

A Study of the Impact of Mobile Devices on First-Year University Students

by

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Declaration of Originality

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

Signed  Date 31/03/17

Abstract

The use of computing and communication devices in the classroom is a new trend in the education sector, and it is expected that it will not only improve students' learning but also enhance teaching practices. Hence, it is essential to analyze the impact of mobile devices on students who use mobile devices in the classrooms. Numerous research papers suggest the positive outcomes of the use of mobile devices in teaching and learning environments. However, a thorough investigation of the use mobile phones in the classroom by first-year university students has not yet been fully explored. Research on the impact of such smart devices on students' engagement is required for efficient use of these devices in the classroom settings. This research explores and reports on the impact of mobile devices on the academic performance of first-year university students. The research found that the use of mobile phones and smart devices, including mobile phones used in the classroom for student learning and engagement ultimately affects the academic performance of the students in the end.

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Chapter 1

Introduction

An increased use of computing devices has been encouraged in the classroom with the hope of improving student learning and enhancing teaching practices. The existing research literature suggests positive outcomes for student engagement and student motivation when 1:1 access for computing devices is provided in classroom settings [1]. However, there is inconsistent result reporting for student achievement through the implementation of computing devices. Therefore, there is a need to understand the possible impacts of these devices for student outcomes. In the past few years, many computing devices have become mobile thus allowing them to be accessible outside traditional classroom settings. Therefore, it is natural, that the mobile nature of these devices and their accessibility should have a substantial impact on how students use them and how they affect the academic performance of students.

1.1. Background and Motivation

As mentioned above, the use of computing devices in classrooms is heavily encouraged with the hope of facilitating learning and teaching processes. Reports have indicated a positive correlation between the use of such devices and the performance of students. Carter [1] stated that research has shown that there is a relationship between the increased use of computers and learning outcomes that benefits both the teacher and student in the academic process.

The use of mobile devices in academic settings has pros and cons. On the one hand, such devices enable easy transfer of information, on the other hand, they are also a means of distraction for students who tend to send text messages, play games and access Facebook on their mobile phones. The negative impact of social media on academic performance has been shown by Kuznekoff & Titsworth [2]. Such distractions inhibit the ability of students to utilize such devices for accessing educational information.

Previous research, although not extensive, has considered certain aspects of the impact of mobile devices on educational pursuits and explored the impact of texting on student learning outcomes through information processing. Kuznekoff & Titsworth [2] point out that information processing is a process that is involved in educational settings where mobile devices are used. This process includes activities such as attention, working memory, short-term and long-term memory that are used by students as resources while learning new information. The process is nuanced, and the relationship between such devices and educational learning is an important

topic. However, due to the unavailability of extensive and accurate reports on the topic, it becomes difficult to gauge the real impact of the same on learning and teaching processes. However, with the proliferation and constant development of mobile devices, the potential of such gadgets to affect the educational process is immense. Hence, it is a worthwhile attempt to investigate the nature of the relation such devices share when it comes to student academic work. Such a research exercise will help ascertain the impact of mobile devices on education and harness their potential to better the academic performance of students.

1.2. Research Objective

This research study intends to answer the following research question:

What perceptions the first-year university students have on the effect of their mobile use in the classroom?

The outcomes of the research will enable teachers to improvise the use of mobile devices in the classroom/lecture theatre. It will also enable teachers to train students to use the mobile devices effectively to ensure improvement in the academic performance of first-year university students. It has been observed that the use of computing devices in classrooms can facilitate learning and teaching processes, provided they are used efficiently and effectively. There is a positive correlation between the use of computing devices and the performance of students. The increased use of computing devices is directly proportional to learning outcomes and are beneficial for both the teacher and student involved in the academic process.

1.3. Research Contributions

This study explores the impact of mobile devices on the academic performance of first-year university students. As has been mentioned in the previous sections, mobile devices share a nuanced and impactful relationship with educational processes. The purpose of this research is to understand the possible impacts of mobile devices on the learning outcomes of students, especially the learning outcomes or effect on the academic performance of first-year university students. Popular literature on the subject encourages increased use of computing devices in classroom with the hope of improving student learning and enhancing teaching practices [3] [4]. However, they have not provided consistent reports on the same. This research, supported by its mixed method of investigation has found that the availability of such computing devices to students can be a double-edged sword.

In the recent past, many computing devices have become mobile and have proliferated greatly within student communities. Therefore, they can be easily accessed even outside traditional classroom settings. Thus, the potential impact such devices have on the academic pursuits of

students has now become even larger in the past two decades with the increasing use of these devices by students. While these devices can be used for academic work to positively affect their academic performance, they also offer many distractions, which can interfere with the academic learning of the students.

This research is also based on intensive secondary research, which seeks to find out the reasons why students would prefer mobile devices as learning tools. Alshathry & Fayyoubi show that mobile devices are like mini-computers with a wireless network connection. They help students to gain access to information online as well as search and retrieve information from the Internet anytime and anywhere. The myriad of applications available on such devices also helps users to efficiently perform a variety of operations including data management and word processing. They are easy to learn from and affordable given the wide variety of devices available and their competitive market. With the help of such devices, students are also able to acquire additional course materials on the Internet, which helps them complement and enhance their learning.

This research aims to address the void in the literature on the topic of the impact of mobile devices on academic performance. Although the research is focused on first-year university students, it has tried to be as inclusive as possible by including students from across different countries and universities. The research supports the idea that mobile devices offer several benefits that can aid academic learning, including the freedom of location and time, ability to access teaching materials and high speed, etc. It maintains that these devices also afford the teachers the opportunity to update their own knowledge and education. Mobile devices are very useful in class settings for making notes, instant messaging applications for helping maintain and participate in campus activities like group work and discussions. Academic blogs and online websites can successfully be used to persuade students to use their original thoughts, ideas and skills and from there discuss their understandings online with other students. Thus, impact such devices can have on the learning outcomes of students are immense. However, there is not enough knowledge about this phenomenon. This research aims to contribute to that growing pool of information and provide insights as well as recommendations for future direction of studies on the subject to benefit the academic and educational learning of students.

1.4. Structure of the Thesis

The thesis is divided into six chapters. Chapter 1 is an introduction, which provides a description of the background and motivation for the research and underlines research objectives. Chapter 2 reviews literature on various issues related to the research objectives and concludes with a summary of the literature review. Chapter 3 describes the methodology used for conducting the research and also justifies the selected methodology. Chapter 4 presents the research design,

which provides a description of research and survey design. Chapter 5 describes the research findings and analysis including survey design. The thesis concludes with Chapter 6, which provides a summary, recommendations and thoughts for future research directions.

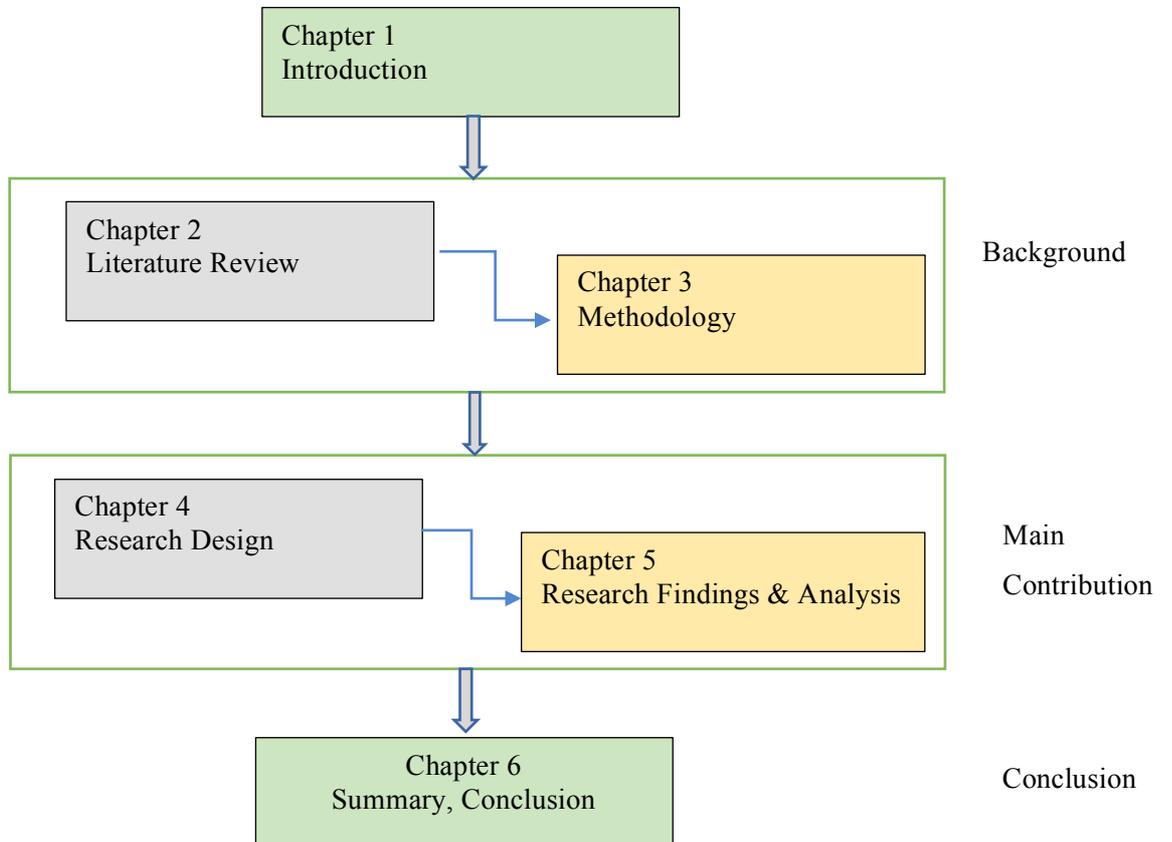


Figure 1.1: Structure of the thesis.

Chapter 2

Literature Review

2.1. Introduction

Chapter 1 presented an outline of motivations for this research. A primary objective of this thesis is to understand the impact of the use of mobile devices in the classroom/lecture theatre on the academic performance of first-year university students. To achieve this objective, a general understanding of the literature around various mobile technologies, how they are used and how they affect students' academic performance is required.

Mobile devices have introduced new avenues to enhance student learning and project options. Mobile terminals have transformed into mini-computers with the capability to have operating systems and storage capacity that allows many applications to run on them [5]. In the context of the educational use of these devices, students are the main users and consumers of mobile devices. This chapter aims to research the existing literature to learn more about the services offered by mobile devices, and will also explain how these unique services and features are used for learning. Section 2.2 discusses the services offered by mobile devices, section 2.3 discusses the features of mobile devices, while section 2.4 presents the classification of mobile technologies. Regarding the various mobile technologies, section 2.5 discusses aspects of mobile technology literacy; continuing from this chapter, section 2.6 explains various learning scenarios as explained by Texler. Section 2.7 explores various benefits of using mobile technology in student learning. This is followed by section 2.8, which discusses of various characteristics, and critical success factors of mobile learning. Section 2.9 explores the correlation between mobile learning and academic performance. Section 2.10 continues the discussion by highlighting the effect of integrating mobile devices in student's learning process. Section 2.11 discusses how mobile devices affect student performance and satisfaction. Section 2.11 extends the discussion by investigating teachers' perspectives about use of mobile devices for student learning. Section 2.12 presents the finding of other studies about this topic, and section 2.13 summarizes the main points of this chapter.

2.2. Services Offered by Mobile Devices

Some of the basic types of services offered by mobile devices include:

1. Voice service: It is the main service for mobile phones and is used for communication between people [5]. Although mobile devices are now used for many purposes,

predominantly, internet use, the primary purpose of such devices is to make phone calls [6].

2. **Short Messaging Service:** Short Messaging Service is popularly known as SMS. It allows the user to send short messages of up to 160 characters between different mobile terminals. This is an effective way of communicating without disturbing people as they can read the message when they are free to respond to the SMS.
3. **Multimedia Messaging Service:** This service may be used to send multimedia messages such as pictures and songs through mobile devices. This service is also known as MMS and it can be used in the classrooms for sending images and audio recordings to students as well as teachers.
4. **Location Based Services:** These services allow mobile phones to track the location of people through GPS and other technologies [5]. This service is also beneficial for educating students as it can enable the location tracking of students if they are not present in class.
5. **Mobile Software Applications:** These services run on various software platforms and are highly interactive in nature. There are many mobile software applications, which are readily available and can be easily downloaded and installed in mobile devices when needed. Besides, more mobile software applications can be developed as per the requirement of the students, teachers or the course.
6. **Data Services:** These allow users to access the Internet on their mobile devices. The use of the Internet not only provides access to unlimited source of information, but also enables users to collect and download the required information for educational purposes.

2.3. Features of Mobile Devices

The widespread use of mobile devices by students is due to their characteristic features. Mobile devices such as mobile phones are like mini-computers with a wireless network connection, which enables mobile phone users to gain access to information online [7]. They can search and retrieve information from the Internet anytime and anywhere. Additionally, the various applications that run on mobile devices allow users to perform a variety of operations such as word processing and data management effectively [7]. Mobile devices are portable which makes their use convenient for students. Also, mobile devices are easy to learn and affordable for students thus making them an attractive choice. Research studies have indicated that access to mobile devices allows students to quickly find their course material, documents and discussions [7]. Students can also access additional course materials on the Internet to enhance their learning [7].

2.4. Classification of Mobile Technologies

Technologies may be categorized as portable, movable, static or shared (Figure 2.1).

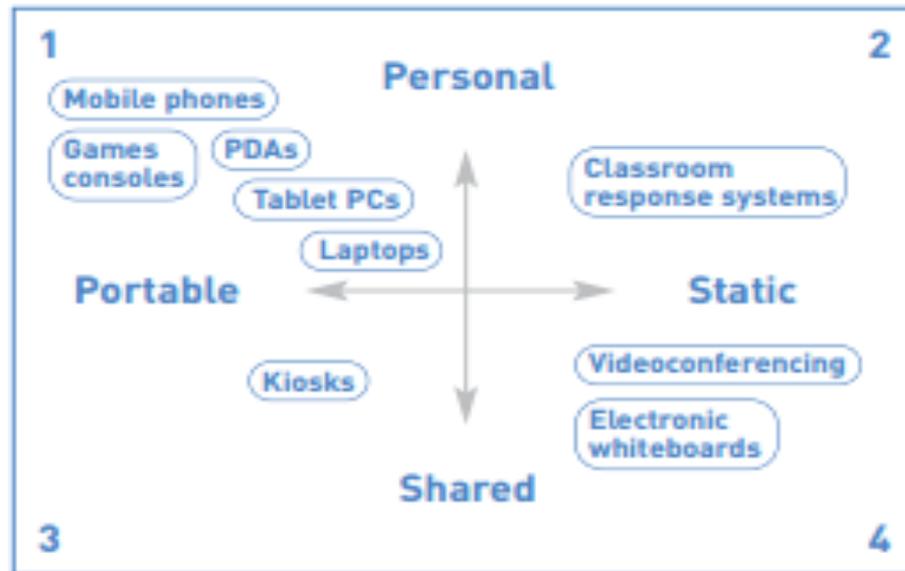


Figure 2.1: Classification of mobile technologies [8]

The first quadrant in the figure shows devices that are both personal and portable. Examples include mobile phones, laptops, tablet PCs and gaming consoles. The second quadrant shows devices that are personal and static such as classroom response systems. Devices such as kiosks are portable as well as shared while video conferencing and electronic whiteboards are static as well as shared.

2.5. Mobile Technology Literacy

Different students have different kinds of access to the range of mobile technologies and therefore a broader understanding of literacy for mobile technologies is needed.

1. Traditional Literacy Paradigm

This viewpoint considers literacy to be the ability to code and decode written texts and it is the formal definition of literacy taught in schools. This literacy model has limited scope for including the learning activities that typically occur outside a classroom setting [9].

2. Concept Literacy Paradigm

It has now become habitual to describe any human proficiency in a subject as ‘literacy’. According to this view, literacy has some merits, particularly in relation to daily activities. This paradigm is closely related to any competent area of human interaction. These may involve excellence in various areas such as computer, media, digital and economic literacy. A model of mobile literacy does not necessarily support one type of literacy paradigm over the other [9].

2.6. Traxler’s Learning Scenarios

Traxler has written on mobile e-learning or m-learning [10]. He writes that while m-learning is grounded in e-learning, the former gives more flexibility of movement and space to students and allows students to learn on the go. Moreover, m-learning is spontaneous, informal, not tethered to a particular setting and personalized [10]. Within the context of the present research, Traxler’s framework provides concepts of different learning scenarios. These can be used to understand the benefits of mobile learning for the students.

