Educational Technology: The Tablet Computer as a Promising Technology in Higher Education

By

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Abstract

Education has been significantly affected by the emergence of new technologies. Appropriate implementation of technology in education can facilitate teaching and learning, increase student engagement and participation, and elevate student achievement. A major practice of technology integration in education is mobile learning, which allows for anytime and anywhere learning through use of mobile devices such as Smartphones and tablets. Due to its convenience, mobile learning has found significant importance in education, particularly in higher education. One of the most promising mobile devices in education is the tablet computer, which is becoming very popular among educators and students. In this theoretical thesis, I will study the effects of educational technology implementation on teaching and learning, with a focus on tablet computers in higher education. I will focus on how tablets benefit education, and why I believe they are a more useful tool in education compared to other mobile devices.

To get the best results from implementing tablets in education it is important to have a strategic plan for this implementation. I will briefly look into this subject in this research, but I will not discuss it in detail, as I will be focusing on an earlier stage: why tablets are a promising technology in education?

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INTRODUCTION

Educational technology is an important phenomenon in modern day education and especially in higher education. It is of significant importance to governments, institutions, instructors, and learners. Technology is changing rapidly and new technologies continue to emerge. Education has been significantly affected by emerging technologies and technological changes. Bates[1] (2005) states: "Hardly a conference on education goes by without a major part being devoted to technological change" (p. 2). For the past 50 years, there has been significant debate over whether or not educational technology should have a significant place in education, and what the best ways of integrating it in the educational system are. Numerous scholars have pursued research to evaluate the effects of technology on education, and many supporting and opposing theories have been developed. A great number of scholars agree that educational technology has a significant role in teaching and learning.

That said, some research on educational technology evaluation shows contradictory results on the effects of technology on student learning and education quality. Does technology improve student learning and engagement, or does it just change the way education is being practiced? I will answer these questions in this thesis through a review of the literature with special attention to tablets.

[1] *Technology, E-Learning and Distance Education* (2005) by A. W. Bates is a guide for use of technology in education. It reviews different technologies and their application in teaching and learning, arguing that technology itself is not good or bad for education, but what matters is the way teachers implement it. I will refer to this book several times in this thesis.

With the popularity of mobile devices among people, mobile learning has found significant importance in education, especially in higher education. Mobile learning is a convenient learning practice that provides anytime and anywhere learning possibilities. Of the mobile devices, a key and promising technology in modern day higher education is the tablet computer, which is drawing significant attention to itself. The tablet is a neat device that has a significant potential as a medium in teaching and learning, and has many advantages over other devices with similar potentials. In this thesis, I will provide a comprehensive theoretical study of these subjects.

In chapter 1, I will provide an introduction to educational technology and discuss its progression, its significance in modern-day education, its effects and advantages. I will cover the definition of educational technology, the devices and technologies that are included in this definition, its history, different methods of education that benefit from educational technology, educational theories, effects of educational technology implementation, and its benefits.

In chapter 2, I will deal with the criticism of educational technology. I will review some of the disadvantages associated with it, as well as some barriers on the way of implementing it. Later in the chapter I will discuss the solutions to those barriers and how the outcomes could be improved. I will then review educational technology in higher education.

In chapter 3, I will focus on mobile learning, discussing its advantages, challenges facing it, and the criticism associated with it. I will further discuss mobile learning applications in higher education. Later in the chapter I will provide a comparison of different mobile devices and their application in education.

In the final chapter of this thesis, I will focus on tablet computers, different applications of them, their application and use in education and in higher education, and the criticism associated with their applications in education. I will then compare tablets with some other mobile technologies in education, arguing that the tablet computer is a more useful device for educational purposes.

I will briefly discuss the strategic planning for implementing tablets in education in the conclusion, and conclude the thesis.

CHAPTER 1

AN OVERVIEW OF EDUCATIONAL TECHNOLOGY AND ITS BENEFITS

Definition of Educational Technology

Educational technology, also known as instructional technology, refers to the use of various modern technological tools as mediums in education, with the goal to facilitate and enhance teaching and learning. Laliberte[2] (2010) defines the term as: "Educational technology is a tool that increases performance levels while allowing the use of innovative approaches with regard to teaching and learning" (p. 53). Yet due to the broadness of the field, one can find different and sometimes contradictory definitions for it (Schneider, 2013).

For example, some see it as a design science, or as a collection of research interests related to teaching and learning ("Educational Technology," n.d.b). Some scholars view it as the use of technology primarily to improve education. Adams (2004) defines the term as "The study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources" (para. 1).

[2] "Mixed Method Study: Exploring the Use of Educational Technology Tools in K-12 Classrooms" (2010) is a dissertation by Tonya R. Laliberte exploring the way teachers integrate technology tools to promote active engagement among students. It also studies the techniques technology proficient teachers use for this purpose, and examines the barriers on the way of technology integration. A mixed questionnaire was used to be filled by forty-eight elementary, intermediate, middle, and high school teachers in Keller, Texas, United States.

Some take the emphasis away from the improvement aspect of educational technology and try to look at it more broadly. For example, in a glossary of terms it has been defined as: "A complex, integrated process involving people, procedures, ideas, devices, and organization, for analyzing problems, and devising, implementing, evaluating and managing solutions to those problems, involved in all aspects of human learning" ("Educational Technology," n.d.a). But regardless of what the definition would emphasize, there are usually two fundamental aspects to educational technology: 1. the use of technology as a tool is essential and fundamental. 2. Its aim is to improve education ("Educational Technology," n.d.b). In the next section I will talk about the devices and technologies that are included in the definition of educational technology.

Devices and Technologies

Before elaborating on specific technologies, it is important to first clarify what the term technology means in this context. Technology in education is defined as tools that could prove helpful in facilitating and advancing teaching and student learning. It can refer to devices and material objects such as machines or hardware, or programs and software. It can also include systems, techniques, and methods of organization ("Educational Technology", n.d.b).

Some common technology categories include different tools, software, apps, multimedia, the Internet, wikis, blogs, forums, learning management systems, games (both online and offline), video and audio conferencing, digital books or e-books,

desktop and laptop computers, overhead projectors, podiums, Smart Boards, calculators, tablet computers, smartphones, etc.

As Bates (2005) notes, the number of technologies useful for educational purposes is increasing constantly, therefore we need a framework for proper decision making about the choice of technology for teaching and learning. Bates also makes an important note that there is a difference between media and technology. According to Bates media is the "generic forms of communication associated with particular ways of representing knowledge" (p. 43). The most important media in teaching include: direct human contact or face-to-face interaction, text (including still graphics), video, audio, and Digital multi-media (incorporating text, audio and video) (Bates). Each medium has its own way of representing knowledge, as well as organizing it. It can also be carried by different delivery technologies (Bates).

Bates also argues that there are four structural characteristics for technology: one-way or broadcast, two-way or communications, as well as synchronous and asynchronous. As an example, the Web is a technology that combines different types of media and technology. According to Bates:

> Web in particular can combine four of the five media (text, audio, video, digital multimedia) within a single technology, and can also combine both one-way and two-way communication, and synchronous and asynchronous communication. The Web therefore does have very powerful characteristics that lend itself to a wide variety of ways of teaching and learning (p. 49).

Asynchronous technologies have an advantage over synchronous technologies: They allow more freedom, flexibility and control for the learner. This gives learners more time to study the materials, because they can stop, go backward and forward, and go over

materials again and again (Bates, 2005). In the next section, I will review the history of educational technology.

History of Educational Technology

In this section I will look back on the history of educational technology, reviewing where, when, and how it emerged and developed.

Any technological medium and tool that facilitates transferring knowledge to the learner is considered educational technology. This definition even includes paper. Paper helps knowledge to be recorded externally, and eases its transferability from one to others. The introduction of print in the 14th century facilitated this process significantly and marked an important point in the history of educational technology. This allowed the large-scale dissemination of knowledge through books for the first time (Bates, 2005).

Later, Johann Friedrick Herbart (1777-1841) developed a four step learning design as a systems approach to instruction (Laliberte, 2010). Maria Montessori (1870-1952) also impacted educational technology by developing graded material for appropriate assessment (Laliberte).

In the 1900s, live broadcasting was practiced as a way to mimic traditional classroom lectures. The technologies used for this purpose included radio, television, film, and satellite (Laliberte). The direct use of new technologies in education started with the introduction of the educational films in the 20th century. The training of the US army soldiers with educational films during the World War II is an example of this type of use ("Educational Technology," n.d.b).

Thomas Edison was among the first people who invented educational films for the classroom (Laliberte). The 16 mm. film became increasingly used in schools from the 1930s onwards, and was replaced by the development of educational television near the end of 1950s (Bates, 2005).

B. F. Skinner was an educational theorist whose contributions significantly influenced education and the use of technology in the 20th century. He believed that teachers should take advantage of the advancements in teaching and learning and take assistance from computers and devices in their instruction (Skinner, 1954). His "operant conditioning theory and the inclusion of small technological advances" (Laliberte, 2005, p. 38) caused a shift in educational thinking in 1953 (Laliberte). He also created a manila folder teaching machine that was later developed into a slider machine (Skinner). This slider machine provided immediate feedback for the students as they completed their assignment on cardboard disks and put it in the machine (Skinner). This increased the speed of students' progress, and the immediate positive reinforcement influenced and shaped student learning behaviors (Laliberte).

In 1995 the web was applied in the education in a systematic way for the first time (Bates), while the idea of using computers in teaching and learning emerged in the mid-1950s in the United States (Albirini, 2007).

The first courses presented over the web started in 1995 and online instruction using asynchronous communications technology was practiced in the early 1980s (Bates). The World Wide Web and the spread of the Internet and personal computer ownership caused a big breakthrough for online learning in economically advanced countries, and the first online university course started in 1995 (Bates).

Baharak Makki and Bahador Makki (2012) discuss the evolution of instructional technology from a different perspective. They state that this evolution took place in 5 steps: The first step took place in terms of tools and equipment. Projectors were one of the early technologies entering the classroom. They displayed images on the screen and sometimes they could display sound and produce files simultaneously. Gradually schools started to be equipped with different projectors, phonographs and tape recorders.

The second step revolved around training materials. Industries started to produce materials for schools. Educational films are one example of such material.

The third step had an emphasis on curriculum and educational systems. At this stage educational systems were shaped, and decision-making for the material and equipment to be used in each educational institution depended on the system.

The fourth step was about the educational system itself. At this stage the educational material was designed based on the society's needs, and community learning received more attention.

Finally, the fifth step was focused on the social system, which is a governing philosophy over the whole education in a country to achieve certain developmental objectives.

Today technology is an inseparable part of education. Computers, mobile devices, e-books, the Internet, learning management systems, different software and multimedia tools all play a significant role in the educational systems of most countries. In the next section I will discuss different methods of education and how they benefit from technology.

Methods of Education Benefiting from Educational Technology

Educational technology plays an important role in various methods of education, its role varying from facilitating and optional roles to key and major roles. It has an important place in blended learning, distance education, E-learning, online learning, and mobile learning. Bellow I will look at the different methods of education and how technology benefits them.

Face-to-Face learning / Blended Learning

Face-to-Face learning refers to the type of education in which students and the teacher meet face-to-face and are physically present in the classroom. Teaching then happens inside the classroom and students and the teacher get to talk, discuss, ask questions, or solve problems, in person.

A main focus of educational technology is on face-to-face classroom teaching and learning. Implementing technology in the classroom is a very important topic and many scholars and researchers have been working to evaluate the effects of educational technology on face-to-face classes.

Many scholars argue that technology can facilitate in-class teaching and learning. A variety of different forms of technology including the Internet, desktop and laptop computers, tablets, projectors, smart boards, learning management systems, educational games, and multimedia are used for this purpose.

Blended learning, also known as hybrid learning, integrated learning, multi-method learning, and mixed mode learning, refers to the type of instruction in which the

Internet integrated into regular face-to-face classroom teaching. Compared to face-to-face learning, there is a higher level of interaction in blended learning environments (Wingard, 2004). They allow teachers to be aware and address all student needs (Laliberte, 2010). The expansion of blended learning results in an increase in student achievement (Laliberte). Results from a research conducted at the University of Central Florida shows that students in mixed mode classes did better than those in face-to-face or fully online courses (Bates, 2005).

