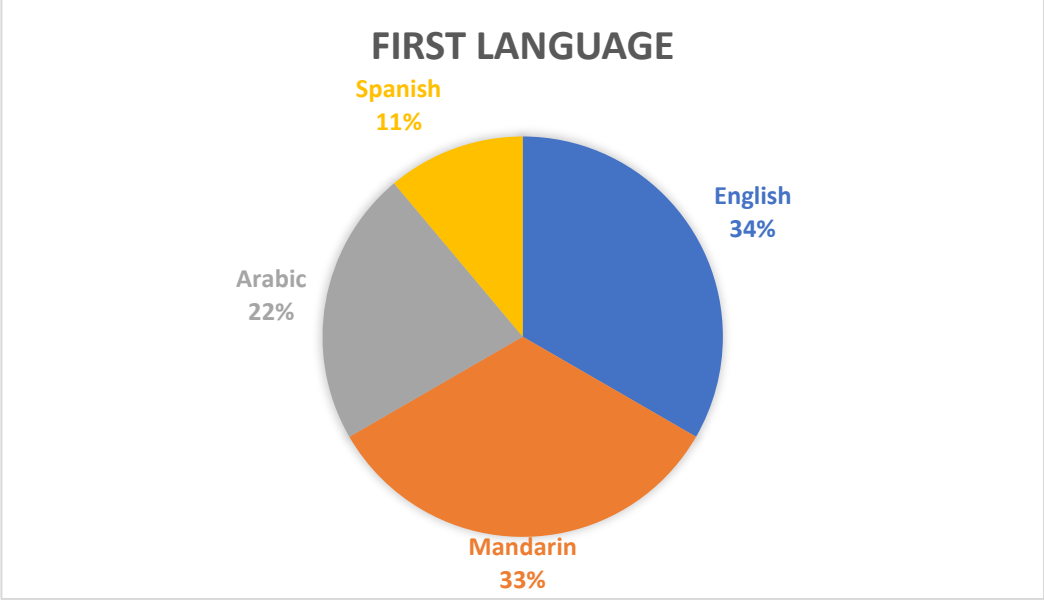


Figure 4.14: First language spoken by discussion participants

4.5.2 Within the context of a pre-degree, university preparation course in New Zealand, how are students using mobile devices in relation to learning?

Identified themes from the discussions indicated there were four explicit uses of mobile devices within the context of, or in relation to, learning: (1) vocabulary and spelling; (2) completing or contributing to coursework and assignments; (3) time management and organisation; and (4) extracurricular or additional study.

Mobile device usage	1. Vocabulary and spelling 2. Complete or contribute to coursework and assignments 3. Time management and organisation 4. Extracurricular / Additional study

4.5.2.1 Vocabulary and spelling

In the case of students who had more than one mobile device with them in class, often a mobile phone and a laptop or tablet, they differentiated between the tasks that they used their phone for and the tasks that were completed on laptops or tablets. The most common use of mobile devices within the academic context was to access vocabulary.

> *We might want to access something short and quick like dictionaries so we just use our phones or if we need to do a 1 minute search and then put it back in my pocket* (Fang).

All students involved in the discussions indicated they always had their mobile phone with them in all classes.

Some students reported using translation apps or websites when working between languages:

> *Usually I find the translation on the phone is not as useful as the laptop. The laptop gives more detailed meanings; the phone just gives simple meanings* (Qing).

Discussion participants also mentioned accessing dictionaries, to find definitions, synonyms and word families, via apps or websites such as *Wordhippo,* as ways they used their mobile devices to support language accuracy. This was consistent across native English language speakers as well as students for whom English is an additional language.

One student reported using Siri, the intelligent personal assistant native to Apple operating systems, to ask for spelling assistance. When asked how mobile devices can help with learning in class, she responded:

> *Spelling especially with my dyslexia and stuff … If I'm really lost I'll say the word to Siri, cause I've got an apple phone, and usually it'll come up with how to spell it which I find really useful when I'm doing stuff like my essays and stuff. So I'll just say "Hey Siri" so it picks up my voice and then I'll just say the word and it writes it for me* (Georgia).

This describes a mobile device being used in a way that supports a learning need that could, arguable, not be supported as seamlessly or immediately without the use of the mobile device.

4.5.2.2 Complete or contribute to coursework and assignments

Seven out of the nine discussion group participants directly mentioned using mobile devices within the classroom context to find sources to complete classwork and assignments. Some students reported using their mobile devices to stimulate conversation:

> *I think that it's awesome to engage people in a topic. Actually go on your phones and look through it and it triggers a group discussion and almost everybody has some access to the topic* (Olivia).
>
> *If the teacher just said discuss the topic, the majority of the class would have no idea. But if they can use their phone they have something to say or know what they are talking about. Whereas if the teacher is like research this guy,*

then the whole class has some sort of knowledge about that and they can all contribute to the discussion (Joshua).

Finding additional information to support in class learning and teaching activities were also mentioned:

I use my phone quite a bit in class. It's really good for when I'm writing essays, I can just quickly search up things right then and there (Joshua).

We sometimes need to find business facts online to help us understand the topic. Getting up-to-date materials/resources. For example, this is what happens in the textbook, what is happening now in modern times (Qing).

Students are self-reporting here that they were using mobile devices to access up-to-date, real-time data to actively contribute to classroom activities.

4.5.2.3 Time management and organisation

Another use of mobile devices in relation to learning was for organisational and time management purposes. Students reported the accessibility of mobile devices, in particular, their phone meant they could efficiently keep track of course related tasks:

I use [my phone] quite a lot for our group presentation. Like a group mate would say, you need to do this bit and I could quickly write it down on my phone right then and there, instead of trying to remember it and then not (Joshua).

Stay organised. In my reminders, that's where I write my homework, my to-do lists, my grocery lists, everything. And my phone and laptop are synced which is why I like to have everything the same brand because they all sync together (Olivia).

Transferable skills such as organization and time management are vital for sustainable student success. It is of interest that students are using mobile devices to gain, practice or improve these skills.

4.5.2.4 Extracurricular / Additional study

Finally, some students referred to using their mobile devices to explore extracurricular studies. During one of the discussions, one of the pairs discussed study in other disciplines in addition to their current studies. Lin talked about studying Japanese online using her device and Omar mentioned exploring disciplines related to psychology, technology and law through open source materials made available by British universities.

4.5.3 What factors influence the use of mobile devices within this academic context?

Five themes emerged from the transcripts when considering factors that were perceived to influence the use of mobile devices within the academic context of a university preparation course: (1) teacher influence; (2) task completion; (3) peer use; (4) attention span; and (5) preference for traditional learning and teaching techniques. These themes are explored in the subsequent paragraphs.

Influential factors	1. Teacher's influence 2. Task requirements 3. Peer usage 4. Attention span 5. Preference for traditional learning and teaching techniques

4.5.3.1 Teacher's influence

All nine of the students referred to teachers influencing their use of mobile devices both in and out of class. On 17 different occasions throughout Olivia and Joshua's discussion, they mentioned that their teacher influenced the way students used their mobile devices within the classroom context. Across the five discussions, there were 44 references to teachers, as shown in table 4.21.

Discussion participants	Frequency
Olivia and Joshua	17
Qing	9
Fang and Ahmed	8
Lin and Omar	6
Jessica and Georgia	4

Table 4.21: References to teachers during student discussions

All students commented on different ways they perceived teachers could impact their use of mobile devices. Students indicated that the teacher influenced the use of mobile devices through direct classroom instruction:

> *Every time I go into class, teachers always say log on to Stream.* (Jessica)

> *If teacher[s] say to bring it, I do but otherwise I don't; it's too heavy.* (Qing)

This would imply teachers were explicit in their intention to use mobile devices for classroom learning and teaching activities.

Teaching styles were also mentioned as a factor that influenced their use of mobile devices:

> *I guess it just depends on the teacher's style a lot. Things like when we have to look up stuff. Like if we are doing a lecture and it's just like, find this and you have 5 minutes, go! And the teacher can pull up an example. Just keeping students engaged and stuff.* (Olivia)

This student discussion group described ways that teachers actively encourage the use of mobile devices to engage students in tasks and to demonstrate access to relevant materials.

Three students discussed pedagogical approaches and classroom management decisions being additional factors that influenced the use of mobile devices within the pre-degree classroom context. One comment that illustrated this was:

It would be easier to pay attention to the teacher with the big screen but in our EAP class she might say stuff and then ask us to do it on our own screen at the same time, it distracts me because I'm trying to do both at the same time. Whereas if she is saying do your own thing, I can do it at my pace. Rather than try to do my pace and her pace at exactly the same time. (Joshua)

Students were able to use their own devices to follow through what the teacher was presenting to the whole class. The excerpt for the student above would indicate that although this was a strategy used by the teacher it was not perceived, by this particular student, to be supportive of his personal learning style.

Students also discussed perceived roles and responsibilities of teachers, particularly with regard to discipline in relation to appropriate or inappropriate use of mobile devices within the classroom. An example of this can be seen in the exchange between Fang and Ahmed when asked to clarify whose responsibility it was to bring students back on track when students were distracted or off-task because of their mobile devices.

Of course it is not the teacher's responsibility. The teacher should concentrate on what they have to do and what they should teach the class and it's the student who brings the mobile device to class should control themselves. But if they are doing another thing then it's their fault. (Fang)

I would say it's the student's responsibility but I think also the teacher could encourage but it's not the responsibility but they could encourage. They could do some steps of when to use mobile devices for example limiting when to use mobile phones to control the student in the classroom. (Ahmed)

I don't think it's a big problem. I think most students are on-track. Some students are just bored or are tired. (Fang)

This exchange is representative of all of the discussions that arose within the student discussion groups. All students agreed that students should be able to self-monitor and should be capable of exercising self-discipline in relation to the use of mobile devices.

One student also commented on occasions when teachers actively discouraged the use of mobile devices.

> *Sometimes [mobile device usage] is annoying teachers. Some people just playing with their phone under their desk. Every time our math teacher tells us to turn off, put in flight mode or put in bag.* (Qing)

In some cases, whilst it appeared students felt that teachers were actively encouraging, or discouraging, the use of mobile devices, students reported noticing that not all of their classmates complied. As the observation above indicates, elements of subterfuge on the part of some students was evident.

4.5.3.2 Task requirements

A further factor that influenced the use of mobile devices was the necessity to complete tasks. Some classroom tasks required access to digital materials that were available from the prescribed LMS. In order to connect to the LMS whilst in class, students required access to a mobile device. One example of this was the submission of assignments:

> *Usually the teacher asks us to submit our work or our essay on Stream. I can't do that on my phone. It's a major problem because the system doesn't match. We can download from Stream but not upload when using a phone.* (Qing)

It would appear that not all mobile devices were suitable for all tasks.

4.5.3.3 Peer usage

Students indicated a number of ways that classmates using their mobile devices could influence their own use of their devices. Some students indicated a negative influence in the form of being distracted by other users:

> *I'll distract myself by looking at what they are looking at.* (Joshua)

Actually there was this one time when there was a guy in front of me just watching videos and I just find myself like watching too. (Jessica)

Within the classroom context, it was not only an individual's personal mobile device that is a factor that influenced use but the way mobile devices, in the near vicinity, were being used could also influence students.

Conversely, others commented on positive influences, especially in regard to the increased accessibility to communication tools that were facilitated through the use of mobile devices and web 2.0 applications.

Communicating with your teacher and classmates is necessary. Sometimes if I don't have something, I can email my classmates or my teacher to ask for it. (Omar)

It also brought the class a lot closer because you could post a question and other classmates could answer and see the responses. (Olivia)

Communication tools, in the form of emails and forums mentioned in these excerpts, mean that students were able to keep in touch with peers (and teachers) outside regular classroom times.

4.5.3.4 Attention span

A number of students reported a perceived shortening of their own attention spans and indicated that they often turned to their mobile device when they were bored or tired:

If I saw some news on my mobile phone, maybe I will check other news and get distracted. (Lin)

I think most students are on-track. Some students are just bored or are tired. For tertiary students, if you feel the class is boring or if you already know this knowledge then you will use your devices. (Fang)

Students in the discussions commented on having difficulty sustaining their attention and staying on a task. The ability to hyperlink to additional material or for notifications to appear were factors that influenced how they used their mobile devices.

4.5.3.5 Preference for traditional learning and teaching practices

The two female Chinese students indicated that they felt using mobile devices in class could change the way learned learn which could influence their use of mobile devices for learning:

> *I think if I read a book it will take a long time but if I go to the internet, I just find the summary. I will know exactly what it talking about. If it's interesting, I will read it. If not, I won't. … Looking at reviews and summaries.* (Lin)

> *From my opinion, I find it hard to learn using technology. I prefer books or just following what the teacher says. I don't mind online learning but I think it makes the learning time to be able to understand it longer.* (Qing)

Qing also indicated that she had noticed that she reads differently when reading from a book as opposed to from a screen.

> *When I was reading a book, I understand the writer's purpose faster than when I'm reading it online. When I have it on paper, I will read it from beginning to the end and that's where I understand more but when it's on the screen I will just look for the information what the essay needs.* (Qing)

Qing articulated that the format of materials, whether print or online, influenced how she read and retained information.

4.5.4 From the students' point of view, how do mobile devices add value, if any, to learning and teaching practices within this New Zealand context?

Throughout the discussions four specific areas appeared where students reported value had been added to their learning practices by the use of mobile devices: (1) personalised support for learning needs and difficulties; (2) collaboration and connectivity; (3) engagement in topics and focus of study; and (4) facilitating to get tasks completed. These areas are further discussed in the following paragraphs.

Value added	1. Personalised learning support 2. Collaboration and connectivity 3. Engaging students in topics 4. Facilitation of task completion

4.5.4.1 Personalised learning support

One student, referring to her personal learning disability, spoke about the added value of being able to use her mobile device to support her specific learning needs. When asked to describe ways that mobile devices helped her to learn given her dyslexia, she quickly indicated that mobile devices added value by making her writing more legible:

> *At the start of the term my Communications teacher was noticing that my handwriting is not the best so especially in class when we were doing activities it kind of got to the point where she just let me type it and it is just a whole lot easier. I can pick up my mistakes more easily. Ok there is a squiggly line under that I'll be able to change so it's good because I start to compare the two so I realise when I start writing that I've made mistakes.* (Georgia)

For this student, working with mobile devices meant she could access additional assistance to support her individual learning needs.

4.5.4.2 Collaboration and connectivity

The ability to be able work collaboratively on one document was also perceived as an additional value of using mobile devices in the classroom context. During one discussion, Olivia and Joshua discussed a group project that they were involved in. The project required them to research a topic, present it as a group, and produce an individually written report. The students discussed the use of mobile devices to keep notes, maintain communication and work collaboratively both synchronously, whilst in class or at home, and asynchronously.

> *The google docs allowed us to group edit a document.* (Olivia)
>
> *We didn't have to email around a document. We could all be on it at exactly the same time. (Joshua)*

Using mobile devices, students were able to work collaboratively to complete the project. They were able to work through the logistics of completing the task as well as the final product, in this case an oral presentation supported by a PowerPoint presentation and a written report.

International students, in particular, felt that having mobile devices with them was important for family members to be able to contact them. Constant connectivity and having the ability to communicate with others was seen as an added value:

> *Sometimes for us, for international students, if our parents send us a message, it's very important for us to check.* (Lin)
>
> *As far as my phone goes, … I have it on my at all times in case of emergencies. Especially with the time difference. Like when I'm in class that's when people are awake so it's important that I have it there.* (Olivia)

Students mentioned that if they knew they could be contacted at any time, they were then able to concentrate on what was happening in class.

4.5.4.3 Engaging students in topics

Olivia believed that the use of a mobile device was inherently beneficial in terms of engaging students with a topic.

> *I feel like devices engage you more. Maybe it's just the screen or something but it definitely captivates you more.* (Olivia)

On four separate occasions throughout the discussion, Olivia mentioned feeling more engaged when using mobile devices to access course materials and learning resources.

4.5.4.4 Facilitation of task completion

More than half of the students who participated in the discussions spoke about a conscious differentiation of tasks that they used different mobile devices for to complete:

> *I use tablet in class because it's very light and easy to carry. It's also fast to connect. Internet, search something, software is faster to open. If you use your laptop in class, it takes time to open so in class maybe you will miss something. Also in class we use many mobile devices, we might want to access something short and quick like dictionaries so we just use our phones or if we need to do a 1 minute search and then put it back in my pocket.* (Fang)

> *I use my laptop and my phone in class. It depends on what I'm doing. I would rather type than handwrite just because I edit a lot when I'm writing and it just facilitates it all a lot when I'm writing.* (Olivia)

Affordances, such as versatility, portability, and efficiency, were taken into account when deciding which mobile device to use for the completion of various learning and teaching activities within the classroom context.

As discussed in earlier sections, access to dictionaries, online tools and resources were seen to hold importance for students enrolled in the university preparatory

courses. The ability to be able to work across multiple platforms was facilitated by the use mobile devices in the classroom:

> *I probably in class use my laptop most and usually I'll have Stream open because in most classes they have slideshows and stuff and then usually I take notes on Word of what the teacher says which I find quite helpful. Usually I have my phone on me as well but most of the time it's in my back pocket … then maybe I'll check it and see if I've got any emails or something like that. Actually I use emails quite a bit. I've usually got my tabs open so I have Stream, my Hotmail and Google probably.* (Georgia)

This would indicate students were working in multiple platforms simultaneously. Through their mobile devices they were potentially working to synthesise information garnered from different sources to complete tasks.

It was also acknowledged that it was possible to complete tasks on different devices but that there were considerations about the effect the choice of tool would have on task completion.

> *Sometimes when we are using the mobile phone, it's hard to control the messages coming on your phone. They interrupt your studies sometimes, especially when the message comes from your parents and your friends. This is why I sometimes use my computer in the class because you can ignore the messages on your phone.* (Ahmed)

Making this conscious, or subconscious, decision could affect whether or not a task was completed or a learning objective was obtained.

4.5.5 What challenges, if any, do students in this context face when using mobile devices in the classroom?

When asked what students use mobile devices for, students spoke about the uses covered in an earlier section of this chapter. While responding to this question, a number of students also mentioned challenges that impacted on their ability to stay

on task during classes. Overwhelmingly, the challenge that was described most often was managing distractions. This included being distracted by peers who were off-task using their mobile devices, for example:

> *He has his laptop screen which is huge. He has the audacity to just full on play weird video games in the middle of class.* (Olivia)

Maintaining focus when peers were off-task was identified as a key challenge for students.

The pull of social media being so easily accessible from the mobile devices also made it challenging for some students, as illustrated by these comments:

> *Sometimes [mobile devices] are a barrier for learning, especially social media. Facebook, Twitter, Snapchat, WhatsApp. I see many of my classmates using them during class.* (Omar)

> *Facebook, in class, if I get the chance, for socializing while in class. Just being honest.* (Georgia)

> *To me, the biggest challenge is to not do other things in class, like the social calendar. I think that's a biggest challenge and your teacher is talking and you are feeling bored and your mobile phone is in your pocket vibrating beep beep, I think it's very hard to not check to see who wants to contact you.* (Fang)

Students reported social media could be a distraction that impacted on their learning. They also reported being distracted by peers accessing social media. So it would appear students were distracted not only by accessing their own social media but also vicariously through others' social media.

Self-discipline was further mentioned as a challenge when in the classroom context. Students recognised the need to self-monitor and resist the temptation to deviate from the current learning and teaching task when using their mobile devices.

> *So if you check one thing, you then check another, and another… [laugh]... I use just one hour but I can't remember what I read. Just lots of information and sometimes it's hard to stop.* (Lin)

We must have good self control. Sometimes it's difficult, very hard. (Fang)

Some people can just handle not using their devices. Most times I can go the whole lesson without checking my phone except for the [clock] whereas some times I've noticed some of my classmates will be constantly on them. They just can't put them down. So I think it's just personal will power. (Joshua)

Accessing materials on mobile devices, for some students, can become an exercise in self-control. The challenge to stay on task becomes a personal exercise in self-discipline.

Some of the discussion participants claimed to be addicted to their mobile phones or had noticed that their classmates appeared to have difficulty disengaging from their mobile devices.

He is addicted to use the mobile phone in the classroom. (Ahmed)

Just like when some naughty people cannot control themselves. I do see some people just play games or chat with people when we are writing essays. (Qing)

My phone has been broken 3 days ago. I'm just like addicted to it so it's been really hard for me. (Omar)

A lack of self-control and elements of potential addiction are indeed challenges that both teachers and students need to be cognizant of, particularly with regard to planning and completion of learning and teaching activities.

4.5.6 Summary of student discussion group findings

The discussions with students resulted in four salient themes when exploring how students used their mobile devices in the academic context, in relation to learning:

- Vocabulary and spelling – including accessing translation tools;
- Completing or contributing to coursework and assignments;
- Time management and organisation – keeping track of course-related tasks were considered an important function of mobile devices;

- Extracurricular or additional study – students were supplementing their learning.