Traxler has identified five types of learning scenarios where mobile learning has a substantial impact on learning:

1. Contingent Mobile Learning and Teaching

Learners are free to react and respond to their environment, and their changing experiences and learning and teaching opportunities are not decided in advance [11]. This learning scenario is quite beneficial for both the students and teachers as it enables students to react and respond spontaneously to the environment and changing experiences. The reactions and responses of students enable teachers to make better decisions about their learning performances.

2. Situated Learning

In this learning scenario, learning takes place in surroundings that make learning useful [11]. It is very important to ensure that the learning experience of the students are useful for their life and that situated learning is a useful scenario for the learning experiences of the students.

3. Authentic Learning

Authentic learning refers to the scenario when learning tasks are logically related to immediate learning goals [11]. Mobile learning ensures authentic learning by relating learning tasks to learning goals.

4. Context-Aware Learning

Context-aware learning refers to the learning scenario, in which the history, surroundings, and environment of the learner define learning [11]. Learning by awareness of the context makes the learning easy and useful as it enables students to relate the learning to the context.

5. Personalized Learning

Personalized learning refers to the learning experience, in which the learning is customized according to the abilities, interests and preferences of learners or groups of learners [11]. Learning is provided according to the capabilities of the students.

2.7. Benefits of Mobile Devices in Student Learning

Some of the benefits of mobile devices in student learning include freedom of location and time, higher speed in teaching and learning, one to one learning facility to help with individual learning need of students, and allowing tutors to stay updated with higher education knowledge [12]. According to research conducted by Oliver & Goerke, university students are more likely to use mobile devices such as desktop keywords for making notes rather than using a spiral notebook [13]. Instant messaging applications available on mobile devices can help in campus activities such as group work and discussions. Since university students are active users of instant messaging applications, these can be used for academic learning purpose [13]. Blogs can be effectively used to encourage students to use their creative skills and create discussion posts online [13]. Similarly, podcasts can be deployed to encourage students to improve their listening skills and thus can be used in academic learning activities.

Five characteristics of mobile devices have been identified that lead to educational affordability:

1. **Portability:** Mobile devices are lightweight and smaller in size, which means that they can be easily transported from one area to the other with ease [8].
2. **Social interactivity:** Mobile devices allow users to interact with others and exchange information socially.
3. **Context sensitivity:** Mobile devices can collect and respond to data that is relevant to a situation and environment [8].
4. **Connectivity:** Mobile devices can be connected to other data sharing devices through a network, thus making data exchange easier.

5. Individuality: Mobile devices allow the facility of customized content and access of content to meet individual learning needs [8].

Mehdipour and Zerehkafi [14] discuss the benefits and challenges associated with using mobile devices in the student's learning by describing two key forms of education and training, namely conventional and distance education. They underline that mobile learning or M-learning is not only beneficial in supporting learning process by providing modern mobile devices, such as mobile phones, smartphones, MP3 players and handheld and tablet computers, but also in passing the knowledge, skills and wisdom from one generation to the next. They conducted a study to analyze mobile learning, differentiating M-learning from E-learning to understand the benefits and value of mobile learning. The evaluation of challenges to mobile learning showed the following benefits of M-learning as a distance tool that: provides training when it is required at any time and any place; provides learner-centered content to mitigate any problems for people re-entering the workforce; provides training to students who are also at their place of work during university sessions and training center lectures; industrializes teaching and learning. They added that modern devices like notebooks, the iPod touch, iPads and mobile tablets are becoming very popular for M-learning due to the availability and cost of apps.

There are also studies that highlight some of the disadvantages or negative impacts of use of mobile devices in the classroom. One study presents concerns that mobile devices can make students less sociable and affect their psychological growth negatively [15]. It is also suggested that students may use mobile devices surreptitiously to watch movies and videos in classrooms, while pretending that they are using these devices for studying [15]. Another study mentions classroom disruptions as one of the key challenges for teachers to harness the use of mobile devices by students [16]. Considering both the benefits as well as the challenges or possible negative impacts of mobile devices in classroom settings, it can be said that mobile devices can provide a good method for learning as long as it is harnessed properly by the teachers.

2.7.1. Using Mobile Devices in Learning can Increase Academic Outcomes for Students

Nasser conducted a study to find whether using mobile devices in learning can increase the academic outcomes of students and finds that the wide range of functionalities offered by smartphones and digital devices are not only useful for students, but also for teachers, including university faculties [17]. The devices equipped with touch screen, 3G/4G, various applications and multimedia software have helped students to replace pens and notebooks, enabling them to

read, take important notes, receive assignments and homework. The mobility of these devices has offered new learning as well as teaching possibilities. It was observed in the study that there was a substantial enhancement in the return rate of assignments and homework and the achievement scores of the students using these devices were better than those of traditional groups. Nasser added that mobile devices helped students to continue and persist with the homework and assignments leading to achieve higher academic grades [17]. However, Nasser suggested developing new and more useful applications for the mobile devices used by the teachers and students to make them more advantageous [17]. Jabbour [18] conducted a study of Lebanese students to explore the effect of mobile technology on them and found that using 3G technology in higher education affects the attitudes of students, who take pleasure in learning. It develops positive learning experiences and influences positive learning outcomes for the students. Furthermore, it positively affects the interactions between students, as well as between the students and instructor. Jabbour [18] adds that wireless technology, such as smartphones, laptops, personal digital assistants (PDAs) and other personalized tools are extensively used by Lebanese students at different levels of education to enhance their learning.

2.7.2. Encouraging BYOD Programmes to Increase Learning

Vanwelsenaers [19] underlines the importance of encouraging BYOD (bring your own device) programs to increase learning as common sense suggests that the mobile technology used in the classroom improves and enhances student learning. According to various studies, most of the teenage students have iPads and smartphones, which enable them access to the Internet and by encouraging students to engage with BYOD programs, teachers can provide them with a better chance to improve their learning.

2.8. Mobile Learning

The main intention of mobile technologies in education is to be mobile i.e. to be in motion, for a better learning experience. The mobile technologies not only provide access to learning content but also make the learning easier. The embedded batteries and wireless radio in mobile devices make them portable. In the current education scenario, mobile technologies are used where neither the teacher nor the students are mobile but operate in fixed settings. Mobile learning may be defined as learning across multiple platforms through social and content interactions, with the help of personal electronic devices such as laptops, media players and tablets [20].

There are several challenges in understanding the concept of mobile learning in the educational scenario. One aspect of mobile learning is that it is highly device-centric, relying on the use of mobile devices in traditional classroom learning [20]. In other aspects, mobile learning may imply the use of mobile devices such as smartphones to learn about certain subjects [20]. In many other aspects, mobile learning may involve the use of mobile devices in a traditional teaching set-up to enhance the quality of education.

2.8.1. Themes for Mobile Learning

Social Construction Theory examines an activity that involves a person and an object using a tool to complete a task [20]. The theory describes a concept of learning in which a knowledgeable peer assists the less learnt peer to acquire new skills and understanding of concepts. Mobile learning thus allows an extended zone of proximal development (ZPD) for learners [20]. In the context of the present research, social construction theory provides insight into how mobile learning can enhance the learning of the students.

1. Ad Hoc Infrastructure for Learning

Mobile technologies may be seen as extension of existing infrastructure for learning. One application of this concept is to use the concept of cellular network to expand the formal institutional learning framework [20]. One example of an application where institutions have extended access to institutional learning material is the case of Blackboard Mobile Learn [20]. This technique may prove to be an effective learning strategy since mobile learners are quite used to using mobile devices.

2. Higher Learner Independence

Educational culture wants students to become independent as they progress to higher level of courses. The goal of education should be to sustain self-initiated and lifelong learning [20]. A way to achieve this goal is to implement autonomous learning within the formal educational set-up. The connected nature of hand-held devices facilitates the concept of autonomous learning [20].

3. Higher Learner Engagement

Research studies in the 1980s established a close link between student investment of time, effort and interest in educational activities and favorable outcomes such as superior performance, persistence and satisfaction [20]. Strategies to increase student interactions are still discussed. A literature review of emerging practices in M-learning indicates that the use of mobile learning

strategies can enhance student learning in higher education (for both undergraduate and graduate education) [20]. This rise in student engagement has been seen inside and outside of traditional classroom settings. The use of mobile learning instead of traditional activities has similarly increased student engagement [20]. Students have reported increased participation, interest and better quality of class learning experience with mobile learning methods [20].

4. Enhanced Communication

Communication increases between teachers, students and content in mobile learning programs [20]. An increase in communication outside campus-wide mobile learning programs is also observed [20]. The majority of the students tend to use mobile devices for communicating through email, and text to discuss academic work with professors and peers [20].

2.8.2. Critical Success Factors for Mobile Learning Projects

Six critical success factors have been identified for mobile learning projects:

1. Pedagogical Integration of Technology into Course and Assessment

The integration of technology into course content and assessment for academic courses in a pedagogical manner is a critical success factor for mobile learning projects and ensures that students participate in mobile learning methodologies.

2. Lecturer Modeling of Pedagogical Use of Tools

Lecturer involvement with technology is essential to demonstrate the use of mobile learning technology for students beyond social interactions [11]. The lecturer involvement with the mobile learning projects helps in motivating the students to participate in the mobile learning activities.

3. Creating A Supportive Learning Community

An international community of students, lecturers and technology researcher can together create a supportive environment for the growth of mobile learning. Anywhere anytime learning leads to higher levels of student interactions in comparison to traditional teaching methods [11].

4. Appropriate Choice of Mobile Devices and Web 2.0 Social Software

Access issues need to be considered carefully when pushing the use of mobile web 2.0 technologies in classrooms [11]. A focus should be placed on sustainability as students owning their own mobile devices tend to increase student satisfaction with the devices.

5. Technological and Pedagogical Support

Technology support can play a critical role in the success of mobile-based learning as students and lecturers need to be guided towards the use of mobile learning technology [4].

6. Creating Sustained Interaction Between Students and Teachers

For some students, the use of mobile devices is beyond their comfort zones and they tend to avoid the use of mobile devices unless it becomes necessary due to peer pressure or through constant interaction with the tutors and student community regarding course assessments and educational activities [11].

2.9. Use of Mobile Devices and Academic Performance

According to Carter, many factors affect the level of student learning in the classroom; research has indicated that there is a correlation between increased use of computers and learning outcomes [1]. The integration of technology in the teaching methodology allows the teachers to think out of the conventional teaching practices and use new learning methods for students. Also, following Carter, three key practices that affect the impact of laptop computing on student achievement include systematic support, professional development and changes in teaching practice [1]. Kljunić & Vukovac [21] state that the use of mobile devices in M-learning has exploded significantly in the past few years. They underline the differences in the use of M-learning activities on a tablet and on a smartphone, as smartphones are more convenient for Croatian students.

The use of mobile devices in educational settings is a double-edged sword. On the one hand, mobile device use in classrooms facilitates easy transfer of information. On the other hand, mobile devices such as smartphones are a means of distraction for students who tend to send text messages, play games and access Facebook on their mobile phones. Research by Kuznekoff and Titsworth proves that social network sites are one of the most commonly accessed features of mobile devices that have a detrimental impact on student learning [2].

Some of the distractions caused by multi-tasking on mobile devices can include accessing social networking websites, text messages and video games that can hamper the ability of the students to use these devices for accessing educational information.

Previous research has explored the impact of texting on student learning outcomes are based on information processing story. Scholars argue that mobile texting interferes with student learning by causing frequent distractions [2]. Also, according to a study by Kuznekoff and Titsworth, information processing includes activities such as attention, working memory, short-term and long-term memory that are used by students as resources while learning new information [2].

Since learning is a process, interference with one of the processes has an impact on the other processes. A similar effect is seen in the case of mobile texting as an interfering process. Mobile texting can include simple text messages and chat messages exchanged on mobile devices.

Goundar suggested that mobile devices are perfect means of making educational services accessible to rural regions in different parts of the world that are more convenient than formal education [22]. Mobile devices provide tremendous scope of learning for the developing world.

Research has established that educational institutions have seen a rise in the use of mobile phones by students, however inattentiveness, disruption and distraction are commonly seen disadvantages of mobile phones for university students [23]. Some of the positive impacts of mobile devices include easy information access, effective teaching tools and convenience for students and faculty alike [3]. Mobile devices allow students to access information in a fast and convenient manner and can be effectively used by instructors to devise modern teaching methodologies for faster learning.

The educational literature has assessed the benefits of mobile devices in classrooms and indicated that if students do not bring these mobile devices to classrooms, it does not have any detrimental impact on their academic performance. A study by Kahari has indicated that the use of mobile devices such as cell phones may have positive as well as negative impact on the academic performance of students depending on the type and nature of usage patterns [23]. A recent research study by Jumoke et al. focused on finding the correlation between the use of mobile devices (e.g. mobile phones) and academic performance of university students by observing the student activities in the classroom [24]. It was found that mobile devices negatively affected the academic performance of tertiary students as chatting, music and games distracted students from academic activities.

A research study by Richard et al. has examined the use and preference of mobile devices by pharmacy students in a practical environment and involved the ranking of mobile devices such as iPad, iPhone and iPad mini for preferred use in practice settings by 81 students [25]. It was found that the iPhone was the most commonly used mobile device for these students in comparison to the iPad mini, which was least, used. Pharmacy students use mobile devices for academic purposes, such as finding drug-related information, patient information, literature review and other academic purposes. This research study was, however, restricted to the use of mobile devices for academic purposes only.

A research study by Olufadi has conducted a self-report and self-analysis study in two Nigerian universities with 285 students from the universities selected using convenience sampling approach [26]. According to this study, the time spent on phone calling was the only significant factor affecting student academic performance out of seven variables such as addiction,

distraction, dependence, multitasking, time spent calling, social networking sites, and perception of the impact of mobile devices on the academic performance of students.

The research study by Kennedy et al. was conducted in 2006 with more than 2000 first-year students at the Australian National University [27]. The study asked students to rank their preferred access and use of technologies and technology-based tools and found that a high number of first-year university students were tech savvy. The technologies included mobile phone, desktops, digital camera, memory stick, mp3 player, laptop, games console and Internet. The majority of the students used technology devices for the purpose such as instant messaging, playing media files and communicating with others rather than educational purpose [27].

A research study by Thornton & Houser conducted a survey among 333 Japanese university students about their use of mobile devices and all the students confirmed ownership of a mobile phone. Sixty-six percent of the students emailed their classmates about the classes and 44% of them used emails for studying. In another survey conducted during the same research with 44 Japanese university students, it was found that 71% of the students preferred taking lessons on mobile phones rather than desktops and 93% percent felt that mobile phones were a valuable teaching method. Economic and cultural issues may have an impact on mobile learning [28].

A research study conducted by Byrne-Davis et al. has investigated the impact of mobile devices such as the iPad on the development of knowledge and competence of medical students in the UK. The results of the study indicate that the use of these mobile devices has a positive impact on the learning outcomes of medical students in the UK, as students tend to use these mobile devices for learning and development [29]. Another research study conducted by Potgieter has reported that undergraduate university students in South Africa tend to download mobile apps mainly for entertainment and information needs. The users tend to download apps depending on their individual needs and continue to do so while ignoring the security risks associated with the apps [30].

Foti underlines mobile learning or M-learning as one of the newest trends in higher education, which redefines the delivery of instructions and the manner in which learning takes place [31]. The mobile devices have the potential to enhance learning, but also to support the learning of university students in a graduate level program. Foti established that mobile devices are not only used in the classrooms as a learning tool, but students also use them outside of the classroom for enhancing their learning [31]. They use mobile learning for accessing and sharing information, which is a new trend in higher education and which has provided them the unique opportunity of accessing information instantaneously, irrespective of their location. In other words, these devices have enabled the students to learn anywhere at any time. The mobile devices used for learning are

mostly smartphones, which have the LG Android™, Apple® operating systems or Windows®; or tablet computers. To be more specific, the most widely used mobile device for learning is the iPhone, followed by iPad and Android, Kindle and Windows tablets respectively as shown in Figure 2.2.