Distance Education

Distance education is a type of education in which there is no face-to-face interaction among the students and the teacher. Teaching and learning therefore happens at a distance. In this type of education, technology plays a key role. In today's distance education, it is through technology that teaching and learning, as well as the connection between the teacher and learners takes place. Bates (2005) indicates: "Technology is the infrastructure, the bones, of distance education" (p. 3). The Internet, email, computers, learning management systems, video and audio conferencing, educational Apps and games, multimedia, and discussion forums all play important roles in distance education. Technology has made it easier for distance education to spread globally, independent of geographical locations. People can study and take courses without having to be physically present in the class.

Distance education also makes education more convenient for adults who work or have family responsibilities. This is facilitated by a variety of different forms of technology. Distance learning has advanced since educational technology emerged (Laliberte, 2010).

From the economical perspective also, modern technologies are more cost-effective for distance education. For example, web-based learning is much more cost-effective compared to broadcasting technologies (Bates, 2005).

E-learning

E-learning or electronic learning refers to any kind of computer-based learning and telecommunication that happens on a screen (Bates, 2005), either online or offline. The primary technological needs for e-learning are a computer and digital material.

E-learning is not an independent method of education separate from other types. Other methods of learning such as distance education or face-to-face education also include e-learning. E-learning is not limited to learning for educational purposes, but includes learning out of personal interest.

Today e-learning is an important part of the educational system in most countries. Most governments plan for implementing the new technologies and e-learning in education. One instance of this is the British government's numerous initiatives to promote and support teachers in e-learning which was carried out throughout all sectors of the educational system (McConnell, 2006).

Online learning

Online Learning refers to learning that happens online, using the Internet and the Web (Bates, 2005). Clearly, connection to the Internet is the basic necessity for this type of learning. Like e-learning, online learning is not limited to learning for educational purposes, and it includes any type of learning that happens online, which could be for personal interest only. Online learning shapes a huge part of educational technology.

Email, learning management systems, forums, blogs, and web browsing are widely used in education. The Internet and the web provide the opportunity for the learners to find, retain, and use resources useful for learning (McConnell, 2006). Online learning gives the students the possibility to construct knowledge and test ideas through collaborative learning. Therefore it is a valuable tool that helps furthering constructivist approaches to education (Bates).

To understand the uses and integration of technology in education better, it is useful to briefly discuss fundamentals of learning and review some important educational theories.

Educational Theories

In this section, I will provide an overview of some important theories of education and learning. I will briefly discuss Bloom's taxonomy, and three important theoretical models in education, objectivism, behaviorism, and constructivism. I will discuss how these educational models relate to educational technology.

Bloom's Taxonomy

Benjamin S. Bloom and his colleagues published *A Taxonomy of Educational Objectives* in 1986. In this book they discuss a taxonomy which is composed of six categories. In this taxonomy the intellectual skills that are of most concern to educators are classified into categories which represent increasing complexity (Boslaugh, 2013). The six categories of it from simple to complex are Remembering, Understanding,

Applying, Analyzing, Evaluating, and Creating. The Bloom's taxonomy was originally meant to simplify exam creation but was found extremely important and influential in education (Boslaugh, 2013).

In 2001, a group of scholars created a revised version of this taxonomy, published as *A Taxonomy for Teaching, Learning, and Assessment* edited by Lorin W. Anderson and David R. Krautwohl. In the revised version verbs are used instead of nouns for the major categories, and they are broken down to different subcategories. It also has a separate category for knowledge. The revision does not keep the original hierarchy of the taxonomy and allows for a more lenient approach (Seaman, 2011).

Bloom's taxonomy provides an easy to understand classification of tasks that students should complete in the learning process (Boslaugh, 2013). It also may be adapted to all different subjects or levels of education (Boslaugh, 2013). It is used widely and referred to as a guideline for writing of learning objectives of courses, organizing instruction, and writing exams (Boslaugh, 2013). Bloom believed that the taxonomy could also serve other purposes such as facilitating communication across people, grade levels, and subject matter as a common language for learning objectives, or being the basis for determining the specific meaning of educational goals for a curriculum or a specific course (Krathwohl, 2002).

Objectivism

In objectivism, knowledge is regarded as a phenomenon independent of the learner or human experiences and the learner would need to acquire it. Objectivism is what it means to know or have the knowledge of something (Bednar, Cunningham, Duffy, & Perry, 1992). The mind of the learner could then be viewed as a computer, analyzing and

manipulating symbols (Bednar et al.). According to Jonassen (1991), "Objectivism assumes that learning is the process of mapping those entries or concepts onto learners" (p. 9). Objectivism could be viewed as the opposite of constructivism.

Behaviorism

Behaviorism is a fundamental educational model. Behaviorists believe that knowledge exists on its own, and learning happens through transmission and acquisition of knowledge. In behaviorism, the teacher has the primary role in transmitting knowledge to students, and students work individually.

B. F. Skinner (1904-1990) was a behaviorist who significantly influenced a shift in educational thinking through his operant conditioning theory and the inclusion of small technological advances (Laliberte, 2010). His contributions to education significantly affected the evolution of technology and its inclusion in education.

In a behaviorist classroom a step-by-step teaching of how to use computers or other technologies that are used in the class is the first step by the instructor. Then the focus would shift to the larger task, which is learning the school material through using technology (Cornell, 2007).

Constructivism

Constructivism is another major educational model. In constructivism, "learning is the construction of knowledge and occurs through social relationships and is distributed and shared through the community" (Laliberte, 2010, p. 36). In this view, teachers are facilitators of learning, and help students with construction of meaning. Piaget (1896-

1980) is a key figure in constructivism, who believed knowledge is built through experience.

In constructivism, teachers use computers and technology tools to increase student engagement at higher cognitive levels. As a result, the teachers' role would mainly be as facilitators rather than dispensers (Laliberte). While in behaviorist classrooms on the other hand, technology is used as a means to assist teachers with the instruction, and the role of the teacher as the key dispenser of knowledge remains unchanged.

It is argued that constructivist teaching practices help the successful implementation of educational technology. Technology use in the classroom is looked at as a method for making the shift from traditional methods of teaching to the more constructive-compatible teaching (Laliberte, 2010). In *How People Learn,* research from the National Research Council, it is argued that for a better learning, classrroms and schools much be learner centred (Donovan, Bransford, & Pellegrino, (1999).

The way technology is integrated in education and its effects depends on many factors. The educational method and system, government policies, teacher preferences, types of technologies, and many other factors affect how technology is used and how it affects student learning. In the next section I will discuss the results of several studies regarding the effectiveness of educational technology.

Controversial Results of Implementing Educational Technology

The main purpose of technology integration in education is to facilitate and to improve the quality of teaching and learning. Different studies and reports on the results of technology integration in education show different and controversial results (Cravey, 2008; Baharak Makki & Bahador Makki, 2012). According to Cravey[3], most previous research shows mixed results for the effects of educational technology. This could be due to the different methods of technology integration. It could also be related to the subject and level of the courses in which technology is integrated. Different technologies also have different effects on teaching and learning. Bellow I will review a few research findings regarding this subject, as well as teacher and student perspectives on the effectiveness of educational technology.

Cravey's study on the relationship between educational technology implementation level and student achievement shows that technology integration does not have a significant and direct effect on student achievement and learning. It also shows that technology does not decrease student achievement.

Yet, many other research results reveal that technology integration has positive effects on student learning and performance (Laliberte, 2010). Some research shows that using educational technology has led to a significant positive effect on student

[3] *An Analysis of the Relationship of Educational Technology Implementation Level and Student Achievement* is a doctoral dissertation by Ronald Therman Cravey exploring whether there is a relationship between level of implementation of educational technology and student achievement. The student achievement is studied in the areas of reading, math, and social studies. The population of the study was Texas public school campuses with grades 6 to 8. The results were measured by the Campus School Technology and Readiness Chart.

achievement (Laliberte). Technology also provides teachers with tools that would help students to gather information, communicate it, and present it (Laliberte).

Laliberte notes that technology integration could alter the way teachers think and teach. This could mark the start of an educational reform. It could make a shift from traditional methods of teaching to a more constructive-compatible method of instruction. She states that the existing contradiction is the result of the varying definitions that exist for educational technology.

Bates (2005) believes technology by nature is not good or bad for education, but what matters, is the way teachers use it. According to Oliver and Price (2006), whether technology will change curricula and pedagogic practice or not, depends on the level of analysis. Their study showed that at the micro-level, there was a significant change as screens and keyboards became the main means of interaction with students (Riley, 2007).

Teachers' perspective

Different teachers have various and controversial opinions on this subject. Some teachers believe in the negative or non-significant effect of technology in education, while others believe in the positive effects of it. Sometimes what teachers think in this respect could be the result of their general attitude towards technology, which in some cases is a negative one. This could be due to their preference of traditional methods of instruction over the technology integrated methods, and as a result a resistance towards change is created. This resistance could also be the result of a lower level of comfort with technology.

Yet, According to Cravey (2008), surveys show that most teachers believe in the positive impact of educational technology. A study shows that about 90 per cent of instructors believed in the important and positive effects of technology integration in education (Cravey).

Students' Perspective

Overall, students have a positive attitude towards technology, and majority of them believe in the positive effect of technology on learning.

According to Cravey (2008), a survey done on student perspectives regarding educational technology reveals:

> 87.3% of students believed technology could be effective in learning in four ways. First, technology increased efficiency, allowing easy access to information and making learning easier. Second, technology allowed for various approaches to teaching and learning, including ways not available with traditional textbook-based learning like animated models and simulations. Third, students felt that technology should be used in the classroom to help them prepare for their future, citing the need to master technology, since the world relies on technology. Fourth, students contended that the use of technology increased their motivation and confidence in their abilities, using words like "fun," "interesting," and "flexibility" to describe their beliefs. (pp. 27-28)

Appropriate integration of educational technology can result in various benefits. In the next section I will discuss these benefits.

Benefits of Educational Technology

Obtaining higher student achievement and engagement, facilitating teaching and learning, and keeping education up with the modern technologies of the day are among the major goals of educational technology. Yet, enhancing student learning is the main purpose of integrating educational technology. The idea that educational technology improves student achievement has been supported by many scholars such as Glennan and Melmed (1996), who believed technology could be revolutionary in schools and education (Cravey, 2008).

Studies show that implementing technology in education has many advantages and does indeed improve student learning. As an example, it has been shown that using modern technologies such as computers and the Web in the class, helps students learn faster and perform better, and at the same time appear more satisfied in the classroom (Ghaznavi, Keikha, & Yaghoubi[4], 2011). Bellow, I will discuss some benefits of the implementation of educational technology in more detail.

Increasing Student Engagement and Participation

Integration of technology in instruction, whether inside or outside of the classroom, could lead to more participation and engagement of students. For example, using

[4] In their study, Ghaznavi, Keikha, and Yaghoubi evaluated the effects of information and communication technologies on the educational improvement of third grade high school students in Khash, Iran. The research was a descriptive survey. The study took place in 2010 and the sample size included 350 students across 35 educational units. This study reveals interesting results but is by no means a generalizable or a conclusive study.

computers in the class provides the possibility for students to browse and find new information and enhance the class discussion, look things up, look for examples and additional data, or find answers to the questions being raised. They could also use online discussion forums to continue discussions after the class time. Technology makes it possible for the students to stay connected with one another or with the teacher beyond the boundaries and limits of time and space. Use of the new media such as virtual learning environments and online discussion groups can increase student engagement and interaction (McConnell, 2006).

Technology also encourages students to participate more through making learning more interesting and fun. For example, playing educational games, usually called serious games, and using modern technology and interactive tools are examples of methods to attract student attention and encourage them for more participation. Studies show that higher level of student engagement results in higher level of motivation and therefore higher achievement (Laliberte, 2010).

Also, sometimes students take further steps and use social media sites to discuss their school material or share opinions, ideas, or interesting school related material. Facebook student groups are an example of this voluntarily engagement.