Students reported always having access to mobile devices when in class. In the cases where students had access to multiple devices, the choice of device depended on the task(s) to be completed. Mobile devices were sometimes used to support a specific learning need, such as an unknown vocabulary item or spelling assistance, so that the rest of the task could be attempted. Mobile devices were also used to support coursework completion and organisation.

Five factors were found to influence the use of mobile devices within the pre-degree, university preparation context, namely:

- Teacher's influence – including teaching styles, pedagogical approaches and classroom management decisions;
- Task completion – some tasks, such as access materials on the LMS, required the use of mobile devices;
- Peer usage – peer-to-peer communication was facilitated using mobile devices. Peers using mobile devices as a distraction could negatively impact others in the class too;
- Attention span – access to notifications or hyperlinked text could have a negative influence on a student's attention span;
- Preference for traditional learning and teaching techniques.

Teachers greatly influenced the use of mobile devices for learning and teaching activities.

Students described four key areas where mobile devices added value to learning and teaching practices:

- Personalised support for learning needs and difficulties – a student reported using her mobile device to support her dyslexia;

- Collaboration and connectivity – students could collaborate on projects and maintain connectivity with family whilst on campus, which was especially important for international students, and peers outside the classroom;
- Engaging students in topics – helped encourage focus on topic of study, materials and resources;
- Facilitation of task completion – different mobile devices could be used to complete different tasks.

Challenges as identified throughout the student discussion with the researcher referred to difficulties maintaining focus when distracted by social media and the potential to be off-task. Students referred to being distracted by their own use of mobile devices or their peers' use of mobile devices when in close proximity. Students discussed the need for self-discipline and acknowledged concern that they, or their classmates, showed signs of addictive practices.

4.6 Observations and analytics

While the previous data collection methods relied on self-reporting, observations and LMS analytics were also used as data collection methods. The findings from these methods are presented in this section.

Research questions (RQ)	**Teacher survey**	**Student survey**	**Inventory**	**Student Discussions**	**Observations and Analytics**
RQ1 Usage	✓	✓		✓	✓
RQ2 Influential factors	✓	✓		✓	
RQ3 Value	✓	✓	✓	✓	
RQ4 Challenges	✓	✓		✓	✓

Table 4.22: Crosswalk showing the research questions and data collection methods used – observations and analytics

Observations and LMS analytics were used to collect data in relation to how students were using mobile devices with regards to learning and to identify any challenges that students were facing, in the context of university preparation courses, when using mobile devices. It was intended that collected data could be used to further triangulate self-reported data collected through the other research instruments; however, a number of issues arose that rendered the data collected of minimal use.

4.6.1 Within the context of a pre-degree, university preparation course in New Zealand, how are students using mobile devices in relation to learning?

4.6.1.1 Observations

During the observations, the size of the screens on some of the devices meant it was difficult to observe what students were doing on their devices without interrupting them and their studies. In the case of laptops, where screens are more publicly visible from a distance, it was easier to see what students were using their devices for and to be able to infer the purpose for using their mobile device within an academic context. Mobile devices, such as phones, were more difficult to view in an unobtrusive manner.

Class sizes throughout the university preparation courses are relatively small, with each class having between 12 and 25 students in a classroom. Students were always aware of having an observer in the room so behaviours may not have been representative of mobile device usage if the students had not been observed. In addition to the probability that observed behaviours were not representative of unobserved behaviours, the physical size of the classrooms where these programmes were taught did not make it possible for observations to be made in any consistent manner.

As observation did not yield particularly useful data, additional modes for collecting data on actual usage of mobile devices were considered. Installing tracking software to monitor student use was briefly considered but dismissed due to ethical concerns on behalf of the researcher, because of the personal nature of content on mobile devices such as phones. It was considered that the potential for harm did not justify this as a method of data collection. Self-reporting on their use of mobile devices by students was also considered, however, it was hypothesised that students were unlikely to accurately self-report any off-task activity, rendering this method also ineffective.

4.6.1.2 Analytics

The LMS used on the programmes in this study had the facility for teachers and course administrators to download reports that showed what students were accessing. This data was available to show the time that a student started an activity and how long they stayed logged onto that activity. However, it did not show how engaged a student was in a task or activity. The data collected from these reports only showed if a student had logged on or opened an activity. It did not show, for example, if a student logged into the LMS and then started doing something else like watching a movie or having lunch. As the interaction activity or level of engagement was not captured, the analytics were only useful for identifying which pages were opened and were not useful for identifying how students were using their mobile devices or the effects of mobile devices on student learning.

4.6.2 What challenges, if any, do students in this context face when using mobile devices in the classroom?

Despite the difficulties with observing tasks completed with mobile devices, it was clear that some challenges were present when using mobile devices in the context of

these university preparatory courses. The main observed challenges were: (1) task-device appropriateness; (2) digital literacy inadequacies; and (3) technical difficulties.

Observed challenges	1. Task-device appropriateness 2. Digital literacy inadequacies 3. Technical difficulties

4.6.2.1 Task-device appropriateness

All students present in the observed lessons had access to a mobile device during the lesson. The majority of classroom-based learning and teaching activities required students to access the internet for research purposes or the LMS for task information. At the site of this study, students bring their own personal devices, therefore, there was a range of makes, models and types of mobile devices. With the range of devices, tasks were not always appropriate for the device that students had on hand. For example, in the case of an observation conducted of a class from programme two (refer to table 3.1 for programme details), the majority of the students (10 of the 12 students) had access to laptops, one student had a tablet and the other student had a mobile phone. The students were working on compiling a bibliography for an academic essay. The students with access to laptops were much better equipped to complete the task than the student on the mobile phone. In this case, it can be hypothesised that a mobile phone was not an appropriate device to use for this particular task.

Some students were observed changing devices depending on the task at hand. During reading tasks, students could be observed using different devices for different aspects of the task. For instance, on five separate occasions students were observed reading the course text on one device (often a tablet), writing answers to comprehension tasks on another device (usually a laptop), and using a mobile phone to access the dictionary and record unknown vocabulary on personal vocabulary lists.

This would indicate a more sophisticated understanding of the limitations of different devices to complete some tasks.

4.6.2.2 Digital literacy inadequacies

All students had access to digital devices and appeared to be using them; however, from the observations that were possible, it was clear that digital literacies were such that students were often struggling with challenges that detracted from the learning task itself. For example, navigating to the correct place was at times challenging for some students. All teachers used the main computer console connected to the data projector to demonstrate the location of course materials. However, it was observed that students easily got lost following through multiple hyperlinks, windows, software programmes or documents. Locating a file that had been accessed or downloaded in a previous class was particularly challenging for many students. Students who struggled with this the most appeared not to have labelled or filed electronic documents in any systematic order or with any logical naming convention. When documents were located, formatting or manipulating texts and fields were seen to cause difficulties.

For some tasks, language choice appeared to present challenges too. Academic conventions suggest a formal approach to writing, however, there were occasions where modified language, such as text speak or abbreviations, were used inappropriately. This was particularly evident in tasks such as writing on LMS forums.

4.6.2.3 Technical difficulties

Various devices meant teachers could not always troubleshoot. Despite this, in some classes, there appeared to be an expectation that teachers could and would be able to do so. During one observation, students were formatting a reference list and a few students had difficulties with adjusting the settings on their device. These students

stopped the task and waited for the teacher to come to their aid. All settings on the devices were in Chinese so it was difficult for the teacher (who was not a Chinese speaker and was unfamiliar with the software the student was using) to support the student in answering the question or solving the problem. Troubleshooting in this case meant the teacher and students were not focusing on the learning and teaching activity or the lesson objectives but on technical difficulties in using the device effectively.

On several occasions the battery failed on a student device. In the classrooms, there were not always sufficient power sockets to plug in multiple devices and often students did not have the necessary charger with them. For some, power down meant no more work was done.

4.6.3 Summary of observations and analytics

Observations of classroom practices with regard to the use of mobile devices were problematic. Difficulties were faced with the size of many of the screens and also in the physical layout of classrooms where Foundation and Continuing Education courses were taught. Despite the difficulties in conducting reliable observations into how students were using their mobile devices in relation to learning, it was possible to identify some of the challenges evident in the classroom context when using these devices. Challenges with having, or not having, access to the appropriate tool (mobile device) at the appropriate time to complete particular tasks meant learning and teaching activities did not always go to plan, which then impacted negatively on learning opportunities. Inadequacies in digital literacies also presented challenges with time spent on basic navigation, formatting and organisation of resources preventing time on-task. Finally, technical difficulties, such as understanding the functionality of a device or not having sufficient battery power, were observed challenges for both teachers and students.

Data gathered from the Learning Management System (LMS) analytics did not provide information that was deemed reliable. The available data was not detailed enough to be able to ascertain time on-task nor whether students were accessing the LMS from a mobile device or from a wired technology source such as a desktop computer.

4.7 Chapter summary

Chapter four has outlined the findings as they pertain to each research instrument. Data was collected from two main participant pools: teacher participants and student participants. Demographics from each of these groups have been presented in this chapter. The teacher participants were experienced classroom practitioners and were, at the time of the data collection, teaching university preparation courses at the site of the study. The student participants were enrolled in a Foundation and Continuing Education (FACE) university preparation course. The cohort of students was ethnically and linguistically diverse with a combination of domestic and international students. Some students were recent school leavers and others were returning to formal study after having had a break in their education.

Findings from the teacher survey indicated that students were predominantly using mobile devices to support learning and achieve relevant learning outcomes. However, at times, mobile devices were also used to avoid active participation in learning and teaching activities. Teachers commented on a number of factors that influenced the use of mobile devices in the academic context. The identified themes suggested a clear consideration of pedagogical factors when deciding on the integration of mobile devices in classes. With considered inclusion of the use of mobile devices based on pedagogy, teachers felt teaching and learning opportunities were enhanced. Value was seen to be added with respect to the possibilities of more collaborative learning opportunities. However, challenges were also apparent in the

form of perceived distractions from learning as well as technical and physical challenges present when using mobile devices.

Findings from the student survey into the effects of mobile devices on student learning were presented next. Students reported using their mobile devices for communicative purposes in addition to completing assignments, doing coursework, and conducting research. Access to dictionaries and language support were also identified as ways students were using their mobile devices to support their learning. Perhaps unsurprisingly, given the context, academic factors, such as the ability to conduct research online, combined with functional factors, such as portability, accessibility and convenience, were found to influence the use of mobile devices. Distractions and the receipt of notifications were challenges identified by students when using mobile devices in university preparation courses.

The inventory of online learning strategies was used to identify the perceived value of 19 online learning strategies. Learning strategies associated with course information were perceived to be the category of most value with posting of a course calendar online as the most valuable overall strategy. Email communication with the teacher was the second most valuable online strategy, with submission of assignments via the LMS rounding out the top three.

The themes emerging from student group discussions into the use of mobile devices showed four main uses. Students talked about using different devices for different purposes, especially to support vocabulary and spelling. Completing coursework and organizing studies were also identified as key themes. Teachers were found to be the most influential factor in the use of mobile devices within the context of university preparation courses. Other influences included task requirements, peer usage, attention spans and a preference for traditional learning and teaching practices. Mobile devices were perceived to add value to learning and teaching activities by facilitating learning support for learning disabilities, enabling students to work

collaboratively on projects and maintaining communication with peers. Value was also perceived to be added in terms of engaging students in topics or facilitating task completion. Notwithstanding the perceived value of mobile devices within an academic context, the student discussion groups also identified that mobile devices posed challenges of maintaining focus when faced with peers' usage of mobile devices in class and the pull of social media. In addition, students mentioned having difficulties exercising self-control and showing signs of addictive behaviours as additional challenges.

The final data collection methods described in this chapter, observations and analytics, did not provide reliable data to respond to the research question about how students were using mobile devices in relation to learning. However, classroom observations showed challenges that were present when using mobile devices in the classroom. Task-device appropriateness, inadequate digital literacy skills and technical difficulties were the three key challenges observed.

Chapter 5: Analysis and discussion

In the previous chapter, collected data was presented according to the different research instruments as they corresponded to each research question. This chapter aims to analyse and discuss the findings in relation to each research question. Therefore, this chapter is arranged according to the research questions:

> RQ1. Within the context of a pre-degree, university preparation course in New Zealand, how are students using mobile devices in relation to learning?
>
> RQ2. What factors influence the use of mobile devices within this academic context?
>
> RQ3. From the teachers' and students' point of view, how do mobile devices add value, if any, to learning and teaching practices within this New Zealand context?
>
> RQ4. What challenges, if any, do teachers and students in this context face when using mobile devices in the classroom?

In keeping with my epistemological grounding in constructivism, findings presented in chapter four are connected to literature that I continue to explore and are framed by my own experience of collecting this data and working with it through an iterative analysis. The literature includes studies that informed my original interest in this area, as referred to in chapter two, but literature is also explored that has emerged in the years between starting the data collection and the writing of this thesis.

By way of summary, data collected from the research instruments, as documented in chapter four, have been summarised in table five. This chapter explores how the findings interrelate across the research instruments and correlate with literature. The chapter is organised to allow for discussion of the findings in relation to each research question. Looking at the findings enables a comparison of data collected from different perspectives and experiences of similar phenomena within the same pedagogic context.

	Teacher Survey	Student Survey	Inventory	Student Discussion Groups	Observations & Analytics
RQ1 - Usage **Within the context of a pre-degree, university preparation course in New Zealand, how are students using mobile devices in relation to learning?**	• Learning support • Achieving learning outcomes and objectives • Avoidance of learning activities	• Social connection • Assignments and course materials • Research • Dictionary and vocabulary • Entertainment		• Vocabulary and spelling • Complete or contribute to coursework and assignments • Time management and organization • Extracurricular / Additional study	
RQ2 - Influential factors **What factors influence the use of mobile devices within this academic context?**	• Pedagogical considerations • Enhanced teaching • Teacher encouragement • Equipment and tacit know-how	• Academic factors • Social factors • Functional factors		• Teacher's influence • Task requirements • Peer usage • Attention span • Preference for traditional learning and teaching techniques	

	Teacher survey	Student survey	Inventory	Student discussion groups	Observations & analytics
RQ3 - Perceived value From the teachers' and students' point of view, how do mobile devices add value, if any, to learning and teaching practices within this New Zealand context?	• Portability • Accessibility • Collaboration • Cognitive processes • Rising expectations	• Efficiency • Accessing materials • Convenience • Accessibility to language support	• Course information • Learning resources • Assessments and grading • Communication	• Personalised learning support • Collaboration and connectivity • Engaging students in topics • Facilitation of task completion	
RQ4 - Challenges What challenges, if any, do teachers and students in this context face when using mobile devices in the classroom?	• Distractions • Technical challenges • Physical challenges	• Distractions • Notifications		• Focus / distractions • Own use and peers' use	• Task-device appropriateness • Digital literacy inadequacies • Technical difficulties

Table 5.1: Summary of emerging themes

5.1 How are students, in a university preparation course, using mobile devices in the academic context in relation to learning?

Three of the research instruments aimed to address this first research question. The teacher survey investigated what teachers observed students using their mobile devices for in the academic context of university preparation courses. The student survey and student discussion groups examined how students self-reported their use of mobile devices within the same context. In this section, I explore the findings across these three instruments in relation to the themes that emerged. The emergent themes were: (1) course related tasks; (2) lexical support; (3) social connection; and (4) time management.

5.1.1 Course related tasks

As the premise of this study was the use of mobile devices within a pre-degree academic context, it was perhaps unsurprising that course-related tasks emerged as the most prevalent theme across the research instruments. Course-related tasks included references to any part of the course of study that students were undertaking. It included references to course materials (the resources used in the course), coursework (tasks that were completed as part of the course), assignments, assessments, research, learning support, learning objectives, and learning outcomes.

All students in this study declared ownership of a mobile phone and 96.5% claimed to bring a mobile phone to class every day. Not only did students report bringing them to class but they also claimed to access their mobile devices during class on a regular basis. The data collected from the student surveys and discussion groups indicated that students considered that much of their accessing of mobile devices was to complete learning and teaching activities. Teachers also reported regularly leveraging the use of mobile devices to access learning materials. This is in contrast to earlier findings such as Murphy et al.'s (2013), which identified a perceived resistance to the use of personal mobile devices for formal learning purposes, as a

third of students in their study were purportedly uncertain or opposed to the use of their own technologies within classrooms or on excursions. This was not found to be the case within this pre-degree, New Zealand-based context. Indeed, more recent studies, such as research into how undergraduates are using mobile devices to support learning (Moreira, Ferreira, Santos, & Durão, 2017), show there is a growing trend towards students using mobile devices in their studies. Moreira et al. (2017) investigated the use of mobile devices in higher education institutes and compared findings from data collected in 2010 with data collected in 2015, which saw an increase in positive perceptions from 87.3% to 93.4%.

Given that data collected for this study was taken from students enrolled in blended learning delivery courses, it could have been anticipated that the ability to complete assignments and access coursework would be identified as a use of mobile devices. Students reported actively accessing course materials via their mobile device because it was convenient and practical. The speed with which they could access materials, the ease of completing a task, and the physical portability of the device were all factors that contributed to the perception expressed by students that mobile devices were convenient when it came to completing course-related tasks. These findings are congruent with Farley et al. (2015), who reported that students at an Australian university were using mobile devices in a range of different locations to access course-related materials, and Souleles et al. (2014), who investigated the use of iPads and laptops (examples of mobile devices) in undergraduate art and design classes.

Access to appropriate resources for the purpose of academic research was identified as a task that students reported using their mobile devices for to complete. Access to online resources was possible through the university library website that had a comprehensive database as well as links to international databases, making research via mobile devices readily accessible. These affordances and positive perceptions were identified throughout this study. These findings replicate findings from three Australian universities (University of Melbourne, University of Wollongong, and

Charles Sturt University) into student perceptions of the usefulness of technology for either access or retrieval of course-related material and information (Kennedy et al., 2009). Gikas and Grant (2013) also described advantages of using mobile computing devices (namely cellphones and smartphones) in higher education as perceived by student participants during a qualitative research project across three American universities. Their findings provided examples of how students created and interacted with course content by accessing information quickly, communicating and collaborating on content, and capitalizing on opportunities for situated learning.

When students are able to maintain ubiquitous connectivity to access course materials and activities (Murphy, Farley & Koronios, 2013; Murphy et al., 2013), and when they engage with learning content in an interactive manner (Murphy, Midgley & Farley, 2014), the use of technology to deliver content, reinforce skills, and complement or enrich the curriculum can transform learning and teaching (Ertmer et al., 2012). In this case study, it appears that devices were being used to support learning and teaching activities. As students often brought more than one device with them to class, it is likely that they were being selective about which device to use depending on the task at hand. As presented in section 4.3, students in this study were more likely to bring a mobile phone to class every day followed by laptops. Tablets were found to be the least preferred devices with the pre-degree FACE students in this context. This contrasted with Murphy, Midgley and Farley (2014) who found tablet devices were popular with students and appeared to have the greatest applicability across multiple types of learning activities with students in their Australian-based study. This difference could be due to the advances with the technology, for example the size and ubiquity of smartphones, over the last few years that has seen a blurring of the distinction between tablet and phone. Nevertheless, the processes behind how this decision is made and what factors affect the choice of one device over another is an area that would benefit from further exploration outside the scope of this study.

By increasing the opportunities to autonomously access materials and resources, students are able to take more responsibility for their own learning. One of the teacher participants in this study described that using mobile devices enabled a transference of ownership for the pace of learning. This is congruent with principles of adult learning where "adults are problem-centered, not subject-centered, and desire immediate, not postponed application of the knowledge learned" (Merriam & Bierema, 2014, p. 53). The 2016 NMC Horizon Report (Johnson et al., 2016) also indicated that by heightening autonomy, educators are likely to observe an increase in motivation and engagement. It would appear, from what teachers reported in this study, that this growing sense of autonomy was perceived to be facilitated by the potential of constant connectivity that influenced the use of mobile devices in the classroom.

Reading on a mobile device has been reported to be different to reading on a printed page (Singer Trakhman, Alexander, & Berkowitz, 2017). This study of FACE students showed a preference for printed course materials over access to digital readings. However, Shepherd and Reeves (2011) found hyperlinked and interactive texts changed the way students read by enabling readers to read in a non-linear fashion through externally linked content. Jennings et al. (2011) reported that hyperlinking improved reading.

In addition to reading, writing is another academic task students reported using their mobile devices for. Students throughout this study reported using their mobile devices to support the academic writing process, from brainstorming and researching topics, to drafting responses, to submitting assignments online. All parts of the writing process were mediated with technology, however, recent research has suggested that students demonstrate less critical thinking when using mobile devices (Heflin, Shewmaker, & Nguyen, 2017). If students are not engaging critically with academic tasks, particularly with writing tasks, then perhaps it should be considered that mobile devices should not be used. However, as this was outside of the scope of

this current study, the quality of students' critical thinking whilst engaging in the writing process cannot be assumed and would need to be investigated further.