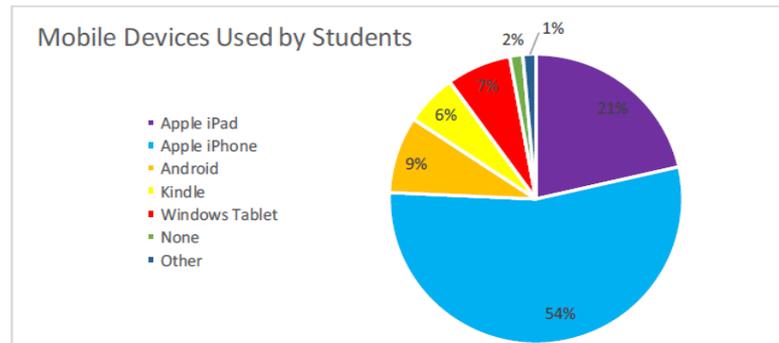


Figure 2.2: Mobile devices used by students [31]

Foti stresses that the mobile devices are used for various purposes in the education sector, but the two key purposes are the academic purpose and the support purpose, outside of the classroom [31]. Mobile devices have the capabilities to encourage university students towards learning and engagement. Students can use mobile devices and various Apps for a wide range of requirements varying from accessing course content to supporting their learning as shown in Figure 3 below:

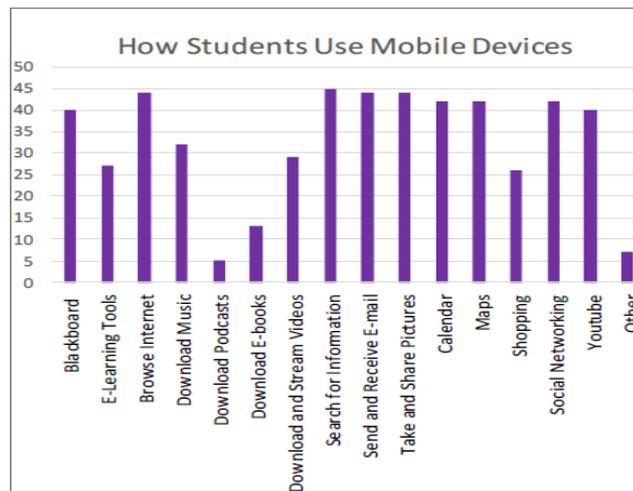


Figure 2.3: Uses of mobile devices in learning [31]

It is obvious from the above Figure that students use mobile devices for various purposes to enhance their learning. These devices enable them to utilize the study materials efficiently and to adapt the course content to fit their learning style and pace. These devices are supported by the

apps, which students download to get the more interactive visual representation of the data and information they need. The mobile devices also have touch screen capability, which helps students to rotate or enlarge images easily and makes their learning more hands-on. Davis [4] states that the precipitously varying and developing marketplace of mobile devices (smartphones, tablets and e-Readers, etc.) continuously conveys new devices, opportunities and standards around mobile capabilities. This has encouraged higher education institutions for facilitating learning on mobile devices. The changes in the marketplace of mobile devices have substantially influenced the efforts made by the higher education institutions. Over recent years, the use of mobile devices by the higher education institutions has overtaken the proliferation of PCs in modern social and professional contexts. However, despite all the awareness and efforts, the pedagogical use of the mobile devices is limited or not extensively widespread in higher education. In the modern context, it is difficult to imagine that students do not own one or other digital device, but they are not used at the optimum level in higher education institutions.

2.10. Effect of Integrating Mobile Devices to Improve Student Performance

Sung et al. studied the effects of integrating mobile devices with learning for improving the performance of students and find that the use of mobile devices has been more beneficial compared to the use of desktop computers or no use of mobile devices [32]. They further add that the handheld devices are greatly effective compared to laptops or desktops to be used for inquiry-oriented learning, self-directed study, game-based learning and cooperative learning in an informal educational environment. However, they are not ideal or effective in traditional environments and lecture-oriented teaching. The findings of this study can contribute to understanding the way, where and for whom mobile devices can be used in the learning environment. They suggest that development of more elaborate instructional designs can maximize the educational benefits of using mobile devices in learning. They proposed the following three implications to facilitate and achieve the maximum benefits of mobile devices in learning:

- To leverage the pedagogical impacts of mobile devices by elaborating designs of teaching/learning scenarios
- To enhance the quality of the experimental design to ensure mobile intervention in education
- To empower educational practitioners by integrating mobile devices, pedagogical design, and software [32]

Ali & Ahmad studied the effect of integrating mobile devices for improving the performance of students in the present scenario when mobile application and technology is getting wider and better on a daily basis [33]. This revolution in the mobile application and technology has provided applications like Whatsapp, Chats, Entertainment, Games, Social media, etc., which have been integrated to improve students' learning. The students widely use these applications through their tablets, smartphones, iPhones for exchanging information with other students and accessing information, which has improved their learning. Elfeky & Masadeh conducted an experiment to examine whether M-learning improves student performance by developing their academic achievements and conversational skills and found that M-learning is quite effective in improving both academic achievements and conversational skills of the students [34]. Vrije et al. underline that the information and communications technology (ICT) has expanded the boundaries of learning into an "anytime /anywhere" experiences [35]. Mobile communications and wireless networks coupled with PC devices provided new means for students for accessing classroom information and communicating with teachers and peers and altered the concept of the classroom. However, Vrije et al. warn that M-learning is not to be incorporated for technology's sake, but for creating meaningful learning experience and the IT departments need to work more for supporting such initiatives accordingly [35].

2.11. Impact of Mobile Applications on Student Performance

Alqahtani & Mohammad underline the importance of mobile applications for various purposes, including educational purposes. The mobile applications can be used reading, pronouncing, translating and learning new languages [3]. The mobile applications are useful not only in improving the performance of students but also ensuring their perceived satisfaction and behavior and presently they have emerged as a pervasive tool in educational learning. Modern mobile devices are equipped with speech recognition technology, which enables users (students) to interact with the device as if they are interacting with another person. Mobile learning involves many aspects of comprehensive learning, which improve the performance of students and ensure their satisfaction. Although M-learning involves many challenges, yet it has emerged as an important tool for learning, performing experiments and satisfying the expectations of students [3].

Jumoke et al. highlight the increasing usage of the Internet in the education sector, which has enabled to use mobile phones for improving the learning process. The Internet-enabled smartphones have positive effects on the academic performance of the students. They underline

that in general, mobile devices are considered as avenues of distraction to students, but they can improve the academic performance of the students if used adequately [24]. Students focusing on music, chatting or other similar activities during academic hours were influenced negatively by the mobile phone. Hence, they need to be trained and educated in the academic use of mobile devices, as they couldn't be allowed to neglect their academic performance. They discovered that the uncontrollable use of mobile devices by the students for non-academic purposes adversely affects the academic performance of the students. The mobile phone is one of the new technologies, which can affect the society positively as well as negatively. They found that most of the students were engaged on social networking sites during academic hours and were greatly influenced by social media. However, this fact cannot diminish the importance of mobile devices in improving the academic performances of students while ensuring that suitable strategies are used to integrate mobile devices into students' academic activities to mitigate distractions [24].

According to a study conducted by Kuznekoff and Titsworth (2013) students who do not use mobile phones during a lecture write 60% more information in their notebooks, make more detailed notes, can recall more lecture information, score better grades and perform better in multiple choice tests, than students who use their mobile phones during the lecture [2]. The students who do not use mobile phones provide 93% more outstanding answers to the questions in their notes than the students who frequently use their mobile phones. Similarly, students not using their mobile phones can recall 87% more answers than the students using mobile phones. They describe the mobile phone as a high distraction tool for the students who instead of using it for learning get involved in texting or chatting.

Wang et al. (2009) underline the utility of mobile phones in Chinese online classrooms, which provide recorded lectures. They warn that high use of mobile phones leads students towards passive non-participatory learning. They suggest the use of mobile phone interventions for increasing interactivity of students by delivering live broadcasts of classroom teachings to students [36]. The real-time broadcasts of classroom teachings should encourage students to ask questions and make suggestions in real-time, which must be addressed by the instructor immediately. M-learning has tremendous potential to actively engage the student in the learning process, changing them from a passive to an active learner who is intellectually, emotionally and behaviorally involved in the learning tasks [36].

The mobile learning system is an innovative system in many ways. The use of the smartphone platform enables to broadcast real-time classroom teachings in the form of audio, video, handwritings, and lecture notes to the mobile phones of the students via the GPRS network. This platform will help in synthesizing the real-time classroom activities onto the mobile phones,

which can be played back by the students whenever they need. This can enable students to customize their preferences for receiving the broadcast (audios, videos, or texts) based on their GPRS network. This M-learning system can be also helpful for the instructors for monitoring the screens of the smartphones of all online students, which enables them to supervise student-learning activities and providing guidance when necessary.

The M-learning system can also be enabled to provide various teacher-assisting mechanisms like text-messaging exchanges and real-time polls, which can enable both students and instructors for communicating timely and freely for better learning and teaching. Wang et al. add that according to the pedagogical approach, the M-learning is a useful mechanism that can be used to promote interactivity in a traditionally didactic learning environment, and to encourage active student participation [36]. They highly appreciate the use of smartphones for changing students from passive participants to active learners and actively engaging them in the learning process and describe M-learning as one of the potential persuasive technologies, which can be influential in changing actions, feelings, and thoughts of students.

M-learning is an ideal model to ensure the active learning of university students, which can engage students in learning the key three aspects – social, cognitive and emotional. Wang et al. also suggest that the M-learning courses needed to be designed and conducted by using a thorough orientation to encourage students to stay involved continuously [36]. M-learning is ideal for short activities, which do not need intensive reading and individualized feedback and the activities must facilitate interactions of students with their classmates through the M-learning system.

Sevillano-García and Vázquez-Cano conducted a study to examine the use, incidence and acceptance of digital mobile devices, specifically smartphones and tablets among university students to identify that the use of these devices has fostered the generic competencies and learning activities among students [37]. They add that the M-learning is a new educational paradigm, which is based on new technology and media to encourage students for active participation, collaboration and mobility. This alternative learning enables interactions among students and access to a wide range of resources and contents. Jeng et al. add that these mobile devices are not only more powerful and portable, but they also have some useful tools that can assist people to handle their daily life [38].

The increasing capabilities of mobile technology have converted them into a useful tool for M-learning. The technical and pedagogical strengths of mobile devices have changed the learning environments as well as learning strategies. There is also a need to develop pedagogical strategy to enhance learning scenarios and encourage socially networked as well as collaborative mobile learning. Shonola et al. [39] agree with Sevillano-García et al. [37] and Jeng et al. [38] to add that

mobile devices, specifically smartphones and tablets, have become very popular among students and influenced them greatly by enabling them for better communication, collaboration and learning.

Portable devices have provided them new ways to learning by supporting the learning process. The students have started using their portable devices for exchanging academic files and education-related messages with classmates, searching library databases and the Internet for academic materials, practicing online tests or quizzes and holding discussions with classmates among others. The result of their study shows that the students of both the genders use mobile devices.

2.12. Use of Mobile Devices for Student Learning: Teacher Perspectives

According to Santiago et al [40], the teachers have a different perspective on the use of mobile devices for student’s learning. According to them, mobile devices can be used for different purposes such as communication, productivity, educational and management purposes as shown in figure 2.4 below. Similarly, teachers think that mobile phones can be used for motivating students for homework, self-esteem, value of homework and inspiring action as shown in Figure 2.5 below. Teachers believe that mobile devices are useful to evaluate social abilities and cognitive abilities of students as shown in Figure 2.6 and Figure 2.7, respectively.

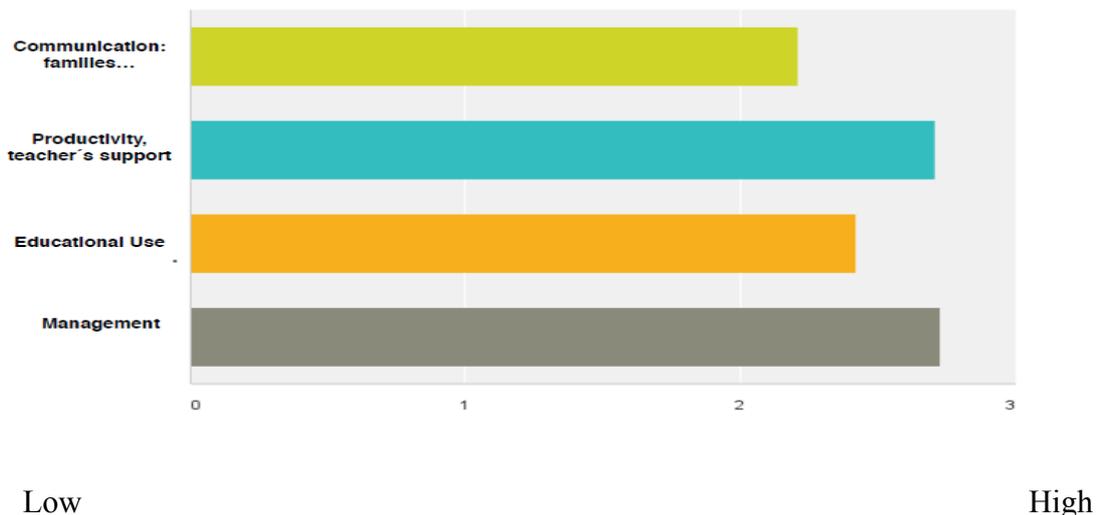
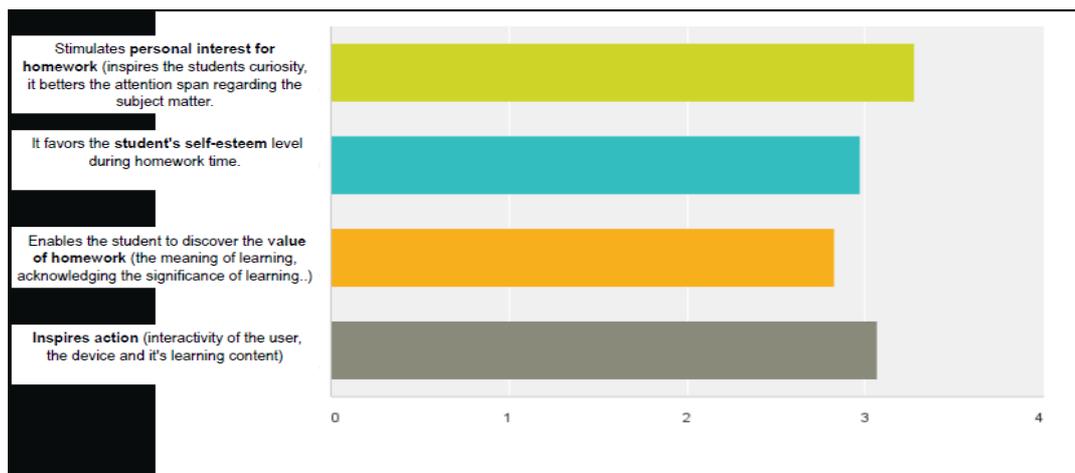


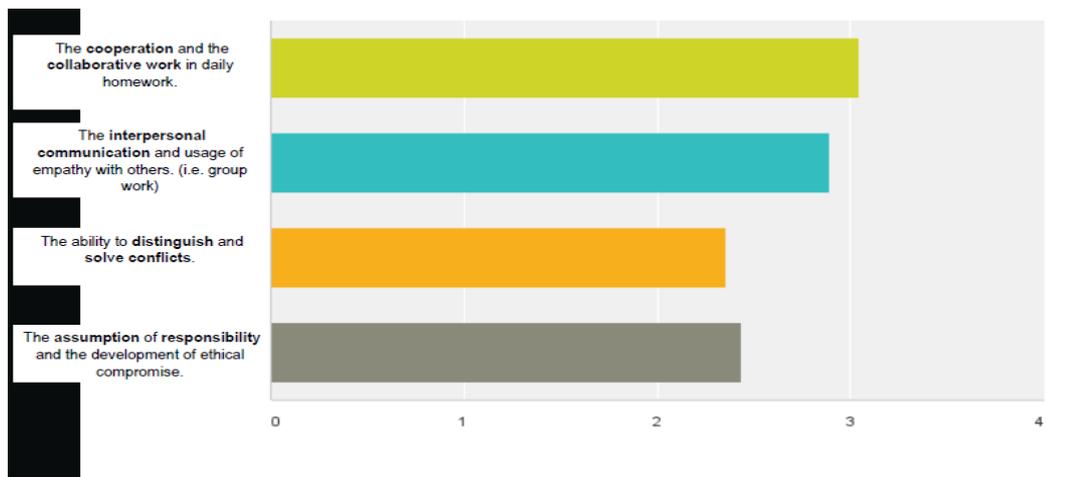
Figure 2.4: Purposes of using mobile phones [40]



Low

High

Figure 2.5: Student motivations [40]



Low

High

Figure 2.6: Social abilities [40]

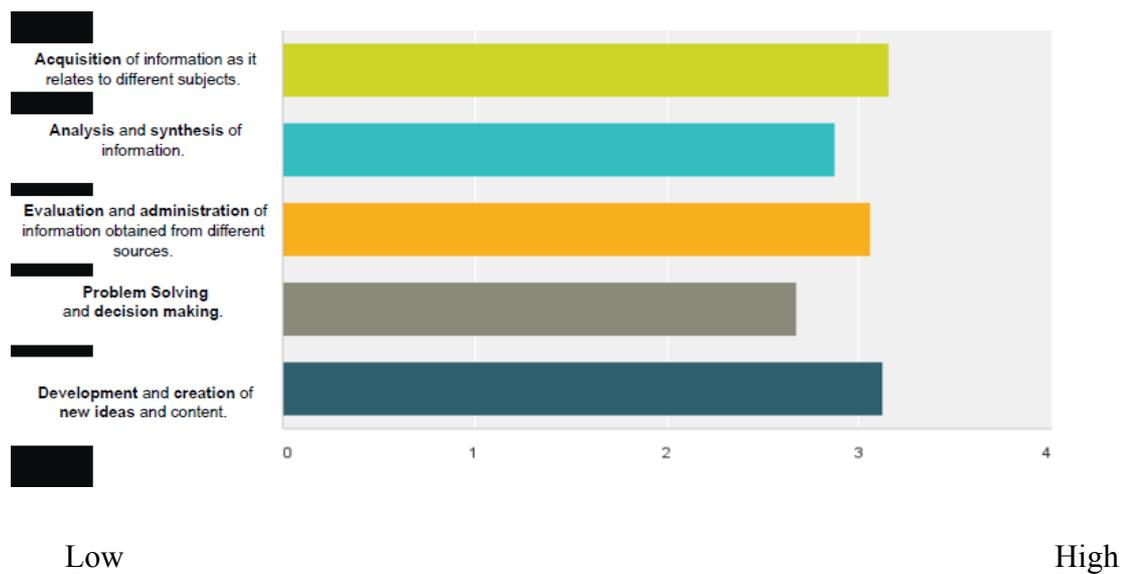


Figure 2.7: Cognitive abilities [40]

2.13. Use of Mobile Devices for Student Learning: Student Perspectives

Kim et al. explore student’s perspectives of the use of mobile devices for their learning to underline the challenges faced by educators to develop new learning and teaching methods, as most of the students as well as many teachers oppose changes in learning and teaching methods [41]. In fact, they find themselves alien to the new learning culture. Secondly, most of the students feel that the new technology-oriented resources and training are not able to meet the individual needs of students. The authors highlight that the technological, psychological, pedagogical or even environmental barriers prevent students from selecting mobile devices for learning activities. West adds that M-learning has helped students in resolving many educational problems [42]. It enabled innovation and helped students and teachers as well as parents for gaining access to digital content through Universal 4G/3G wireless connectivity, which dramatically improved their educational outcomes.