Increasing the Speed of Teaching and Learning

Technology can increase the speed of teaching and student learning. As an example, online exams that generate automatic answers save a lot of time for teachers and also reduce the time students wait for exam results. Students can see the results immediately, find out about their mistakes and the correct answers. Another example is the use of previously made slide-shows and projectors for teaching instead of using a

white-board. This would increase the speed of teaching. Email and the Internet also make transition of knowledge much faster.

Making the Process of Learning More fun and Enjoyable

Technology makes learning fun. Laliberte (2010) notes: "Educational technology is a method that allows students to have experiential and enjoyable learning experiences" (p. 53). By adding many interactive features, technology makes teaching and learning fun and interactive, and eliminates boredom. Also, overall young people are interested in learning and using the new technologies of the day. Therefore integrating technology in education makes learning more interesting and pleasurable for them.

Furthermore, there is a wide variety of online and offline games designed for educational purposes and are sometimes a component of the course syllabus. Studies show that playing games can have a significant role in student learning and engagement. Playing simulation games can develop specific skills in learners (Rockwell & Kee, 2011). Most students enjoy playing video games, and playing instructional games adds much fun to the learning process.

Studies show that the quality and speed of learning increases when one enjoys the process. Other research shows that usually when computer-based learning is provided, students learn more in less amount of time, and they enjoy attending the class more (Guo, Li, & Stevens[5], 2012).

[5] In their study, Guo, Li, and Stevens investigated how technology use motivations in students could be represented as a set of hierarchically organized and interrelated elements. Relevant data was collected by the Repertory Grid Interview Technique and analyzed through a qualitative content analysis. Though this study provides important findings, it is not a conclusive study.

Students also enjoy interacting with one another and with the teacher in forums and social media sites. Using personal devices such as laptops, tablets, and Smartphones also makes learning more fun. Using technological tools in making school projects is another way that makes assignments more fun and enjoyable.

When learning is more fun and pleasurable, students' motivation for learning will increase. I will discuss this in the next section.

Increasing Student Motivation

Technology increases student motivation (Ghaznavi, Keikha, & Yaghoubi, 2011). As mentioned in the previous section, students are generally interested in learning and using the new technologies of the day. Using technology at school or for educational purposes makes the process of learning much more pleasurable for them. According to Gu, Zhu, and Guo[6] (2013), student interest in the subject matter can be enhanced by technology, and they will become more motivated when they are interested in the subject matter.

Also with all the features that technology provides, it becomes easier for students to complete tasks and exercises, to manage the coursework and homework, and to communicate and collaborate with one another. When doing the school tasks becomes easier, students will become more motivated and interested in attending school and seeking learning.

[6] This study was done in order to understand the difference between students and teachers' acceptance of technology. A research model with factors complied from the relevant literature was used in collecting data. The study took place in Shanghai and the participants were selected through stratified random sampling.

Facilitating the Student-Student and Teacher-Student Connection and Communication

Technology can facilitate and ease the connection and communication among students, and between the instructor and the students. Bates (2005) discusses this issue, emphasizing the importance of the Internet. He indicates: "the Internet, with its potential for two-way, asynchronous communication, thereby allowing the student to interact directly and flexibly with the teacher or other students, at a distance and at a time of their choice, is such an important technology" (p. 60). The Internet and email make it possible for students and instructors to contact one another very easily and at any time. They can plan for future sessions and meetings, or discuss assignments and deadlines without having to wait to meet on the next session of the class to discuss those issues. Online communication removes the barriers of time and space for class discussions.

Making the Course and Course Material More Manageable and Accessible

Technology makes managing the course easier for teachers. The introduction of information and communication technology in education and curriculum has revolved classroom management and made it more of a research-based and student-based procedure (Ghaznavi, Keikha, & Yaghoubi, 2011).

Modern technologies such as learning management systems, e-books, laptop computers, tablets, and file hosting services such as Dropbox make it a lot easier to manage the course material for both teachers and learners. Online ways of communication such as chat and email make it easier for teachers to follow up with students, and notify them of any changes to the upcoming plans or meetings. Automatic grading of assignments by computer programs provides teachers with more time to

spend on other activities (Laliberte, 2010). Bellow I will discuss the effect of some technologies on course management in more detail.

E-Books: Digital books or e-books have a significant role in making the course material more accessible and manageable. They have solved issues regarding carrying and storing books. They have made it possible to store huge numbers of books in digital format and on a small electronic device. Unlike the case with print books, there will be no more need to worry about students' heavy backpacks, or the limited space on the bookshelf.

With digital school materials and electronic books students would only need to carry their personal laptops or tablets to school with them. They can store a huge amount of study material on a hard-drive. It is also easier to search and find a specific document among the stored digital files compared to hardcopy material.

E-books can be found or purchased online for immediate access. This increases the accessibility of books. Students would not need to look for books they need in the book store anymore, or get disappointed when a book has been sold out. Digital libraries are also a great resource for students and provide easy access to a pool of digital books, digital papers, digital journals, etc. Some of these materials could be downloaded and studied offline, and some could be accessed online only.

Laptops and Tablet Computers: Laptops and tablets also have an important role in increasing manageability and accessibility of the course material. They can be easily carried to school by students, and can act as a great medium to store and access course material. Increasing Wi-Fi accessibility facilitates this process.

Tablet and e-readers are also great mediums for reading, and are becoming increasingly popular for that purpose. An increasing number of students prefer to read their e-books on their e-readers and tablets. These devices are very light, and it is very convenient to carry them around and use them for reading. Most of them can also connect to the Wi-Fi and students can use them to access the online course material.

File Hosting Services: File hosting services such as Dropbox help accessibility and manageability of the course material to a huge degree. These services offer cloud storage and file synchronization services ("Educational Technology," n.d.b). They provide the user with a folder as a digital storage space. Users can install it on their computers and use it as a space to save their digital material. They can also access this space and the material saved on it online from different computers and locations.

Google Drive is another amazing service that provides the user with many possibilities. Users can access this service once they have an email account with Google. They can create documents, presentations, spreadsheets, forms, and drawings, and can share the content they create with other users. They can also upload files and folders to this space. It is possible to connect other apps to the Drive. The Google Drive provides the possibility for different users to edit documents simultaneously. This provides an opportunity for collaboration.

This technology allows students and teachers to share course material, to edit, modify, collaborate, write, prepare presentations, split tasks, upload homework or assignments, etc. It is also a great environment for data storage. Google Drive provides two separate spaces of "My Drive" and "Shared with Me" for creating and uploading files, which helps avoid confusions between one's own documents and files, and what

have been shared with them. Both students and instructors can manage the course material easier using Google Drive or similar services.

Learning Management Systems: Moodle and other Learning Management Systems make it much easier for students and teachers to manage and access the course material. LMSs are great tool for course management. Teachers can design courses in some easy steps and provide students with access to the course. Teachers can both upload digital course material to the LMS, or provide links to the online material. They can easily modify the content, add charts and figures, define tasks and assignments for each session and share it with students. They can also receive completed assignments from students, take quizzes, provide feedback, make announcements, follow up and communicate with students through the discussion forum, and much more.

LMSs can act as a study guide, which usually includes the course syllabus (Bates, 2005). Students can refer to the LMS to find the material for each session. All the material they would need is available in one place. A good example of LMSs is the Moodle, which is very popular among instructors and institutions.

Providing Opportunities for Distance Learning and Open Education (Wider Participation)

Technology plays the key role when it comes to distance education. The Internet, email, and computers are the bases of today's distance learning. LMSs are also very helpful and useful in structuring and managing the course in distance education. Technology makes it possible to take exams and tests and provide feedback without having to ever meet in person. Adobe Connect, Skype, or other audio and video conferencing technologies are

used as a way of communication between teachers and students. Educational CDs and DVDs could be distributed among students, and video and audio files could be shares with them. Web-based learning makes it possible for institutions to deliver courses globally (Bates, 2005). Distance education makes it possible for many people who are unable to physically join classes to take courses, and therefore it results in wider participation.

Open education refers to free and online courses which are normally open to anyone who is interested and has an access to the Internet. In open education, anyone from anywhere in the world can sign up for courses, and usually the only prerequisites are access to the required technology and knowledge of the language of the instruction.

Facilitating and Improving Student Writing

Technology can improve students' writing. There are several writing tools and apps that students could use for their writing assignments. These tools help students develop their writing skills. They also facilitate structuring, organizing, and managing writing projects. Word processors such as Microsoft Word are also very helpful. Microsoft Word has useful features for editing, formatting, and structuring writing and makes the writing process easier.

Most writing tools are featured with built-in dictionaries which notice spelling and grammatical errors. Students can then know their mistakes and get help from the software suggestions list to correct their mistakes. In contrast with writing on paper, using digital writing software makes editing very easy. It is easy to delete, rewrite, highlight, add/remove punctuation, or keep the count of words or pages.

Students can also collaborate on writing tasks in an environment such as Google Documents. Studies show that students do better at editing or critiquing written work that is exchanged through a computer network with other students ("Educational Technology," n.d.b).

Providing Differentiated Instruction

Technology provides the opportunity for a method of instruction different than traditional ones; a method in which multimedia and computer programs are used to increase student engagement and participation ("Educational Technology," n.d.b). Technology helps presenting differentiated questioning strategies and increases individualized instruction. Using different software and multimedia would help students gain knowledge in creative ways. This would result in students' individual progress and development of their creativity ("Educational Technology," n.d.b).

Learning New Technologies

Knowing how to use different technologies is very important in today's society. By using technology in learning, students find the opportunity to learn about a variety of different technologies that they might have not used before. They get to work with different tools, machines, and software. Cravey (2008) states: "Students are learning about technology when it is available in schools and although it may not help them achieve more, it may be helping prepare them for a world where computers are ubiquitous" (p. 82). Therefore implementing educational technology would help students develop their technological skills, and stay up-to-date and knowledgeable of the modern technologies of the day.

As we see, technology has many benefits for education. It facilitates teaching and learning, and increases student engagement and participation. In the next chapter, I will deal with criticism of educational technology. I will discuss the possible disadvantages of it, as well as barriers on the way of its implementation.

CHAPTER 2

EDUCATIONAL TECHNOLOGY: CHALLENGES AND SOLUTIONS

Criticism of Educational Technology

As I discussed in the previous chapter, technology integration in education has many benefits and advantages. It can increase student engagement and interest, as well as enhance student performance and achievement. Yet, there are certain critiques associated with it as well. Some studies done to evaluate the effects of technology integration in education have shown that implementing technology does not have any significant effect on student achievement. As an example, Cravey (2008) mentions that studies conducted by the Texas Education Agency show that there are no positive effects on student learning. Some other studies even show that technology has a negative effect on student learning.

Albirini (2007) argues that educational technology has failed to obtain its goals in the educational system, and that information technology has not had impacts, or caused improvements in education. He contrasts educational technology to industrial education and argues that unlike the industrial education, educational technology lacks a proper process. He notes: “information technology has yet to find a place, despite the unceasing attempts to “fit” it into the existing educational system… the information mode of production has created the tools, namely “educational technology,” before developing a

corresponding paradigm or institution" (p. 227). He argues that despite the huge enthusiasm, research, and effort, educational technology has been unable to show significant benefits to teaching and learning.

Such criticism deals with the effectiveness and usefulness of educational technology in general. In the following sections, I will review some of the disadvantages associated with educational technology, as well as barriers on the way of implementing it.

Disadvantages

All education methods have some advantages and disadvantages. In many cases, the disadvantages are not necessarily a characteristic of the education method, but they vary and change based on the circumstances, and can be avoided. Bellow I will discuss some of the disadvantages that address the implementation of technology in education.

Distraction of Students

Some critics argue that the use of modern technology such as Wi-Fi, personal computers, or Smartphones in the classroom can distract students from the subject matter of the class and the lectures. Critics believe that students might check personal emails, browse the Internet, check social media sites, or text during class time instead of paying attention to class discussions and lectures. Some studies show that the screens could even distract screen-free classmates ("Laptop Use," n.d.). This could potentially have a negative impact on student learning.