5.1.2 Lexical support

Lexical support refers to any support for the acquisition of words or vocabulary. In the student surveys, students mentioned the use of mobile devices to access the dictionary and to support vocabulary studies. In the student discussion groups, the use of mobile devices to aid vocabulary and spelling were also mooted. The teacher survey responses also included observation of students using mobile devices for a variety of lexical support including accessing online dictionaries, grammar checking tools and access to examples of authentic language use.

Teachers commented on students using their mobile devices to actively enhance their vocabulary. As shown in figures 4.1.3 to 4.1.5, the majority of students were multi-ethnic and multi-lingual so having immediate and efficient access to lexical support via a mobile device meant students could actively support their own learning. This finding supports the concept that language instruction and language learning can be facilitated, through the use of mobile technologies, to occur anywhere, anytime (Averianova, 2012). This support for lexical acquisition was also found in studies that showed that students used mobile devices to access corpora (Dudeney & Hockly, 2012), thesauruses (Shepherd & Reeves, 2011), web-based translators, and extensive, authentic reading and listening (Steel & Levy, 2013), in addition to online dictionaries to promote vocabulary learning.

This study found that students were referring to online dictionaries and translation tools or websites via their mobile devices. This resonates with similar findings that students are more likely to consult an e-Dictionary than a paper-based one (Geist, 2011) and they frequently use dictionary or language apps to learn languages or support language acquisition (Farley et al., 2015). The prevalence of mobile phones in the FACE context may further substantiate claims about smartphones being more

likely to be preferred over tablets for supporting immediate learning needs such as accessing dictionaries (Murphy et al., 2014). It is likely that accessing unknown or unfamiliar vocabulary can then instantly enable students to continue a pace of learning that is not hampered by a lack of lexis and thus can be said to support learning.

5.1.3 Social connection within the academic context

Using mobile devices to maintain social connections and to serve communicative purposes was one of the activities mobile devices were most widely used for, as described in the student surveys. This is not surprising given the preference for mobile phones over laptops and tablets within the context of this study. With the merging of private and public spaces (Solé et al., 2010), mobile devices can be used to support language learning and collaborative approaches to learning. Although some of the communication reported by students was off-task (e.g. accessing social apps, checking messages), the potential "to pedagogically exploit the intrinsic communicative affordances of mobile technology" (Burston, 2014, p. 115) exists so long as mobile devices are not simply seen as mini computers and distinctions are made when choosing which tool to use. The use of mobile phones to facilitate a sense of permanent connectedness with students' social world is akin to claims made by Perkins and Saltsman (2010).

In the online learning strategies inventory, communication is one of the identified themes. The online learning strategy within this theme perceived to be most valuable was that of email communication with the instructor. In addition, pre-degree, New Zealand-based students in the current case study reported using their devices to connect with peers both in- and out-of-class. This supports findings that students in their studies appeared to leverage the greater functionality and connectivity of smartphones and tablet devices and were actively using these technologies to connect socially with peers to support their learning (Murphy et al., 2013). This New

Zealand-based study found that the smartphone in particular was being used by students for collaborative activities such as sharing information and communicating through social media which concurs with findings by Gikas and Grant (2013) who found that students with mobile devices in classrooms benefited extensively from the constant connectivity available to them and the ability to communicate with classmates and instructors.

As students in this study reported via the student survey, they regularly accessed emails, texts and social networks. They reported using their mobile devices to maintain social connections not only with friends and family, but also with classmates and teachers. By promoting the social dimensions of studying in a university context, teachers are in a position to strongly influence students' motivation and commitment towards study as well as positively influencing feelings and attitudes towards the same (Rolls & Northedge, 2017). Therefore, it could be argued that this social connection is a valuable use of mobile devices. Furthermore, Gikas and Grant (2013) described how the use of social media and mobile tools enabled immediate feedback on content as well as enhancing interactions with subject matter experts, which in turn positively influenced students' perceptions of both formal and informal learning opportunities.

5.1.4 Time management

During the student discussion groups, time management and improved organisation of tasks were cited as specific uses of mobile devices that students implemented to support their studies. Students recalled using to-do lists, reminders and note-taking apps to keep track of learning tasks. This finding potentially contributes to improved academic workflows by providing an opportunity for students to develop new approaches to time management by customizing and personalizing effective time management strategies (Eichenlaub, Gabel, Jakubek, McCarthy, & Wang, 2011). In

addition, Carrington (2013) has claimed that time management is one of the essential graduate attributes and capabilities.

As mentioned in the student discussion groups, mobile devices were used to organize tasks. Earlier studies (Murphy, 2011; Park, 2011) also reported enhanced productivity when students used productivity tools such as calendars, emails and other apps to improve planning, scheduling and related time management activities. Students in the discussion groups shared their experiences of these tools. They further reported being able to sync multiple devices, which meant workflows were systematised to enable more efficient organisation. Tasks could be updated in response to any changes in circumstances such as changes in deadlines or additional information becoming available.

5.2 What factors influence the use of mobile devices within this academic context?

The most influential factor in the use of mobile devices within this pre-degree context was the pedagogical approach taken towards learning and teaching activities. This was followed by teacher influence and the facilitation of task completion. Social, cognitive and physical influences were the final identified influential factors. These influences are discussed in the following sections.

5.2.1 Pedagogical approaches

In this study, pedagogical considerations were identified as the most important guiding principle when deciding on how to use technology within the classroom. Therefore, it can be said that teachers were conscious of technology for teaching, not teaching for technology. These same considerations were identified by Merriam and Bierema (2014). In addition, time taken to design pedagogically robust teaching and learning activities was deemed to be an important factor when deciding when and

how to integrate the use of mobile devices in the classroom, which affirmed a conscious understanding and appreciation of the need to use pedagogy and curriculum to inform the appropriate integration of technology into learning, as expressed by Gikas and Grant (2013). As suggested by their length of service outlined in table 4.2 and figure 4.1, it can be proposed that the teachers had a strong command of content knowledge and comprehension of pedagogically sound approaches.

Further contributing to earlier calls from a range of researchers (Hockly, 2013; Kukulsha-Hulme, 2009) to document how pedagogical practices are implemented to integrate mobile devices in a way that enhances learning and teaching opportunities, reports from teachers in this study pointed to a perception that teaching was enhanced by the use of mobile devices. Teachers described a number of areas they felt were facilitated by the use of mobile devices in the classroom, learning and teaching context. A paradigmatic shift to a more collaborative education model (Dudeney & Hockley, 2012; Johnson, et al., 2012) by embracing constructivist approaches to classroom practices (Doolittle & Hicks, 2003; Falloon, 2015; Liaw & Huang, 2011), as described earlier in the literature review, appear to have been adopted by the teachers at the site of this study.

Adapting teaching and learning tasks to cater to a wider variety of learning styles was identified as an influential factor perceived to enhance teaching. In addition, the ability to tailor teaching and learning activities through the use of interactive elements corroborated the argument posited by Rolls and Northedge (2017, p. 8) who stated that "[T]he notion of 'flexible learning', as enabled by new technologies, … allows for supporting students with different learning needs and styles." This was echoed by the teacher participants. Mobile devices were used to facilitate support for different learning styles and preferences within the classroom. As in any classroom setting, an effective teacher will respond to student learning needs as they present themselves during learning and teaching activities (Merriam & Bierema,

2014), which would include the need to accommodate a variety of learning styles. Teachers in this study found that mobile devices enhanced their ability to cater for these different needs in order to promote engagement. Catering for varying learning styles was seen as a definite advantage of using mobile devices within this academic context.

According to Rolls and Northedge (2017, p. 20) a teacher's role is to "stimulate, engage in dialogue, organise and support" students within a modern university context. It would appear that teachers in this study recognised that mobile devices could be used to facilitate these elements. Interactive capabilities inherent in many of the mobile devices used by students was perceived to increase levels of student engagement. Teachers also reported that mobile devices could be used to facilitate the organization of learning materials in order to enhance learning and teaching opportunities both in the classroom and outside the classroom for revision and repetition purposes.

A preference for traditional pedagogical approaches to learning and teaching was identified during student discussions. One area that was described as being affected by pedagogical choices was reading and the consumption of course materials. Although students are exposed to a growing number of digital texts, there is still a need for students to be able to read texts on screen as well as in academic articles and readings that have been downloaded and printed off (Rolls & Northedge, 2017). In this study, it was mentioned that the format of texts influenced how students read. A preference for printed format was explicit in the context of pre-degree students. This is divergent from research conducted by Garrett-Rucks, Howles, and Lake (2015), who investigated cognitive theory of multimedia learning and found that students in their study believed that hypermedia texts bolstered their active learning more than print reading. Students perceived print text to require more effort to understand than hyperlinked texts. Singer Trakhman et al. (2017) also found that students preferred digital texts. Students read digital texts faster and judged their own performance to

be better, even if their actual performance was at a lower level. Singer and Alexander (2017) investigated how reading online or reading printed text affects comprehension. Students were given tasks and asked how they thought they might perform in a test of comprehension. Students thought their comprehension was better reading digital texts; however, comprehension of what had been read was actually better in a printed medium. Furthermore, they found there was no difference in the ability of recall of main ideas or gist of a text when read online or in a print version, but specific details were impacted by the choice of medium. Yet, there is still much to be learned with regard to the nature of reading and comprehension, not only in terms of cognitive processes, but also in terms of motivation, sociocultural, and visual-motor factors (Singer & Alexander, 2017). Although students in this study were not assessed on their comprehension of texts, they did report a preference for printed texts.

5.2.2 Teacher influence

Closely related to pedagogical approaches and the perception of enhancing teaching was the theme of teacher influence. This theme was particularly prevalent in the data collected during the student discussion groups but also included how teachers reported encouraging students to use mobile devices to support their learning.

During the student discussion groups, all students referred to perceiving that their teacher influenced their use of mobile devices. Students described teachers actively encouraging the use of mobile devices to access materials, stimulate discussions, and demonstrate key learning and teaching tasks. Harper (2018) has reviewed empirical research of the use of technology and teacher-student interactions and found that teachers could engage students in sustained, learning-oriented interactions when using technology as a learning tool. Furthermore, Sana, Weston and Cepeda (2013) suggested co-creation of materials as a possible strategy that could be implemented to ensure student engagement and to minimise any potential distraction that mobile

devices can cause. This strategy would necessitate teacher influence at the outset but could be scaffolded to encourage student-initiated development. Moreover, this could provide social stimulation, which Merriam and Bierema (2014) stated to be a motivating factor for adult learners.

Teachers and students reported the ability to readily gauge understanding of content and concepts covered in the lesson materials when using mobile devices to support learning. Teachers commented on the ease of finding pertinent materials to support learning, thereby strengthening the link between current learning, feedback and responding to student needs. This meant that the relevance and connection to learning was explicit for the student and teacher alike. This can potentially heighten student motivation and can be achieved by making explicit links to the relevance of learning, as suggested by Kukulska-Hulme (2009).

Teachers' stated perceptions in the survey, that the use of mobile devices enhanced their teaching, consequently influenced the inclusion of mobile device-assisted activities in their curriculum and lesson planning. Khlaif (2018) has also reported that teachers perceived their teaching to be improved with the adoption and inclusion of mobile devices. Mobile devices were found to facilitate access to additional resources, which was perceived to have a positive influence on the decision of whether or not to implement mobile device-assisted activities. This current study also appears to concur with these findings.

Teachers in this study expressed a willingness, through the teacher survey, to engage in continuing professional development. They also identified a need to ensure that learning outcomes, curriculum and the tools used to achieve these were aligned. Self-reported levels of comfort did not correspond to frequency of technology use. Some teachers were operating outside their comfort zone. However, by improving teaching skills through professional development, teachers can feel more confident in what they teach, which in turn can achieve better results for students (Richards, 2015).

Implications for this are important when considering the availability of in-service, professional development opportunities.

5.2.3 Task completion

In the previous section, course-related tasks were identified as one of the main uses of mobile devices in an academic, pre-degree, FACE programme in New Zealand, by students and teachers alike. As far as what factors influence the use of mobile devices within this context, the ability to facilitate the completion of a task was, perhaps predictably, identified as a key influential factor. Observations conducted in this study highlighted the practice among some students of selectively choosing the device to suit the task at hand. This task-device appropriateness was presented as a challenge in the context of face-to-face, university preparation courses but can also be considered a factor that influenced which device to use. Data collected from the student survey on student usage and access to devices showed all students had access to at least one device with the mobile phone being the mobile device they most often had on them. Whilst some studies have investigated the attitudinal factors that affect the adoption of m-Learning technologies (e.g. Al-Emran, Elsherif, & Shaalan, 2016; Briz-Ponce, Pereira, Carvalho, Juanes-Méndez, & García-Peñalvo, 2017; Simonova & Poulova, 2017), the factors that influence the selection of devices for specific tasks have not been documented in the literature, making this a potentially new area that would benefit from further exploration.

Within the context of this study, constant connectivity was assumed by teachers when students were in class. This was illustrated by the proliferation of teaching and learning activities designed around the assumption that students were always connected, and the availability of a free, stable, wi-fi connection on campus at the site of this study. Constant connectivity enabled aspects of a flipped classroom approach to be implemented. The concept of a flipped classroom works on the premise that students can access course content outside the confines of the

traditional, face-to-face, classroom time and is often facilitated by technology. Time in the class is used to work on tasks or activities that would have otherwise been assigned as out-of-class tasks in a more traditional, face-to-face, didactic teaching scenario. Johnson et al. (2014) described a flipped classroom as a digital, instructional strategy that encouraged learner centricity. Teachers within the context of this study expected students to sustain a high level of connectivity. This expectation appeared to influence pedagogical decisions in order to adhere to andragogical principles of adult education where active learner engagement and self-direction are valued (Angelo, 1993; Merriam & Bierema, 2014; Rolls et al., 2017).

5.2.4 Social influences

Data collected from the student survey showed that mobile devices enabled the development and maintenance of relationships, which was therefore a factor that influenced their mobile device usage. Berk (2009) reported that the *net generation* crave social face-to-face interaction and relationships are a high priority. Berk (2009) claimed students go to class to chat with peers orally (face-to-face) and digitally (online). This would indicate that students' presence in class may have more of a social component than an academic or content focus. Furthermore, Clandfield and Hadfield (2017) have claimed that interaction was extremely beneficial for building student motivation and self-confidence. This was found to be true across modalities ranging from face-to-face, partially online (for example blended learning environments) and fully online learning contexts. This suggests that social interaction may be a high priority for students within the demographic of pre-degree students and is an area that could be addressed at curriculum planning stages.

As described in section 4.2.2.3, the majority of teachers encouraged the use of mobile devices for communicative purposes according to the student and teacher surveys. Using mobile devices for the purpose of sustaining social connectedness (Richards, 2015) further supported communicative language teaching methods and practices that were evident at the site of the study. The active encouragement that students

received from teachers to use their mobile devices for communicative purposes has been documented to align with wider communicative goals, particularly where learning a language is more than simply understanding linguistic aspects. However, it extends to a wider context within which the language is used, including social experiences (Solé et al., 2015), thus bridging the academic and personal use of language.

One area of socialization that did not appear to translate into the academic context was the use of social networking sites. This study found that students did not have positive perceptions of the use of networking sites, such as Facebook, within the academic context. Students in this New Zealand study considered Facebook to be a distraction. This finding differs from van Rensburg and La Thanh (2017) who found that the use of Facebook had a positive impact on student motivation in Vietnam. The use of a social media platforms reportedly heightened the sense of community for students in their study. By contrast, at the site of this study, Facebook was not used to maintain teacher-student relationships nor to support academic studies. If there was a directed focus on academic support, this may change.

5.2.5 Factors influencing attention

During the student discussion groups, some students self-reported a shortening of their own attention spans. They indicated they would often disengage with classroom activities when bored and distract themselves with off-task activities on their mobile devices. This would appear to be congruent with Berk's (2009) observations that *net geners* have a short attention span and therefore must be kept actively engaged with a task they enjoy, otherwise they will easily become bored and impatience is likely to negatively impact learning.

Students mentioned a perceived shortening of their own attention spans, which has been substantiated by Berk (2009) who also claimed student's attention spans were

decreasing. This may provide opportunities for relevant just in time teaching (JiTT) as described by Gregor Novak (2011), and teachable moments are perhaps one way to use mobile devices to support teaching and learning as students and teachers co-create the teaching-learning experience. This would substantiate claims that if students, particularly adult learners, are interested and engaged, they will be more likely to learn (Angelo, 1993; Merriam & Bierema, 2014).

Not all researchers who have investigated the distractive factor present with the use of mobile devices in classrooms considered this distraction to be negative. Geist (2011) referred to digital distraction, and claimed that mobile devices were being used as a form of digital doodling, which was seen as positive.

5.2.6 Technical proficiency

The final factor that was found to influence the use of mobile devices was equipment and tacit know-how. Feeling competent with the use of technology and the access to ongoing technical support were key considerations for teachers when deciding how and what technology to integrate. As with previous studies (Stephenson & Harold, 2008), teachers were found to show willingness to experiment and upskill in areas of technology integration but access to continual, sustained professional development is required. As reported in the previous chapter, most of the teachers rated their comfort level with using technology for teaching and learning purposes as comfortable. Only two teachers indicated any discomfort with using technology in the classroom. Despite rating their comfort as uncomfortable or very uncomfortable with the use of technology in the classroom, they still self-reported being casual users or to always use technology respectively. This would indicate that teachers were accustomed to using technology despite their personal comfort level. Perhaps a heightened sense of comfort could be achieved if teachers and students were encouraged to create an environment where exploration and experimentation with technology within the academic context was promoted. This could then contribute

to eliminating a possible lack of self-efficacy (Tilton & Hartnett, 2016). An approach such as problem-centred learning, which is often preferred by adult learners according to Merriam and Bierema (2014), could be used. Problem-centred learning is said to be more engaging as students can immediately apply skills and concepts learnt, which reinforces learning.

5.3 From the teachers' and students' point of view, how do mobile devices add value, if any, to learning and teaching practices?

Analysis of the findings indicated that students and teachers perceived value to be added in six key areas. The analysis and discussion of these areas are addressed in this section. The areas identified were: (1) access; (2) convenience; (3) collaboration; (4) personalization; (5) scaffolded support; and (6) increased connectivity.

5.3.1 Access

Value was perceived to be added when mobile devices facilitated access to resources and materials that supported the completion of tasks such as accessing course materials, resources and assessment information. Also included in this section were functions available on a mobile device that supported the completion of tasks such as access to organizational tools. Teachers and students further referred to accessibility in general terms as well as specifying accessibility to language support.

Instantaneous access to information and resources was identified as being more readily available through the use of mobile devices. Similarly, Geist (2011) reported a change in classroom interaction as students were able to access reference materials more readily using their mobile devices. This change in interaction resulted in the ability to respond to teachable moments, provide opportunities for differentiated tasks, and having instant access to resources, which then allowed teachers to cater for just-in-time teaching opportunities. Just-in-time teaching can, according to Novak

(2011), improve student motivation and foster deeper learning. By enabling teachers to be more responsive to teaching and learning opportunities, such opportunities were in turn more organic and reflexive.

Access to course information ranked as the most valuable overall theme for pre-degree students in the online learning strategy inventory. This was further evidence to support Kennedy et al. (2009) who found that the use of technology to either access or receive course-related material and information was useful for students, and Bennett, et al. (2011) who, based on semi-structured interviews, found technology was perceived to be useful for accessing information as well as communicating.

Throughout the surveys, inventory and student discussion groups, value was considered to have been added when using mobile devices to submit assessments. Assessments are often considered an important motivational factor to build extrinsic, intrinsic and academic motivation (Lynam & Cachia, 2017). Although electronic assessment submission was perceived to be a valuable function of mobile devices, it is, of interest that assignments and grading emerged as the third most valuable theme, preceded by course information and learning resources, in the inventory. Within the theme of assignments and grading, pre-degree students valued receiving online feedback regarding assignments as more valuable than the posting of grades. This finding was unexpected and could indicate that students, within this study, valued teacher feedback more than the numerical or alphabetic grade associated with an assessment.

Other strategies that supported and encouraged the development of time management skills and organisation were also considered to be of high value. Pre-degree students ranked the posting of a course calendar online as the most valuable online learning strategy. Students also mentioned the value of using online time management and organisational tools during the discussion groups. Value was

further perceived to have been added when devices were synced, enabling all relevant information to be electronically collated and later retrieved from any device. This could be attributed to the need to scaffold and provide more guidance for students at the pre-degree stage, which establishes relevant skill sets as they move through their academic pathways.

Responses to the student survey indicated that mobile devices were perceived to add value to support language learning. Mobile devices enabled students to access language learning and lexical tools online. During the group discussions, students also discussed different tools used by native and non-native English language speakers alike. Therefore, it can be said, mobile devices were being used to facilitate autonomous learning practices. This supports similar findings where student-centred constructivist approaches to language learning were implemented (Burston, 2014). It would appear that a similar approach was present in this context of pre-degree, university preparation courses.