2.14. Use of Mobile Devices for Student Learning: Parent Perspectives

According to a study conducted by the Grunwald Associates, LLC the perception of the parents about the use of mobile devices and mobile generation is different from the common perceptions [43]. The interest of the schools, to engage students in mobile learning, is increasing – in ‘bring your own device’ (BYOD) programs, and in increasing the use of digital technology. The

perceptions of the parents greatly matter as they can be a prime contributor in the new concept of learning. Their influence and support can smoothen the process of M-learning, but their attitudes differ, depending on gender and grade level of children. However, most of the parents accept that mobile applications and devices not only offer fun, but also can help students communicating, connecting and engaging ways of learning, they open up new opportunities for students, but they are skeptical about the use of these devices for pure entertainment.

2.15. Mobile Device Technologies Used Currently

Beniwal & Sharma describe some of the key mobile device technologies used for M-learning, such as Worldreader, Drona, TeacherMate, BridgeIT Project, School of One and BBC Janala Project [44].

- Worldreader - presently used in Ghana engaging 500 teachers and students to measure the impact of e-readers [44].
- Drona –a Mobile Learning Management System, which provides an M-learning environment and helps users to create their own mobile applications as required. It won the World Summit Awards (WSA) in the year 2010.
- TeacherMate – a handheld computer system designed to support teachers.
- BridgeIT Project –used to provide access to digital content, training and support for teachers.
- School of One - used in New York for "smart" teaching.
- BBC Janala Project –used for teaching English language students [44].

2.16. Similar Research Studies

Gaining an insight into similar research studies done in the past and their reported outcomes can be of significant advantage in accurately addressing the research objectives for the current study. An earlier study conducted by Kahari on the impact of cell phone use on the study habits of first-year Arts students in Zimbabwe revealed that cell phones (a type of mobile device) positively and negatively impacted on the study habits of university students [23]. This depended on cell phone usage patterns, as University students are susceptible to recent trends in fashion and styles, which make them more willing to adopt new technologies such as cell phones. The success or failure of these technology uses in education depends on how effectively students can use them for their individual learning and development. The results of the study by Kahari concluded that the cell phone is a very important study tool for first-year university students and most of the students used it for study purposes [23]. The mobile and convenient nature of cell phones along with quick

access to information and connectivity make them a good choice for university students. However, chances of abuse are equally high depending on individual behavior and use.

Another research study was conducted by Goundar to study the potential impact of using mobile devices in education. The study has reported several advantages of mobile devices in comparison to traditional computing devices [22]. Some of these include portability, lesser electricity needs and convenience. Some of the advantages of mobile devices over laptops and netbooks include lighter weight, flexibility, instant operations and switching of applications. A high level of user interactivity can be seen in the case of mobile devices through their touch screen features. In addition to the advantage of accessing these devices outside classrooms, the applications on mobiles are much lesser cost intensive in comparison to those on other devices. With a high strength of mobile devices exceeding those of the computers, it is high time that these devices are used for innovative teaching and interactive learning. Some of the challenges involving the use of mobile devices in education include the lackadaisical attitude of the teachers towards integrating digital technology in classroom settings and lack of appropriate training for teachers about the use of modern digital devices [22].

A recent research study by Farley et al. provides an overview of student ownership of mobile devices at an Australian university. The research suggests that students have access to a wide variety of mobile devices in classrooms. However, one important observation is related to the delivery of learning. It is substantially changed with the use of these mobile devices. For example, course materials are not optimized for using on smartphones, website navigation, and learning management systems. Also, one important outcome of the study is that none of the students participate in educator-led mobile learning activities [45]. Therefore, there is a need for integrating educational learning programs with mobile devices so that students can use these at their convenience.

Another research study which has studied the role of smartphones and tablets in information seeking and teaching behavior for medical students is that conducted by Sir in Nigeria [46]. The study indicated a high level of awareness about the use of mobile devices among the medical students and staff for academic purpose. Some of the positive impacts of mobile devices for medical students included faster and easy access to the Internet to search information, access to eBooks and lower the expenses of accessing the Internet through cybercafés. Some of the challenges for the mass use of smartphones for educational purpose included lack of proper technical staff, operational issues, and data subscription costs. The study recommends the intervention of university management in collaborating with IT companies in designing specific tablets for medical students to address their educational needs.

Research conducted by Kuznekoff and Titsworth to study the impact of mobile phone usage on student learning has revealed that students who did not use mobile phones for classroom learning could better recall information and scored higher grades in comparison to those who were using mobile phones in classrooms [2]. The research, therefore, suggests that mobile phones, when used in the classroom environment, tend to negatively affect the academic performance of students since students then tend to note down lesser information and pay less attention to what is taught in the classroom.

Another research conducted by Vogel et al. has investigated the impact of mobile device applications on student learning [47]. The study reported that intrinsic and extrinsic motivations related to the use of mobile devices are closely related to enhanced performance, and a better alignment with student learning interests. The study also reports that the mobile applications for learning need to be improved further to enhance student learning. The technical barriers restricting the use of mobile devices are expected to decline over the years according to the study. However, institutional challenges related to the use of mobile devices and their applications need to be addressed. Universities need to take active part in the development and use of mobile devices and its applications in classroom settings.

2.17. Summary

Mobile devices have introduced several new alternatives through which we can enhance student learning and project options. Mobile devices offer a range of different functions including basic options like Voice service, Short Messaging Service, Multimedia Messaging Service, Location Based Services like GPS [2], Mobile Software Applications, Data Service. Students are the main users and consumers of all such mobile devices and alternatives. Some of the main reasons why students gravitate more towards the use of such products are because mobile devices such as mobile phones are like mini-computers and can help users to gain access to information online anytime [5]. They can search and retrieve information from the Internet anytime and anywhere. Furthermore, the numerous applications that run on mobile devices allow users to complete an assortment of operations such as word processing and data management effectively [5]. The portability of such devices makes their use convenient for students. These devices are user-friendly and affordable for students thus further increasing their appeal. Additionally, research studies have shown that mobile devices help students access their course material, documents, and discussions quickly, enabling them better their learning procedure [5]. Students can also access additional course materials on the Internet to better understand the course material. Some of the benefits of mobile devices in student learning include higher speed in teaching and learning,

freedom of location and time, helping tutors to stay updated with the latest knowledge [11]. The research methodology adopted by the current study is discussed in the next chapter.

Chapter 3

Research Methodology

3.1. Introduction

In Chapter 2, various mobile technologies, frameworks around these technologies, their applications in academic contexts, and how they affect a student's performance was discussed. To gain a deeper understanding of the issue, research into the topic was conducted. This section explains the research methodology in detail. Section 3.2 explains the research approach, section 3.3 describes the research method and the justification of the research method is given in section 3.3.1. The research strategy is explained in section 3.4, data collection methods are explained in section 3.5, ethical considerations are outlined in section 3.6. Finally, the chapter is summarized in Section 3.7.

The research uses the Onion model suggested by Saunders et al. as the framework for carrying out this project [48]. This chapter provides justification for selecting the Onion model as well as the methodology used for the research. The onion model helped the researcher in clearly revealing the various layers of the research similar to that of an onion. The outermost layer of the onion model is the research philosophy followed by the research approaches, research strategies, data collection methods, etc. Besides, the steps described in the onion model, the research process and design are discussed to provide a broad overview of the research methodology.

3.2. Research Approach

Kumar underlines that the key research approaches often used by a researcher include the deductive approach and inductive approach [49]. The deductive approach enables a researcher to arrive at a particular stance by comprehending and analyzing the available generic data, which prevails in the academic world. Hence, the deductive approach is regarded as a top-driven approach. Kumar adds that the inductive approach helps the researcher in reaching a broad-based theory or concept initiating from a particular condition or situation [49]. Hence, the inductive approach is regarded as a bottom-up approach. It is obvious that the success of a research project exclusively depends on collecting and analyzing valid and accurate data, which is indispensable of both the approaches, yet the deductive approach is more appropriate this research considering the objective of the topic.

The deductive approach is preferred for the ongoing research as it enabled the researcher to review and analyze the collected secondary data and pertinent literature critically to evaluate the impact of the use of mobile devices in the classroom/lecture theatre on the academic performance of first-year university students. The deductive approach helped the researcher to identify and analyze the various impacts of mobile use, to understand the complexities associated with it and to make recommendations for avoiding excessive use of mobile technology by first-year university students.

3.3. Research Method

Bryman & Hardy highlighted that there are two research methods or approaches, namely qualitative method, and quantitative method, are widely used for conducting a research [50]. The qualitative research approach refers to a non-statistical framework used by researchers for conducting research projects concerned with social issues. This approach is not rigidly structured, and it offers high flexibility in conducting the research. This research approach is based on the views, knowledge, and perceptions of the participants of the research including the researcher. The researcher often uses a semi-structured interview and survey for data collection [51]. On the contrary, the quantitative approach refers to the statistical framework used for the research. This approach is rigidly structured and it does not offer any flexibility to the researcher in conducting the research. The data for this research approach was collected using quantitative methods such as close-ended surveys and experiments. However, both research approaches required justifications for the appropriate sampling method and size before data collection to ensure accurate results. However, these days a mixed research method is preferred for conducting a research. The mixed research method refers to a proper blend of both qualitative and quantitative research approaches [52]. A mixed approach was selected for this research.

The survey was conducted with participants, who were all Saudi. Both male as well as female participants were involved in the survey instrument. The rationale for selecting only first year university students for the survey was that prior to entering university, the students had no experience of using mobile devices in classroom settings. Mobile devices are not permitted in primary and secondary schools. Therefore, this study presented an opportunity to assess the perceptions of the students who were first time users of such technologies in classrooms.

For the purpose of collecting the data, the Saudi Social Clubs were contacted in different universities and those universities responded with a list of Saudi students. Due to constraints in time and resources, only those universities who responded were finally chosen for survey. The number of students varied from university to university as it is not possible to have a uniform number of Saudi students studying in first year in all universities.

3.4. Justification for the Research Method

This research pertains to the impact of mobile devices used in the classroom/lecture theatre on the academic performance of first-year university students. A mixed research approach was selected as this study drew from primary data collected through quantitative methods and secondary data collected using qualitative methods. The qualitative approach was helpful for analyzing the collected data from existing literature. The primary data was collected by through survey instrument from students from three universities in New Zealand, the United States and Saudi Arabia. The secondary data comprised various journals, articles, books and research papers relevant to the topic.

3.5. Research Strategy

Saunders et al. underline that the research strategy is helpful in elucidating the tools used for collecting data for the research [48]. The common strategies used for a research include experiments, interviews, discussions, observations, case study and direct or online surveys. Selection of an appropriate research strategy is highly important for a research as it influences the process of data collection as well as the research results.

Since, the mixed research method is used for the ongoing research, which is based on both primary and secondary data, it is highly imperative to obtain accurate and pertinent data from the accessible resources. A mixed research strategy enabled the researcher to collate data from various available data resources such as academic sources and primary data by using a survey instrument with university students as participants.

The major resources of secondary data include reports, articles, journals, study papers, previous works of other researchers, documentary data from various databases of relevant institutions, peer-reviewed journals as well as online resources. The authenticity of the collected data has been asserted before the data have been utilized for the research. Authenticity of the data was ensured as the data was collected only from books, peer reviewed journals and government data bases. The researcher also used the data collected by renowned and recognized institutions like the academic and governmental surveys, worldwide organizations, etc. for the completion of the research.

3.6. Data Collection Methods

Creswell underlines the importance of data for the relevance and validity of a research and the quality of data depends on methods and strategies applied to data collection [51]. The accuracy and reliability of the collected data influences the research results and adds value to the research.

Hence, data is indispensable to achieve the research objectives. The data collected for this research could be grouped as primary and secondary data. Similarly, the methods used for collecting both sets of data are commonly termed as primary and secondary data collection methods. The primary data refers to data collected through the opinions, knowledge, responses, views and perceptions of individuals or groups of individuals. The methods used to collect primary data include various tools like surveys. The secondary data for the research are collected from the available relevant literature, which includes reports of the recognized organizations, books, peer reviewed journals, articles, websites of recognized institutions, etc. The researcher ensured that the secondary data are not only collected from authentic sources, but they were also authenticated by subject matter experts [51].

3.6.1. Survey scope and sample size

The researcher collected survey data from about 227 students participating from four New Zealand Universities (Auckland University of Technology, Massey University, The University of Auckland and Waikato University), 79 from a University in Saudi Arabia and another 70 from a University in the United States. This enabled a sample database of 389 participants.

3.6.2. The Questionnaire

The Questionnaire will be used to collect data based on the following sample questions:

- Which types of mobile devices are used?
- Rate your use of various mobile devices for the following purpose (Rate on a scale of 1 to 5 in increasing order of importance)
- Do you think that mobile devices are a source of distraction from education?
- Your academic activities will be unaffected or least affected by the absence of which mobile devices? (Select all applicable)
- Which mobile devices are essential or critical for academic activities?
- What steps can be taken to make the best use of mobile devices for academic purposes?

3.7. Ethical Considerations

Ethical considerations are crucial for research and they included various considerations such as protecting the confidentiality of research participants (specifically, those involved with primary data), addressing copyright issues for literary materials and documents utilized in the research as secondary resources. The researcher also ensured obtaining permission and consent from

appropriate agencies before using the data. Moreover, the researcher also properly referenced and cited the data and resources used in the research.

3.8. Summary

Exploratory research involving primary data collection shall be used. The research study shall involve a survey questionnaire with university students from New Zealand, Saudi Arabia and the USA. The collected data shall be analyzed using various statistical techniques and the results shall then be outlined. Secondary data analysis along with primary data analysis shall be used to conduct the current research study. The secondary data analysis of online journals, reports and articles shall be used to understand the previous research studies related to the current topic. Additionally, primary data was collected through survey with university students and faculty to understand the impact of mobile devices on university students based in New Zealand, the USA and Saudi Arabia. Primary data analysis will help collect relevant data for the current study. The research design is presented in the next chapter.

Chapter 4

Research Design

4.1. Introduction

In Chapter 3, a detailed discussion of the research method took place. This chapter explores research design and describes the survey. The topic of the research seeks to analyse the impact of the use of mobile devices in the classroom/lecture theatre on the academic performance of first-year university students. This topic is not a previously well investigated one and thus the bulk of the work depends upon the researcher. Therefore, this research requires an exploratory process and design with a mixed approach, as will be described below.