Limiting Students' Creativity and Knowledge

Relying on technologies such as calculators, computers, software with auto-correct spelling features, and even Google Search to name a few, can make students less knowledgeable or less creative. Students might merely rely on the technology to provide them with the answers without doing the required effort to find answers and solutions on their own. For example, they might just do a Google search on an assignment to find the answer. Critics believe that by doing this students would not go through the appropriate steps of doing their assignments, for example solving a math equation, or do appropriate amount of research and reading to find the answer to a research question. This could lead to students' laziness, and limit their creativity and imaginative skills.

Limiting Students' Social and Communication Skills

By providing opportunities for extended learning and online communications, technology could cause a reduction in the amount of face-to-face interaction among students. Students might rely on online ways of communication such as email, chat, and discussion forums, and engage less with the class discussions in the classroom, or avoid to physically attend meetings or after-class gatherings. Distance education and online learning which are facilitated by technology also limit or exclude face-to-face meetings and interactions. Critics argue that this could cause students to become less sociable and could lower their communications skills.

Industry Marketing

Some education scholars and researchers argue that the urge to implement technology in education is due to industry marketing and has consumerist goals behind it. New technologies get introduced to the market continuously and as a result both institutions and students need to purchase the new technologies and tools often or upgrade to the new systems in order to take the most advantage of technology and stay up-to-date. This would create ongoing consumerism and the manufacturers benefit from this process.

There are also a variety of products designed specifically for educational use. The educational benefits of these products are sometimes advertised exaggeratedly. This as well could serve the benefits of the market.

Excessive Use of Technology

Youth grow up using technology and are referred to as the 'digital natives'. They often deal with different technologies on a daily basis. This has caused some theorists, psychologists, and physicians to raise concerns regarding the excessive use of technology, and in particular computers. They believe this excess in using digital technologies could result in physical, psychological, and social disorders (Pies, 2009). Let us take playing video games as an example.

Computer games are very popular among children and young adults, and oftentimes kids overdo playing these games. Now, if they get to play computer games at school and for educational purposes or as homework in addition, there will be concerns regarding the amount of time they spend playing video games and the consequences of it. Though educational games and video games in general have advantages such as helping children's mental development and increasing their knowledge and awareness

("Educational Technology," n.d.), critics argue that the excessive playing of video games could result in many physical and mental issues such as vision problems, over-weight (due to lack of physical activity), round shoulders and spinal disorders, shyness, violent behavior, and stress.

Reducing Students' Ability to Focus

Some critics believe that the new technologies could reduce students' ability to focus. Technologies such as the Internet, computers, and cellphones, connect students to a stream of ongoing information and sources that draws their attention constantly. Therefore their focus is constantly moving from one thing to another, and this can affect the way their brain performs, and reduce their ability to focus on one thing properly. Richtel (2010) writes:

> Computers and cellphones, and what they offer, pose a profound new challenge to focusing and learning. Researchers say the lure of these technologies, while it affects adults too, is particularly powerful for young people. The risk, they say, is that developing brains can become more easily habituated than adult brains to constantly switching tasks — and less able to sustain attention. (p. A1)

As explained by Richtel, this could change children's ability to focus and affect their learning process.

A Note on the Disadvantages of Educational Technology

Educational technology could have some disadvantages if used inappropriately. But most of these disadvantages are not common, and are minor compared to the advantages and benefits of educational technology.

Also, it is very important to note that in assessing the effects of educational technology on student learning, many factors should be taken into account. Factors such as student's age, level of education, the subject matter, the type of technology being used, how it is being used, and how often it is being used are important factors that should be considered when evaluating the effects of technology integration in education, and interpreting research results. It is important to remember that some technologies might be helpful to the learning of a certain age group, or for specific subject matters, and not for the others.

Therefore one should always pay attention to the reasons why in certain situations educational technology has failed to be helpful, or has led to negative results, and should make sure that all the important factors have been considered in the study and evaluation. Since we are still in the learning process of the concept of educational technology and how to implement it to get the best results, there is much that needs to be studied and found until educational technology finds its perfect form and place. Till then, there will definitely be many challenges on the way. In the next section I will talk about the barriers on the way of implementing educational technology.

Barriers on the Way of Implementing Educational Technology

Apart from the criticism of educational technology, there are certain barriers on the way of its implementation caused by different factors. Bellow I will discuss some of these barriers.

Lack of Access

Lack of access to technology either by the institutions or by the individuals is a big barrier on the way of implementing educational technology. In many developing countries technology is not as accessible as it is in the more developed countries. Those countries therefore would have to practice the more traditional methods of instruction.

Even in the developed countries, many institutions or individuals cannot afford to purchase a variety of different new technologies and therefore they might only have access to limited number of technologies. As Hernández-Ramos (2006) notes, "Despite the relentless drops in price for computer and networking equipment, …[they] are still too expensive for the vast majority of people around the world" (p. 212). This would stand as a barrier on the way of taking the most benefit from the new technologies in education.

Low Budget and Limited Quantities of Hardware and Software

There are many expenses associated with integrating educational technology including purchasing devices and software, maintenance, upgrading, training, and hiring

expertise. Many institutions do not have the required budget for technology integration, or are unable to afford sufficient amount of hardware and software.

Institutions need a high budget in order to be able to purchase sufficient amount of devices and software. In cases that they are able to purchase the devices, they will need additional funding to hire experts for maintaining tools and devices, as well as providing ongoing training to the instructors and staff.

Also, new technologies get introduced to the market continuously and therefore institutions would need to upgrade to the new versions of the current technologies or purchase new systems and tools in order to take the most benefit of technology. These require much planning and budget. As Bates (2005) notes, "Once major investment has been made in a particular technology or set of technologies, it is difficult to move quickly into other technologies" (p. 48). Therefore most institutions can only provide a limited number of technologies. This stands as a barrier on the way of implementing educational technology.

Time-Consuming

It takes time to implement and use technology in the classroom. Turning on machines, opening software, figuring out how to use a certain technology, and making sure everyone uses it properly take a considerable amount of the class time. Also, sometimes technology might break and it would take some time to troubleshoot. As a result, many teachers might find it too time-consuming to implement technology in their classroom.

Lack of Sufficient Professional Development

Lack of sufficient professional development stands as a major barrier on the way of technology integration in education. Many teachers lack proper or sufficient training for the technology that is provided for them to use. Therefore in many cases they might not know how to use specific technologies properly and thus they would avoid using them.

Also, sometimes teachers might know how to use the technology itself but might not know how to use it properly to get the most benefit out of it. Therefore many teachers are not very eager to integrate technology in their instruction. The National Center for Education Statistics (2000) reports that most professional development experiences focus on technological and computer skills rather than on how to implement technology in the classroom (Laliberte, 2010), and this stands as a barrier to best integrate technology in education.

In some cases students also are not familiar with some technology and as a result face difficulties in using it. The class time limits often does not allow for training students for the technology which is not directly the subject matter of that class. Most institutions lack sufficient professional development programs for students, and this would stand as a barrier on the way of proper technology integration.

Criticism of Educational Technology

Negative criticism of educational technology and research results which show technology integration has no significant effect on student learning, stand as a barrier on the way of integrating technology in education by institutions and instructors. As discussed earlier, some research has shown negative results on the effects of technology integration on students learning and performance. Such criticism could negatively

influence decision-making of institutions and teachers toward technology integration. In many cases teachers or institutions hesitate to take the risk of implementing new technologies and prefer to continue the traditional methods of instruction they have been using.

Resistance by Teachers

Some teachers are supportive of the traditional methods of instruction, and they often resist a change in their teaching habits and stand against changes in the educational system. This could be caused by several factors.

Some teachers might believe that the traditional methods of instruction are more beneficial to students. For some others it could be because they are more comfortable with practicing methods that they have been practicing for years or have been trained for, and therefore resist a change. Sometimes even when they choose to use technology, as Laliberte (2010) state, they use it "in ways that are consistent with their current teaching practices" (p. 10). Studies show that instructors usually hesitate to implement technology into their teaching if it is not already within their instructional design (Laliberte).

This resistance towards change could also be caused by the teacher's discomfort with technology or the lack of sufficient training provided to them by the institution. Sometimes even if they are willing to integrate technology into their curriculum, it would be difficult for them to do so when they are uncomfortable with the technology or still in the process of learning about it ("Educational Technology," n.d.).

Some teachers might also find it time-consuming to implement technology in the classroom, or find it confusing for the students who do not have sufficient knowledge of

those technologies. All these reasons could lead to teachers' hesitance toward implementing technology in their instruction.

Digital Divide

Digital divide refers to the gap between the people who have access to the digital technology (usually a computer and the Internet) and those who do not (Wei & Hindman, 2011). This access or lack of access to technology would cause a gap between these two groups of people. Digital divide could also be age-related and create a gap between people of different age groups and different generations.

This digital divide is a barrier to implementing technology in education. Some students might not have access to technology at home and not be familiar with it. This would make it difficult for them to stay in the same line with the students who have access to technology and knowledge of it. Those without the access would then miss online conversations and discussions for example, or would not be able to get specific homework or tasks done.

The gap between the two groups of students could also be intimidating sometimes. Those students without access and knowledge of technology might think they are less knowledgeable and therefore feel less self-confident, or get embarrassed because of that lack in front of the other group of students.

Digital divide could also make a gap between the students and the teacher. The students, as the digital natives might be more comfortable with technology and learn it faster compared to teachers who were born before the advent of the Internet and other new technologies ("Educational Technology," n.d.). This digital divide would stand as a barrier on the way of implementing technology in education.

How to Improve Educational Technology Integration

As I mentioned earlier, many of the disadvantages and barriers associated with educational technology are resistible. In this section, I will look at solutions for overcoming the barriers on the way of implementing educational technology, and getting better results from its implementation. I will discuss solutions from several perspectives.

Strategic Change

Some critics believe that in order to successfully integrate technology, we need to make strategic changes to the educational system. We need to establish a new curriculum, and make sure that a suitable learning environment that incorporates the use of technology exists (Laliberte, 2010).

Some scholars believe the best solution is to change the whole education system. Albirini (2007) suggests that the main solution is to completely restructure schools and education. He states: "a possible solution would be to thoroughly restructure "education" and schools, as remnants of the industrial age, into a new paradigm and institution" (p. 227).

He believes that the emphasis must shift from the tangible barriers to the theoretical assumptions of educational technology and the theoretical issues of its identity. Bates believes that technology provides governments and instructors with the capacity to change and transform the whole education system.

Professional Development and Training

Proper professional development for the instructors, staff, and students is a key factor in successful integration of educational technology. Professional development is crucial in order to obtain the most effective use of technology in instruction (Cravey, 2008). According to Laliberte, "High-quality professional development is necessity for successful integration, and can turn reluctant teachers into enthusiastic users of technology in the classroom" (p. 8).

Proper professional development could also increase motivation in the students and educators. It is important to note that in a professional development program it is not enough only to teach learners how to use the technology, but it is important to make them aware of the benefits educational technology could have for teaching and learning. Baharak Makki and Bahador Makki (2012) argue that it is important that teacher educators ensure their students have the sufficient technology proficiency, and know the advantages of implementing technology in the classroom, and therefore can use it to improve teaching.

Increase in Access and Budget

As I discussed earlier, lack of sufficient budget and lack of access to sufficient amount of technology are major barriers on the way of integrating educational technology in many institutions. Strategic investments by government and institutions are necessary to overcome this shortage. Providing budget to purchase a specific amount of devices or software is not enough; but institutions should plan for an ongoing support for maintenance, purchase, and professional development.

In the more developed countries the budget for educational technology integration has been increasing. This helps them to provide continuing support for technology integration. Also in recent years there has been continuing reduction in the price of many technologies. This would make it easier for individuals to purchase technology. Bates (2005) argues that this increasing accessibility has made it possible for teachers to choose different software and technologies on their own to use within their instruction independent of the institution policies.