5.3.2 Convenience

The term convenient appeared to be multifaceted. It incorporated portability, speed, immediacy of access, and ease of completing tasks such as editing writing tasks and uploading or submitting assignments.

One of the definitions of a mobile device is a device that is constantly connected to the internet and is easily portable (Murphy, 2011; Traxler, 2009). Therefore, it is perhaps not surprising that constant connectivity to the internet and easy portability were identified, by teachers participating in this research, as being of value. Access to a plethora of information at our fingertips, anywhere at any time, was deemed to be valuable for students in university preparation courses. The location of study was no longer confined to fixed times according to a timetable or in fixed places such as a classroom. This corresponded to findings reported by other research projects (Gedera, 2014; Jarvis & Achilleos, 2013; Park 2011) as well as being highlighted in the

New Media Horizon Reports 2012-2017 (Johnson et al., 2012; Johnson et al., 2013; Johnson et al., 2014; Johnson et al., 2015; Johnson et al., 2016; Adams Becker et al., 2017). Therefore, capitalising on the concept of "anywhere, anytime" access to education, along with scaffolded independency and increased student autonomy, teachers in the context of the university preparation courses in this study perceived mobile devices to be of added value.

Mobile devices were also considered valuable for facilitating communication. In the online learning strategy inventory, pre-degree students identified email communication with teachers as the second most valuable strategy. However, online academic discussion groups, access to email addresses of peers, and the ability to post personal information on homepages were considered to be the three least valuable online learning strategies by these pre-degree students. Similar results for the use of homepages for posting personal information was found for both post-graduate and under-graduate students (Frey et al., 2003; McSporran, 2004). This could be attributed to the prevalence of social networking sites such as Facebook, WhatsApp and WeChat. The availability of classmates' email addresses, having group online discussions, and receiving online announcements via the locally used LMS were perceived to be of similar, in the case of email contacts, or the same value, in the case of discussion groups for pre-degree and under-graduate students (Frey et al., 2003). However, these two online learning strategies were perceived to be much more valuable for students in post-graduate level studies (McSporran, 2004). This could be because post-graduate study generally involves more discussion and debate than pre-degree and under-graduate study.

Submitting assignments via the LMS ranked third equal in the online learning strategies inventory for this group of pre-degree students. When compared to previous studies, the function of online assignment submission was ranked as more value for pre-degree students than for the other cohorts. Pre-degree students ranked electronic submission of assessments via an LMS or via email as the third most

valuable online learning strategy. This contrasts with undergraduate students who ranked this strategy at number nine (Frey et al., 2003) and postgraduate students who ranked it at tenth most valuable (McSporran, 2004). Of interest to course developers designing courses for similar cohorts is the perception of the value of posting detailed assignment instructions online and the provision of example tests and exams, and it would appear that the participants perceive more value in the ability to access feedback regarding assignments than in the grades themselves.

5.3.3 Collaboration

Alongside portability and accessibility, collaboration was identified in this study as a key feature perceived to add value to teaching and learning. In 2008, Bloom's taxonomy of cognitive objectives was adapted by Andrew Churches (2008) to include digital verbs. Two additions to the original verbs posited by Bloom (1956) were collaborating and networking. Collaborating was defined as the communication of collective intelligence. According to the adapted Bloom's digital taxonomy, collaborating requires students to use higher order thinking skills at the level of evaluating, and networking was seen as a feature of collaboration (Churches, 2008). It would appear that findings from this study are consistent with previous studies where collaboration was identified as a key feature of using mobile devices in teaching and learning contexts (Burden, Hopkins, Male, Martin, & Trala, 2012; Churchill, Fox, & King, 2012; Manuguerra & Petocz, 2011; Melhuish & Falloon, 2010).

During the Student Discussion Groups, students in this study discussed the perceived value of working collaboratively to complete coursework activities. Teachers in this study also perceived that mobile devices added value when students and teachers were able to work collaboratively on learning tasks. These findings appear to support Manuguerra and Petocz's (2011) claim that the latest technologies greatly favour constructivist and collaborative approaches to learning. Collaborative learning that highlights students as active participants in learning has been found to be facilitated

by the use of mobile devices (Moreira et al., 2017). Khlaif (2018) also reported that students perceived added value when they were able to use mobile devices to support collaboration as it allowed for, and encouraged, discussion and debate amongst peers. This has also been highlighted in this study and, through an active involvement in collaborative learning processes, principles of adult learning can be more readily applied.

Furthermore, working collaboratively can be said to be a key element of developing and sustaining social networks. Social dimensions with the course and community are one of the seven distinct concepts of Activity Theory. Promotion of, and support for, teacher-student and student-student social dynamics within the tertiary context can benefit student motivation (Rolls & Northedge, 2017). Therefore, whenever collaborative efforts can be encouraged, and subsequently supported, value can be added.

5.3.4 Personalisation of learning

In this study, the ability to personalise learning support and experiences was perceived to be an area where mobile devices contributed positively to a perception of value added. The ability to use a mobile device to unobtrusively support personal learning needs in a way that enabled students to fully integrate and support their learning was mentioned during the student discussion groups as being of particular value. This incidental, student-initiated learning support has not been discussed in the literature to date. This is an area that should be investigated more so as to better understand the ways that students can autonomously support their own personalised learning needs.

During the Student Discussion Groups, mobile devices were described as being used to stimulate ideas and engage students in topics and discussions during classes. This enabled students to build on prior knowledge to participate in learning and teaching

activities. This ability to build on prior understanding and be active in the construction of new knowledge adheres to andragogic principles of learning (Merriam & Bierema, 2014). Furthermore, this study has confirmed findings from Balanyk (2013) and Burden et al. (2012) that by appropriately combining technology, pedagogy and content knowledge. as described in Koehler and Mishra's (2009) TPACK model, teachers were able to provide active, engaging and stimulating learning opportunities.

One strategy to stimulate these learning experiences was the provision of access to real time feedback through interactive activities, which was found to be a valuable function when using a mobile device. Feedback could be individualised to a student's attempt at an activity. This is congruent with two of Angelo's (1993) research-based principles for improving higher learning in our classrooms. Angelo (1993, p. 6) stated that "information organized in personally meaningful ways is more likely to be retained, learned and used" and "[L]earners need feedback on their learning, early and often to learn well". By facilitating personalised feedback, accessible through mobile devices, teachers and students were able to capitalise on these principles.

Findings from the student survey and student discussion groups provided insight into how students were using mobile devices to personalise their learning and also pointed towards the perception of value inherent in the ways students described using their devices to support their learning experiences. By promoting and encouraging student's self-reliance, particularly with regard to actively encouraging students to use mobile devices to support language learning practices, students were able to develop more autonomy within their own learning. This mirrors findings from research conducted by Jarvis and Achilleos (2013) into how non-native speakers of English studying at a British university used their digital devices. Students in both contexts were using their devices to support language acquisition.

In addition to supporting language acquisition, personalising organisational tools was also perceived to be of value. Students in the pre-degree sector more clearly identified the need to understand timings throughout the course with access to a course calendar, which they rated as the most valuable online learning strategy. This differs significantly from postgraduate (ranked the least valuable at number 19; McSporran, 2004) and undergraduate students (ranked 7th; Frey et al., 2003) who completed the same online learning strategy inventory some years ago. This may suggest that students in a pre-degree course place more value on the strategies that support the planning and organising of their studies.

5.3.5 Scaffolded support

The findings from the teacher survey, as presented in section 4.2.3.4, identified cognitive processes as an area where the use of mobile devices was felt to have added value. The ability to manipulate texts to examine and explore academic discourse was one such area. Contemporary tertiary teaching often requires teachers to provide opportunities for scaffolded interaction within classroom activities, catering for a diversifying student population (Rolls et al., 2017). Teachers surveyed self-reported using mobile devices within their courses to engage students actively in the manipulation of texts and also in the support of autonomous learning practices, particular for, but not isolated to, students from non-English speaking backgrounds.

According to the online learning strategy inventory, it appears learning strategies that provide the largest amount of structured scaffolding are ranked higher than strategies with less guidance. Students in this study of pre-degree courses identified the need to see example tests and exams, which they rated as the tenth most valuable online learning strategy. Undergraduate and postgraduate students in earlier studies ranked this strategy as much less valuable (Frey et al., 2003; McSporran, 2004). This suggests that students in a pre-degree course perceived more of a need for scaffolded direction through the use of exemplars in their studies. The provision of online computerised study guides and self-assessed quizzes were

perceived to be of similar value with the pre-degree and post-graduate cohorts, with only slight differences in perceived value. Having announcements posted on the LMS (Stream, Blackboard or the Web) was not perceived to be of substantial value by pre-degree students, who ranked online announcement postings as the 13th most valuable, which equates to being the seventh least valuable online learning strategy. This ranking was the same for undergraduate students in Frey et al.'s (2003) study. Whilst online announcements were considered to be of considerable value to postgraduate students with a ranking of second most valuable (McSporran, 2004), this strategy was not considered as valuable by the under-graduate and pre-degree students. This is perhaps due to the students' perception of their readiness to learn (Merriam & Bierema, 2014) where they perceived more direction to be valuable and desirable within their context. This may be particularly germane in the case of students who have had a gap in their education and who are using these pre-degree courses to return to formal study. This has not been investigated but could, and should, be an area of future study.

5.3.6 Increased connectivity

Given the age of over half of the student population enrolled in pre-degree courses, many students were considered millennials (Kennedy et al.,2009), digital natives (Prensky, 2009), or net-geners (Berk, 2009). Inherent in these classifications was the expectation that students would be constantly connected and assumptions were made not only about connectivity, but also about digital abilities and digital competencies of students.

As value was perceived to be added by students being able to support their own language acquisition and learning, a growing expectation has emerged, as teachers acknowledge an expectation that students are online and able to access a variety of resources to support and supplement their learning. Teachers described having higher expectations of how students interacted, manipulated, applied and presented information. This is reminiscent of Park (2011) who found that technology meant that

learning had the potential to be more dynamic and flexible. As students have access to be able to collaborate and curate appropriate resources, perhaps there is greater need to explore adaptive or open book assessments as suggested by Mitra, Kulkarni and Stanfield (2016). It remains to be tested as to whether or not these higher expectations had a Pygamalio effect leading to increasing levels of achievement.

International students in particular commented on a need to be connected and contactable at all times. This sense of connectivity, both in face-to-face and online contexts, is said to be an identified trait of net-geners (Berk, 2009) and was also identified by Midgley (2010) who reported that Saudi students felt the need to be connected to family whilst in the classroom. This sense of connectivity was said to enable students to concentrate on their studies more as they were sure family member would be able to contact them if necessary. Whilst this may not appear to add direct value to learning and teaching activities, it was perceived to add value by minimizing concern felt by students if they could not be contacted. Students in the discussion groups within the context of this study stated they valued the ability to connect with family members, particularly internationally located ones, highly. This corroborated Midgley's (2010) findings amongst Saudi students and further extends this to suggest other ethnic groups may equally value the ability to be contactable and connected whilst in class.

5.4 What challenges do teachers and students in this context face when using mobile devices in the classroom?

An analysis of findings identified students and teachers alike claiming the potential for distractions associated with using mobile devices in the context of pre-degree academic classrooms was the main challenge. Other identified challenges were peer use, maintaining focus, and technical and physical issues that presented as challenges when integrating mobile devices into this learning and teaching context. These challenges are analysed and discussed in the following sections.

5.4.1 Distractions

Overwhelmingly the largest challenge identified by teachers in this study was the possibility that students would be distracted by the use of mobile devices and consequently would be off-task and not able to concentrate on the task at hand. Balancing these challenges was also identified as a *wicked challenge* in the *NMC Horizon Report: 2016 Higher Education Edition* (Johnson et al., 2016). However, managing these distractions could be framed in the context of workplace readiness where workers could also be presented with the distraction of notifications on mobile devices during work hours. Understanding how to minimise or mitigate these distractions could be, and perhaps should be, an important teaching opportunity in FACE classrooms. Also, as information becomes more digitally available, workers must be trained to access electronic information and training materials using technology (Ally, Samaka, Impagliazzo, Mohamed, & Robinson, 2014).

Not all uses of mobile devices positively support learning. Teachers commented on students being distracted from learning by engaging in off-task activities such as accessing social networks and other entertainment functions available on their mobile devices. Educators in similar academic contexts (e.g. Kuznekoff, Munz, & Titsworth, 2015; Junco & Cotton, 2012; Ravizza, Hambrick, & Fenn, 2014; Sana et al., 2013) have also commented on the potential for distraction as being detrimental to an active learning environment. Sharples (2002, pp. 510-511) asserted that educators can respond by banning mobile devices, ignoring them or welcoming them into the classroom. If educators welcome mobile devices into the classroom, it must be on the understanding that mobile devices will disrupt traditional didactic teaching practices. This disruption could contribute to a more conversational approach to learning and teaching. Therefore, developing a set of principles or engaging in discussions about appropriate usage of mobile devices is necessary so as to minimise the negative impact of these distractions on teaching and learning activities.

This study has confirmed that students and teachers alike identified mobile devices as having the potential to negatively affect learning by providing multiple

opportunities for distraction. This corroborates findings from studies reviewed in section 2.6 (Culén & Gasparini, 2011; Jennings et al., 2011; Madrazo, 2011; Nguyen et al.,2014; Sheppard, 2011) that mobile devices can distract students from learning and teaching activities. However, this study has also highlighted the conscious response from teachers to ensure classroom management techniques were maximised. This finding concurs with Jennings et al. (2011) who noted that the management of student distraction was a classroom management consideration not specific to technology-enhanced contexts.

Teachers in this study also identified the potential for students to be off-task, distracted or otherwise unengaged with learning and teaching activities. Kirschner and Bruyckere (2017, p. 139) lamented the “deleterious effects of multitasking", claiming that students cannot multitask but instead task switch. This disrupts one task to work on the next as opposed to being able to work on multiple tasks simultaneously. Ravissa et al. (2014) investigated the correlation between test scores and rate of internet use for non-classroom purposes. They found that accessing Facebook, checking emails and texting were not statistically significantly related to test scores. They hypothesised this was due to the transient nature of these activities and furthermore, time spent doing these was less than browsing the internet. Higher rates of internet use throughout the semester corresponded with lower test scores. This relationship held even when accounting for intellectual ability. Students in the study appeared unaware of the detrimental effect portable technologies had on their test scores.

However, despite these challenges, teachers identified a need to ensure classroom tasks were meaningful and engaging for students. Their collective experiences showed that when students were actively engaged, the distractions were minimised. This, at least in part, may address an earlier call for the need to develop competences with regard to digital literacies (Hockly, 2012). One of the identified literacies was "attention literacy” (ibid, p. 109) or the ability to know when to switch off as well as

on. This would include self-management of distractions knowing, i.e. when to avoid, or at least minimise, these distractions. It would appear from teacher responses in this study that teachers were aware of the need for this area to be added to the curriculum or as part of a teaching syllabus so that students would be more aware and better informed to be able to manage their 'attention literacy' and proactively support their learning. This further supported findings suggesting disengaged students regularly use technology to avoid participation in potentially collaborative learning environments (Heflin, Shewmaker, & Nguyen, 2017).

5.4.2 Maintaining focus

Related to students being distracted emerged the theme of having difficulty maintaining focus. In this study, receiving notifications on mobile devices was mentioned during the teacher survey, student survey, and Student Discussion Groups as a trigger that interrupted focus. Gikas and Grant (2013, p. 23) also discussed devices as distraction reporting that "traditional college-aged students" found that the allure of social networking applications potentially threatened concentration; however, this demographic of students also felt that it was very easy to respond to a received message and quickly return to the task at hand. This supposedly demonstrated an ability to manage their own time on appropriate learning tasks during class. Similarly, older students at a different university within the same study discussed the concept of devices as a distraction and emphatically stated that the devices were not a distraction.

Some teachers noticed a focus on instant gratification amongst students. Unfortunately for those students who want instant gratification, it can lead to them to look for quick solutions such as googling answers to equations and problems instead of working on the transferable skills, strategies and approaches that can be applied to future, potentially more diverse, issues and contexts. The perceived need for instant access to information was identified by teachers in this study as an area of vexation that appeared to cause frustration among students when time was

needed to be invested in the process of learning. This sense of frustration was reported as a trait present in net-geners. Berk (2009) claimed net-geners (a term used to describe the generation of students who have never known life without computers or the internet) thrive on instant gratification. When a need is not met, such as finding instant access to the information they need to complete a task, they will likely lose patience and subsequently become frustrated and bored. The need for instant gratification was examined by Liaw and Huang (2011) who argued that wireless devices have the potential to change the way students behave. Although outside the scope of this study, this would appear to be an area that would benefit more in-depth evaluation. However, the comments presented in chapter four (section 4.2.4.1) concur in that students were often focused on quick fixes and teachers were actively monitoring how this affected classroom behaviours.

5.4.3 Impact of peers' uses of mobile device

During the Student Discussion Groups, students mentioned being sidetracked by what other students were using their mobile devices for. While the effect this distraction had on test scores was not part of this study, this is an area of further exploration. Sana, Weston and Cepeda (2013) conducted experiments to show the effect a student's multitasking had on other students around them. They asserted that multitasking negatively affected the multitasker's notetaking and recall ability and it also negatively affected those around them. They found students who were multitasking did not think their actions would affect their peers. However, the results of the research indicated that peers were in fact distracted by what others were doing on their laptops around them. Findings such as these should be widely disseminated with students, not only teachers and other academics.

In addition, during the Student Discussion Groups, students talked about a perceived involuntary lack of control when it came to accessing mobile devices. Students reported their own sense of addiction to their devices and a perception that their

classmates and peers were also demonstrating, what they considered to be, potentially addictive behaviours towards mobile device usage. This sense of addiction contributes to findings that have indicated that mobile devices and student identity have merged (Gikas & Grant, 2013), making the two, student and device, inseparable. This discussion of perceived addiction supports the notion of a sense of self being linked to a student's device.

5.4.4 Technical challenges

Teachers in this study demonstrated high levels of resilience when confronted with technical challenges within their classroom contexts. Kukulsha-Hulme (2009) reported that the type of device mattered when it came to integrating mobile devices into learning and teaching activities. In the teacher survey, one of the identified challenges were technical issues: "Inevitably these new forms of learning bring technical and pedagogical challenges for both students and teaching staff" (Rolls, Northedge, & Chambers, 2017, p. 8). Butcher (2014) also reported frustration with technical infrastructure amongst teaching staff. Some identified technical challenges were intermittent wifi and difficulty accessing the LMS. Khlaif (2018) further identified lack of technical infrastructure and technical support as a potential roadblock to integration of technology.

Teachers in this study also expressed frustration when faced with technical difficulties that negatively impacted on planned learning and teaching activities. Technical challenges could perhaps be managed by ensuring teaching staff and learners are supported in the acquisition of relevant skills. This could include explicit teaching of ways that mobile devices could be used to support learning such as the use of personal devices to record lectures (Manguerra & Petocz, 2011) as well as strategic professional development courses for teachers to be able to harness teaching and learning opportunities. For this to be possible, it is necessary that an adequate professional development infrastructure is implemented (Adams Becker et

al., 2017) in a way that is sustainable and supportive. By minimizing, if not eliminating, technical issues, teachers can invest their expertise in maximizing and actively supporting learning opportunities.

5.4.5 Physical challenges

The physical dimensions of mobile devices change depending on make or model; however, a number of health and safety concerns were expressed regarding the length of time spent looking at screens. These physical challenges were identified more from a teacher's perspective than the students'. It is not clear from the data collected whether students did not have the same concerns or simply did not mention it. It may, however, still be an issue. Therefore, it is important that teachers are aware of health and safety guidelines to minimise the negative effects.

Evident from the teacher survey in this study was the physical challenge presented by the size of the screen when using mobile devices in the classroom context. This concern was warranted according to research into the readability of texts on small screens, which found that readability was negatively affected by smaller screens (Godwin-Jones, 2011). However, with the potential to zoom and double tap screens this issue may have improved. According to Singer Trakhman et al. (2017), students preferred to read digital texts, as opposed to printed text. They found that students read digital texts faster and judged their performance higher with regard to textual comprehension. However, actual performance when recalling specific details within texts was affected negatively.

5.5 Chapter summary

Chapter five has examined each of the research questions. The findings from the research instruments used in this study were linked together for discussion alongside

studies found in available literature. Similarities and divergent perspectives were both discussed.

In response to research question one regarding the use of mobile devices in university preparation courses in relation to learning, four themes emerged. Students were using their mobile devices to complete a range of course-related tasks. This was not surprising given the context of this study. Students were also reportedly using mobile devices for lexical support. Multiple online tools were used to provide support in the acquisition of vocabulary. Mobile devices were further found to be used to establish and maintain social connections between students and teachers both in- and outside class times. The final use of mobile devices discussed in this chapter was the role mobile devices played in organisation of study in the form of particular time management tools.