The research design was thus selected as to best generate new assumptions and ideas, on a rarely investigated topic. The exploratory research design selected for this topic will help acquire useful information regarding the background of specific issues that are related to the topic and will be covered through the tools of this research e.g. survey questions. The exploratory research design, with its mixed method and the use of surveys, will help the researcher identify new relationships between different factors involved in the research and generate formal hypotheses after the precise problems of the research are developed. To accomplish the purpose, an online survey was employed which was distributed to students attending different universities. In this research, a large sample size has been used. The online survey was sent to the students of six universities spread across different countries, namely – New Zealand, Saudi Arabia and the United States, thus creating a large sample size. The large and diverse pool has been selected because it will help gain information from which it will be easier to make more generalized findings that can be applied to a larger population. The researcher collected survey data from about 227 students attending four NZ Universities (Auckland University of Technology, Massey University, The University of Auckland and Waikato University), 79 from King Saud University in Saudi Arabia and another 70 from West Virginia University in the United States. This enabled a database of 389 participants.

In the online surveys, here, special care was taken to prepare a questionnaire that included close-ended questions, which helped to guide the research in a steady direction and surmount the challenge of exploratory research yielding tentative results with limited value. The data for this research approach have been collected using quantitative methods such as close-ended surveys and experiments. Additionally, to accomplish the mixed method of the research the secondary data collected from available literature like books, research papers, articles, etc. have been

supported by primary data collected using quantitative data collection methods. The design and content of the survey questionnaire mostly included close-ended questions. However, all the questions, except for questions one and nine, included the “Others” field, which prompted respondents to provide answers other than those offered as the question choices. Then survey results and the subsequent findings from the data gathered are discussed in the following section on research findings and analysis.

4.2. Research Design

As mentioned earlier, an exploratory design is used when there is limited background to the research, i.e. when there are limited earlier investigations in the field to rely upon or to refer to predict the outcome. This method has been specially selected because it helps best understand the most productive way to analyses or study the specific issue that is yet to be investigated, as well as to decide on an effective methodology for gathering information and data on this topic.

The exploratory research framework will enable the researcher to gain possible insights and obtain familiarity with the basic details, concerns and settings associated with the topic, which will help us get a well-rounded picture of the situation involved in the topic. This research design was further selected to best help generate new assumptions and ideas on a topic that has rarely been investigated. This design will also help the researcher develop tentative hypotheses and theories, as well as determine the future viability of the study at hand. This design is most suited for refining the issues, ensuring that the same are systematically investigated, come up with new research questions, and provide a direction for the future research in this area. The exploratory research design as selected for this topic will help acquire useful information regarding the background of specific issues that are related to the topic and will be covered through the tools of this research e.g. survey questions. The exploratory research, as it helps look into a new topic, it will help the research address questions of different types including- the why, the what, and the how of the matter. It is expected that the same design will help define certain new terms and elucidate on existing terms and concepts. It will help the researcher identify new relationships between different factors involved in the research and generate formal hypotheses after the precise problems of the research are developed.

The exploratory research design of this study is supported by a survey that has been sent out online. Although exploratory researches sometimes do suffer from small sample sizes that hinder generalization of results, however in this research, a large sample size has been used to minimize that limitation. The online survey was sent to the students of six universities spread across different countries, namely – New Zealand, Saudi Arabia and United States. The large and diverse pool will help gain information from which it will be easier to make more generalized findings

that can be applied to a larger population. Usually, online surveys used to carry out exploratory research have open-ended questions, and can encumber an ability to draw definitive conclusions by making the research process an unstructured one. However here, special care has been taken to devise a survey that includes close-ended questions, which help guide the research in a steady direction and surmount the challenge of exploratory researches yielding tentative results with limited value. The data for this research approach has been collected using quantitative methods such as close-ended surveys and experiments.

However, to best use the available resources, this research has been designed using a mixed approach. The secondary data collected from available literature like book, research papers, articles, etc. have been supported by primary data collected using a quantitative method of data collection about the impact of the use of mobile devices in the classroom/lecture theatre on the academic performance of first-year university students.

The literature review formed an important part of the data collection for the research. Literature review was conducted by approaching literature in two settings. First, the library provided resources such as books and journals. Second, these were supplemented with the online resources for books, journals and databases. The literature review was conducted systematically. Initial research revealed some significant themes, which were further researched into. This process led to an extensive literature review and the expanding of the bibliography.

Therefore, whereas the qualitative approach was helpful in analyzing the collected data from the existing pertinent literature, the primary data was collected by using survey instrument with students of four universities in New Zealand, along with one university each in the United States and Saudi Arabia.

The researcher collected survey data from about 227 students attending four NZ Universities (Auckland University of Technology, Massey University, The University of Auckland and Waikato University), 79 from King Saud University in Saudi Arabia and another 70 from West Virginia University in the United States. This enabled a database of 389 participants. The discrepancy in number was because 13 students omitted to mention their universities of origin.

4.3. Description of Survey

Previously, in section “3.7.2 The Questionnaire,” the broad sample questions were mentioned, which would have been used as the base for data collection. The Questionnaire used for the online survey included ten questions, which were as follows:

Question 1. This question listed the names of the six universities (four from New Zealand and one each from the USA and Saudi Arabia) and students could pick the name of the university they attended from the list.

University Name?

- Massey University
- Auckland University of Technology
- University of Auckland
- Waikato University
- West Virginia University
- King Saud University

Question 2. This question aimed to explore the mobile devices used by students.

Which mobile devices do you use in classrooms?

- Smartphone
- iPad
- Laptop
- None
- Other (please specify).

Question 3. The reasons for bringing the mobile devices were examined in this question.

Why do you bring mobile devices into classrooms?

- University requirement
- Convenience
- Time saving
- Entertainment
- Social Media
- Instant Messaging
- Other

Question 4. This question was designed to help identify if there was any one mobile device most relied upon by students for their academic work.

Which of these mobile devices are often used by you for academic purpose?

- iPad
- Smartphone
- Laptop
- Other (please specify).

Question 5. This question was designed to help identify how students used the mobile devices for non-academic purposes. The section on research findings and analysis will consider if there are any correlations between the responses to these questions.

Which of these mobile devices do you use for non-academic purposes such as entertainment, social media or any other purpose?

- iPad
- Smartphone
- Laptop

- Other (please specify)

Question 6. This question will enable the researcher to understand if the students think that the mobile devices are beneficial in studies.

Do you think mobile devices help you in academic studies?

- Yes (if yes please elaborate how?)
- No
- Cannot Say
- How?

Question 7. This multiple-choice question will help to guide the research in a clear direction and identify the most interfering aspect of mobile devices.

What are some of the most common reasons you think that mobile devices interfere with your academic performance?

- Social Media
- Online Games
- Instant Messenger
- Distraction
- Other (please specify)

Question 8. This question was framed to get a well-rounded idea regarding the impacts of mobile devices, both positive and negative.

What are some of the reasons you think that mobile devices help you with your academic performance?

- Online Course Material
- Lecture Videos
- Interactive Tools
- Self-learning
- Other (please specify)

Question 9. This single choice question would help identify in definite terms what the students or respondents thought about the impact of mobile devices.

Do you think mobile devices?

- Should be banned in classrooms
- Should be used in classrooms

Question 10. This was an open-ended question where respondents could put forth any recommendation or advice they had regarding the use of mobile devices in classroom and, or lecture platforms.

Do you have any recommendations for the use of mobile devices by students for academic purposes or any tips to avoid misuse?

4.4. Summary

The research topic attempts to investigate the impact of the use of mobile devices in the classroom/lecture theatre on the academic performance of first-year university students. To investigate and analyze the findings, the research employs an exploratory process and mixed approach to design. An exploratory design approach is selected, as there have been limited earlier investigations of this topic to rely upon as a reference to predict the outcome. It is believed that the exploratory design and mixed method will best help understand the most productive way to analyze or study this specific issue and gather information or data on this topic. Research design and survey description were elaborated in this section; the next section discusses the research findings.

Chapter 5.

Research Findings and Analysis

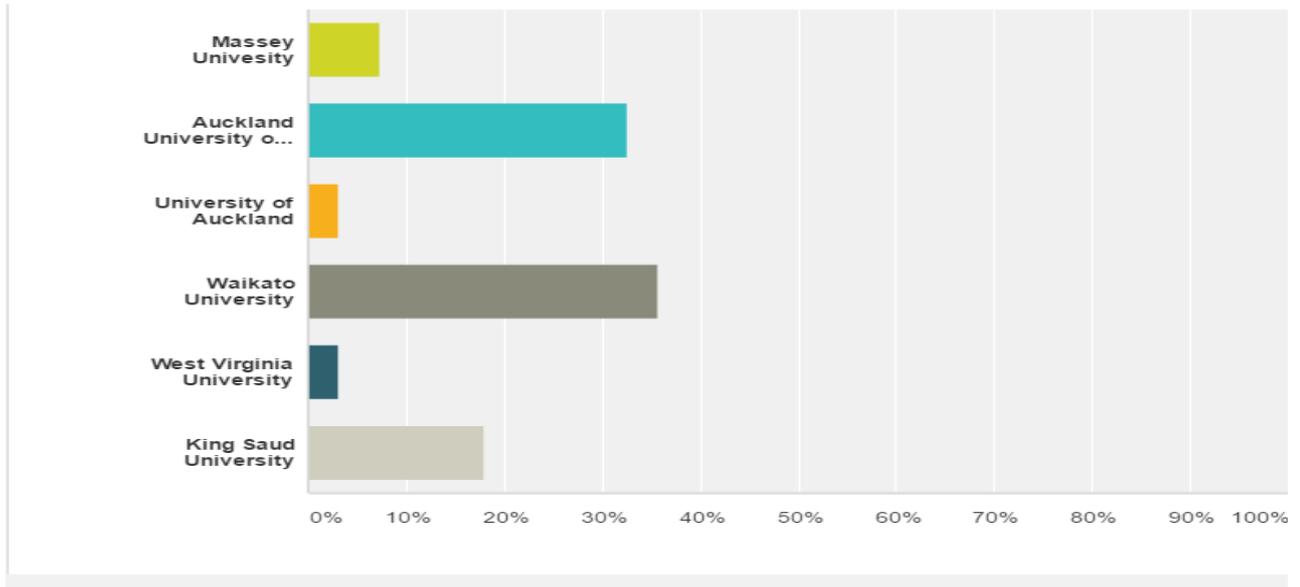
5.1. Introduction

A detailed discussion of the research design took place in the previous Chapter. This Chapter takes the discussion further by discussing deals with the findings of the Research at hand. As mentioned before, the data collection methodology utilized for the purpose of this research is mixed in character i.e. both primary and secondary types of data collection. Additionally, the research methodology is also a mix of both qualitative and quantitative data analysis, with the primary data collected quantified to identify typical and dominant trends. The findings of the analyses are presented in this section of the paper using several tables. The tabular representation of the data gathered, their implications will be mostly followed by descriptive analyses of the same. In addition to this, the section will also look into examination of the data gathered to locate any correlation among devices and their uses, wherever it is deemed appropriate, or if the data reveals any such trends.

5.2. Survey Design and Research Findings

The survey was distributed to students at four different universities in New Zealand, namely - Massey University, Auckland University of Technology, University of Auckland, Waikato University. In addition, students from one university in US West Virginia University, and King Saud University were also invited to participate. The first table shows the percentage of the target population concerning each of the universities, i.e. how many respondents were from each university. Out of 389 respondents, 13 missed the question while 376 respondents replied.

Table 5.1: Participant universities and their respondents



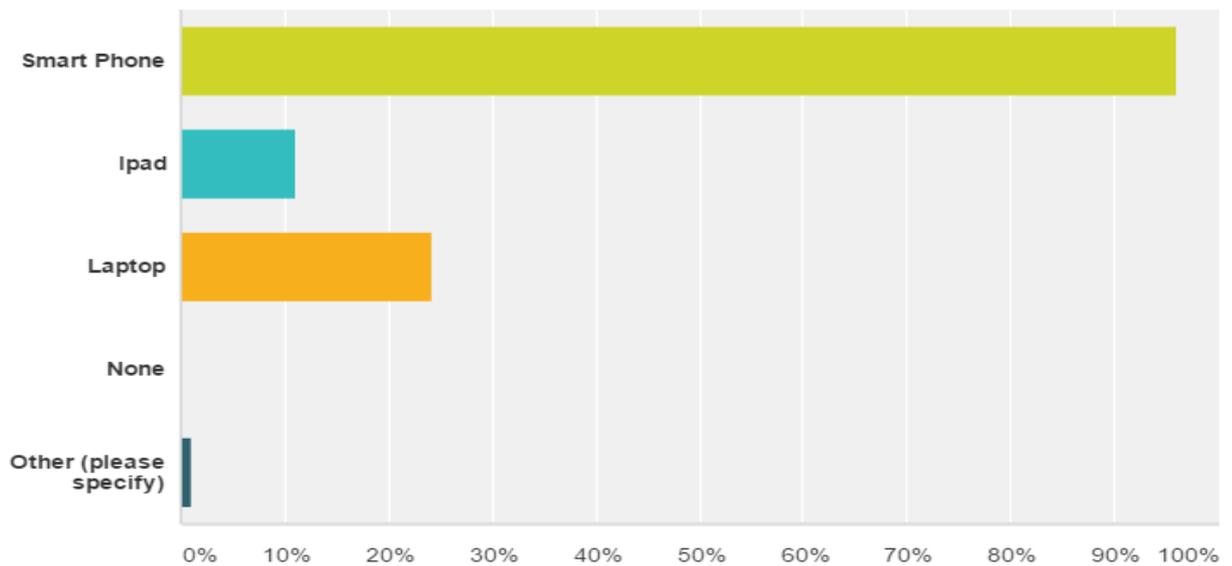
Conducting the survey among students from a variety of universities spread across the globe provided a unique opportunity to collect responses from different sources. The different universities enabled access to the perspectives of students from different programs, backgrounds and cultural contexts, which ensured a diversity of opinions. The diversity of sources helped create a sample population, which could provide insights into the impact of mobile devices in academic works, spread across subjects, categories and countries. Thus, helping locate or identify a wider pattern of behavior, expectations and beliefs concerning the research issue. After recording the institutional identities of the respondents, the next question on the survey concerned the choice of mobile devices that the students used in their classrooms.

Table 5.2 shows the percentage of students who used mobile devices in classrooms. Of 389 respondents, three missed the question while 386 answered. The survey results clearly demonstrate that Smartphones are the most commonly used mobile devices, followed by laptops. Two hundred and ninety-two students in this sample i.e. exactly 75.6% used smartphones in classrooms. Laptops, which as mentioned above, are the second commonly used mobile devices, are used by 112 students in the sample. Therefore, 29.3% respondents use laptops. iPads were relatively low in usage numbers, with only 75 of the students using iPads in classrooms that made up 19.4% of the total population pool. Moreover, in stark contrast to all of the above, eight students, i.e. 2% of the total target population of the students said that they did not use any mobile device in classrooms. Two out of the rest of the students responded to the other option, as the kind of mobile devices that they used in classrooms. One of them specified the use of ‘Computer’, which can be the common terminology to refer to PCs, and the other replied to the question as

‘Mod’. Therefore, 0.52% of the total students used other mobile devices than the popularly used ones. Since students were provided with the option to choose more than one mobile device in response to the survey question, the percentage of students who used at least one mobile device in classrooms (not shown in a table) were calculated. It was found that 282 students (73.1%) used at least one mobile device in classrooms. Only 104 of the 386 students who responded used more than one mobile device. The remaining eight students did not use any mobile device.

Based on the information received from this question, it is clear that the maximum number of students carries smartphones to their classrooms, whether the purpose is academic or non-academic will be realized from the answers to the following questions.