Proper Use of Technology

The appropriate use of technology in instruction is a key factor in order to receive positive outcomes from it. Purchasing technology and supplementing classrooms with it is not enough. But a systematic plan for how, when, how often, and for what purposes each technology should be used is necessary in order to get the desired outcomes. As Baharak Makki and Bahador Makki (2012) note, "Placing computers and software in classrooms is not enough. Discovering whether technology "works" is not the point. The real issue is when and under what circumstances. Like any other tool, teachers have to come up with a strategy or pedagogy to make it work" (pp. 276-277).

The North Central Regional Laboratory in Illinois found in a study that there was a strong relationship between appropriate use of technology by teachers and increased student achievement (Baharak Makki & Bahador Makki). The study also showed that when technology was implemented systematically, it could enhance student achievement through many opportunities it provided.

Baharak Makki and Bahador Makki state that a technology-rich environment that is appropriately designed can produce a number of positive outcomes such as increased

student motivation, improved social interactions, changes in instruction styles, a more effective instruction, and most importantly elevated student learning. This can be achieved through a correct vision of technology integration.

McConnell (2006) believes that in order to see qualitative changes in student learning, we need to actively design the student experience. Otherwise using technology will not make qualitative changes on its own. The choice of technology is also a very important factor, and as Bates (2005) notes, technology should be chosen according to the needs of students and the subject matter.

As explained in this section, it is possible to avoid and resolve the barriers and disadvantages associated with educational technology. Proper integration of educational technology has many benefits and results in positive outcomes. A strategic and comprehensive plan that would consider all the factors is required in order to achieve the best outcomes. In the following section, I will discuss educational technology and its significance in higher education.

Educational Technology in Higher Education

Educational technology has found significant importance in higher education and is shifting the paradigm of education. Garrison and Akyol (2009) state: “online and blended learning ideas have begun to shift the thinking and practice of educators and leaders in higher education” (p. 20). E-learning has become widespread due to its benefits and advantages (Abu-Al-Aish, 2014). Most universities in the more developed

countries are equipped with the latest educational technologies and high-speed Internet connection (Garrison & Akyol).

Through educational technology the capacity of education and forms of knowledge preservation have altered significantly in higher education (Ting, 2006). Norton (2013) states: “technological change challenged the 'traditional' campus-based university” (p. 10). The traditional methods of teaching, such as passive lecturing are not popular anymore. Technology has altered teaching and learning practices. Schwartz (2013) states: “To keep from drowning, higher education has no choice but to become faster, cheaper and better” (p. 4).

Online and blended learning practices have become very popular in higher education. The reason for this according to Garrison and Akyol is: “the convergence of the valued idea of collaborative constructivist approaches and new communications technology” (p. 20). This relationship between instructional technologies and collaborative constructivist ideas is the main drive to transform higher education (Garrison & Akyol).

As I discussed earlier, educational technology has provided many new possibilities for collaborative learning. A main advantage of this is that the new collaborative learning communities are not constrained and limited by time and space (Garrison & Akyol). Garrison and Akyol state that the foundation of higher education has been laid by collaborative constructivist teaching and learning ideas. They believe: “It is through the integration and sustainability of reflection and discourse where students become engaged in deep and meaningful learning experiences” (p. 22). Research has shown that collaborative and cooperative learning results in higher

student achievement and academic success, as well as social adjustment (Garrison & Akyol).

Norton makes important notes about the effects of information technology on higher education. He states:

> "It challenges conventional disciplinary boundaries and extends the intellectual, span, interests, and activities of faculty far beyond traditional organizational units such as departments, schools, or campuses. Therefore, higher education institutions will need to reconsider a broad array of policies, such as concepts and policies of intellectual property that are outdated in the digital age. In addition, the relationship between universities and their faculty, staff, and students should be reconsidered" (p. 361).

As we see, technology has affected all the aspects of education, and is not limited only to the classroom. Information technology also affects scholarship and scholarly communication by shaping new tools for them (Norton, 2013).

EDUCAUSE[7] is introducing a list of the top ten strategic technologies in higher education in 2014. The findings are based on elements including the time, active attention, and the priority of a technology at a specific time. The top ten technologies were selected from analysis of a survey about 78 technologies, presented to EDUCAUSE members in fall 2013. The results show that analytics dominates this list. Institutions are paying much attention to learning and administrative analytics. Mobile apps are also found very popular and prominent.

[7] EDUCAUSE is a nonprofit association that aims to advance higher education through information technology. The principal investigator for this study is Susan Grajek. This study does not aim at describing or justifying the importance of specific technologies, and the results are not generalizable to all institutions and technology users.

To obtain the most benefit from educational technology in higher education, we should make a shift from traditional methods of instruction and take advantage of capabilities of the new technologies (Garrison & Akyol, 2009). By focusing on the emerging communications technology we can improve higher education and make a shift from the large lecture methods of teaching. Educational technology provides the means to engage students and sustain that engagement in a beneficial and cost-effective manner (Garrison & Akyol).

It is also important to note that for a successful implementation of instructional technology, technology must be used in an efficient way, and too much emphasizing of the technology itself and getting distracted from the main subject matter of the course will reduce the benefits (Garrison & Akyol). Another major player in the successful integration of instructional technology in higher education is professional development. Ongoing professional development for faculty and students is necessary in order to successfully integrate educational technology in higher education.

An educational practice that is significantly affecting higher education is mobile learning. In the next chapter, I will introduce mobile learning and discus its implementation in higher education.

CHAPTER 3

MOBILE LEARNING

Introduction and Overview

As I discussed in the first chapter, educational technology has an important role in various forms of education. A form of education which is finding significant and growing popularity is mobile learning. Mobile learning or m-learning is the delivery of learning material through mobile devices such as cell phones, smartphones, tablet computers, iPods, PDAs, and palmtop computers. It is generally considered as the next step after e-learning and distance education (Abu-Al-Aish, 2014). Freysen (2005) Defines the term as: "the use, both synchronously and asynchronously, of mobile communication technology (MCT) to achieve a learning task or outcomes" (p. 73). A more comprehensive definition is provided by Clark and Quinn (2009) as: "An activity that allows individuals to be more productive when consuming, interacting, or creating information, mediated through a compact digital portable device that the individual carries on a regular basis and has reliable connectivity and fits in a pocket or purse" (p. 5).

Some scholars count laptops in the definition of mobile learning as well, while some others such as Keegan (2005) eliminate laptops from this definition and restrict

mobile learning to devices that are ubiquitous, easily portable, and flexible for providing a wider range of social contexts (Abu-Al-Aish, 2014).

The main advantage of mobile learning which makes it distinguished from other forms of learning is that it allows learning to happen at anytime and anywhere. As the use of modern and wireless technologies is growing rapidly, mobile technology is finding significant importance in education. Many universities are practicing mobile learning as one of their main methods of course delivery. Mobile learning provides mobile access to learning material and resources, and facilitates collaborative learning and feedback exchange between instructors and students (Abu-Al-Aish[8], 2014).

To take advantage of m-learning, the learning material should be designed in a way that is proper for the small screens of mobile devices, as the current design of most learning material is for computers with larger screens. Paying attention to learning theories is another important factor. Ally (2005) States: "When designing learning materials for mobile devices, proper learning theories and instructional design principles must be used to meet learners' needs, and at the same time, help learners to achieve the desired learning outcomes" (p. 5).

With mobile devices, the information provided to the learner should not be in a textual format; rather it should be presented in the form of a network or a concept map that highlights the important concepts (Ally, 2005). The information presented on the

[8] In this study, Abu-Al-Aish studies students' readiness for mobile learning, and investigates the elements affecting student acceptance, as well as proposing a model that could foster the deployment of mobile learning within educational strategies in higher education institutions. The research took place in Brunel University, London. The data was collected through using three surveys distributed among students in the School of Information, Computing and Mathematical Science. Though raising interesting points, the results of this study are by no means conclusive.

screen should be between five and nine chunks in order not to overload the short-term memory of learners. The interface should be graphical to best coordinate the interaction of the learner with the learning material (Ally).

To increase motivation and enhance learning, the mobile learning system should be proactive. It should anticipate what the learner would do next and provide an appropriate interface (Ally, 2005). Use of good navigational strategies for the interface is important in allowing the user to interact with the material and easily move back and forth between different displays (Ally).

According to Ozata and Keskin (2014) there are three main phases to the research focusing on the development of m-learning: “a focus upon devices, a focus on learning outside the classroom, a focus on the mobility of the learner” (p. 190). Some devices that facilitate and support mobile learning include the cell phone, Smartphone, Ultra Mobile PC (UMPC), tablet computer, wireless laptop computer, personal digital assistant (PDA), digital audio player, and handheld game console; and some technical support and delivery tools include Wi-Fi, e-books, cloud computing, apps, 3GP format, GPRS, and mobile web (”M-Learning,” n.d.).

Different devices used in mobile learning provide some similar and different services and benefits. Mobile learning provides great learning opportunities, and has some advantages over other types of learning. Bellow I will discuss some of these advantages.

Advantages of Mobile Learning

Mobile devices have advantages that make mobile learning popular in modern education. They support functionalities such as Internet access, messaging, multimedia convergence, and games. Access to these functionalities can enhance teaching and learning (Abu-Al-Aish, 2014).

Mobile technology makes cloud teaching possible, which allows for float of immediate access to people, information and resources, independent of location (Ally, 2005). Services available on mobile devices are constantly increasing, and their capabilities rival standard computers (Abu-Al-Aish, 2014). Bellow I have listed and discussed some of the advantages of mobile learning.

- Portability: mobile devices are small and light, and usually fit in the pocket. This makes it possible for students to carry them with no difficulty (Abu-Al-Aish, 2014).
- Anytime/anywhere communication and learning: through mobile devices learning and communication can happen at anytime and anywhere. Mobile devices make learning independent of barriers of time and space.
- Permanent connectivity: mobile devices are usually always on (Ruis, Clariso, & Masip, 2014). Therefore students can receive real time notifications, emails, and messages, and stay connected with peers and teachers.
- Context sensitivity: mobile devices provide users with real data in their local location and time (Abu-Al-Aish, 2014).
- Social interaction: mobile devices ease and facilitate communication between students and instructors. They also make students and teachers more accessible.

- Connectivity: mobile devices can usually connect to other mobile devices or to a shared network. This facilitates information transfer.
- Utility: mobile devices provide access to many apps and utilities, many of which are useful to education.
- Multimedia support: mobile devices support creation and delivery of multimedia content.
- Relative affordability: mobile devices are usually more affordable compared to laptop and PC computers ("M-learning," n.d.).
- Increased interactivity: use of mobile devices such as tablets in the classroom can increase student interactivity through interactive displays, games, and different educational apps.
- Enhanced collaboration: mobile devices can be used to enhance and increase group collaboration among students through use of communication applications and audio and video features ("M-learning," n.d.).
- Popularity: Mobile devices are very popular among students. One of the reasons for this is that they are more affordable compared to PC and laptop computers, while they provide sufficient tools and utilities (Abu-Al-Aish, 2014).
- Active learning strategies: Mobile learning allows for active learning strategies and provides the opportunity for students to learn in their own context. This enhances learning in students (Ally, 2005).

All these advantages make mobile learning very useful and favourable. Yet like all other forms of learning, there are challenges alongside the advantages and benefits of mobile learning. In the following section I will review some of those challenges.

Challenges Facing Mobile Learning

There are various challenges on the way of implementing m-learning. These challenges can be either educational or technical. Bellow I will discuss some of these challenges briefly.

Technical Challenges

The technical challenges facing mobile learning address the challenges associated with mobile devices. I will discuss these challenges bellow.

- Battery life: the battery life of mobile devices can be an issue for m-learning. If the devices die while there is no access to a power source, learning has to be stopped.
- Screen size: the screens of some mobile devices such as cell phones are small, and it is not very convenient to use them for longer browsing or reading purposes.
- Typing difficulty: due to small keyboards or virtual keyboards, mobile devices are not very suitable for typing. Mistyping with virtual keyboards is a common challenge.
- Limited memory: mobile devices have a fairly smaller memory capacity compared to laptop or PC computers.
- File format limits: some file formats are supported only by specific mobile devices and not by others ("M-learning," n.d.).
- Device damage or loss: the risk always exists that the devices get damaged or lost, and as a result the user loses the material saved on the device. This risk is high with

mobile devices since they are handheld devices and people carry them everywhere. The User might drop and break the device, or leave it somewhere and lose it.