Teachers featured as the most influential factor in the use of mobile devices within the academic context. The pedagogical approach adopted by each teacher had the largest impact on the integration of mobile devices in learning and teaching activities. Adapting activities in response to different learning styles, abilities and preferences were all reported considerations that were taken into account when designing academic tasks. The ability to complete the task at hand was also an identified influential factor. Social factors and factors that influenced students' attention spans were further pertinent themes discussed. The final influential factor regarding the use of mobile devices found in this context was the technical proficiency of teachers.

Evident from the findings across the different research instruments as presented in chapter four was that teachers and students reported mobile devices added value to teaching and learning practices in six key areas. Some of the areas of perceived value were in respect to the affordances inherent in the mobility of the devices. Accessibility to information and convenience were touted as being valuable attributes for learning and teaching. Mobile devices were also found to add value

when used to support collaborative learning opportunities. Furthermore, mobile devices were perceived to add value with regard to the ability to personalise learning and provide scaffolded support for learners. Constant connectivity was the final area of value added when using a mobile device in the context of pre-degree, university preparation courses.

Although value was seen to be added, there were a number of challenges evident with the integration of mobile devices in pre-degree, blended learning classrooms. The main challenge was in the managing of distractions. This applied to both teachers, especially with regard to classroom management requirements, and students, for whom it was deemed necessary to develop personal self-management techniques to minimise the negative effect of distractions that appeared more apparent with mobile devices. Maintaining focus on relevant tasks was an identified challenge that was present using mobile devices. Teachers found that some students' focus on instant gratification meant that they often struggled to maintain focus when tasks were more complex. A challenge within the pre-degree classroom was the impact peers' uses of devices had on those in the same proximity. With students constantly connected, it is important that this impact is understood. Technical challenges, such as intermittent wifi difficulties with the LMS, and physical challenges, such as screen size that affected readability of texts, were also discussed.

Chapter 6: Considerations and implications

This study aimed to identify the effects of the use of mobile devices on student learning in a face-to-face, blended learning context. The previous chapters have outlined the research process beginning with an introduction to the study and the context within which it took place, followed by a review of literature that informed the study in chapter two. Chapter three summarised the methodological approach to the study. Findings from the data collection were presented in chapter four before combining the analysis and discussion of the presented findings in chapter five.

This chapter provides an overview of the study before outlining key findings and considerations emanating from the four research questions. This chapter also presents intended contributions to knowledge, identified limitations with relation to this study, and it concludes with directions for further study as a result of the findings in this research project.

6.1 Synopsis of this case study

An interest in understanding the academic applications of mobile devices was an area that inspired this research. This case study investigated how mobile devices were used to support learning and teaching activities in the context of foundation and continuing education blended-learning courses. The influences and perceived value, if any, of using mobile devices were also examined alongside challenges faced by students and teachers using mobile devices within the context of university preparation courses. At the conclusion of this study, much remains to be learnt about how students, in different contexts, are using their mobile devices.

Activity Theory has guided the collection and interpretation of the data throughout this study. Activity Theory provided a theoretical perspective to frame this study of how participants (students) used mobile devices, as tools and instruments, to work towards completing and achieving an outcome within the context of the rules and regulations, the community networks and roles and responsibilities of the courses they were enrolled in. The research questions were designed to explore different concepts as presented in Activity Theory (see figure 6.1) and to expand our understanding of the effects of mobile devices on student learning within a Foundation and Continuing Education context.

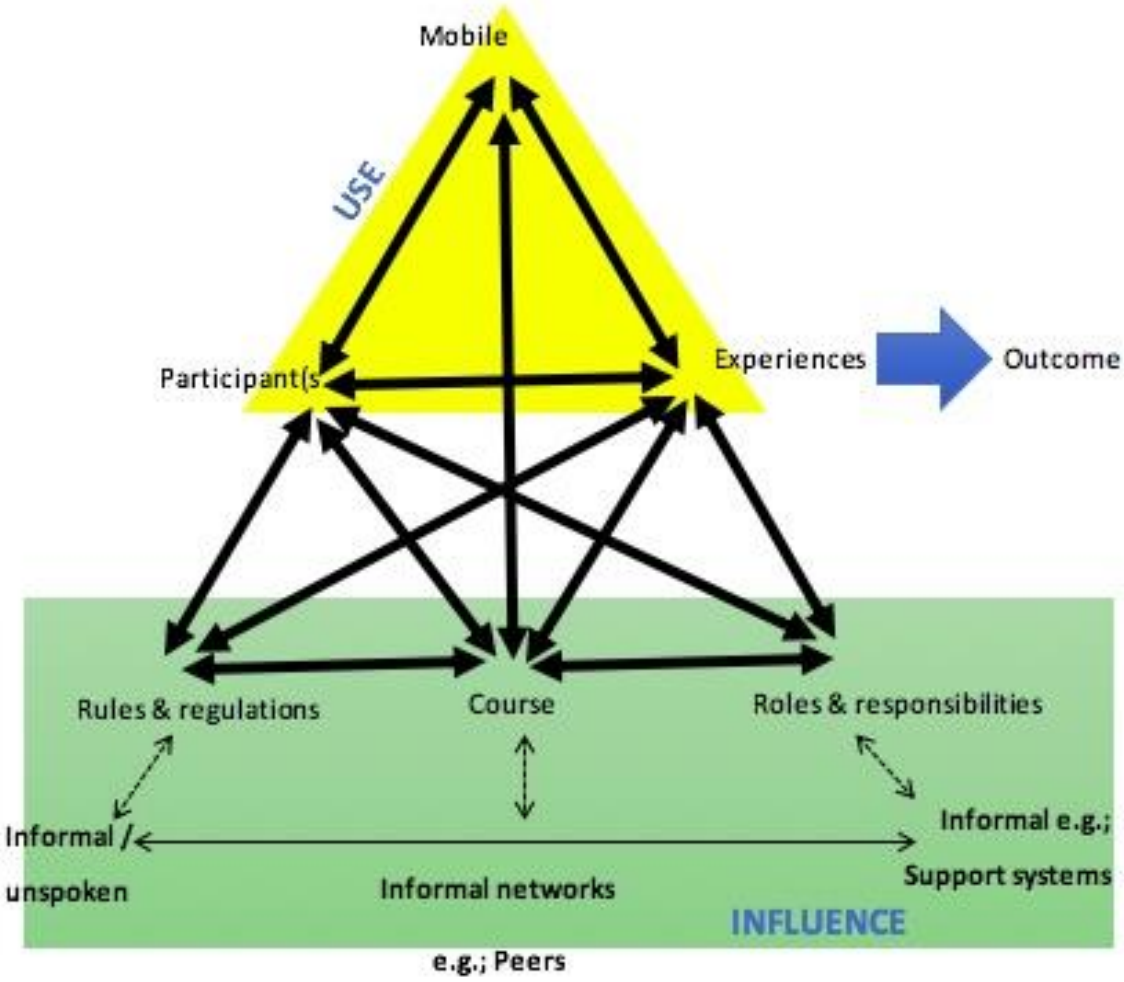


Figure 6.1: Alignment of uses and influences with Activity Theory

As presented throughout this thesis, this case study of a New Zealand based university preparation course, explored four research questions to examine the

effect mobile devices had on student learning. The first research question focused on the use of mobile devices by students to achieve an experience and work towards a specific outcome. Students reported using mobile devices to complete course-related tasks, provide lexical support, maintain social connections and facilitate the establishment of time management skills necessary for promoting effective learning practices.

The second research question looked at factors that influenced the use of mobile devices within the academic context. Teachers and peers were found to greatly influence and affect student learning. Teachers influenced the use of mobile devices through their pedagogical decisions and approaches used in the classroom which were, at times, influenced by the teacher's technical capabilities. The influence of peers was at times positive, encouraging social connections, but could also interfere with a student's ability to focus on their own studies.

The answers to the third research question found that teachers and students perceived added value to teaching and learning when mobile devices were used to support the access to course materials and enabled collaborative learning opportunities. Value was also added when students were able to personalise their learning, particularly through access to organisational tools, language learning tools in the case of students for whom English is an Additional Language (EAL) and real-time, personalised feedback facilitated through the LMS, as well as facilitating scaffolded support for learning and teaching activities.

The final research question was designed to identify challenges experienced by students and teachers when using mobile devices in the classroom. The challenges represented areas where there was a breakdown in the connections between the concepts identified in Activity Theory (see 6.2). Both connections and contradictions play important roles in Activity Theory. In the case of this study, contradictions were evident in the challenges. These challenges often interrupted learning and teaching

activities and have been depicted in figure 6.2 by the red arrows. The most challenging aspect of having mobile devices in the classroom was the managing of distractions. Maintaining focus and avoiding becoming distracted by what peers were doing with their devices were also challenges experienced within this context. Furthermore, challenges with respect to the technical and physical aspects of mobile devices were apparent as well. These identified challenges were found to negatively affect learning.

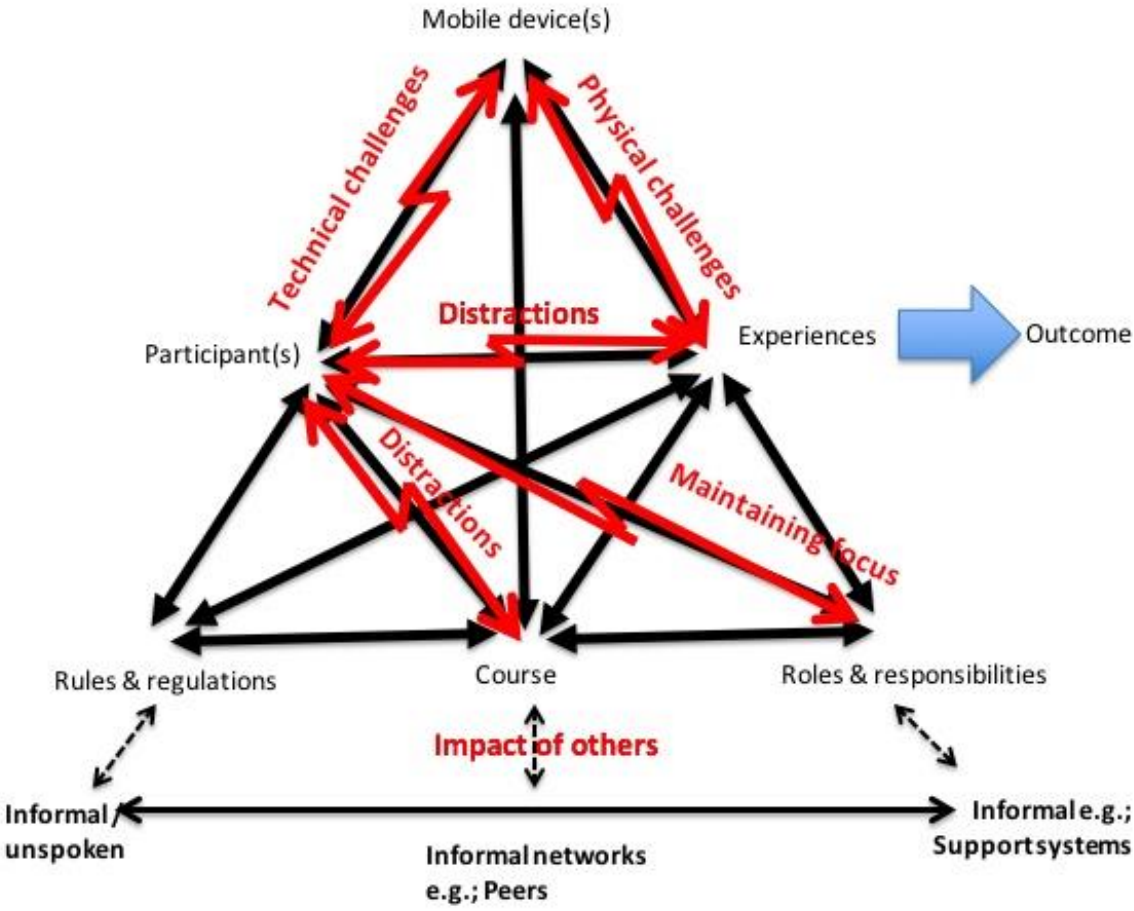


Figure 6.2: Challenges present in case study

6.2 Key Findings

The purpose of this study was to investigate the effects of mobile devices on student learning within the context of a New Zealand-based university preparation course. For this to happen, it was important that the reported use, factors that influenced the use, perceived value and possible challenges of using mobile devices were

documented and researched. Following qualitative data analysis, there were a number of themes that emerged in response to each research question (table 6.1).

Research question	Overall themes
RQ1 - usage Within the context of a pre-degree, university preparation course in New Zealand, how are students using mobile devices in relation to learning?	• Course related tasks • Lexical support • Social connection within the academic context • Time management
RQ2 - Influential factors What factors influence the use of mobile devices within this academic context?	• Pedagogical approaches • Teacher influence • Task completion • Social influences • Factors influencing attention • Technical proficiency
RQ3 - Perceived value From the teachers' and students' point of view, how do mobile devices add value, if any, to learning and teaching practices within this New Zealand context?	• Access • Convenience • Collaboration • Personalisation of learning • Scaffolded support • Increased connectivity
RQ4 - Challenges What challenges, if any, do teachers and students in this context face when using mobile devices in the classroom?	• Distractions • Maintaining focus • Impact of peer's use of mobile device • Technical challenges • Physical challenges

Table 6.1 Key findings

6.2.1 Use of mobile devices in relation to learning

The findings into the use of mobile devices in relation to learning show that students in the context of this case study were capitalizing on the speed and ease with which they could access course-related learning materials using their mobile devices. Students in this case study were in university preparation courses and consequently one of the course-related foci was the process of academic writing. The use of mobile devices was evident throughout this process, from the initial planning stages through to submission and receiving feedback on their writing. Complementary to writing processes, students were using mobile devices to support lexical acquisition by accessing pertinent websites, online dictionaries, using translation tools, and keeping digital lists of relevant vocabulary items. Students were also observed to be using different devices to complete different tasks, indicating that they were selective, where possible, about task-device appropriacy. As students were constantly connected to learning and teaching materials, there was a reported sense of autonomy amongst learners and a potential for the transference of ownership for the pace of their learning, suggesting a move away from a teacher-centred didactic approach to a more student-directed model.

Within the academic context, students were also using their mobile devices to maintain social connections with peers and teachers. Mobile devices were used to facilitate a sense of connectedness and community through the use of text-based applications, such as emails and text messages, as well as oral communication via the phone or other internet-based communication apps available on mobile devices.

Mobile devices were also used to support personal organisation and aid in the implementation of appropriate time management strategies. Students were readily accessing tools to enhance productivity and improve tasks related to time management such as planning and scheduling. By keeping track of tasks, updating reminder lists and taking notes on their mobile devices, students were better able to organise their own workflows.

6.2.2 Influential factors in the use of mobile devices

The role that teachers played in the use of mobile devices within the academic context was found to be one of the most influential factors. It was evident that teachers within this context took time to consider pedagogical implications before integrating mobile devices into their approaches to learning and teaching. Interactive elements, accessed via mobile devices, were used during learning and teaching activities to heighten engagement and stimulate learning opportunities. These were often accompanied by real-time feedback, meaning teachers were able to readily respond to gaps in knowledge or make relevant connections between learning activities. Teachers also reported that the use of mobile devices in their classes enabled them to seamlessly cater for different learning styles in a way that had not been as easy prior to the integration of mobile devices.

An additional factor that influenced the use of mobile devices was the access to, or ownership of, aforementioned devices. Teachers noted that students were constantly connected to devices and developed the assumption that all students would have access to mobile devices. This assumption enabled tasks to be completed outside the confines of the physical and time-bound constraints of timetabled classes.

Social influences were another factor that influenced the use of mobile devices. Students were using mobile devices to communicate with each other and with their teachers. Furthermore, it is possible to suggest that students, within the demographic presented in this case study, were also attending classes for the social experience and connection with others. This connection was often facilitated through a variety of social media. However, students in this study did not rate the use of social networking sites within their academic programmes positively.

The final influences often impacted negatively on learning. Students reported a perceived a shortening of attention spans, which subsequently led to students disengaging with learning and teaching activities. When they became bored or disengaged, students would use their mobile devices as a distraction. This was also true when technical proficiency inhibited the effective use of technology in the classroom. This was potentially mitigated when students and teachers explored and experimented with technology to achieve learning outcomes. This was particularly the case when problem-centred learning approaches were implemented so students were actively applying skills and concepts learnt to the solving of an issue or problem.

6.2.3 Perceived value to learning and teaching practices

Value was perceived to be added when using mobile devices within the academic context. Instantaneous access to course materials and information at their fingertips was said to enable more opportunities for responsive learning and teaching activities. The use of mobile devices added value by facilitating the use of time management tools, promoting organisational skills, providing language learning and lexical support, and by encouraging a more autonomous approach to learning. Mobile devices were also perceived to add value due to the convenience associated with their portability, speed, immediacy of access, as well as perceived ease of use.

From the perspective of students and teachers alike, value was deemed to be added when mobile devices were used in collaborative activities whilst also personalising the learning experience. Working collaboratively was an area that mobile devices were used for to heighten productivity and deepen learning. Teachers were able to collaborate with students and students were able to form peer groups to work on collaborative projects. These projects were facilitated more readily with mobile devices as opposed to wired technologies such as desktop computers. Students were able work on their own devices to contribute to a group objective or were able to share a device to work on a product. Each approach catered to different learning

outcomes and learning styles. When catering for different learning styles, mobile devices were found to be of value in personalising learning experiences. More specifically, mobile devices were utilised to provide any necessary, individualised, or personalised support in the form of feedback from interactive activities, discrete and unobtrusive learning support, especially for students with diverse learning needs or difficulties, scaffolded activities, or by promoting and encouraging self-reliant autonomous learning practices.

Finally, value was seen to be added when mobile devices were used to enable connectivity. This was found in two key areas: connectivity to materials and connectivity to family members. Due to the increased connectivity, teachers held higher expectations of students' ability to locate, integrate, manipulate, apply and present information in a way that was accessible to others, whether for the purpose of assessments or to contribute to class discussions and share with other students. For international students in particular, the knowledge that they could be contacted at any time by family members overseas meant they felt they could concentrate on their studies in a way they did not believe they could if they did not have the means for instant connectivity.

6.2.4 Challenges when using mobile devices in the classroom

The prominence of distractions presented the most evident challenge when using mobile devices in the classroom. Students regularly displayed off-task behaviours when using mobile devices. To minimise the opportunities for students to be distracted, teachers reported a need to implement appropriate classroom management techniques that maximized student engagement in learning and teaching activities. Findings suggested students who were actively engaged in the learning and teaching process rarely had the opportunity to be distracted by interruptions such as notifications that popped up on their devices. A perceived lack of tenacity to work through a process to find a solution was linked to a possible focus

on instant gratification. When answers were not immediately apparent, students were more likely to be distracted by their device.

Students also reported being distracted by what their peers were doing on their devices. This was particularly the case when screens could be seen by others, for example a laptop. If another student was off-task and their device could be seen, students reported that this distracted them and often affected their ability to stay on-task. Students also acknowledged feelings that they associated with addiction. They reported having difficulty disengaging from their mobile devices in order to respond to classroom activities.

Challenges with the physical dimensions of mobile devices and with technical aspects of the devices were also apparent. Despite demonstrating high levels of resilience when faced with technical challenges, these did impact on learning and teaching. Frustration was felt when the technology did not work in the way that had been anticipated, particularly when it had a negative effect on classroom activities. Although not evident in data collected from students, teachers also reported concerns over the physical size of some devices for use in the classroom context. It is not clear from current findings whether students found this to be an issue but did not comment, or if it was not a mutual concern. Further research would be needed to ascertain this.

6.3 Contributions to knowledge

The impetus for this research project was the proliferation of mobile devices I had observed when teaching Foundation and Continuing Education courses. When I first embarked on this research journey, there was little research into the use of mobile devices in the context of pre-degree university preparation courses offered in blended mode. As a teacher in the Foundation and Continuing Education courses, the motivation to investigate and report on the uses, influences, possible value and challenges was omnipresent, and a desire to understand how mobile devices were being used to support learning and teaching activities thus underpinned this investigation. At the conclusion of this research, there are a number of contributions that I believe have been made. Whilst these contributions have been divided for reporting purposes, it must be acknowledged that areas of knowledge are interdependent with substantial overlap between them. The three areas of knowledge where contributions have been made are: theoretical, methodological and practical knowledge. These are outlined in this section.

6.3.1 Theoretical contributions

As described in chapter two, the context of Foundation and Continuing Education has, to date, been under-documented with regard to the integration and the use of mobile devices within academic settings. This study was, therefore, undertaken to develop a contextualised understanding of the mobile device usage phenomenon within the academic context that bridges the divide between secondary and tertiary educational settings. The findings, analysis and discussion add to the growing body of literature on the integration of mobile technologies across a variety of academic contexts, and more specifically to the pre-degree, tertiary context.