Table 5.2: Mobile devices used by students in classrooms

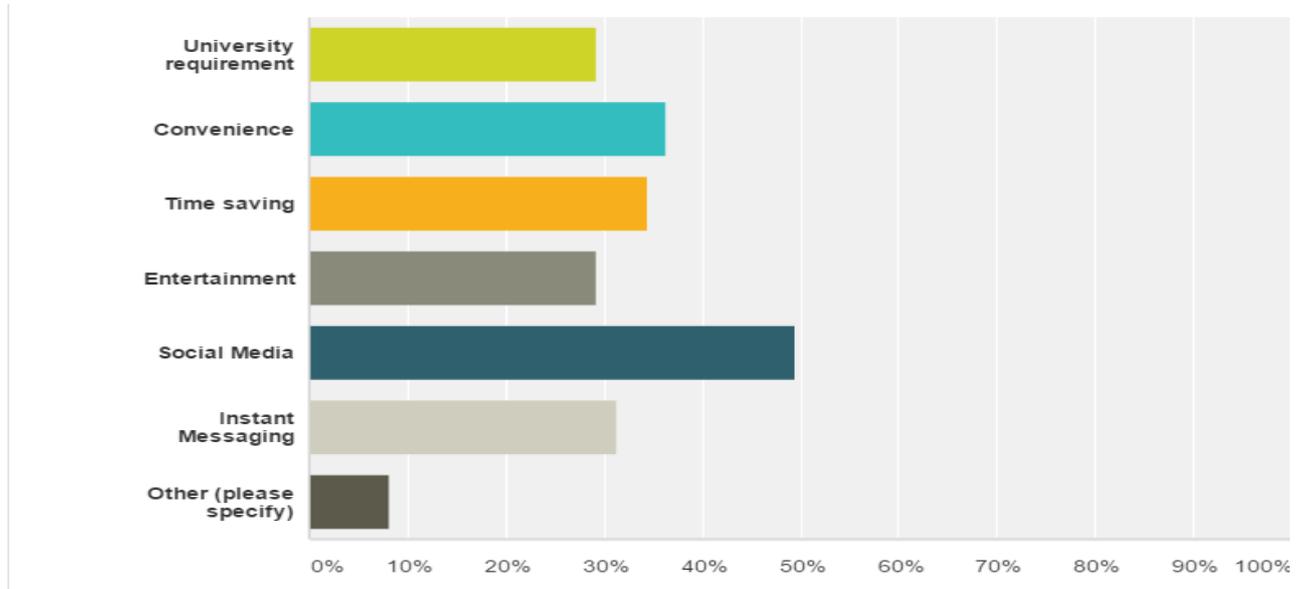


Following the question regarding the choice of mobile devices brought to the classroom, the students were asked the reason behind their selection of devices, or why they brought mobile devices in classrooms. The response categories included various choices such as university requirement, convenience, entertainment, social media, and instant messaging. The alternatives reflected several considerations ranging from those of academic origin i.e. university requirement to those of personal recreation like social media, entertainment, and instant messaging. The responses to this question are presented in Table 3. Of 389 respondents, 388 answered this question while one missed it.

The following Table 5.3 shows that most of the students brought mobile devices to classrooms for social media i.e. 150 out of the 388 replying respondents or 38.7% of the total population answering the question picked social media as the reason for their bringing a mobile device to the classroom. The second most commonly mentioned reason for carrying a mobile device to the

classroom was convenience; 144 students said that they brought mobile devices to the classroom because it was convenient for them. Thus, 37.1% of the total sample population cited 'convenience' as their motive behind the decision to carry mobile devices to class. The next or third most common reason for the decision was time-saving; 113 students mentioned this reason, which makes up 29.1% of the total sample population. The next highest picked motive or reason was that of entertainment with 112 out of the 388 respondents picking that as their response. Therefore 28.9% of the total pool of respondents brought one or mobile devices to the class because of the reason of entertainment. One hundred and four students picked the academic reason of University requirement, as the reason why they brought mobile devices to classroom, i.e. 26.8% of the total sample population responding to the question chose university requirement. The reason of instant messaging was on the lower side of selections, as out of the 388 respondents replying only 77 picked this as their motive or reason, i.e. a total of 19.9% of the students brought a mobile device to the classroom for the reason of instant messaging. Out of the total population, 23 students i.e. 5.9% of the total respondents selected the other option as their reason. Two out of the 23 respondents picking this reason specified that they do not use mobile devices in classrooms, while two mentioned that they brought one but did not use it. About 11 of the respondents from the 23 cited a variety of academic needs like recording lectures, taking notes etc. as their reasons for carrying such devices to classrooms, the remaining respondents mostly mentioned that they brought such devices for emergency calls and other personal reasons like contacting family etc. Here two students could reply or select more than one reason for their answer, and almost as many as 335 respondents picked more than one of the specified reasons.

Table 5.3: Reasons why students carried mobile devices to classes



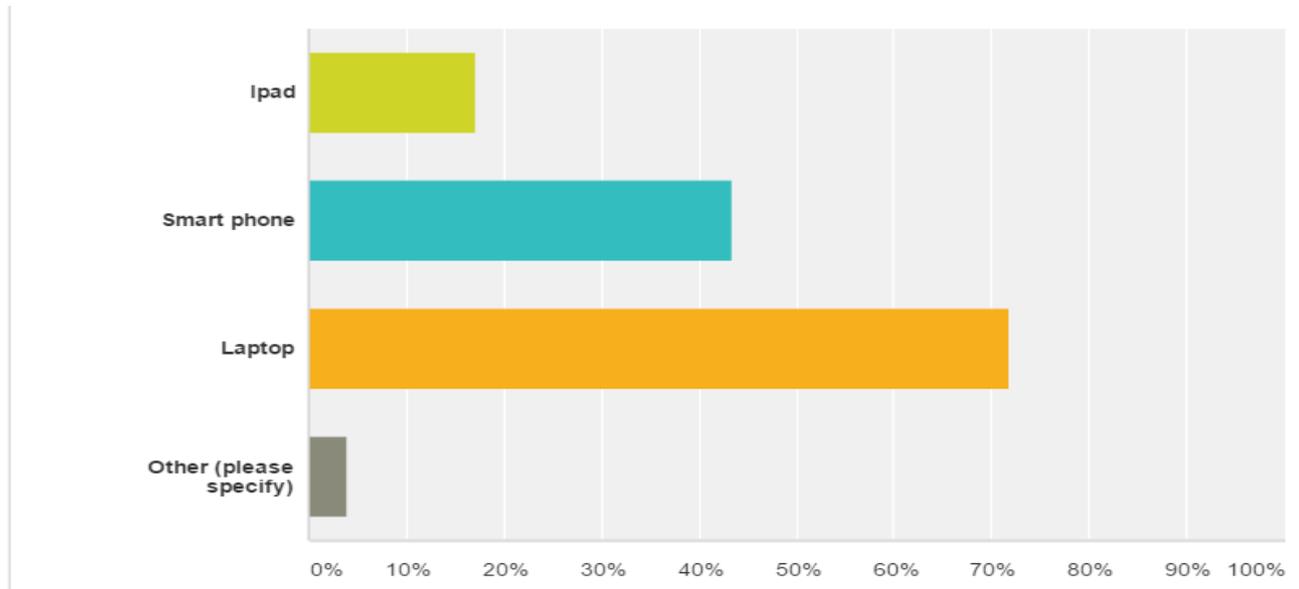
From the response to this question and as seen in the given table, the options of social media and convenience are the closest to each other with 38.7% students picking social media as their reason and 37.1% students selecting convenience. While the selection of social media as a reason implies that students bring such devices to classrooms as a means of distraction, the selection of convenience can imply anything between convenience in taking notes, translating, or keeping in touch with family and friends, for any purpose.

The fourth question on the survey asked the respondents which of the previously specified mobile devices i.e. out of the iPad, smartphone, laptop, and others, which were the mobile devices the respondents used the most for academic purposes.

Of the 389 respondents, two missed the question whereas 387 answered. The majority of respondents picked the laptop as their most favored mobile device for academic work. Thus, 238 out of 387 of those who replied picked the laptop, i.e. 61.5% or more than half the population of the survey picked this option. The second most favored alternative was the smartphone, selected by 160 respondents. Hence, 41.4%, which is a little shy of the half mark, picked smartphones. The third favored option was the iPad, with 89 respondents selecting it i.e. 23% of the total survey takers relied on iPad for their academic purposes. Six of the total respondents i.e. a meager 1.6% of the population clicked on the other option. One of the six respondents did not specify what they meant by other, while four of them mentioned PC or Desktop and one of the six respondents mentioned MOD. Note that almost twice the number of the students who used iPad for academic purposes used smartphones for academic purposes. This is a somewhat odd finding because the iPad seem to be more appropriate for academic use than smartphones.

Here too, as in questions two and three, the respondents could pick or select more than one option. Thus, here too the total percentage exceeds the maximum of 100%. As many as 106 respondents selected more than one alternative.

Table 5.4: Student preference of mobile device for academic work



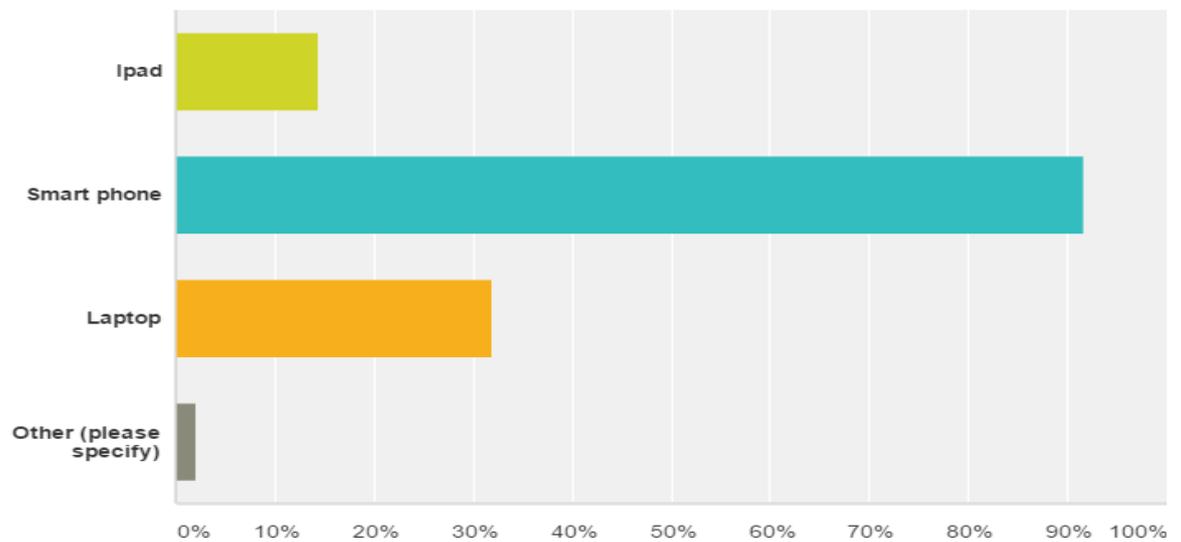
Based on the answer received on this question, it can be assumed that students rely more on laptops for their academic purposes than on the next closest option, i.e. the smartphones. Correlating this piece of information with that from questions two and three showed that most students brought smartphones to their classes. The most popular reason for bringing mobile devices to classes were social media, then convenience and it can be assumed that most students who had smartphones and laptops relied more on the latter for their academic pursuits.

In the next question, to obtain better insight into the use of mobile devices by students, the respondents were then also asked which mobile device they used for non-academic purposes like entertainment, social media, or any other purpose.

Of 389 respondents, 386 replied while three respondents missed giving an answer. The results for this question are presented in Table 5. Smartphones were the most commonly used mobile devices that were used for non-academic purposes in this sample. Three hundred and four students said that they used smartphones, which comprised 78.8% of the sample, which is well over the three-quarter mark of the whole sample. Laptops were the second most commonly used mobile devices; 113 students said that they used laptops for non-academic purposes, which is 29.3% of the total sample population. Eighty-nine students said that they used the iPad for non-academic or entertainment purposes. Almost the same number of students used the iPad for academic (89) and non-academic purposes (88). Out of the whole sample, only four students

specified other as the mobile devices they used for non-academic, entertainment purposes. One respondent mentioned the iPhone, one other mentioned a PC, another wrote MOD. However, one respondent might have been confused and mentioned “and smartphone” in the customizable ‘other’ field. Since students could choose more than one mobile device, the percentages in Table 5 also exceeded the 100% mark. Based on this, further analyses showed that 262 of the students said that they used only one mobile device for non-academic purpose, and 124 of them said they used more than one mobile device.

Table 5.5: Student preference of mobile device for non-academic work



The information gathered from the previous questions looked into the kind of mobile devices students brought to classes, why they brought and used them and which devices they relied on for academic purposes. When combined with the information received through survey responses, it can be gathered that students heavily rely on smartphones for non-academic use. Although the responses to question three pointed out that smartphones are not merely used for non-academic purposes and 41.3% of the sample population depended on them for their academic uses, the response to this question shows that the majority of students depended on this device for non-academic reasons too. It might be the level of convenience offered by such a device that means it is mostly used for non-academic reasons. For instance, smartphones are easy to carry anywhere and anytime, and they provide a number of mobile applications offering all-time access to different social media platforms.

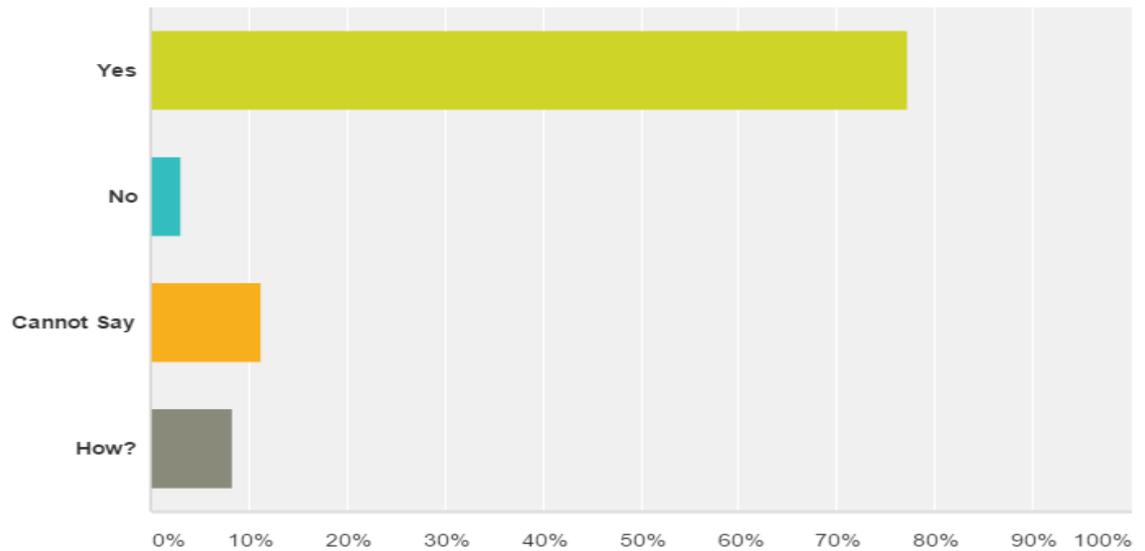
The sixth question asked students if they thought mobile devices were helpful in their academic studies. The alternatives from which they could select their answers included – Yes, No, Cannot

say, and they subjectively customizable 'How?' Of 389 respondents, eight missed the question while 381 answered.

The overwhelming majority believed that the use of mobile devices benefitted their academic studies. Thus 301 respondents or 79% of the sample population agreed with the question regarding the use of mobile devices and their benefits. However, 35 respondents believed that such devices did not help in academic studies. Therefore, 9.2% selected the option 'no'. Twenty-six respondents from the sample were not sure, thus, 6.8% selected 'cannot say', and 19 of the 381 of the respondents who replied, mentioned how. Of the 19 respondents who answered this final question, the majority cited reason, as mentioned by almost all those who replied to the question 'how?', was regarding how the devices helped in accessing online academic materials, translating, sourcing additional information, research, and the facility of using interactive tools.

One student mentioned that having an alternative mobile device also adds to the process, as, if in case something happens to the laptop or computer, the smartphone can be relied on for that period. Another respondent laid out that the availability of specific applications like e-readers, pdf files, and ability to maintain notes and checklists, help with a variety of academic work, as well as keep a tab on the progress made on academic work (through checklists and notes). Respondents of this question also pointed out that the options of providing pictorial representations explaining lecture portions, and the options to click pictures of boards and recordings of lectures, further benefits their academic learning. Respondents also pointed out that carrying such devices to classes helps refer to facts and related information taught in lessons, which help them better learn and understand topics. Students who have been brought up with English as their second language, stressed on the use of translators and dictionaries easily available on these devices. They mentioned that using such apps helped them grasp the lessons promptly. Students also mentioned that such devices helped them be in touch with other classmates, which was especially helpful when they were not present in lessons due to any reason. Respondents also mentioned that it makes research work easier, as rather than spending hours at libraries looking for information, such devices make information available to them at the click of a button. This was a question where the respondents could only pick only one option and the total percentage of replies came to an even 100% maximum.

Table 5.6: Usefulness of mobile devices for academic work



Therefore, from the above information it can be concluded that for the majority of the students, their mobile devices offered a number of beneficial features, which affected their academic learning in a positive way. One of the key benefits which came across from the replies obtained under the ‘How?’ section is that the device helped to provide translation and dictionary facilities to those who had any language issues following course work. With international students travelling to universities of different lands, where they might be taught in a different language, such facilities become even more helpful.