- Difficult programming: Programming and designing learning material for mobile devices is difficult and costly (Clark & Quinn, 2009).

With advancement of technology, these technical challenges are being addressed and are in the process of improvement. Newer devices are becoming lighter, more damage resistant, and come with better screens, longer battery life, increased memory capacity, and more precise keyboards. Bellow I will look at some educational and social challenges facing mobile learning.

Educational and Social Challenges

The educational and social challenges facing mobile learning mostly relate to the curriculum, planning, and management of learning rather than devices. Some of these challenges relate to the following criteria:

- Theories of learning: it is still a challenge to define and develop an appropriate theory of learning for m-learning ("M-Learning," n.d.).
- Quality of learning: through m-learning, learning can take place at times or in places that are not completely suitable for learning purposes. Therefore students might not be fully focused on the learning material or task and this could negatively affect the quality of their learning.
- Access: many students around the world do not own mobile devices or do not have access to the tools and software used for m-learning.

- Assessment: with mobile devices it is difficult or impossible to assess learning outside of the classroom (“M-Learning,” n.d.).
- Distraction: use of mobile devices in the classroom can cause distractions for individual students or their classmates.
- Variety of devices: different students might own different types of mobile devices with different functionalities. This would be a challenge for strategic practices of m-learning.
- Changes in device models or functionalities: as new device models with new functionalities enter the marketplace, there might be a need to redesign the learning content and delivery methods to make them suitable for the new platforms and functionalities.
- Learning timetable: with mobile learning there is no restriction for the amount of time students spend on learning, and it is difficult to make an organized schedule for this type of learning (“M-Learning,” n.d.).
- Personal life: by making learning possible at anytime and anywhere, mobile learning might eliminate the boundary between students’ personal and academic lives. This could cause disruptions for the students’ personal life.

The social and educational challenges on the way of implementing mobile learning are not always a major concern. Most of these challenges apply only to specific aspects of m-learning and under certain circumstances. Mobile learning is yet a rather new practice and many of the challenges and barriers on its way will be resolved over time. With the great learning opportunities that m-learning provides, it is beneficial to consider it more seriously in education and take advantage of what it has to offer.

Mobile learning finds a more significant importance when it comes to higher education. In the following section I will discuss mobile learning in the context of higher education.

Mobile Learning in Higher Education

Mobile learning is more useful and convenient in higher education. Most students in higher education own mobile devices, and use them on a daily basis. It cannot be denied that ICT has affected many aspects of human life. In higher education also it has had and is having important effects, and is changing university paradigms (Rajasingham, 2011). Mobile communications have added to these effects. Over the past several years, many higher education institutions have moved towards applying mobile learning in their curricula.

Today most university students in the more developed countries own different types of mobile devices such as cell phones, Smartphones, iPods, tablet computers, etc. Based on a Pew Research Centre's study, as of January 2014, 90% of American adults own a cell phone 58% own a Smartphone, 42% own a tablet, and 32% own an e-reader.[9]

Many students use their mobile devices for educational purposes casually and on their own. Educational planners and institutions therefore have thought of implementing the use of mobile devices in education in a systematic and more formal way. By doing so, they can take advantage of the benefits of mobile learning.

[9] This is a continuing research on mobile technologies and the findings may get updated. The results of this study are based on surveys and though valuable, are by no means conclusive or generalizable to mobile device ownership in other parts of the world.

J. Herrington, A. Herrington, and Olney (2011) state that as students bring their mobile devices into the classroom with them, instructors in higher education would therefore need to find strategies to deal with these devices. It is not possible to ask students to turn off their mobile devices in the class anymore (Herrington, J., Herrington, A., & Olney). Therefore it is better to plan for a systematic use of mobile technology in education to make its usage beneficial to teaching and learning.

In addition to the above reasons, many higher education institutions implement mobile learning to provide a flexible learning experience (Ally, 2005). Mobile technology benefits higher education institutions by providing them with a broader student population and increased enrollment (Ally). Mobile learning provides all students with equal opportunities by making learning accessible regardless of time zone and location boundaries (Ally).

According to Rajasingham (2011), m-learning could be referred to as a "subset of e-learning to affect a new paradigm of higher education" (abstract). Mobile technologies increase access to learning material especially for people who seek just-in-time and just-for-me education (Rajasingham).

Ally (2005) states: "Mobile learning is not about the technology, it is about the learner. The learner is mobile and is at the centre of the learning, and the technology allows the learner to learn in any context" (p. 145). Mobile technology therefore paves the way for learning to happen without boundaries. In the future this mobility of learners will further increase as there will be smart systems here and there, with more virtual capabilities. Therefore, higher education should be prepared for a different generation of mobile devices, which will be more ubiquitous and virtual (Ally). New

educational models should be developed for new generations who will be using new mobile technologies (Ally).

Criticism of Mobile Learning in Higher Education

Alongside the benefits of mobile learning in higher education, there are certain criticism about the usefulness and effectiveness of it which I will discuss in this section.

Freysen (2005) believes that most of the usage of the mobile technology in higher education is for administrative support rather than for education and learning. Much of the learning with mobile devices that happens for educational purposes is usually in a less structured format (Freysen). Also, often mobile devices are used for just-in-time learning, and not much beyond that. This is mainly due to the lack of a strategic plan for use of mobile devices in education by many institutions.

Rajasingham (2011) argues that the results and evidence form research on higher education and the new paradigms of teaching and learning for the past two decades suggest that the universities and institutions that opted for mobile learning did not find all their expectations completely fulfilled. He further notes that retrospective accounts emphasize that the reason for these shortcomings were not due to weaknesses of the technologies, but the result of poor implementation of the innovations (Rajasingham).

To get the best results, other than having a systematic plan for implementation and use of mobile devices in education, we should pay attention to some details. Clark and Quinn (2009) summarize some of the important criteria for a successful implementation of mobile learning as:

- “The right information
- To the right person
- At the right time
- In the right place
- In the right way
- On the right device.” (p. 12)

Paying attention to all these criteria would result in a better learning outcome, and would maximize the benefits of mobile learning. In the next section I will talk about some mobile devices and their use in education.

Mobile Devices in Education

Different mobiles devices have some similar and some different usages in education. Bellow I will briefly talk about some mobile devices and their application in education.

Mobile Phones

Mobile phone ownership has increased significantly and rapidly over the past decade. It has even become widespread in the developing countries. Rajasingham (2011) states: “the African continent has stunned the world by leapfrogging several stages of traditional telecommunications development. The mobile phone has become commonplace even in many of the poorest countries” (introduction). However, the use of mobile phones in education and for learning purposes is low globally.

Mobile phones can be used in education for a variety of different purposes such as text messaging, recording class sessions, or taking quick pictures of the board. Other than these usages, there are also some platforms designed for a strategic use of cell phones in education.

As an example, student response systems such as Poll Everywhere (http://www.polleverywhere.com) allow teachers to ask questions and receive real time answers from students via mobile phones in the form of text messages. Poll Everywhere works also on computers and tablets other than cell phones.

Platforms such as TeachHUB (http://www.teachhub.com) allow for delivery of material to students directly on their cell phones.

SchoolTown (http://www.schooltown.net) is a cloud hosted teaching and learning platform for delivering curriculum for an engaging blended learning and differentiated instruction setting with sharing and rating. Using such platforms, students and teachers can collaborate and chat with one another ("TeachHUB," n.d.).

Smartphones

Smartphones can be used for the same purposes that other mobile phones can be used, but they provide some additional possibilities.

Smartphones can connect to Wi-Fi and therefore this access to the Internet provides many just-in-time opportunities for students to browse, access the course material, watch an educational video, or connect to a learning management system. Also, most Smartphones have a data plan; therefore they provide students with instant access to the study material at anytime and anywhere in the lack of a Wi-Fi access.

Smartphones also have a touchscreen that provides a more interactive interface. Using Smartphones students can engage, collaborate, and interact with learning material easily. They can have immediate access to their email, upload material to shared environments such as LMSs, and stay connected with classmates and teachers beyond the walls of the classroom and limits of class time. With Smartphones students can also download different educational apps and use them to speed and enhance their learning.

There are cloud storage Smartphone apps that allow for data such as notes, photos, calendars, audio files, and browsing history to be synced automatically from one device to other devices. For iPhone as an example, this cloud storage is named iCloud. Using iCloud, students can access the content saved on their laptops or home computers for example, at any time or any place. Students can also choose to share some of the content with other students. To do so they would need to choose whom they want to share material with and connect their iClouds. It is noted in the Apple website that "With iCloud, you can share exactly what you want, with exactly whom you want" ("iCloud," n.d.). Evernote (https://evernote.com) is another app that allows the same process and can be downloaded on different devices.

Tablets

Tablets are very useful in education, and can be used for many different purposes. Tablets are at a point between Smartphones and regular computers, sharing many features of both. Like Smartphones, tablets can usually connect to Wi-Fi and cell data networks, and are great tools for interaction, collaboration, and just-in-time learning.

Most of what can be done by tablets can also be done using desktop or laptop computers. For those features, it is the mobility of tablets that makes them special. Corlett and Sharples (2004) state: “it is the mobility, flexibility and robustness of a Tablet PC (over and above other form factors) that makes it possible for these powerful uses of IT to become embedded in every aspect of informal, collaborative learning” (p. 61).

I will explain the use of tablets in education comprehensively in the next chapter. I will also discuss tablets’ types, applications, history, and criticism, and will provide a comparison of tablets with some other technologies and tools in education.

CHAPTER 4

TABLETS AND HIGHER EDUCATION

Introduction to Tablets

Tablets are a great technology for education. Among other mobile devices and other technologies, tablet computers are great tool for educational purposes. Tablets are light and mobile, can connect to Wi-Fi, have a long battery life, support different tools, and are compatible with different methods of instruction. They are perfect devices for mobile learning, blended learning, and distance education. They can be used both inside the classroom, and outside of the classroom and on-the-go. They are interactive and engaging devices and support many useful apps. Also, much of the criticism and disadvantages associated with mobile learning does not apply to tablets. In this chapter I will focus on tablets and their applications in education, and argue why they are a great technology for education.

Definition

A tablet, also referred to as a tablet computer, is a general-purposed mobile computer with the display, battery, and circuitry contained in a single panel ("Tablet Computer," n.d.a; "Tablet Computer," n.d.b).

The most distinguishable feature of tablets is their touchscreen, which allows for direct interaction. Some tablets require a stylus for interaction, though most modern

tablets are operated by fingers (“Tablet Computer,” n.d.b). They are equipped with capacitive touchscreens which are multitouch. Compared to PC computers tablets are usually much lighter, smaller, have a longer battery life, and they usually have an on-screen virtual keyboard instead of a real one. They can also be used while standing. Tablets are usually sold with a variety of apps, and there is also a pool of paid or free apps available for download. In the next section I will briefly review the history of tablet computers.

History

Tablets were conceptualized in the mid twentieth century (“Tablet Computer,” n.d.a). They were prototyped and developed in the 80s and 90s, and they reached their popularity in 2010 (“Tablet Computer,” n.d.a). Computer scientist Alan Key (1972) described and developed the concept of tablets in his PhD proposal titled “A personal computer for children of all ages”. In the abstract he refers to tablets as “personal, portable information manipulators” (Abstract).

Platforms

There are different platforms and operating systems for tablets. Some major ones include: iOS, Microsoft Windows, Android, Linux, Blackberry Tablet OS, and Firefox OS. In the following section I will introduce tablets made by different manufacturers.

Manufacturers

Tablet computers are produced and sold by several manufacturers. Bellow I will talk about some of the more important tablet brands briefly.

Apple's iPad

The iPad by Apple Corporation was first released in 2010. The iPad has a high-quality and detailed touch interface. It soon became very popular, and shaped the commercial market. Apple's iPad has been the most successful tablet to date ("Tablet computer," n.d.a).