Blended learning was identified as a key trend that could contribute to the acceleration of technology adoption in higher education (Johnson et al., 2015;

Johnson et al., 2016; Adams Becker et al., 2017). This study examined the effects of mobile devices on student learning in a New Zealand-based university preparation course that was taught using blended learning principles. Course materials were predominantly technology-mediated learning and teaching activities and were accessed during face-to-face classes or they used a flipped classroom model. By researching the use of mobile devices in these courses the body of research can be expanded to include findings reported in this thesis.

Findings from this case study were consistent with other researchers who have reported on the need to improve the digital fluency of teaching staff and indicated that in order to successfully integrate technology, according to Mishras's TPACK model, it is vital that time is invested at the point of curriculum discussions, lesson planning and teacher training. Not only is it necessary to develop teacher competencies in the area of digital fluency, but students' digital fluency needs must also be addressed. Although the pre-degree students, of which 50% were under 20 years old at the time of this study, have been predominantly brought up in a digital world that is becoming increasingly more digitised, assumptions were clearly being made about students' abilities to use devices in a way that contributed to or supported their learning. Students were active on their mobile devices but were not necessarily digitally fluent in utilising the devices' functionality to achieve outcomes. One way to develop teachers' and students' digital fluency is to establish a sense of collaborative collective efficacy, which can further support andragogical learning principles by enabling students to take ownership of their own learning and facilitate a more collaborative dynamic between students and teachers. This researcher has identified that digital fluency was an area that clearly needs to be understood more and developed further.

In addition to a need to develop digital literacies, this research has shown that students in the pre-degree stage of their academic progression have different perspectives on the value of some online learning strategies when compared to

perceptions of undergraduate and postgraduate students. It would appear that pre-degree students would benefit from more direction through the use of exemplars and scaffolded support for learning activities. This approach to more supportive instruction would need to be consciously integrated when planning courses if it is to be implemented effectively. For example, findings from this study would indicate that students ranked receiving feedback regarding assignments higher than receiving a grade for work submitted. This is an aspect that could have implications for the way that results are reported back to students. If pre-degree studies are designed to prepare students for future study, then it is perhaps incumbent on teachers in this context to ensure they provide growth-orientated and transferable feedback.

There was evidence that students were using their mobile devices to personalise their learning experiences. This aspect of incidental student-initiated learning support has not been discussed in literature within the context of university preparatory courses. Therefore, this is an area that would benefit from further exploration. This research has shown how students were learning how to harness functions, inherent in mobile technologies, to support academic study. This was found to provide support and possibly contribute to sustainable success, especially in the area of special learning needs.

An additional area, where a contribution to current understanding of students within this demographic has been made, is in acknowledging students' need for social interaction. We can see, according to the findings of this research, the social implications of mobile device usage in the context of university preparation courses. For instance, two areas where value was seen to be added, collaboration and increased connectivity, both have implicit social characteristics. In addition, one of the key influential factors for using mobile devices within this context was social influences, and mobile devices were further used as a means of social connection within the same academic context. Therefore, students were using mobile devices to facilitate social connections. As reported in chapter five, it is important to consider

that it might be social aspects that bring students to class, so as educators we need to provide opportunities to fulfil this need whilst also achieving learning and teaching targets.

This research, although focusing on student learning, has also demonstrated how teachers integrated opportunities to use mobile devices into learning and teaching activities. It was clear that pedagogical principles underpinned the design of activities and consideration was given depending on what access students had to mobile devices. Teachers were found to be a significant influence on the use of mobile devices within the academic context of pre-degree, Foundation and Continuing Education. Teachers also reported the potential for value to be added to classroom practices which was evident in their experiences of using mobile devices within their content areas. The challenges teachers faced when using mobile devices in the classroom were also discussed in this thesis, thus contributing to our understanding of issues associated with technology-mediated learning and teaching.

By contributing to the existent theoretical knowledge, our understanding of the effects of mobile devices on student learning has deepened. Contributions made with respect to methodological knowledge will be explored in the next section.

6.3.2 Methodological applications

Methodologically, this study adds to a body of literature using Activity Theory and has expanded the use of the online learning strategy inventory to a new context. These are both areas where this study has contributed to methodological knowledge.

Engeström's original Activity Theory diagram was amended for the purpose of this study. The amended Activity Theory (illustrated in figures 3.2, 6.1 and 6.2) acknowledged implicit, unspoken or informal aspects of components of Activity

Theory. By differentiating between the different aspects of explicit/implicit knowledge, formal/informal, and voiced/unvoiced elements, data collection and analysis were guided in a way that had not been done previously, thus contributing to methodological knowledge.

Furthermore, the application of Activity Theory to a new context of Foundation and Continuing Education is an additional area where methodological knowledge has been extended. This study has used Engeström's Activity Theory terms as a starting point but has adapted the original terms for the purpose of this study. The juxtaposition of the original terms used in this study will hopefully provide clarity for future researchers.

The inventory of online learning strategies has previously been used to identify perceptions of undergraduate and postgraduate students but, to the best of my knowledge, has not been used to examine the perceptions of pre-degree level students. Therefore, a contribution to methodological knowledge can be seen with the application of this data collection instrument in a context that has not previously been explored.

In addition to the online learning strategy inventory, this research utilised a variety of data collection procedures. The combination of methods ensured that both student and teacher perspectives were captured. Student responses were collected through the use of surveys, the inventory of online learning strategies, and student discussion groups. Teacher perspectives were gathered via a survey. If I were to repeat this study, I would have also included teacher discussion groups to be able to explore some of the themes that came out of the survey in more depth.

For other researchers investigating the use of mobile devices, it would be advisable to consider the difficulties I encountered when using observations to collect data.

The ability to be able to observe the use of small devices was problematic due to the size of the screens. In order to see what students were doing with their devices as an observer, I would have had to disturb the student from their task in order to view the screen. This would have negatively interfered with student learning and was unlikely to result in a true representation of use. Any future research in this area will need careful consideration as to how best to capture this data.

6.3.3 Practical implications

Alongside the theoretical and methodological contributions to knowledge, there are a number of areas where this study has contributed to knowledge that have practical, and potentially policy, implications. It was clear that students within the context of this study almost always had access to mobile devices during class time. Despite having access to mobile devices, the findings indicated that students needed encouragement and direction to use mobile devices to their best academic advantage. This could require providing learning opportunities built into the curriculum that use mobile devices to acquire and develop effective study skills and strategies to support learning. One such area would be to reinforce the use of mobile devices as tools for the development of time management and organisation skills that can support active learning. Another area could be to exploit situated learning opportunities for communicating and collaborating on content by using mobile device affordances to their maximum potential in these areas.

Another approach to providing scaffolded support may include acknowledging that some students may have a preference for printed material as opposed to digitally available materials. This case study found that students had a preference for printed material; however, this finding differs from other studies so further research into this area would be advised in order to identify how pervasive this preference is.

Distractions were identified as the most challenging aspect of mobile device usage within classes. In an effort to combat this, it could be suggested that achieving a shared understanding about the appropriate and effective use of mobile devices for learning purposes would be an important way forward. The idea of a code of practice or set of principles on using these devices within a programme should be considered. This code of practice could include how devices are used to support learning but could also include discussions about what practices are not conducive to learning and teaching. For example, students reported being distracted by how their peers were using devices; however, it was unclear if there was an understanding that their own actions might be distracting others in their vicinity. This is an area that could be covered under a code of practice. By having an explicit code of practice through a shared understanding of appropriate use, a collective agreement on appropriate mobile device usage within the academic context can be developed.

Alongside discussions regarding the development of a code of practice, it may be expedient to include explicit teaching of task-device appropriateness. It may be that not all mobile devices are suitable for all tasks. Engaging students in discussions about which tool to use to achieve a task outcome is an important application of critical thinking skills. It may be that different tools, if available, are needed for different tasks. This could further be supported by a modularised approach to learning with smaller, linked activities that can be completed using different tools or applications of the same tools in different ways. This modularised approach may also combat shorter attention spans especially when introduced together with explicit *attention literacy* tasks to encourage self-management of distractions. These smaller activities may similarly help with occasions when students are frustrated with answers that are not immediately available, which relates to the need for instant gratification as previously discussed.

As mentioned earlier as well, in reference to theoretical contributions, digital fluency is an area in which some teachers may benefit from some additional in-service

training. Fortunately, all teachers in this study expressed a willingness to engage in continuing professional development as technologies rapidly change and new advances are introduced. Therefore, it is important that ongoing professional development of teaching staff is considered a high priority. Teachers were found to be one of the key influential factors in the inclusion of mobile devices within the academic context. Therefore, support to enable them to align learning outcomes, curriculum and the necessary tools, whether it be mobile devices or a future alternative, needs to be a key consideration for programme development.

6.4 Limitations

There are a number of caveats that need to be acknowledged regarding this current research. In the first instance, as this was a case study, involving a specific set of participants, at a specific location and at a particular point in time, the findings may not necessarily be generalisable and findings should be cautiously interpreted. It is for this reason that substantial effort was put into including various aspects of the decision making and research process. This description was provided for other researchers and academics to draw their own conclusions.

Another limitation of this study is the sample size of teacher participants who responded to the teacher survey. It is notable that the teachers who participated in this research were predominantly experienced teachers and consequently represented an older age demographic (refer to table 4.2). Their experiences with mobile technology may be quite different from experiences of younger or recently graduated teachers. It is also important to acknowledge that as an older group of teachers, the level of experience with mobile devices may have been very different compared with their younger students. The extent of these differences is acknowledged but was not explored in this case study.

Whilst this case study focused on the effects of mobile devices specifically on student learning, it would have been useful to include teacher interviews to quantify and qualify the ways in which students are actually using the technology. As students self-reported using mobile devices to complete on-task learning and teaching activities, they also mentioned off-task activities such as playing games, and checking texts and emails, which were common practice during class. These activities were not really immersion and connection in the educational sense and the extent to which students were engaged in different activities could have been better explored by collecting oral data from focus groups or interviews with teachers in much the same way as those conducted with student participants.

A final limitation was in the small sample size of the student discussion group participants. The participants represented only a selection of the total student population. Of noteworthy mention was the lack of Māori and Pasifika perspectives as they were not represented in the discussion groups.

6.5 Further study

Emanating from this research, there are a number of areas that would be worthwhile investigating further. These areas are:

- *The effect of mobile devices on Māori and Pasifika students' learning*: Māori and Pasifika students were not represented in the student discussion groups, despite this being a significant demographic within the context of Foundation and Continuing Education. Therefore, more research is needed to understand this important group of students.
- *Decreasing attention spans:* students self-reported a perceived decrease in their ability to stay on task and to a lowering of their attention spans. Research into this area would be valuable when designing the length of learning and teaching activities.

- *Effect of mobile devices on critical thinking during writing activities:* students were using mobile devices for all parts of the writing process. Recent research indicates that mobile devices may have a detrimental effect on critical thinking skills. Further comparative research is needed in this area to ascertain whether this is the case for students in the FACE context.
- *The use of mobile devices in summative and formative assessments:* course content is increasingly being accessed through online Learning Management Systems. There are some indications that testing and assessments may also follow this trend. Therefore, comparative research into results from online testing using mobile devices, online testing using wired technologies, and paper-based testing is an area of research that needs to be expanded.
- *Task-device appropriateness*: it was evident that some students were selective in their use of different devices to complete specific tasks. Further research into the considerations for use is an area that could help when developing learning and teaching activities. Also of interest in this area is the effect of having access to one device compared with using multiple devices. One focus might be on the impact of multiple devices on learning.

In addition, it would be interesting to compare experiences from the cohort of students and teachers represented in this study with students and teachers who enroll in the courses in the future. By replicating the research, an understanding of how we are interacting and integrating mobile devices into our academic lives over time would be valuable for potentially predicting future directions of technology integration within the classroom and curriculum.

6.6 Chapter summary

This study has contributed to enhancing an understanding of student's access to mobile devices within the context of pre-degree Foundation and Continuing Education. By understanding how students are using mobile devices, strategies can be implemented to support students and teachers to attain the necessary skills that will enable them to utilise mobile devices in ways that enhance the student learning experience.

Activity Theory was used to highlight the complex issues and inter-relational aspects of using mobile devices in a pre-degree, university preparation context. By implementing an expanded use of an amended Activity Theory model, a new perspective was achieved. This then enabled contributions to theoretical, methodological, and practical knowledge.

This research project serves as a platform which subsequent studies cause to n further contribute to the literature available. Some areas of personal interest deriving from this study have been highlighted. However, there are other areas that would also benefit from future exploration as technologies, particularly mobile technologies, continue to evolve. Thus, findings from this study can be used as a point of reference to form the basis of ongoing curriculum and professional development initiatives and to inform practices with regard to the use of mobile devices in New Zealand-based, university preparation courses. Transferability of these findings should be considered across similar contexts, especially within the context of Foundation and Continuing Education programmes.

As highlighted, teachers play an important influential role in the appropriate, constructive use of mobile devices within the learning and teaching context. The development of activities that facilitate active engagement with materials and experimentation when using mobile devices as tools is an area that will require

sustained exploration as technologies continue to advance. Although mobile devices can present some challenges, particularly in situations where students appear to be attached to their mobile devices, when mobile devices are used appropriately they can have a positive effect on student engagement across a wide range of learning activities. Within the context of pre-degree, university preparation courses, this study has demonstrated how mobile devices can add value to learning and teaching practices, when mobile devices are used as tools to provide opportunities for active engagement with learning and teaching materials that support academic learning and teaching processes and promote deeper learning.

References

Adams Becker, S., Cummins, M., Davis, A., Freeman, A., Hall Giesinger, C., & Ananthanarayanan, V. (2017). *NMC horizon report: 2017 higher education edition.* Austin, TX: New Media Consortium.

Adams, N., & Hayes, C. (2009). Does teaching with a tablet PC enhance the teaching experience and provide greater flexibility? What are the students' attitudes to teaching with a tablet PC? Retreived from http://www.monash.edu/eeducation/assets/documents/atiec/2009atiec-nadineadams-clintonhayes.pdf.

Al-Emran, M., Elsherif, H. M., & Shaalan, K. (2016). Investigating attitudes towards the use of mobile learning in higher education. *Computers in Human Behavior, 56*, 93-102. doi: 10.1016/j.chb.2015.11.033.

Ally, M., Samaka, M., Impagliazzo, J., Mohamed, A., & Robinson, M. (2014). Workplace learning using mobile technology: A case study in the oil and gas industry. In M. Kalz, Y. Bayyurt, & M. Specht, *Mobile as mainstream: Towards future challenges in mobile learning* (pp. 250-257). London, UK: Springer.

Amankwaa, L. (2016). Creating protocols for trustworthiness in qualitative research. *Journal of Cultural Diversity, 23*(3), 121-127.

Angelo, T. (1993). A teacher's dozen: Fourteen general, research-based principles for improving higher learning in our classrooms. *American Association for Higher Education, 45*(8), 3-13.

Averinova, I. (2011). A cell phone in the classroom: A friend or a foe? *EUROCALL 2011 Conference* (pp. 5-12). Nottingham, UK: EUROCALL.

Balanyk, J. (2013). Up to the task: Task based learning with iPads. *eLearning in Action.* Sharjah, United Arab Emirates.

Beatty, K. (2010). *Teaching and researching computer-assisted language learning.* Edinburgh, Scotland: Pearson Education Limited.

Bennett, S., Maton, K., & Carrington, L. (2011). Understanding the complexity of technology acceptance by higher education students. In T. Teo, *Technology acceptance in education: Research and issues* (pp. 63-77). Rotterdam, Netherlands: Sense Publishers.

Berk, R. (2009). Teaching strategies for the net generation. *Transformative Dialogues: Teaching & Learning Journal, 3*(2), 1-24.

Bloom, B. S. (1956). *Taxonomy of educational objectives: The classification of educational goals.* New York, NY: Longmans Green.

Blunden, A. (2010). *An interdisciplinary theory of activity.* Leiden, Netherlands: Brill.

Brand, J., & Kinash, S. (2010). Pad-agogy: A quasi-experimental and ethnographic pilot test of the iPad in a blended mobile learning environment. *Curriculum,*

technology & transformation for an unknown future. Sydney, Australia: Ascilite.

Brand, J., Kinash, S., Mathew, T., & Kordyban, R. (2011). iWant does not equal iWill: Correlates of mobile learning with iPads, e-textbooks, BlackBoard mobile learn and a blended learning experience. *Ascilite 2011: Changing demand, changing directions.* Hobart, Australia.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research In Psychology, 3*(2), 77-101. doi:10.1191/1478088706qp063oa.

Briz-Ponce, L., Pereira, A., Carvalho, L., Juanes-Méndez, J. A., & García-Peñalvo, F. J. (2017). Learning with mobile technologies: Students' behavior. *Computers in Human Behavior, 72*, 612-620. doi: 10.1016/j.chb.2016.05.027.

Burden, K., Hopkins, P., Male, T., Martin, S., & Trala, C. (2012). *iPad Scotland final evaluation report.* University of Hull.

Burston, J. (2014). The reality of MALL: Still on the fringes. *CALICO Journal , 31*(1), 103-125. doi: 10.11139/cj.31.1.103-125.

Butcher, J. (2014). Can tablet computers enhance learning in further education? *Journal of Further and Higher Education*, doi: 10.1080/0309877X.2014.938267.

Caliskan, I. (2014). Identifying the needs of pre-service classroom teachers about science teaching methodology courses in terms of Parlett's Illuminative Program Evaluation Model. *International Journal of Education in Mathematics, Science and Technology, 2*(2), 138-148.

Carrington, A. (2013). *The padagogy wheel v3.0*. Adelaide, Australia: Designing Outcomes.

Cheng, S., Hwang, W., Wu, S., Shadiev, R., & Xie, C. (2010). A mobile device and online system with contextual familiarity and its effects on English language learning on campus. *Educational Technology and Society, 13*(3), 93-109.

Chun, D., Kern, R., & Smith, B. (2016). Technology in language use, language teaching, and language learning. *Modern Language Journal, 100*, 64-80. doi:10.1111/modl.12302.

Churches, A. (2008, April). Bloom's taxonomy blooms digitally. *Educators' eZine*.

Churchill, D., Fox, B., & King, M. (2012). Study of affordance's of iPads and teachers' private theories. *International Journal of Information and Education Technology, 2*(3), 251-254.

Clandfield, L., & Hadfield, J. (2017). *Interaction online: Creative activities for blended learning.* Cambridge, UK: Cambridge University Press.

Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education.* London, UK: Routledge.

Contact North. (2015). Trends and directions: A new pedagogy is emerging ... and online learning is a key contributing factor. Retrieved from

http://contactnorth.ca/trends-directions/evolving-pedagogy-0/new-pedagogy-emergingand-online-learning-key-contributing.

Coombes, P., Danaher, M., & Danaher, P. (Eds.). (2004). *Strategic uncertainties: Ethics, politics and risk in contemporary educational research.* Flaxton, Australia: Post Pressed.

Culén, A., & Gasparini, A. (2011). iPad: A classroom technology? A report from two pilot studies. *INFuture2011: Information sciences and e-society* (pp. 199-208). Zagreb, Croatia.

Dall'Alba, G. (2009). Phenomenology and eduation: An introduction. *Educational Philosophy and Theory, 41*(1), 7-9. doi: 10.1111/j.1469-5812.2008.00479.x.

Doolittle, P., & Hicks, D. (2003). Constructivism as a theoretical foundation for the use of technology in social studies. *Theory and Research in Social Education, 31*(1), 72-104. doi: 10.1080/00933104.2003.10473216.

Drysdale, J., Graham, C., Spring, K., & Halverson, L. (2013). An analysis of research trends in dissertations and theses studying blended learning. *The Internet And Higher Education, 17*, 90-100. doi:10.1016/j.iheduc.2012.11.003.

Dudeney, G., & Hockly, N. (2012). ICT in ELT: How did we get here and where are we going? *ELT Journal, 66*(4).

Education Counts. (2018). *Participation rates in tertiary education*. Retrieved from https://www.educationcounts.govt.nz/statistics/indicators/main/student-engagement-participation/participation_rates_in_tertiary_education

Eichenlaub, N., Gabel, L., Jakubek, D., McCarthy, G., & Wang, W. (2011). Project iPad. *Computers in Libraries, 31*(7), 17-22.

Elliot, S., & Adams, N. (2011). Using a tablet PC to facilitate the engagement and success of students. *7th Pacific Rim, first year in higher education conference.* Queensland, Australia.

Engeström, Y., Miettinen, R., & Punamäki-Gitai, R. (1999). *Perspectives on activity theory.* Cambridge, NY: Cambridge University Press.

Ertmer, P., Ottenbreit-Leftwich, A., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical relationship. *Computers and Education, 59*(2), 423-435. doi: 10.1016/j.compedu.2012.02.001.

Falloon, G. (2015). What's the difference? Learning collaboratively using iPads in conventional classrooms. *Computers and Education, 84*, 62-77. doi: 10.1016/j.compedu.2015.01.010.

Farley, H., Murphy, A., Johnson, C., Carter, B., Lane, M., Midgley, W., . . . Koronios, A. (2015). How do students use their mobile devices to support learning? A case study from an Australian regional university. *Journal of Interactive Media in Education, 1*(14), 1–13. doi: http://dx.doi.org/10.5334/jime.ar.