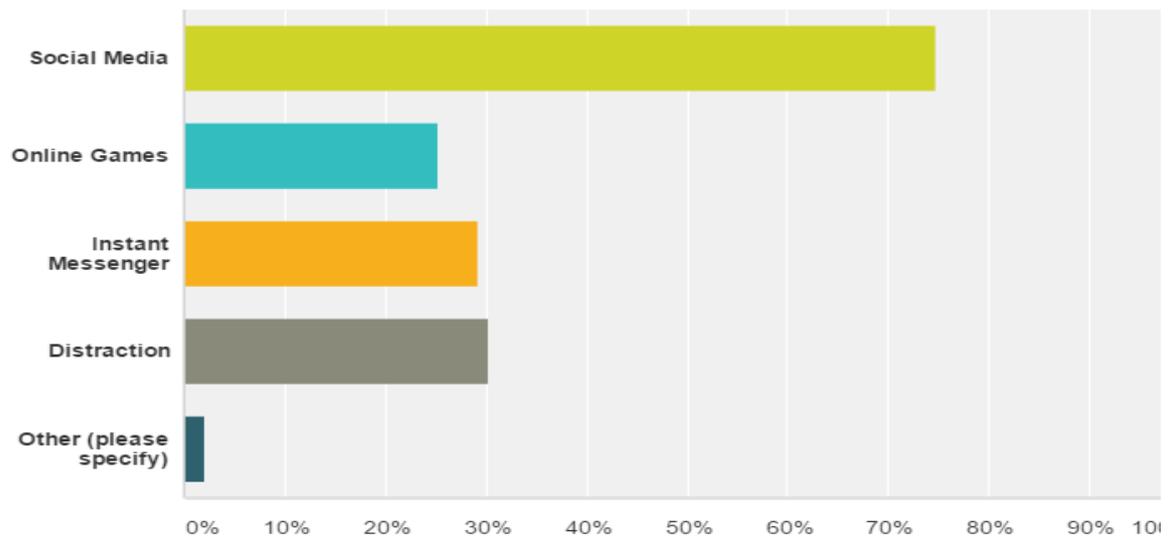
However, in order to get a more well-rounded idea of what the students thought if such devices, students were also asked the opposite of the question above. Thus, in the seventh question respondents were asked reasons that mobile devices interfered with their academic performance, and all of them were able to name at least one reason. The results for this question are presented in Table 7. The result as illustrated in the table below shows that while majority of the students think that mobile devices help them in academic studies, all of them also think that in way or another, mobile devices mobile devices interfere with their academic performance as well. Of the 389 respondents, one missed this question while the rest answered.

The most commonly mentioned reason for interfering with academic performance is social media. Two hundred and fifty-seven of the students said that social media interfered with their academic performance, which makes up for much more than half the sample, i.e. 66.3% to be exact. The next most common reason was “distraction”. One hundred and eighteen students, or 30.4% of the sample population, cited the reason for distraction. The third most popular reason was Instant Messenger, with one hundred and six students or 27.3% of the respondents selecting it. As many

as ninety student respondents (23.2%) considered that online games interfered with their academic performance.

Only seven members of the sample population, i.e. 1.8% of the whole sample specified other as their causes of interference. Of the seven respondents, one did not mention anything specifically; one mentioned that “everything” was an interference; one claimed she or he could concentrate less because of such devices; another specifically mentioned “Google Safari”; another claimed “talking with friends” as an interference; the final two mentioned “MOD” and all three alternatives listed in the survey. It was a question where multiple options could be selected, thus, the total percentage is more than hundred, however, there is a chance that the final respondent got confused and instead of click on all three, manually entered that information in the Other category.

Table 5.7: What are some common interferences with academic work?



The information gathered from responses to the seventh question clarifies that there are many ways mobile devices can interfere with the academic work of students. The availability of social media applications, gaming platforms and immediate connectivity with friends often distract students from their academic work. However, these distractions are within the voluntary control of students. The applications which assist academic work are not combined with social media or gaming applications.

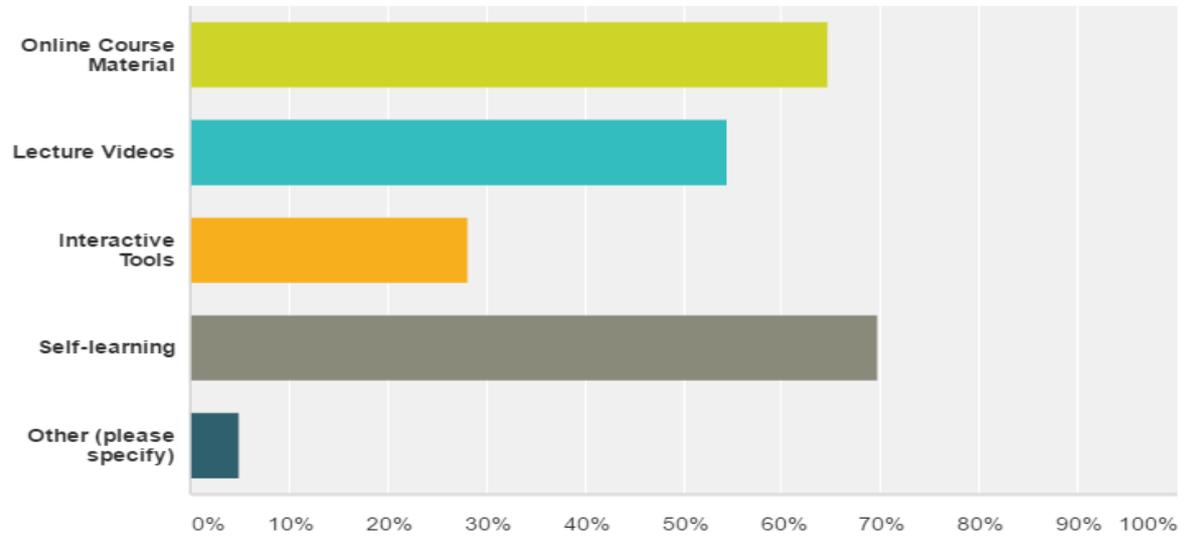
Therefore, the eighth question was designed to investigate the beneficial aspects of such devices in academic work.

The benefits of mobile devices can be far-ranging, as they can also help students’ to improve their academic performance. Basing on this premise, the eighth question was framed, which asked

students what they thought were some of the reasons that mobile devices helped them with their academic performance. To identify the kind of help that the students benefitted from, the alternatives offered were: Online Course Material, Lecture Videos, Interactive Tools, Self-learning, and the subjectively customizable others field. The results of this question are presented in Table 8.

Of the 389 survey respondents, 387 answered this specific question, while two respondents missed it. The most commonly mentioned reason picked was access to online course material. Two hundred and seven students said that mobile devices helped them for online course material i.e. more than half the sample or 53.59% of the sample picked this alternative. The next commonly mentioned reason was self-learning; 193 students mentioned this reason, which is almost half the whole sample or 49.9% of the total. One hundred and eighty students said that mobile devices helped with lecture videos, this is followed the second choice closely as 46.5% of the sample selected it, and 115 of them said that mobile devices helped with interactive tools, thus, 29.7% of the sample picked this option. Only nine or 2.3% of the whole sample picked the others option. Of the nine respondents, three mentioned research, dictionary and searching as the reason they think mobile devices help them with their studies. Two students mentioned these devices make it easy to reach, connect with teachers and save time; one student mentioned that such devices also help to capture the pictures of the board work done by instructors during class. Another student mentioned using these devices to complete all kinds of academic work, rather than using paper. One student wrote 'Mod' and another mentioned 'Video games'. In this question, like many of those before in the survey, the respondent could select more than one alternative. Thus, the total percentage exceeds the 100% mark.

Table 5.8: Reasons mobile devices assist academic work

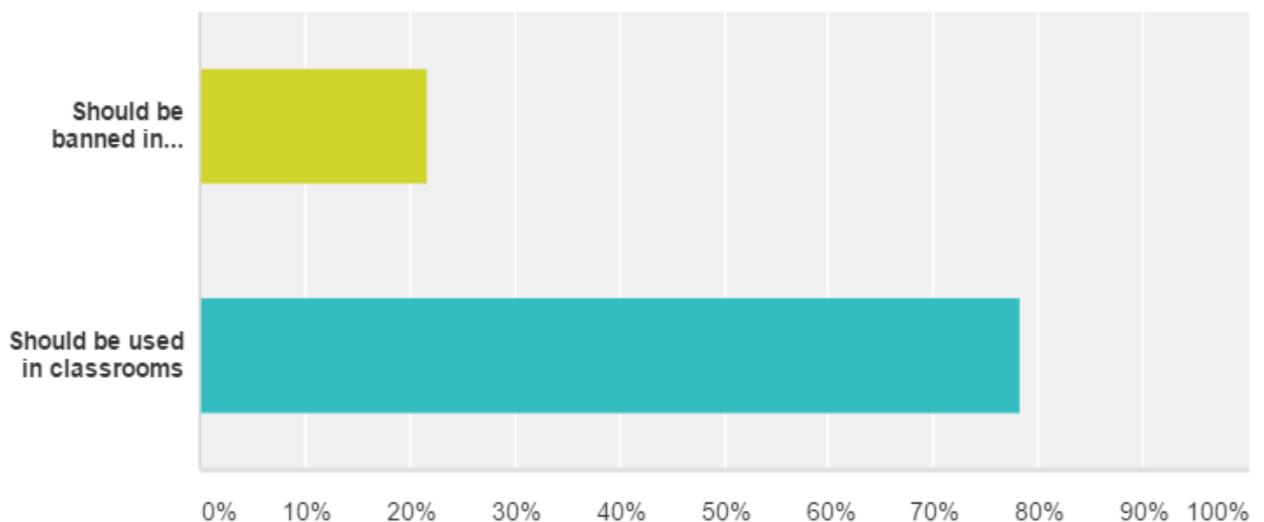


Thus, from the answers received as response to the eighth question on the survey it is evident that the majority of the sample population of the same, benefitted on a variety of grounds in their academic learning, using mobile devices. With 53.4% of the respondents citing online course materials and 46.5% selecting lecture videos as reasons that they think such devices help their academic performance, it can be understood that such devices can help provide students with additional academic materials, which can support and benefit their whole learning procedures. Such tools can also hold beneficial impact for out of class students, who are absent from classes due to any reason. Online course materials, e-books and lecture videos that are open for all, can also help educate individuals who are self-learners and do not attend any classes. 49.8% of the respondents mentioned self – learning as their reason, since these were students of one of the universities mentioned in question one, it can be concluded that these students relied on such devices for further investigating some topics and gaining knowledge that was not a part of their class curriculum. As with the previous questions, here too the subjectively answerable section of ‘Others’ helped gain a little more insight into the question asked, which could help bring about more reasons than those already mentioned in the survey question. From their responses one novel reason that comes across is the increased connectivity between students – teachers, as well as among students themselves come across. This connectivity can help students clarify doubts regarding anything regarding their lessons outside classrooms. The dictionary search option and the availability of supporting materials for their course work are reasons that have been pointed out before as well, along with the facility to take pictures of the board on which lecture material are illustrated. Thus, overall there are a number of ways that mobile devices can be used for bettering a student’s academic learning process, within classes and on one’s own time.

The ninth question posed to the students was whether mobile devices should be used or banned in classrooms'. The results are presented in Table 9. Of the 389 respondents of the survey, 384 students replied to the question while five missed it.

The majority of the students, i.e. 264, which comprises 68.7% of the total sample said that mobile devices should be used in classrooms. Note that this percentage (i.e., 68.7%) is close to the percentage of students who said that mobile devices helped in academic studies (see Table 6 above, 79%). This relationship corresponds with the learning gathered from secondary research as shown in the literature review section. It was found from Alshathry & Fayyumi [3], that Mobile devices are portable which makes their use convenient for students. Also, mobile devices are easy to learn and affordable for students thus making them an attractive choice for students. Thus, it was supported by research studies that access to mobile devices allowed students to promptly access their course material, documents and discussions. Students can also access additional course materials on the Internet in order to enhance their learning and educate themselves further [3]. Of the whole sample, 120 students, which comprise around 31.3% of the total respondents, opined that the use of mobile devices should be banned in the classes.

Table 5.9: Students' opinion on the use of mobile devices in class



The final survey question allowed the respondents to provide their opinions and recommendations on the use of mobile devices by students for academic purposes as well as advancing any tips about how to avoid misusing the devices.

Of the 389 respondents, 316 missed responding to this question and only 73 respondents replied. Of the 73 respondents who replied to this particular question, 20 respondents merely

replied that they did not have any inputs or personal recommendations. Another four respondents conveyed the same in other words. The remaining 49 provided the following recommendations.

One respondent opined that mobile devices could be used more optimally by teachers and professors to make classes more interesting. It was expressed by another student that iPads offer faster and easier ways to learn as they facilitated downloading books and online quizzes rapidly, thus saving more time for the students. Some of the particularly helpful recommendations mentioned that there are plenty of ways mobile devices and smart tech could be used, in an academic environment, to help students save time. These apps and techs could also offer useful and creative tools that can further help students in their academic pursuits. Respondents opined that students could use mobile devices for simple, yet necessary services such as looking up word meanings in dictionaries or using translators. It was also mentioned that students can specifically benefit from tools and apps like 'Socrative' where students can take a direct quiz about the current lesson from their smartphones. There are plenty of tools and apps that can help students create, communicate, receive and share their work instantly. However, avoiding misuse of such devices and keeping them from interfering with academics is the responsibility of the individual, not the lecturer or the university.

Respondents seemed to believe that since such devices had a positive impact on the academic learning of students, only those devices that can help with the course like a laptop or notebook should be allowed in class. In line with this train of thought respondents mentioned that phones could be submitted or placed in lockers during the class. This indicates that smartphones are believed to be more distracting when it comes to academic learning, while devices like laptops are believed to be more useful. This corresponds to the result obtained in question number four and five i.e. “Which of these mobile devices are often used by you for academic purposes?” and “Which of these mobile devices are used by you for non-academic purposes such as entertainment, social media or any other purpose?” respectively. The results of each question as illustrated in Table 4 and Table 5 respectively, showing that 61.5% of the respondents picked the laptop as the most useful device for academic learning, while 78.7% respondents picked smartphone as the device they mostly relied on for non-academic purposes. More than one respondent replied that such devices could be beneficial for their translation services and dictionary use. They also mentioned that using such devices could help provide pictorial representations of the theories and concepts taught in the class. The pictorial aides helped further with their learning.

Along with the pictorial representations and illustrations, certain respondents also mentioned that mobile devices could help show educational and informative videos in class, which can further speed up the learning process for the class. Some students mentioned using such devices

should be encouraged in the classroom so that there can be a constant connectivity between teachers and students, as well as among students themselves. Most respondents who replied to this question mentioned that, either the smartphones should be confiscated before class, or messaging apps and services should be banned in the classes in the least. Only academic apps and services should be allowed during lectures.

Some respondents, however also acknowledged the usefulness of smartphones and mobile phones when it came to academic learning. One respondent mentioned that it was easy to look up any information, especially concerning current and regular affairs by using smartphones. That is to say that, such devices make the accessing information easy and convenient. One respondent also mentioned that mobile phones and smartphones provide us with the technology that helps us work with the times, even when it comes to academic learning. This corresponds with the finding regarding smartphones in question 4, where 41.3 percent of the respondents picked smartphones as one of the devices they relied on for their educational learning. The uses of mobile devices for reaping the benefits of such facilities as online course materials, lecture videos and more were stated by multiple respondents (No. = 8).

Ten respondents mentioned that the user needs to be careful regarding how they use such devices for academic purposes, especially when in a classroom. The respondents elaborated that the user must make sure that the devices are used for academic purposes only and that the use of any application that qualifies chiefly as entertainment should be avoided. Some respondents (No.= 6) pointedly mentioned that it is imperative that students stay away from social media when using mobile devices in classroom. One respondent mentioned that the lecturer or instructor can ensure this by attaching an award of academic credits to the compliance of a no social media or entertainment applications use, in class. About five respondents elaborated on question eight. “Which of these mobile devices are used by you for non-academic purpose such as entertainment, social media or any other purpose?” in this section, as well. They mentioned that mobile devices become all the more helpful for students in their academic preparation, as students don’t have to buy expensive books. Such devices make online copies of books available to them, for nominal or no cost. These devices also save time and help to record information and lecture notes more effectively. One respondent mentioned that such devices could be used to take pictures of the lecture notes, and which one can easily concentrate on instead of taking notes. The respondent advised that one way a student can control the distracting influence of mobile devices is by leaving the SIM card outside the classroom, so the student does not get distracted by instant messaging and social media, etc.

Respondents have mentioned that apart from translation and dictionary services, especially for those who have grown up with English as a second language, these devices are also helpful in

providing background information on any topic or concept to all students. Some respondents (No. = 5) have also mentioned that care should be taken to ensure that non-academic applications are not used in the classroom when using such devices. In tune with this thought, a respondent mentioned that with the rate of progress for such devices, it would be useful to come up with a convenient, foldable and light mobile device that would only be compatible only with academic applications like Moodle. It would not enable students to download any popular entertainment applications like Facebook. Five respondents however maintained that mobile devices should be kept out of classes as they cause distraction.