Microsoft Tablet PC

Upon their arrival in 2001, Microsoft tablet PCs were planned to mainly address the business needs, and were mainly used as note-taking tools ("History of," n.d.). These pen-based tablets used the same hardware as laptop computers ("Microsoft tablet," n.d.). The current series of tablet computers sold by Microsoft is called Microsoft Surface, which is operated by fingers.

Samsung Galaxy Tab

The Samsung Galaxy Tab series are Android-based tablets, and the first of the series was introduced in 2010 ("Samsung galaxy," n.d.). These tablets come in different sizes and with different capabilities.

Amazon's Kindle Fire

The Kindle Fire is Amazon's mini tablet version of the Kindle e-book reader, released in 2011 ("Kindle fire," n.d.). It is a very popular tablet among users, given its affordable price and high functionalities.

Alongside these major tablets, there are e-book readers that perform certain functionalities that are to some extend similar to those of tablet computers. I will talk about these in the next section.

E-Book Readers

An e-book reader, also referred to as e-reader, is an electronic device designed primarily for reading electronic material ("E-book reader," n.d.). E-readers are similar to tablet computers in form but have fewer capabilities. For instance e-book readers usually have slower screens and are not very suitable for interaction.

Their main advantage over tablet computers is that their screen is more readable as they are designed mainly for reading purposes. Due to use of electronic paper technology their screens are more readable in sunlight, and they usually have a longer battery life ("E-book reader"). They are very light and are very convenient to be carried around and used for reading on-the-go. Most e-readers also can connect to the Internet through Wi-Fi and this allows the users to find and purchase digital books easily.

Tablet computers are also great tools for reading purposes. In the next section, I will review different applications and usages of tablets.

Use and Application of Tablets

Tablets can be used for a variety of different purposes. As a result, they have become very widespread and popular among people. A survey from the Online Publishers Association (OPA) shows that by late 2012, 31 percent of Internet users in the United

States owned a tablet (Moscaritolo, 2012). Apple's iPad and Amazon's Kindle are among the most popular tablets ("Tablet Computer," n.d.a). Tablets have also become increasingly popular among children ("Tablet Computer," n.d.a). People use tablets for personal, business, and educational purposes. Bellow I will briefly discuss these usages.

Business

Because tablets are mobile devices, the most common use for them is the work that needs to be done outside ("Talk Tablets," n.d.). Tablets are more convenient to carry around than laptops, and are more useful and convenient for work than Smartphones. Most tablet usage is by people traveling for work reasons, mainly as a way to stay in touch with what is happening back at the office ("Talk Tablets"). They are also very convenient tools for making presentations, as they provide easy manipulation of images ("Talk Tablets").

Entertainment

Tablets are commonly used for entertainment. Many people use tablets to browse, watch videos, play games, read novels, connect to social media, etc. Tablets are very practical and convenient for these usages because they have a high-quality display, it is easy to carry them around with oneself, and they can be held in a variety of positions ("Talk Tablets", n.d.).

Education

Tablets are useful in education. They are interactive, have a high-quality screen that is suitable for reading, offer access to enhanced e-books, provide access to educational

apps, and support many other features that make them an excellent tool in education. I will discuss the use of tablets in education in detail in the following section.

Tablets in Education

Tablets are found useful in education and are attracting the attention of educators. Russell (2013) states: “tablets are no longer just a "nice-to-have" accessory … they are becoming a "must-have” (Abstract).

It is mentioned on Apple website that the “iPad is transforming the way we teach and learn” (“iPad,” n.d.). Based on a study, 90 per cent of North American students believe tablets help them study better and more efficiently (“Graduating,” n.d.). Also 1.5 million iPads are being used in classrooms (“Graduating”).

The popularity of tablets in education is increasing due to many features they provide. Bellow I will explain some of these features and usages of tablets in education.

Apps

There are many apps that facilitate teaching and learning. There are apps for email, web browsing, calendar, e-books, games, multimedia, writing, presentation, social media, video conferencing, cloud storage, etc. Based on studies, Apple’s mobile apps mark as the highest number of apps. There were more than twenty thousand educational apps in the App Store in 2012 (Nguyen, L., Barton, & Nguyen, L. T., 2014).

Reading

Tablets are perfect devices for reading. Their screen is designed to provide a good reading experience. Electronic paper and electronic ink used for some tablets and e-readers are technologies that provide a reading experience similar to ordinary paper in terms of reflecting light. This makes them suitable for reading in natural daylight. Also since tablets are hand-held devices, one can easily take them around and hold them in the desired direction, which makes reading on them very convenient.

Interactive e-books

There is a pool of interactive e-books for tablets with features that allow easy interaction and make the reading experience much more pleasurable. Many of these e-books are equipped with interactive images, videos, read-to-me feature, built-in quizzes, and other features that make the process of reading more interactive and enjoyable.

Games

There are many educational games (serious games) available for tablet computers. Some of these games are available for free download and some are for purchase. Some instructors include such games in the course syllabus. Students might also choose to download and play serious games on their tablets as an extra learning resource.

Accessing LMSs

Tablets are great tools for accessing learning management systems. Since they are mobile devices, students can use them to easily access the LMS and course material on-the-go.

Taking quizzes

It is easy and convenient to use tablets for tests and quizzes. Instructors can then provide immediate feedback to students electronically.

Field-study

Since tablets are mobile devices, they can be taken to sites and provide in-site and instant learning. Tablets are the best tools for this purpose since they are portable and easy to work with.

Camera

Most tablet computers have cameras (usually a front and a back camera), which could be used for taking pictures or capturing videos. These cameras can be used in education for different purposes such as recording a class session or a lecture, or taking pictures from the board.

Pod-casting

Tablets can be used for voice recording and pod-casting. Students can use this feature to make projects, or record lectures.

Note-taking

Many students use their tablets to take notes in the class or in conferences. They can then choose to sink these notes to their laptop or desktop computers and Smartphones.

Surfing

Students can use tablets to surf the web to perform research, find material related to class discussions, access library databases, or watch educational videos.

Video streaming

Tablets support most video formats. Students can watch video tutorials on YouTube or videos embedded in the LMSs for a more engaging learning.

Social Media

Students can stay connected to different social media sites using their tablets. Using social media apps on tablets is a convenient way to stay connected to these sites, receive instant messages, and exchange ideas. Apps such as HootSuite (https://hootsuite.com) create several social networking streams that allow users to send messages to different networks simultaneously (Russell, 2013). Though social media sites are usually considered distractions for teaching and learning, they are a good way for students to communicate and share learning material.

Email

Tablets are great tools for emailing. Students can add several email addresses to their account and access their emails at any time. They can also choose to get notifications when receiving new emails. It is fast and convenient to use tablets for emailing.

Writing

Some students use their tablets for writing assignment or papers. Though maybe not the best tool for writing due to their size and virtual keyboards, some students enjoy typing on the virtual keyboard of tablets, and some use writing apps on tablets for their writing tasks.

Presentation

Use of tablets helps to create more effective presentations. Several iPads for example could be synced together to enhance group presentations. There are different apps which can facilitate presentations. For example one could use Prezi to embed a YouTube video in the presentation (Russell, 2013). Tablets are great tools for demonstration and visualization (Russell).

All these great applications make tablets a great technology for teaching and learning purposes, especially in higher education. Students in college and university levels have more access to tablet devices, and therefore the use of tablets in education finds more importance in higher education. Bellow I will provide a few examples of tablet implementation in higher education.

Use of Tablets in Higher Education

The tablet is an important technology in higher education. Tablets can be used to

enhance teaching and learning. They can be used for a variety of purposes in different educational methods such as blended learning, distance education, or mobile learning. In her study of the use of tablet PCs in education, Amirian[10](2004) reviewed the data taken from 23 schools in K12 and higher education that had incorporated tablet PCs in their system. She found that tablet computers were used successfully in those institutions in similar ways. These institutions had designed their programs for implementing tablets in some similar ways.

In some schools all students had a tablet and in some others a few classes had implemented tablets. Professional development was provided for instructors and students. Tablets were sometimes used in the same way that desktop or laptop computers had been used. But according to Amirian, "students and teachers with tablet PCs in well-planned environments, and with the appropriate curriculum and resources, also could do things that they could not with desktops or laptops" (p. 29). For example, instructors used tablets with wireless projectors for delivering presentations. They drew on the tablets, annotated on the slides, or drew math equations or models. Students also interacted and participated through the software that shared access with them.

In cases where all students had a tablet, group work was very successful. Students collaborated with each other on different tasks such as graphics work or writing, shared documents electronically or presented them to the class. They also collaborated with students in other classrooms. Notation, reading, and performing research were among the major tasks students did using tablets.

[10] Amirian and her colleagues perused this research by studying the published papers, presentations, and websites of 23 K-12 and higher education institutions. Their findings showed that tablets were used successfully in almost similar ways. Though this study raises interesting questions about the use of tablets, it is not a broad study and the results are by no means concussive.

Through software teachers could poll students, making sure they were on the assigned task and understood the learning material. Many instructors used tablets for taking quizzes or providing immediate feedback. Use of digital textbooks and rich interactive multimedia was also very common. All students' notes were searchable.

One major benefit of using tablets was that reading on tablet computers helped students with hearing and vision impairments through easy modification of zooming, colour and contrast, and through pod-casting and sound features.

Amirian further reports that collecting classroom data was easier with tablets rather than with desktop or laptop computers due to their "form factor and pen input" (p. 30). Also, it was made easy for the students to take tests or fill surveys using tablets with pens, and then submitting them electronically. Teachers then annotated and graded the documents and sent them back to students, providing them with immediate and in-class feedback.

As we understand from the above findings, tablets can be used very effectively and can facilitate student learning and interaction, as well as instructor teaching. The next study that I will discuss has a focus on Apple's iPad.

The iPad is one of the most widely used tablets. Gassidy et al. (2014) note that "the iPad has made its thunderous debut, significantly altering the educational technology landscape by becoming a major player in the field and opening the door for other tablet computing technologies" (Introduction).

In their review of the use of iPads in higher education, Nguyen, Bartin, and Nguyen[11] (2014) report that iPad tablets are being used successfully for a variety of purposes in higher education. They report: "iPad was found to be a good tool to provide instant access to rich learning materials and to the Internet resources from YouTube, Google Scholar and Blackboard" (p. 6). The iPad was found useful for taking notes, taking pictures, highlighting text, and presenting. It was also found useful for communication, collaboration, sharing learning material, and receiving feedback, all of which enhanced group work. Students could be more productive and efficient by using the time management apps such as calendars, notes, reminders, and emails.

As seen in these studies and similar studies, tablets are found useful in teaching and learning in the context of higher education. They facilitate, enhance and elevate teaching and learning. Also these positive outcomes and benefits of tablet implementation in higher education could be increased if they are used properly.

That said, I will deal with some criticism of tablet implementation in education in the next section to find out what the downsides of this implementation are.

Criticism of Tablets in Education

Though tablets are a great technology in teaching and learning, there is some criticism associated with them. Some scholars argue that although tablets facilitate teaching and learning, and increase student engagement, they do not have a significant effect on student outcomes, or that their effects are unknown. For instance, Nguyen et al. (2014)

[11] This study is a content analysis of many peer-reviewed publications. The results show that the studies are yet at an exploratory stage. Though it provides interesting findings about iPad use, this study is not conclusive.

state that the “iPad was found to be useful in engaging students with the learning materials, but its association with learning outcome was inconclusive” (p. 2).

The current research regarding the effects of tablets on student achievement and learning in higher education is at an early stage. Therefore it is difficult to make clear statements in that regard and there are contradictory opinions about it. Yet most researchers agree that tablets facilitate teaching and learning and increase student motivation and engagement.

A different criticism of tablets deals with the issue that they could distract students due to the non-educative usages of them. This could cause some academics to have mixed attitudes towards tablets (Nguyen et al., 2014). Academics are mostly concerned that students might browse or check social media rather than paying attention to class activities and lectures (Nguyen et al.). It is useful to note that this criticism is not exclusive to tablets and applies to laptop computers and Smartphones as well. These devices connect to the Internet and it is not possible to completely observe students’ activity in the classroom.