Freeman, B. (2012). Using digital technologies to redress inequities for English language learners in the English speaking mathematics classroom.

Computers and Education, 59(1), 50-62. doi: 10.1016/j.compedu.2011.11.003.

Frey, A., Faul, A., & Yankelov, P. (2003). Student perceptions of web-assisted teaching strategies. *Journal of Social Work Education, 39*(3), 443-457.

Frost & Sullivan. (2013). By 2018, New Zealand will have 90% smartphone and 78% tablet ownership levels [Press release]. New Zealand. Retrieved from http://www.frost.com/prod/servlet/press-release.pag?docid=288249825.

Garaj, V. (2010). m-Learning in the education of multimedia technologists and designers at the university level: A user requirements study. *IEEE Transactions on Learning Technologies, 3*(1), 24-32. doi: 10.1109/tlt.2009.38.

Garrett-Rucks, P., Howles, L., & Lake, W. (2015). Enhancing L2 reading comprehension with hypermedia texts: Student perceptions. *Calico, 32*(1), 26–51. doi : 10.1558/calico.v32i1.26131.

Gedera, D. (2014). *Mediational engagement in e-learning: An activity theory analysis* (Doctoral thesis, University of Waikato, Hamilton, New Zealand). Retrieved from https://hdl.handle.net/10289/8847

Geist, E. (2011). The game changer: Using iPads in college teacher education classes. *College Student Journal, 45*(4), 758-768.

Gikas, J., & Grant, M. (2013). Mobile computing devices in higher education: Student perspectives on learning with cellphones, smartphones & social media. *Internet and Higher Education, 19*, 18-26.

Gitsaki, C., & Robby, M. (2013). *iPad project implementation: Year 1 report.* Abu Dhabi, United Arab Emirates.

Godwin-Jones, R. (2011). Emerging technologies: Mobile apps for language learning. *Language, Learning and Technology, 15*(2), Retrieved from http://llt.msu.edu/issues/june2011/emerging.pdf.

Grace, K. E. (2011). *Comparing the iPad to paper: Increasing reading comprehension in the digital age* (Master's thesis, Bowling Green State University, Reading, OH). Retrieved from http://rave.ohiolink.edu/etdc/view?acc_num=bgsu1300309882

Gray, D. (2009). *Doing research in the real world.* Los Angeles, CA: Sage.

Gray, D. (2018). Doing research in the real world (4th ed.). Los Angeles, CA: Sage.

Harper, B. (2018). Technology and teacher-student interactions: A review of empirical research. *Journal of Research on Technology in Education*, doi: 10.1080/15391523.2018.1450690.

Heflin, H., Shewmaker, J., & Nguyen, J. (2017). Impact of mobile technology on student attitudes, engagement and learning. *Computers and Education, 107*, 91-99.

Heinrich, P. (n.d.). *The iPad as a tool for education: A study of the introduction of iPads at Longfield Academy, Kent.* Retrieved from http://www.naace.co.uk/publications/longfieldipadresearch

Hockly, N. (2012). Digital literacies. *ELT Journal, 66*(1), 108-112.

Hockly, N. (2013). Mobile learning. *ELT Journal, 67*(1), 80-84.

IELTS. (2017). *How IELTS is scored*. Retrieved from IELTS: https://www.ielts.org/about-the-test/how-ielts-is-scored

Jarvis, H., & Achilleos, M. (2013). From computer assisted language learning (CALL) to mobile assisted language use (MALU). *Teaching English as a Second or Foreign Language, 16*(4), 1-18.

Jennings, G., Anderson, T., Dorset, M., & Mitchell, J. (2011). *Report of the Step Forward iPad pilot.* Retrieved from http://www.trinity.unimelb.edu.au/Media/docs/iPadPilotReport2011-1b1e1a52-79af-4c76-b5b6-e45f92f2c9e9-0.pdf.

Johnson, L., Adams Becker, S., Cummins, M., Estrada, V., Freeman, A., & Hall, C. (2016). *NMC horizon report: 2016 higher education edition.* Austin, TX: New Media Consortium.

Johnson, L., Adams Becker, S., Estrada, V., & Freeman, A. (2014). *NMC horizon report: 2014 higher education edition.* Austin, TX: New Media Consortium.

Johnson, L., Adams Becker, S., Estrada, V., & Freeman, A. (2015). *NMC horizon report: 2015 higher education edition.* Austin, TX: New Media Consortium.

Johnson, L., Adams, S., & Cummins, M. (2012). *NMC horizon report: 2012 higher education edition.* Austin, TX: New Media Consortium.

Jones, C. (2013). *Apple's new iPads should lead to record sales in the December quarter.* Retrieved from http://www.forbes.com/sites/chuckjones/2013/10/23/apples-new-ipads-should-lead-to-record-sales-in-the-december-quarter/

Junco, R., & Cotton, S. (2012). No a 4 u: The relationship between multitasking and academic performance. *Computers and Education, 59*, 505–514. doi:10.1016/j.compedu.2011.12.023.

Kaptelinin, V., & Nardi, B. (2000). *Activity theory: Basic concepts and applications.* New York, NY: ACM.

Keane, T., Lang, C., & Pilgrim, C. (2012). Pedagogy! iPadagogy! Netbookology! Learning with mobile devices. *Australian Educational Computing, 27*(2), 29-33.

Kennedy, G., Dalgarno, B., Bennett, S., Gray, K., Waycott, J., Judd, T., . . . Chang, R. (2009). *Educating the net generation: A handbook of findings for practice and policy.* Melbourne, Australia: University of Melbourne Press.

Khalid, A., Chin, C., & Nufher-Halten, B. (2013). In-class use of portable electronic devices (PEDS) - Faculty and student perspectives. *Information Technology and Software Engineering, 3*(1), doi: 10.4172/2165-7866.1000117.

Khlaif, Z. (2018). Teachers' perceptions of factors affecting their adoption and acceptance of mobile technology in K-12 settings. *Computers in the Schools, 35*(1), 49-67.

Kirschner, P., & De Bruyckere, P. (2017). The myths of the digital native and the multitasker. *Teaching And Teacher Education, 67*, 135-142. doi:10.1016/j.tate.2017.06.001.

Koehler, M., & Mishra, P. (2009). What is technological pedagogical content knowledge? *Contemporary Issues in Technology and Teacher Education, 9*(1), 60-70.

Kukulsha-Hulme, A. (2009). Will mobile learning change language learning? *ReCALL, 21*(2), 157-165.

Kukulsha-Hulme, A., & Traxler, J. (2007). Designing for mobile and wireless learning. In H. Beetham, & E. Sharpe, *Rethinking pedagogy for a digital age: Designing and delivering e-learning* (pp. 180-192). Hoboken, NJ: Routledge.

Kuznekoff, J., Munz, S., & Titsworth, S. (2015). Mobile phones in the classroom: Examining the effects of texting, twitter, and message content on student learning. *Communication Education, 64*(3), 344-365. doi: 10.1080/03634523.2015.1038727.

Liaw, S., & Huang, H. (2011). Exploring learners' acceptance toward mobile learning. In T. Teo, *Technology acceptance in education: Research and issues* (pp. 145-157). Rotterdam, Netherlands: Sense.

Lincoln, Y., & Guba, E. (1985). *Naturalistic inquiry.* Beverly Hills, CA: Sage Publications.

Lynam, S., & Cachia, M. (2017). Students' perceptions of the role of assessments at higher education. *Assessment and Evaluation in Higher Education*, doi.org/10.1080/02602938.2017.1329928.

Madrazo, D. (2011). *The effect of technology infusion on at-risk high school students' motivation to learn* (Doctoral thesis, Appalachian State University, NC). Retrieved from https://libres.uncg.edu/ir/asu/f/Madrazo,%20Danielle_2011_Dissertation.pdf

Manuguerra, M., & Petocz, P. (2011). Promoting student engagement by integrating new technology into tertiary education: The role of the iPad. *Asian Social Science, 7*(11), 61-65.

McSporran, M. (2004, December 5-8). Online learning: Which strategies do New Zealand students perceive as most valuable? In R. Atkinson, C. McBeath, D. Jonas-Dwyer, & R. Phill (Eds.), *Beyond the comfort zone: Proceedings of the 21st ASCILITE Conference* (pp. 647-653). Perth, Australia. Retrieved from http://www.ascilite.org.au/conferences/perth04/mcsporran/.html

Melhuish, K., & Falloon, G. (2010). Looking in the future: M-learning with the iPad. *Computers in New Zealand Schools: Learning, Teaching, Technology, 22*(3), 1-16.

Merriam, S., & Bierema, L. (2014). *Adult learning: Linking theory and practice.* San Francisco, CA: Jossey-Bass.

Midgley, W. (2010). *Seeking to understand 'experiences of difference' in discussions with Saudi students at an Australian university* (Doctoral thesis, University of Southern Queensland, Brisbane, Australia). Retrieved from https://eprints.usq.edu.au/8953/

Ministry of Education. (2014). *Tertiary Education Strategy 2014 - 2019.* Wellington, New Zealand: New Zealand Ministry of Education and the Ministry of Business, Innovation and Employment.

Mitra, S., Kulkarni, S., & Stanfield, J. (2016). Learning at the edge of chaos: Self-organising systems in education. In H. E. Lees, & N. Noddings, *The Palgrave International Handbook of Alternative Education* (pp. 227-239). London, UK: Palgrave Macmillan.

Moreira, F., Ferreira, M. J., Santos, C., & Durão, N. (2017). Evolution and use of mobile devices in higher education: A case study in Portuguese higher education institutions between 2009/2010 and 2014/2015. *Telematics and Informatics, 34*, 838–852.

Mulholland, J. (2011). iPads strengthen education. *Government Technology*, April, 21-24.

Murphy, A., Farley, H., & Koronios, A. (2013). Understanding the use of smart mobile technologies for learning in higher education. *30th Australasian Society for Computers in Learning in Tertiary Education Conference.* ASCILITE.

Murphy, A., Farley, H., Lane, M., Hafeez-Baig, A., & Carter, B. (2013). Mobile learning anytime, anywhere: What are our students doing? *Australasian Journal of Information Systems, 18*(3), doi: 10.3127/ajis.v18i3.1098.

Murphy, A., Midgley, W., & Farley, H. (2014). Mobile learning trends among students in Vietnam. In M. Kalz, Y. Bayyurt, & M. Specht , *Mobile as a mainstream: Towards future challenges in mobile learning.* Cham, Switzerland: Springer International Publishing.

Murphy, G. (2011). Post-PC devices: A summary of early iPad technology adoption in tertiary environments. *e-Journal of Business Education & Scholarship of Teaching, 5*(1), 18-32.

Nguyen, L., Barton, S. M., & Nguyen, L. T. (2014). iPads in higher education: Hype or hope. *British Journal of Educational Technology*, doi: 10.1111/bjet.12137.

Novak, G. (2011). Just-in-time teaching. *New Directions for Teaching and Learning, 128*, 63-73. doi:10.1002/tl.469.

Ornek, F. (2008). An overview of theoretical framework of phenomenography in qualitative education research: An example from physics education research. *Asia-Pacific Forum on Science Learning and Teaching, 9*(2), Retreived from https://www.eduhk.hk/apfslt/v9_issue2/ornek/index.htm.

Owston, R., York, D., & Murtha, S. (2013). Student perceptions and achievement in a unversity blended learning strategic initiative. *Internet and Higher Education, 18*, 38-46. doi: 10.1016/j.iheduc.2012.12.003.

Park, Y. (2011). A pedagogical framework for mobile learning: Categorizing educational applications of mobile technologies into four types. *International Review of Research in Open and Distance Learning, 12*(2), 78-102.

Perkins, S., & Saltsman, G. (2010). Mobile learning at Abilene Christian University: Successes, challenges, and results from year one. *Journal of the Research Center for Educational Technology, 6*(1), 47-54.

Porter, W., Graham, C., Spring, K., & Welch, K. (2014). Blended learning in higher education: Institutional adoption and implementation. *Computers and Education, 75*, 185-195.

Prensky, M. (2010). *Teaching digital natives: Partnering for real learning.* Thousand Oaks, CA: Corwin.

Ravizza, S., Hambrick, D., & Fenn, K. (2014). Non-academic internet use in the classroom is negatively related to classroom learning regardless of intellectual ability. *Computers and Education, 78*, 109-114. doi:10.1016/j.compedu.2014.05.007.

Research New Zealand. (2015). *A report on a survey of New Zealanders' use of smartphones and other mobile communication devices.* Wellington, New Zealand: Research New Zealand.

Richards, J. (2015). *Key issues in language teaching.* Cambridge, UK: Cambridge University Press.

Rolls, N., & Northedge, A. (2017). Learning and learners in modern times. In N. Rolls, A. Northedge, & E. Chambers, *Successful university teaching in times of diversity* (pp. 3-23). London, UK: Palgrave Macmillan.

Rolls, N., Northedge, A., & Chambers, E. (2017). *Succesful university teaching in times of diversity.* London, England: Palgrave teaching and learning.

Saavedra, E., & Murray, D. (2015). Student perceptions of the success of an iPad based reading discussion project. In N. Souleles, & C. Pillar (Eds.), *iPads in Higher Education: Proceedings of the 1st International Conference on the Use of iPads in Higher Education* (pp. 92-100). Newcastle, UK: Cambridge Scholars Publishing.

Sana, F., Weston, T., & Cepeda, N. (2013). Laptop multitasking hinders classroom learning for both users and nearby peers. *Computers and Education, 62*, 24-31.

Sharples, M. (2002). Disruptive devices: Mobile technology for conversational learning. *International Journal of Continuing Engineering Education and Life Long Learning, 12*(5-6), 504-520.

Shepherd, I. J., & Reeves, B. (2011). iPad or iFad: The reality of a paperless classroom . *Mobility Conference*. Abilene Christian University. Retrieved from http://www.acu.edu/technology/mobilelearning/documents/research/ipad-or-ifad.pdf).

Sheppard, D. (2011). Reading with iPads – the difference makes a difference. *Education Today, 3*, 12-15.

Shewell, J. (2008). Making the mix work: Effectively integrating technology into the curriculum. In P. Davidson, J. Shewell, & W. Moore, *Educational technology in the Arabian Gulf: Theory, research and pedagogy.* Dubai, UAE: TESOL Arabia.

Simonova, I., & Poulova, P. (2017). Learners preferences in mobile-assisted higher education. *Procedia Computer Science, 104*, 174-182.

Sims, K., & Butson, R. (2014). To what degree are undergraduate students using their personal computers to support their daily study practices? *Journal of Education, 2*(1), 158-171.

Singer Trakhman, L., Alexander, P., & Berkowitz, L. (2017). Effects of processing time on comprehension and calibration in print and digital mediums. *Journal of Experimental Education*, 1-15. doi: 10.1080/00220973.2017.1411877.

Singer, L., & Alexander, P. (2017). Reading across mediums: Effects of reading digital and print texts on comprehension and calibration. *Journal of Experimental Education, 85*(1), 155-172. doi: 10.1080/00220973.2016.1143794.

Solé, C. R., Calic, J., & Neijmann, D. (2010). A social and self-reflective approach to MALL. *ReCALL, 22*, 39-52 doi:10.1017/S0958344009990188.

Somekh, B., & Lewin, C. (2005). *Research methods in the social sciences.* London, UK: Thousand Oaks.

Souleles, N., Savva, S., Watters, H., Annesley, A., & Bull, B. (2014). A phenomenographic investigation on the use of iPads among undergraduate art and design students. *British Journal of Educational Technology*, doi:10.1111/bjet.12132.

Statistics New Zealand. (2017). *Internet use*. Retrieved from http://www.stats.govt.nz.

Steel, C., & Levy, M. (2013). Language students and their technologies: Charting the evolution 2006–2011. *ReCALL, 25*, 306-320. doi:10.1017/S0958344013000128.

Stephenson, L., & Harold, B. (2008). The effective integration of technology into ELT classrooms. In P. Davidson, J. Shewell, & W. Moore , *Educational technology in the Arabian Gulf: Theory, research and pedagogy.* (pp. 313-324). Dubai, UAE: TESOL Arabia.

Stewart, S. (2012). *Reading in a technological world: Comparing the iPad to print* (Master's thesis, Bowling Green State University, Reading, OH). Retrieved from https://etd.ohiolink.edu/rws_etd/document/get/bgsu1335287048/inline

Sung, Y., Chang, K., & Liu, T. (2016). The effects of integrating mobile devices with teaching and learning on students' learning performance: A meta-analysis and research synthesis. *Computers and Education, 94*, 252-275.

Svensson, L. (1997). Theoretical foundations of phenomenography. *Higher Education Research and Development, 16*(2), 159-171. doi: 10.1080/0729436970160204.

Tilton, J., & Hartnett, M. (2016). What are the influences on teacher mobile technology selfefficacy in secondary school classrooms? *Journal of Open, Flexible and Distance Learning, 20*(2), 79-93.

Tracy, S. (2013). *Qualitative research methods: Collecting evidence, crafting analysis, communicating impact.* Chichester, UK: Wiley-Blackwell.

Traxler, J. (2007). Defining, discussing, and evaluating mobile learning: The moving finger writes and having writ. *International Review of Research in Open and Distance Learning, 8*(2), http://www.irrodl.org/index.php/irrodl/article/viewArticle/346.

Traxler, J. (2009). Current state of mobile learning. In M. Ally, *Mobile Learning: Transforming the delivery of education and training* (pp. 9-24). Edmonton, Canada: Athabasca University Press.

van Rensburg, H., & La Thanh, T. (2017). Teachers' use of Facebook motivating Vietnamese students to improve their English language learning. In A. Murphy, H. Farley, L. Dyson, & H. Jones, *Mobile learning in higher education in the Asia-Pacific Region: Issues, concerns and prospects* (pp. 359-378). Singapore: Springer.

Vaughn, P., & Turner, C. (2016). Decoding via coding: Analyzing qualitative text through thematic coding and survey methodologies. *Journal of Library Administration, 56*, 41-51.

Venkatesh, V., Morris, M., Davis, G., & Davis, F. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27*(3), 425-478.

Wang, Y. S., Wu, M. C., & Wang, H. Y. (2009). Investigating the determinants and age and gender differences in the acceptance of mobile learning. *British Journal of Educational Technology, 40*(1), 92-118. doi: 10.1111/j.1467-8535.2007.00809.x.

Wiersma, W., & Jurs, S. (2005). *Research methods in education: An introduction (8th ed.).* Boston, MA: Pearson Education.

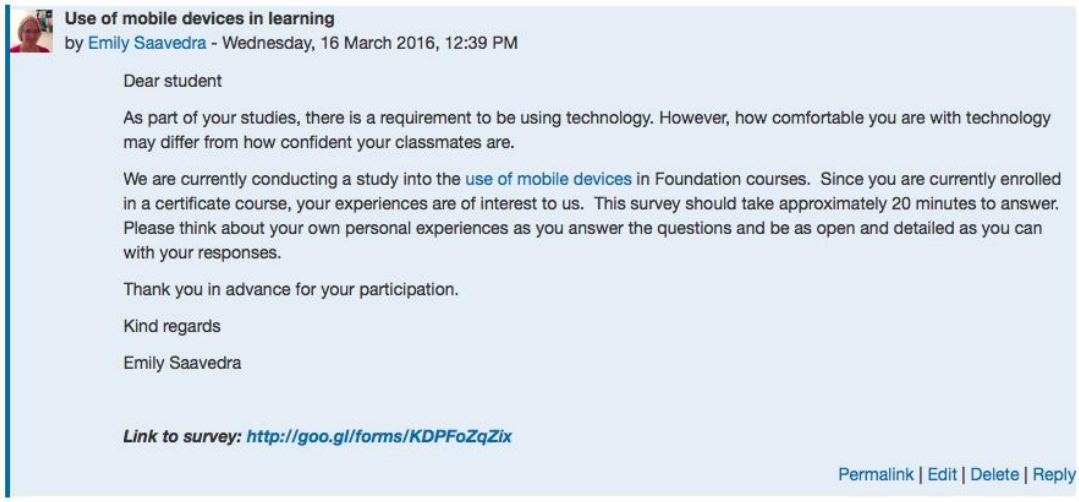
Worldwatch Institute. (2015). *Market saturation slows mobile phone growth*. Retrieved from www.worldwatch.org .

Wynn, K. (2014). Mobiles fuel i-shopping boom. *The New Zealand Herald*. Retrieved from http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11316753.

Yu, W., Lin, C., Wang, J., Hao, C., Chang, H., & Ho, M. (2014). Faculty's perceptions toward the relationships between pedagogical use of emerging technologies and classroom technology infusion. *E-Learn.* New Orleans, LA.

Appendices

Appendix A – Survey forum posts



Use of mobile devices in learning
by Emily Saavedra - Wednesday, 16 March 2016, 12:39 PM

Dear student

As part of your studies, there is a requirement to be using technology. However, how comfortable you are with technology may differ from how confident your classmates are.