Therefore, of those respondents who replied to this question, the major recommendation was for using such devices in classrooms for academic purposes. The most support was lent to the translation, recording and dictionary services, followed by the support for such application which helps students record the class lectures, or grasp the content with the help of additional information, pictorial representations, and illustrations. As mentioned earlier, some international students tend to seek academic training at universities where the teaching medium might be in a foreign language. For all such students, the translation and dictionary facilities are a boon and help them grasp the content of lessons promptly and effectively. Hence, this section allowed more insight into the thinking process of the students concerning the use of mobile devices in the classroom, which elaborated on the beneficial impact of said devices on their academic learning.

One observation that can be made from the survey information is that the majority of respondents admitted to carrying a mobile device to the classroom, with only 2.07% not using the device in class. The majority of mobile device users mentioned that they carried them to the classroom to access social media (38.6%). Nonetheless, 71% of the respondents believed that mobile devices could help them with their academic learning; 53.4% claimed they could access online course material through such devices and 68.7% believed that mobile devices should be used in classroom teaching. These results suggest that there is need and scope to work out ways to better integrate such devices into the teaching process.

As the survey results suggest, it can be seen that the most popularly used mobile device by students in classrooms is the smartphone, whereas the most popularly relied upon mobile device for academic works is the laptop. Additionally, an overwhelming majority of the student respondents also felt that mobile devices had a positive impact upon their academic pursuits.

The success of mobile learning projects is contingent upon the incorporation of technology into course material and the educational evaluation of academic courses, which is a critical factor for the success of mobile learning projects and guarantees that students partake in mobile learning methodologies. Moreover, the lecturer involvement with the mobile learning projects helps in motivating the students to participate in the mobile learning activities. An international

community of students, lecturers and technology researcher can together create a supportive environment for the growth of mobile learning, anywhere anytime. Researchers also stress that Access issues need to be considered carefully when pushing the use of mobile web 2.0 technology in classrooms [6]. There is a pressing need to emphasize on the sustainability of mobile devices for students. The success of mobile based learning also depends on technology support; thus, lecturers need to be guided towards the use of mobile learning technology. For some students, the use of mobile devices might be beyond their comfort zone, which in turn might make them avoid the use of mobile devices unless it becomes necessary as a part of curriculum or due to peer pressure.

5.3. Summary

This Chapter presented information on the findings and certain key analysis made from the research at hand. The questions posed in the survey were designed to find out the central issues of this research i.e. the relation between mobile devices and the academic pursuits of students. The research looked into answering key questions like whether students used any mobile devices in their classrooms, what purpose did they use such devices for and whether or not they believed that mobile devices contribute positively to their education and scholarly learning.

The research relied on a mixed data collection methodology involving primary and secondary types of data. Additionally, this research methodology also incorporated a mix of both qualitative and quantitative data analysis, with the primary collected data quantified to identify typical and dominant trends. The findings of the research as has been made from the survey analysis were presented in this section of the paper in the form of several tables. The tabular representation of the data gathered and some of their implications, concerning this research were supported with descriptive analyses of the same. In addition to this, the section also looked into examination of the data gathered to locate any correlations, wherever it is deemed appropriate, or if the data reveals any such trends. The correlations as found in the analysis of the survey results implied a relation between the use of mobile devices like laptops and smartphones for academic and non-academic purposes, and what the students expected of such devices.

As the results of the survey suggest, it can be seen that the most popularly used mobile device by students in classrooms is the smartphone, whereas the most popularly relied upon mobile device for academic works is the laptop. Additionally, an overwhelming majority of the student respondents also felt that mobile devices have a positive impact upon their academic pursuits.

A summary of research, conclusions and recommendations drawing on research analysis and findings is presented in Chapter 6. Following the summary, the chapter also offers recommendations for future research directions.

Chapter 6.

Conclusion, Recommendations, Future Work

6.1. Summary and Conclusion

This research study began with the intention to answer the key research question, which was:

“What are the perceptions of first-year university students with respect to the impact of mobile devices in the classroom?”

This research has shown that first year university students have largely positive perceptions of the impact of mobile devices on their academic performance. Presently there is a popularly spreading trend of increased use of computing devices in classrooms [4]. This trend is encouraged by teachers as well, with the hope that it will improve student learning on the one hand, and help enhance teaching practices on the other [1]. Carter (2014) pointed out that when students are provided with 1:1 use of computing and mobile devices in their classroom settings, then positive outcomes are noticed in the form of student engagement and student motivation [1]. Other research studies and literature on education has also expressed a similar viewpoint. However, due to the inconsistent result reporting of student achievement using computing devices, this area of research still has room for investigation. There is a need to recognize and comprehend the possible impacts of such mobile and computing devices on the academic performance of student. Due to constant research and innovation, a large number of computing devices have become mobile and easily accessible. Today students can use such devices outside the traditional settings of their classrooms. Therefore, the reach and impact of such devices into the academic learning of the students has been increased today as well, and these effects can continue in the end.

To investigate the research topic further and get an understanding of the impact of such devices on the academic learning of students, especially first-year students, in their classrooms or lecture platforms, the research used the Onion model as suggested by Saunders, Lewis, & Thornhill [48]. The Onion model is the main framework upon which this research project has been carried out. The onion model was selected as it helped the researcher in clearly revealing the separate layers of the research. The outermost layer of the onion model is the research philosophy followed by the research approaches, research strategies, data collection methods, etc. Within this main framework, the research is conducted with an exploratory research design, as the area of investigation does not have extensive background work done on it. The research design was supported further by a mixed method approach whereby both primary and secondary method of data collection has been employed. To accomplish this purpose, an online survey has been

employed which was distributed to students of different universities. In this research, a large sample size was used. The online survey was sent to the students of six universities spread across different countries, namely – New Zealand, Saudi Arabia and the United States, thus creating a large sample size. The large and diverse pool was selected because it will help gain information from which it will be easier to make more generalized findings that can be applied to a larger population. While the primary research has been done in this manner, the secondary research has been conducted by gathering data extensively from existing research on the subject, as available. The questionnaire used for the survey included close-ended questions and helped guide the research, without biasing it to a certain outcome. To ensure that the research is not biased the questionnaire of the survey included questions inquiring into the impact of mobile devices and the way the same are used for academic and non-academic activities. Once the survey respondents had all submitted their responses, the results were quantified and analyzed. Based on the findings and analysis it is realized that the use of mobile devices offers both positives and negatives.

Some of the positive impacts of mobile devices, especially in the field of academic learning include easy information access, effective teaching tools and convenience for both students and faculties. Mobile devices allow students to access information in a fast and a highly convenient manner. Mobile devices can be effectively used by instructors to work out modern teaching methods that facilitate learning and speed it up. However, mobile devices also offer a number of distracting features, which can have a negative impact on student learning. These positives and negatives afforded by the use of mobile devices in academic learning are discussed in the following conclusion to the study.

As mentioned above, the purpose of this research was to understand the possible impacts of mobile devices on the learning outcomes of students, especially the learning outcomes or effect on the academic performance of first-year university students. Popular literature and academic investigations have promoted the increased use of computing devices in the classroom as a means of improving student learning and enhancing teaching practices and have publicized some of the positive outcomes for student engagement and student motivation when accessing computing devices in classroom settings. However, they have not reported consistently about these issues. This research, with its mixed method of investigation, has found that the availability of such computing devices to students is like a double- edged sword and comes with both positives and negatives.

In the past few years, owing to unprecedented achievements in technological advancement, a large number of computing devices have become mobile. Therefore, they can be easily accessed even outside traditional classroom settings. Hence, it is expected that the mobile nature of these devices and their high accessibility will have a considerable impact on how students use them.

While these devices can be used for academic work thus affecting their academic performance, in the end they also offer a number of distractions, which can interfere with student academic learning. Among the purported benefits offered by the devices to the academic learning and its outcomes, the list is a long-ranging one and has been summarized in this concluding section.

The secondary research conducted by the researcher revealed a number of reasons on why students would prefer mobile devices as learning tools. Alshathry & Fayyoumi [7] pointed out that mobile devices are like mini-computers with wireless network connections. This makes it easy for students to search, retrieve and gain access to information online anytime and anywhere. The myriad of applications available on such devices also helps users to perform a variety of operations such including data management and word processing efficiently. The easy portability of such devices also makes them attractive to students. They are easy to learn from and affordable as well, given the wide variety of devices available and their competitive market. Secondary research also showed that students who had access to such mobile devices were able to access their course material, documents and other related academic material easily and quickly. In fact, with the help of such devices, students were also able to acquire additional course materials on the Internet, which helped them complement and enhance their learning [7].

Kim, Mims & Holmes point out that mobile devices offer a number of benefits that can aid academic learning, including the freedom of location and time, ability to access teaching materials and high speed, opportunity to help individual students engage with one-on-one learning with teachers as needed. These devices also afford the teachers the opportunity to update their knowledge and education [12]. Oliver and Goerke mentioned the usefulness of mobile devices for making notes, instant messaging applications on helping maintain and participate in campus activities like group work and discussions. They also mentioned that blogs and online websites could successfully persuade students to use their original thoughts, ideas and skills and from there on discuss their understanding online with other students [13]. In the same manner, podcasts can be utilized to help students to perk up their listening skills and gain knowledge faster, thus aiding their academic learning activities [13].

Naismith, Lonsdale, Vavoula and Sharples wrote about the key benefits offered by mobile devices, which make them most compatible for academic learning and activities. These include 'Portability'; as mobile devices are lightweight and smaller, they can be easily carried from one area to another without any problem, 'Social interactivity'; as mobile devices permit users to connect and exchange information with others socially. 'Context sensitivity'; as such devices can help users collect and respond to a certain data in its most relevant and context specific manner, it also offers 'Connectivity'; helping students connect with their peers and teachers who own and use other data sharing devices [8]. Finally, such devices offer 'Individuality', which help students'

access information and applications that can serve their own individual needs and academic purposes.

Similarly, other scholars like Berge and Muilenburg [20], Carter [1], Oliver & Goerke [13] among others pointed out the same benefits of mobile devices. The benefits mentioned above also correspond with the survey results obtained from the primary research. The survey findings showed that students brought one or more mobile devices to the classroom for a variety of reasons and the majority of them i.e. 79% thought that mobile devices aided in their academic learning with 53.49% believing that mobile devices helped them best access online course materials. Of the few students who elucidated on their responses, it was also found through the surveys that such devices are a major boon to international students studying in an unknown language to them. These devices help students translate course materials, capture pictures of class notes, look up information in dictionaries and understand theoretical concepts through their pictorial representations on the Internet. The survey findings also pointed out that convenience and time-saving were contributory reasons to the students' decision of carrying such devices to classrooms and that the majority of the participants i.e. 68.75% of them believed that such devices should be used in the classroom.

However, it was also found in both primary and secondary research that these devices offered certain negative aspects too which interfered with the academic learning of the students. The survey showed that a considerable percentage of the mobile device users mentioned that they carried the devices to the classrooms for accessing social media (38.6%), with 28.8% citing the reason of entertainment. These results along with the finding that 66.4% of the respondents believing that social media is one of the biggest interferences with their academic learning indicates, that there is a pressing need to regulate the use of such devices in classrooms for e.g. restricting the availability of particular applications in the classroom. Students also need to made responsible for the way they use such devices in classroom, as it is not always possible for the supervisors to oversee each individual in the class. However, 71% of the respondents believed that mobile devices could help them in their academic learning; 53% claimed they could access online course material through such devices; and 68.75% of the respondents believed that mobile devices should be used in classroom teaching. That said, it could be seen that classroom teachers and lectures are not making optimal use of the available mobile device resources in their classrooms and there is a lot of need and scope to work out a way to better integrate such devices in the teaching process. However, in the present research it is not possible to come up with how best to integrate such devices in the classroom. Such issues might be suited for the future direction of the research done on the topic as shown in the following sub-section.

6.2. Recommendations

Literature reviewed for the research has suggested that the use of mobile devices in the classroom/lecture theatre has a positive impact on the academic performance of first-year University students. The survey results for this research also suggest that students' have positive perceptions of impact of mobile devices on their academic performance. Hence, the following recommendations are made to improve learning performance of the students:

1. Students can be allowed to use mobile devices like the smartphone and the laptop for their academic works and academic pursuits. Research has suggested that both teachers as well as students benefit from the use of mobile devices [12]. The use of computing and communication devices in the classroom can enhance teaching practices. Hence, teachers as well as students can also be encouraged to use mobile devices.
2. It is essential to ensure that the impact of mobile devices on students who use mobile devices in the classrooms is regularly analyzed. As use of mobile devices can be a double-edged sword, such regular analysis is necessary to evaluate the continued use of mobile devices.
3. It is essential to investigate and monitor the use the achievements of the students using mobile phones or computing devices in the classroom. This would help to identify the particular reasons or areas where mobile devices are impactful on academic performance so that these areas can be further explored.
4. Ensuring student engagement in the classroom can only ensure the efficient use of mobile devices.

6.3. Future Research Directions

The focus of this research project was to understand better the impact that the use of mobile devices in the classroom/lecture theatre has on the academic performance of first-year university students. The primary research was done through the collection of information via an online survey. However, this approach saw a certain degree of limitation as not all the students, who were sent out the surveys, responded, and among the respondents, some chose to miss a few questions. The self-selection of questions among respondents aligns with the fact that few students mentioned they could not understand all the questions in their entirety shows that the research faced some level of limitation. This section outlines five possible extensions to this research that could help further understanding of the problem.

1. To provide for the translation, simplification and explanation of questions

The students participating in the survey faced some difficulties understanding the questions. One of the possible reasons for this lack of understanding could have been the fact that some students were not used to English as their first language and the survey was completely in English. Therefore, future research may also include translating the information into the local languages of the participating universities when sending out surveys to colleges, especially in countries where English is not the first language. This could help get better and more clarified positions or information from the respondent, in the research area.

2. To conduct the survey more than once

Students needed to be surveyed more than once, once in the early period of their first-year and once again near the end of the first-year. The two-time surveying may help to capture any trends or changing of preferences in the use of mobile devices and their impact upon the learning of first-year students.

3. To conduct a longitudinal study

A longitudinal study that keeps regular track of a group of first-year university students, year to year, i.e. including incoming students' experiences each year, could help provide unique insights into the topic. This would help further capture the trends and patterns in the usages of certain mobile devices for academic learning if such patterns exist. In the same manner, including students from an even wider spectrum of universities would also help. In this survey, four universities from New Zealand and one each from the United States and Saudi Arabia were included. If there is any country based pattern in the inclusion of mobile devices in the academic learning of students, including more universities from different countries would help locate such trends or rule out the possibility of the same in an informed manner.

4. To involve other stakeholders in the study, such as faculty and staff

This study only surveyed the first-year university students. The impact of mobile devices in academic learning, i.e. the study findings could be further strengthened by surveying and interviewing members of the faculty and staff as well. This would help gain a more comprehensive understanding of the ways mobile devices are dealt with and used by students as suggested in this survey. Further research might also bring in a sample of second- year students as comparison groups to better understand whether students carry on the same trends in the usage and impact of mobile devices as they progress with their academic career.

5. To use a case study approach to research

A case-study approach looking into the experiences and beliefs of the first-year students would further help identify the impact of such devices on their academic learning. Such a thorough and in-depth look into the research would provide a more inclusive comprehension of the first-year students' understanding, beliefs and experiences. Such a data collection method could additionally include observations drawn from and insights into the interviews with the first-year students, carried over years, covering different batches of first-year students.

Altogether, a future direction of study and research into the topic, as mentioned above, would help identify the potential benefits that mobile devices offer to the academic learning of students. Such knowledge would help the field of education by helping offer students better academic resources, by integrating the use of mobile devices in their learning process in the classrooms and lecture platforms.

Appendix

Questionnaire

Interview Questionnaire

University Name

University Year (1/2/3/4)

Course

1. Which mobile devices do you use in classrooms?

Smartphone

iPad

Laptop

Others

None

2. Why do you bring mobile devices in classrooms?

University requirement

Convenience

Time saving

Entertainment

Social media

Instant messaging

Other reasons

3. Which of these mobile devices are often used by you for academic purpose?

a) iPad

b) Smartphone

c) Laptop

d) Others (Please specify)

4. Which of these mobile devices are used by you for non-academic purpose such as entertainment, social media, or any other purpose?

- a) iPad
- b) Smartphone
- c) Laptop
- d) Others (Please specify)

5. Do you think mobile devices help you in academic studies?

- a) Yes
- b) No
- c) Cannot say

How?

6. What are some of the most common reasons you think that mobile devices interfere with your academic performance?

- a) Social media
- b) Online games
- c) Instant messenger
- d) Distraction
- e) Others Please specify

7. What are some of the reasons you think that mobile devices help you with your academic performance?

- a) Online course material
- b) Lecture videos
- c) Interactive tools
- d) Self-learning
- e) Others

8. Do you think mobile devices

a) Should be banned in classrooms

b) Should be used in classrooms

9. Do you have any recommendations for use of mobile devices by students for academic purpose or any tips to avoid misuse?

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