One important way to maximize the benefits of tablets in education is to build a structured pedagogical approach for tablet use (Nguyen et al.). As more and more higher education institutions are turning to tablets, it is very important to find the most effective ways for using them in order to obtain the best results (Russell, 2013).

Tablets are a useful technology for education, and are yet a better tool compared to other technologies and mediums such as laptop or desktop computers, paper books, and Smartphones from many aspects for a variety of reasons. To make this advantage clear, I will compare tablets with some other technologies including laptop computers,

Smartphones, and print books in the next section. I will then conclude my discussion by highlighting the advantages of tablets and their benefits to teaching and learning.

Comparison of Tablet Computers with Laptop Computers, Smartphones, and Print Books

In a way, tablets combine laptop computers, Smartphones, and books. One can find most features of those three in tablets, which makes them a great technology. Bellow I will compare tablets with laptops, Smartphones, and books, discussing advantages of each.

Tablets and Laptops

Tablets and laptops are both computers. They both run and support many similar software and applications, but there are some major differences between them as well, which I will discuss bellow.

Advantages of Tablets

Portability and Mobility: tablets are mobile devices and compared to laptop computers, they are much smaller and lighter, and therefore are more convenient to be carried around. Portability of tablets is one of their major advantages that make them very popular in education and especially in mobile learning.

Battery life: Tablets have a longer battery life compared to wireless laptops, averaging at around 10 hours, as opposed to the 4 hours for laptops. This makes them more convenient than laptops for use in situations when students do not have access to a power source. This is great for situations when students are outside the classroom or home; but it also makes them convenient for use inside the classroom since students would not need to carry the device charger with them to the class.

Touchscreen and interactivity: tablets' touchscreen is their most distinguished feature that makes the process of learning with them much more interactive and engaging. This feature lets users to engage with the learning material in a more exciting way.

Although there are touchscreen laptops as well, but due to the position of their screen, it is not as comfortable and handy to interact with the touchscreen of laptops. Also many users do not use it that often just because they are more used to use the touchpad on laptops.

Lack of distance: Due to tablets' touch screen, the distance between the user and the screen which exists in desktop and laptop computers is eliminated. Tablets are hand-held devices and interact with the content on tablets directly, using their fingers.

Amazing apps: there is countless number of apps available for tablets that one could use for learning purposes. Most of these apps have a variety of interactive features and add to the pleasure of learning. For instance, there are many educational games designed for tablets. Many of these apps are available for download free of cost.

Camera: most tablet computers have a camera which can be used for recording class sessions or taking pictures form presentation slides or the board. Since tablets are hand-held devices, it is easy to use their camera for such purposes as opposed to laptops.

Better reading: the screens of most tablets are designed to provide a better reading experience. Electronic paper and electronic ink used in some tablets and e-readers provide a reading experience similar to that of ordinary paper in terms of reflecting light. This makes reading easier in different degrees of natural or artificial light.

Also, since tablets are more mobile and are hand-held devices, they are more appropriate for reading, because one can easily take them around and hold them in different directions or read on them while standing. The interactive e-books designed for tablets also provide a very rich, interactive, and pleasurable reading experience.

Advantages of laptop computers

More powerful processors: laptop computers have more powerful processors. This makes them more functional for tasks and activities that require professional software and programs.

Better keyboard: keyboards of laptop computers are more suitable for typing compared to the virtual keyboard of tablet computers. They are especially more convenient when it comes to longer writing projects such as term papers. It is not convenient at all for instance to write a chapter of a thesis using a tablet. The virtual keyboards are small

with a higher chance of mistyping. Tablets are more appropriate for shorter writing tasks such as emails or instant messages.

More software: due to their more powerful processors and better environment for larger and long term projects, there are more professional software packages available for laptop computers.

Tablets and Smartphones

Tablets and Smartphones have a lot in common. Both of them are mobile and portable, have a touchscreen, are interactive, and support many applications. They both can connect to the Wi-Fi and therefore can be used to access email, online course material, social media sites, or to make video or audio conferencing.

Some believe tablets are the extension of Smartphones, with larger screens and without calling abilities (Fender & Wolfley, 2014; "Talk Tablets," n.d.). Yet tablets are much more useful in educational rather than Smartphones. It is mainly the larger screen that enhances tablets' usefulness to a great degree (Fender & Wolfley). Also, tablets have almost all the features and advantages of Smartphones with the one exception of phone call ability. Bellow I will discuss advantages of each device more specifically.

Advantages of Tablets

Larger screens, better reading, better surfing: the small screen of Smartphones makes reading, surfing and using some applications difficult. Tablets have a larger screen that

solves this problem. Unlike Smartphones, tablets are very suitable for reading purposes. It is also much easier and more convenient to surf the Web using tablets rather than Smartphones. Using educational apps, writing emails, or taking quizzes is also much more convenient with a tablet computer rather than a Smartphone.

Larger keyboards: tablets have a larger virtual keyboard compared to Smartphones. This makes typing with them much easier and reduces the chance of mistyping.

Advantages of Smartphones

More portable: Smartphones are smaller than tablets and are therefore more portable. They fit in the pocket easily, and are also lighter.

Call Ability: Smartphones are basically phones with added features. Tablets lack this ability of making phone calls. However, when connected to Wi-Fi, they can be used for video or audio conferencing with applications such as Skype, Viber, or Facetime.

Phone calls are not generally used for educational purposes. Therefore this capability of Smartphones is not a real advantage from the educational point of view.

Data plans: Smartphones usually have a data plan which keeps them connected to the Internet in lack of a Wi-Fi access. However, there are data plans available for some tablets as well that can be purchased.

Tablets and Books

Obviously tablets as computers offer many features that are not available in books. In the context of this study, I limit the comparison of tablets and books to those aspects that are related to reading.

Advantages of tablets

Backlit screens: tablets have backlit screens; therefore there will be no need for external sources of light at night or in dark places during the day when reading. One can read a book on a tablet sitting in the park at night for example, without having to look for sources of light.

Zoomable screens: Most tablets have a zoomable screen that works by using fingers. This gives the reader the possibility to easily make the font larger and more readable.

Storage capacity: Storage has always been an issue with paper books and print material because they are bulky and take a lot of space. It is also difficult to organize these materials sometimes. On the other hand, one can download and store many e-books and digital material on a tablet computer, and there will be no need to worry about organizing and storage issues.

Portability: Tablets are small and light and therefore it is very easy to carry them to school or elsewhere. One could have many digital books saved on a tablet and carry the

tablet everywhere, while carrying several print books is difficult due to their weight and bulk.

Searchability: Many digital books have a search function which allows users to search for specific content, while with print books it is difficult to look for specific words or sentences in the text. When it comes to using a dictionary, it is much faster and easier to look up words in digital dictionary apps installed on the tablet rather than using a paper dictionary.

Damage resistance: Books are made of paper and paper gets torn and damaged easily. Paper books might get torn or some of their pages might get lost. This would not happen with tablets. Though, tablets can break as well and as a result one can lose the books and reading material saved on them. But the risk of tablets getting damaged is smaller than books. Also with cloud computing, the material saved on the tablet can be synced to other personal devices such as laptops or home computers.

Interactive features: e-book apps available for tablets have many interactive features that make reading more pleasurable. Many of these e-books are equipped with read-to-me features, interactive images, videos, built-in quizzes, etc. This makes the process of reading and learning more enjoyable and interactive.

Cheaper books: e-books are more affordable for students. Paper books cost an average of $65 per book, while iBooks for example cost and average of $14.99 per book. This saves students a lot of money (“Graduating,” n.d.).

Popularity among students: Tablets are more favoured by students for reading purposes compared to textbooks. Three out of four students in North America prefer tablets over paper books ("Graduating," n.d.).

Advantages of books

Easier on eyes: Reading paper books could be less harmful or tiring for the eyes compared to reading on screen due to the screen' backlit display. Yet the invention of electronic paper and electronic ink which mimic the look of regular ink and paper has improved the reading experience on some tablets and e-readers ("Electronic paper," n.d.).

Preference by some users: Despite the growing sales of e-books in the past decade, many users still prefer to read paper books. This is usually caused by an emotional attachment to the paper books, as the concept of book has been tied to the smell and touch of paper books for many people. Yet, this is a general reader preference, and as I mentioned earlier, tablets are more favoured among students for reading purposes ("Graduating," n.d.).

To compare print books with e-books, many users prefer print books over e-books because they can directly interact with them, for example take notes, underline or highlight text. Some users do not like the space between themselves and the e-book on the screen. Some other users prefer paper books to e-books because they can carry them around, for instance read them in the bed, or hold them in different directions.

Tablets have solved these issues to a great degree. Much of the problems and dislikes for e-books are the case with e-books read on a desktop or laptop computer. Like books, tablets provide an easy and direct interaction with the reading material. Their touchscreen makes it possible for users to interact with the book directly and easily. It is possible and easy to take notes, or highlight or underline text in a tablet environment, and the interactive features of tablets add more pleasure to this. The distance between the user and the device is eliminated. Tablets can also be carried around easily, and held in hands vertically or horizontally.

Tablets are a useful technology for education, and are a more comprehensive technology and a better tool compared to laptops, Smartphones, and paper books.

CONCLUSION

Educational technology is an inseparable part of modern day education. It facilitates teaching and learning, increases student engagement and participation, and the appropriate implementation of it enhances and elevates student achievement. A major practice of technology integration in education is through mobile learning. Mobile learning allows for anytime and anywhere learning through use of mobile devices such as Smartphones and tablets. Due to its convenience, mobile learning has found significant importance in education, in particular higher education. One of the most useful mobile devices in education is the tablet computer.

In this thesis I studied and reviewed the benefits of educational technology implementation, with a focus on tablet computers in higher education. My conclusion from the performed research is that the tablet computer is a promising technology for higher education. It has many advantages and benefits for education and offers many opportunities for teaching and learning. It facilitates teaching and learning and increases student motivation and engagement.

Among the major electronic mobile devices, tablets are the most useful and most convenient device for educational purposes. Tablets are perfect devices for blended learning. They include almost all the advantages of mobile learning and blended learning, and are convenient for distance education. They are interactive and support many amazing apps and features. They are also perfect devices for reading. Their touch interface eliminates the space between the user and the material and provides a great and convenient reading experience.

Furthermore, much of the criticism of mobile learning and mobile devices does not apply to tablet computers. They have the longest battery life among electronic mobile devices, and are more suitable for educational purposes. They can be used both as a mobile device for anytime and anywhere learning, and inside the classroom. Tablets have a larger screen compared to Smartphones, they are lighter and more mobile compared to laptop computers, and are more useful and provide many features and usages as a single object compared to print books.

In this study I also looked at the criticism of technology and tablets in education. Some critics believe that implementation of tablets and technology in education does not necessarily increase student achievement. Yet it does not decrease student achievement either. The current research regarding the effects of tablets on student learning and achievement in higher education is at an early stage. Therefore there are contradictory opinions regarding it and it is difficult to make clear statements in that regards. Yet most researchers agree that tablets facilitate teaching and learning and increase student motivation and engagement.

In order to maximize the benefits of tablets in education it is necessary to build a structured pedagogical approach for tablet use. For a successful implementation of technology, it must be used in an efficient way. It is important to implement the most effective ways for using tablets based on the recourses of institutions and needs of learners in order to obtain the best results. This requires careful evaluation of circumstances. In order to have a strategic plan for implementing tablets in higher education many factors should be considered. For example, to implement tablets in University of Alberta face-to-face classrooms, we might look at several important criteria.

Budget is a very important criterion. The university should have a detailed plan for how much funds they would be able to dedicate for this project and for how long they can continue this funding.

They also need to find out how many students have access to a tablet and whether or not the university should provide tablets to all students, or have them share devices with one another.

The university should have a clear idea about which programs or what courses they want to implement tablets in. They need to plan closely with course designers, curriculum developers, and instructors to decide about the specific uses of tablets that they have in mind.

The university should also plan for proper, sufficient, and ongoing professional development available to both instructors and students, and raise the awareness about the benefits of this technology in education.

They would also need to plan for future upgrades and replacement of the devices. Apps and software purchases and downloads and system updates should be planned for as well.

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