We are currently conducting a study into the use of mobile devices in Foundation courses. Since you are currently enrolled in a certificate course, your experiences are of interest to us. This survey should take approximately 20 minutes to answer. Please think about your own personal experiences as you answer the questions and be as open and detailed as you can with your responses.

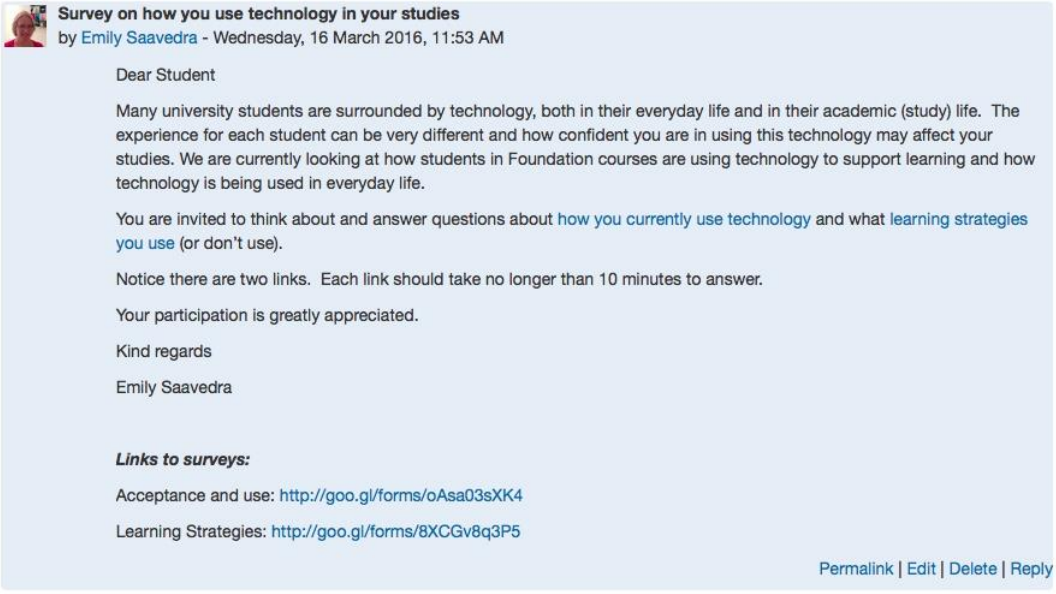
Thank you in advance for your participation.

Kind regards

Emily Saavedra

Link to survey: http://goo.gl/forms/KDPFoZqZix

Permalink | Edit | Delete | Reply



Survey on how you use technology in your studies
by Emily Saavedra - Wednesday, 16 March 2016, 11:53 AM

Dear Student

Many university students are surrounded by technology, both in their everyday life and in their academic (study) life. The experience for each student can be very different and how confident you are in using this technology may affect your studies. We are currently looking at how students in Foundation courses are using technology to support learning and how technology is being used in everyday life.

You are invited to think about and answer questions about how you currently use technology and what learning strategies you use (or don't use).

Notice there are two links. Each link should take no longer than 10 minutes to answer.

Your participation is greatly appreciated.

Kind regards

Emily Saavedra

Links to surveys:

Acceptance and use: http://goo.gl/forms/oAsa03sXK4

Learning Strategies: http://goo.gl/forms/8XCGv8q3P5

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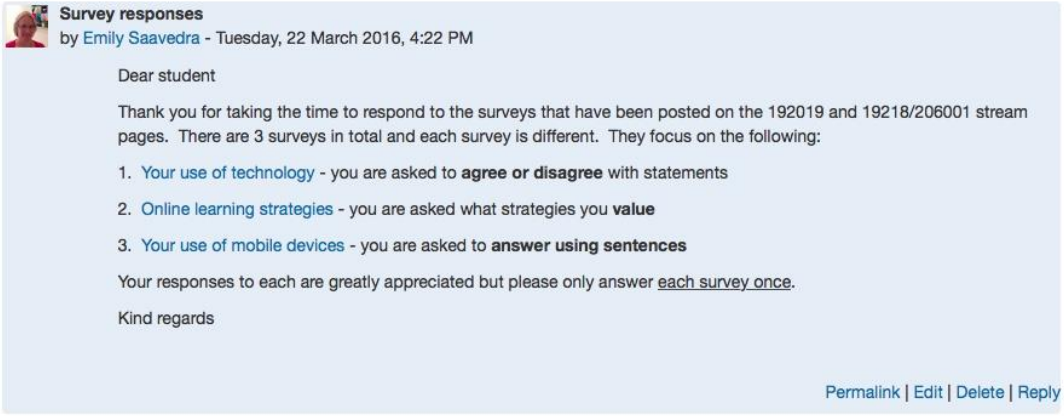

Survey responses
by Emily Saavedra - Tuesday, 22 March 2016, 4:22 PM

Dear student

Thank you for taking the time to respond to the surveys that have been posted on the 192019 and 19218/206001 stream pages. There are 3 surveys in total and each survey is different. They focus on the following:

1. Your use of technology - you are asked to **agree or disagree** with statements
2. Online learning strategies - you are asked what strategies you **value**
3. Your use of mobile devices - you are asked to **answer using sentences**

Your responses to each are greatly appreciated but please only answer each survey once.

Kind regards

Permalink | Edit | Delete | Reply

Appendix B – Teacher Survey

The effects of mobile devices on teaching and learning

Thank you for taking time to complete the following survey. Your submission of the same indicates your consent for the data provided to be included in subsequent analysis and reporting of any data collected.

Answers to this questionnaire will be used to form part of the data collection as part of Doctor of Education Project. The purpose of the project is to identify how students in university preparation courses use their mobile devices. It is proposed that this project will lead to the development of a model for integrating mobile devices in an academic context which may influence and inform future educators and decision makers of practical applications and issues around the integration of mobile devices into the tertiary classroom.

The research team requests your assistance because you are currently enrolled in or are teaching a university preparation course. This questionnaire should take no longer than 30 minutes. If you would prefer to answer any of these questions verbally, please contact the Principal Investigator.

If you have any questions or wish to request further information about this project please contact the Principal Investigator via email <e.k.saavedra@massey.ac.nz>.

Demographics

1. Which programme do you currently teach on? _____

2. What is the total number of years you have been teaching? _____ years

3. How many of those years have you been teaching at your current institute? _____ years

4. What is your age group?
   a. 20 – 29 years old
   b. 30 – 39 years old
   c. 40 – 49 years old
   d. over 50 years old

5. Which would best describe your use technology in the classroom?
   a. infrequent
   b. casual
   c. frequent
   d. always

6. How would you rate your comfort level with using technology in the classroom?
   a. Very comfortable
   b. Comfortable
   c. Uncomfortable
   d. Very uncomfortable

Experiences

1. Do you encourage students to use mobile devices in the classroom?
2. Do you encourage students to use mobile devices outside of the classroom?
3. What tasks do you usually require students to use their mobile devices for?
4. Are there any situations that you discourage students from using mobile devices inside the classroom?
5. To what extent do you think your teaching style has changed with an increased reliance on technology?
6. To what extent do you think your approach to teaching preparation changed with the integration of technology?
7. In your opinion, do you think mobile devices enhance or hinder your teaching? Please explain your answer.
8. In your opinion, do you think mobile devices enhance or hinder your students' learning? Please explain your answer.
9. What tasks, if any, do you feel are enhanced by the use of technology?
10. What tasks, if any, do you feel are hindered by the use of technology?

Appendix C – Student survey

The effects of mobile devices on student learning

Thank you for taking time to complete the following survey. Your submission of the same indicates your consent for the data provided to be included in subsequent analysis and reporting of any data collected.

Answers to this questionnaire will be used to form part of the data collection as part of Doctor of Education Project. The purpose of the project is to identify how students in university preparation courses use their mobile devices. It is proposed that this project will lead to the development of a model for integrating mobile devices in an academic context which may influence and inform future educators and decision makers of practical applications and issues around the integration of mobile devices into the tertiary classroom.

The research team requests your assistance because you are currently enrolled in or are teaching a university preparation course. This questionnaire should take no longer than 20 minutes.

If you have any questions or wish to request further information about this project please contact the Principal Investigator via email <e.k.saavedra@massey.ac.nz>.

Demographics

1. Which programme are you currently enrolled in? _____

2. What is your year of birth? _____

3. Are you: Male Female Prefer not to say ***Please indicate***

4. Are you: A domestic student An international student ***Please indicate***

5. What ethnic group(s) do you identify with?

   NZ European Maori
   Pacifika (please specify) _____ Asian (please specify) _____
   Arab (please specify) _____ Other (please specify) _____

6. What language(s) do you speak?
   What is your first language? (which language are you most fluent in?): _____
   What is your second language?
   _____
   What is your third language?
   _____
   Do you speak any other languages?
   _____

7. How many mobile devices (including phones, laptops, etc) do you own?
   a. I don't own any
   b. 1

c. 2
d. 3-4
e. 5 or more

8. Which would best describe your use of mobile devices in the classroom?
    a. infrequent – once or twice every week
    b. casual – once or twice a day
    c. frequent – once or twice a lesson
    d. always – I never turn them off

Mobile devices

Please answer the questions below about all mobile devices that you own (including those you do not bring to class).

9. Do you bring your phone to class?
    a. Yes, I bring my phone to class everyday.
    b. Yes, I sometimes bring my phone to class.
    c. Yes, but I l never touch it.
    d. No, I never bring my phone to class.

10. What brand of phone do you have?

11. Do you bring your laptop to class?
    a. Yes, I bring my laptop to class everyday.
    b. Yes, I sometimes bring my laptop to class.
    c. Yes, but I l never touch it.
    d. No, I never bring my laptop to class.

12. What brand of laptop do you have?

13. Do you bring an electronic tablet (ie iPad) to class?
    a. Yes, I bring my tablet to class everyday.
    b. Yes, I sometimes bring my tablet to class.
    c. Yes, but I l never touch it.
    d. No, I never bring my tablet to class.

14. What brand of electronic tablet do you have?

15. Do you bring any other mobile device to class? What do you bring?

16. Do you own any other mobile device that you do not bring to class? Why do you not bring it?

Experiences

1. Do you feel encouraged to use mobile devices in the classroom?
2. Do you feel encouraged to use mobile devices outside of the classroom?
3. What tasks do you usually need to use your mobile devices for?
4. When you access course materials (for example, readings, questionnaires, quizzes, etc) do you prefer to access a digital copy (on your mobile device) or do you prefer a printed copy on paper?
5. Which mobile device do you find most useful for your studies?
6. Are there any situations when you think your mobile device(s) distracts you from learning? Please explain.

7. Overall, in your opinion, do you think mobile devices help or hinder your learning? Please explain your answer.
8. What tasks do you feel you could not do if you weren't able to use your mobile device?
9. What tasks, if any, do you feel you use your mobile device for but could probably complete without it?

Appendix D – Inventory of online learning strategies

Inventory of online learning strategies

Dear participant

Thank you for taking time to complete the following survey. Your submission of the same indicates your consent for the data provided to be included in subsequent analysis and reporting of any data collected.

Answers to this questionnaire will be used to form part of the data collection as part of Doctor of Education Project. The purpose of the project is to identify how students in university preparation courses use their mobile devices. It is proposed that this project will lead to the development of a model for integrating mobile devices in an academic context which may influence and inform future educators and decision makers of practical applications and issues around the integration of mobile devices into the tertiary classroom.

The research team requests your assistance because you are currently enrolled in or are teaching a university preparation course.

If you have any questions or wish to request further information about this project please contact the Principal Investigator via email <e.k.saavedra@massey.ac.nz>.

Below are a list of web-assisted strategies that you may use on your course. Rate each strategy on a scale from ***1*** (of no value at all) to ***7*** (very valuable). If you don't use a strategy, tick ***n/a*** for ***not applicable***.

Strategy	**Rating** No value ----------very valuable							n/a
Email communication with the teacher	1	2	3	4	5	6	7	☐
Online announcements posted on Stream	1	2	3	4	5	6	7	☐
Availability of email addresses of all class members	1	2	3	4	5	6	7	☐
Availability of homepages for posting personal information	1	2	3	4	5	6	7	☐
Posting detailed assignment instructions online	1	2	3	4	5	6	7	☐
Posting of syllabus online	1	2	3	4	5	6	7	☐
Posting of course calendar online	1	2	3	4	5	6	7	☐
Posting of task lists that are linked to reminders	1	2	3	4	5	6	7	☐
Posting of lecture/class notes online	1	2	3	4	5	6	7	☐

Strategy	**Rating** No value ----------very valuable							n/a
Provision of computerised study guides	1	2	3	4	5	6	7	□
Online quizzes	1	2	3	4	5	6	7	□
Provision of links to online resources	1	2	3	4	5	6	7	□
Online academic discussion groups	1	2	3	4	5	6	7	□
Example tests and exams	1	2	3	4	5	6	7	□
Posting of grades online	1	2	3	4	5	6	7	□
Online feedback regarding assignments	1	2	3	4	5	6	7	□
Submission of assignments via Stream	1	2	3	4	5	6	7	□
Multimedia assignments and tests to complete	1	2	3	4	5	6	7	□
Compulsory interactive online assignments	1	2	3	4	5	6	7	□

Appendix E – Use of technology survey

Survey of acceptance and use of technology

Dear participant

Thank you for taking time to complete the following survey. This survey will take approximately 10 minutes to answer. Your submission of the same indicates your consent for the data provided to be included in subsequent analysis and reporting of any data collected.

Answers to this questionnaire will be used to form part of the data collection as part of Doctor of Education Project. The purpose of the project is to identify how students in university preparation courses use their mobile devices. It is proposed that this project will lead to the development of a model for integrating mobile devices in an academic context which may influence and inform future educators and decision makers of practical applications and issues around the integration of mobile devices into the tertiary classroom.

The research team requests your assistance because you are currently enrolled in or are teaching a university preparation course.

If you have any questions or wish to request further information about this project please contact the Principal Investigator via email <e.k.saavedra@massey.ac.nz>.

Think about how often you use your mobile device(s) to do the following. Tick the frequency that best suits:

	Never used	**Every 2-3 months**	**Once a month**	**Every 2 weeks**	**Weekly**	**Every 2-3 days**	**Once a day**	**Every 3-4 hours**	**Every hour**
SMS / text									
Take photos									
Send/post photos									
Play games									
Check email									
Book appointments									
Buy products									
Read book(s)									
Surf the internet									
Download apps									
Access social network									
Listen to music									

Appendix F – Information and consent forms for student discussion groups

MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA
UNIVERSITY OF NEW ZEALAND

Professional and Continuing Education,
Massey University Private Bag 102-904
North Shore Mail Centre
Auckland,
New Zealand

A case study into the effects of mobile devices on student learning in a university preparation course

INFORMATION SHEET

You are invited to participate in research into the use of mobile devices in university courses. The research is being conducted by Emily Saavedra as part of a Doctor of Education with the University of Southern Queensland, Australia.

> Mobile devices, such as cellphones, tablets and laptops, are becoming frequently more ubiquitous in our everyday lives. Many of us "consult" our devices multiple times throughout the day to keep in touch with our social and professional connections, current affairs or for entertaining ourselves.
>
> These devices have become a part of our social lives but what role do they play in our academic lives? This research project aims to investigate how students are using these devices in their studies.

I would like to invite you to take part in this research project.

How were you chosen?
All students enrolled in Foundation courses are invited to participate in the research. You have been invited to participate because you are currently enrolled in one of the Foundation courses offered through the department of Professional and Continuing Education at Massey University.

What will you need to do?
There are a few stages to this research. You can choose to participate in all stages or you may decline to participate at any time if you do not wish to participate. The project involves:

- Answering questions about the mobile devices you use (10 minutes)
- Answering a survey about how you feel about using mobile devices for completing everyday tasks and how often you use different applications (5 minutes)
- Answering a survey about strategies that you use when online (5 minutes)
- Participate in a group discussion or individual interview with the researcher (maximum 30 minutes)

Do you have to participate?
No, you do not. Participation is entirely voluntary. If you do not wish to take part, you are not obliged to. If you decide to participate, you have the right to:

- decline to answer any particular question.
- withdraw from the study at any time.
- ask any questions about the study at any time during participation.
- ask for the recorder to be turned off at any time during the interview or group discussion.
- provide information on the understanding that your name will not be used.
- be given access to a summary of the project findings when it is concluded.

How will data be collected and stored?
You have the choice to complete the questions and surveys online or on paper. The questions are the same for both formats. Interviews and focus groups will be recorded for the purpose of later analysis.
All data and recordings will be stored by the researcher. If you wish to withdraw from the research project, please notify the researcher via any of the means of communication outlined below. In the case that your personal data is identifiable, you may withdraw your data at anytime. Removal of your information or data will in no way affect your relationship with Massey University, The University of Southern Queensland nor the researcher.
Upon completion of the research project, data will be stored for five years, after which it will be destroyed. If you would like to obtain a copy of a summary of the results please contact the principal researcher via any of the details below.

Who do I contact if I have any questions about this project?
Emily Saavedra
Senior English Language Teacher
Massey University
Professional and Continuing Education (PACE – 72.09)
Private Bag 102 904
North Shore Mail Centre
Auckland
New Zealand

Ph: +64 9 2136497
Email: e.k.saavedra@massey.ac.nz

Who do I contact if I have any ethical concerns about this project?
If you have any ethical concerns about how the research is being conducted or any queries about your rights as a participant, please feel free to contact the University of Southern Queensland Ethics Officer on the following details

Ethics and Research Integrity Officer
Office of Research and Higher Degrees
University of Southern Queensland
West Street, Toowoomba 4350
Ph: +61 7 4631 2690
Email: ***ethics@usq.edu.au***

Committee Approval Statement
This project has been reviewed and approved by the Massey University Human Ethics Committee: Northern, Application 15/038. If you have any concerns about the conduct of this research, please contact Dr Andrew Chrystall, Chair, Massey University Human Ethics Committee: Northern, telephone 09 414 0800 x 43317, email humanethicsnorth@massey.ac.nz.

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FOCUS GROUP PARTICIPANT CONSENT FORM

MUHECN Approval number: 15/038

USQHREC Approval number: H15REA158

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I agree not to disclose anything discussed in the Focus Group.

I understand that while information gained during the study may be published, I will not be identified and my personal results will remain confidential.

I understand that the information recorded in the interview will be kept at the researcher's home in a secure location for a period of 5 years. Transcriptions of the interview will also be kept in password protected documents on the researcher's personal computer.

I understand that I will be audio taped during the study.

I agree to participate in this study under the conditions set out in the Information Sheet

Name of participant…….....

Signed……**Date**…….

If you have any ethical concerns with how the research is being conducted or any queries about your rights as a participant please feel free to contact the University of Southern Queensland Ethics Officer on the following details.

Ethics and Research Integrity Officer
Office of Research and Higher Degrees
University of Southern Queensland
West Street, Toowoomba 4350
Ph: +61 7 4631 2690
Email: ***ethics@usq.edu.au***

Appendix G – Email to teachers to participate

From: Saavedra, Emily
Sent: Monday, 22 August 2016 10:49 a.m.
Subject: Your input appreciated

Hi team

As many of you know, I'm currently enrolled in a doctoral programme at the University of Southern Queensland. As part of my studies, I'd love to get your input regarding your experiences with mobile devices and the effects on teaching and learning.

If you are interested in participating in my research, the link below will take you to a survey that should take approximately 20-30 minutes to complete. Your participation is completely voluntary and any data collected is anonymous. More details are available on the link but if you have any questions or concerns about the research, please don't hesitate to contact me.

https://goo.gl/forms/09fs8GOJbRmSNGX73

The survey will remain open until 4pm 9th September 2016.

Kindest regards
Emily

Appendix H – Prompts for student discussion groups

FOCUS GROUP / INTERVIEW QUESTIONS (STUDENTS)

Prompts to be used as necessary

Questions are to be open ended in nature in order for asked during interview

1. What do you usually use your mobile device for out of class?
2. What do you usually use your mobile device for in class?
3. Do you think using mobile devices in the classroom helps the way you learn? How?
4. Can you describe a situation when you think mobile devices do NOT help your learning in your class?
5. For what activities does your teacher actively encourage you to use your mobile device?
6. In your opinion, what is the biggest challenge you face when using mobile devices in the classroom?

Appendix I – Authority for the authenticity and release of transcripts

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AUTHORITY FOR THE RELEASE OF TRANSCRIPTS

I confirm that I have had the opportunity to read and amend the transcript of the interview(s) conducted with me.

I agree that the edited transcript and extracts from this may be used in reports and publications arising from the research.

Name of participant…….....

Signed……**Date**…….

If you have any ethical concerns with how the research is being conducted or any queries about your rights as a participant please feel free to contact the University of Southern Queensland Ethics Officer on the following details.

Ethics and Research Integrity Officer
Office of Research and Higher Degrees
University of Southern Queensland
West Street, Toowoomba 4350
Ph: +61 7 4631 2690
Email: ***ethics@usq.edu.au***