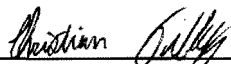Teacher use of Educational Technology and Factors Affecting its Implementation

Senior Project

In partial fulfillment of the requirements for
The Esther G. Maynor Honors College
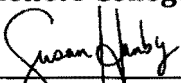University of North Carolina at Pembroke

By

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April 13, 2019

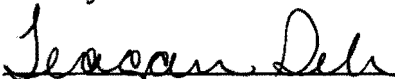Christian Tilley
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5-1- 2019
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Acknowledgements

I would like to take this opportunity to thank my advisor for this senior project, Susan Hanby. She made herself available and was willing to work around my schedule when issues arose. Her help was crucial in setting off in the correct direction with my research for this project and without her I am unsure as to whether it would've been completed.

Secondly, I would like to thank another professor who helped with the research of this topic, James Smiling. His expertise and interest in the topic of educational technology was invaluable as I started exploring this topic more in-depth.

Finally, Dr. Teagan Decker made sure this project stayed on track and provided me ample opportunities to ask questions. She was accommodating to my academic situation and made sure everything was going as planned, for that I am thankful.

Abstract

This paper will provide an analysis of educational technology, how it is used in the

21st century classroom, and what factors are affecting its proper use and

implementation. This will be accomplished by defining the various terms associated

with the topic, providing an in-depth look at how each content area uses technology,

and analyzing the statistics and benefits of educational technology. This paper will

also examine the various teacher opinions and beliefs, both positive and negative,

that affect educational technology's long-term success and implementation.

Keywords: educational technology, teacher opinions, 21st century classroom,

one-to-one policy, bring your own device, interactive whiteboard, laptop, computer.

Teacher use of Educational Technology and Factors Affecting its Implementation

What is Educational Technology?

If a person were to walk into today's modern classroom, they would most likely notice an abundance of technology being used by both teachers and students alike. The teachers may use their computers to present a lesson while writing on an interactive whiteboard (IWB). The students could be following along or taking notes on their school-provided laptops. These described situations all showcase how educational technology might be used in the modern classroom. As the usage and availability of educational technology continue to raise these situations have not only become more commonplace, they have become the norm.

In order to further explore this topic, it is important to understand what defines educational technology. As a broad definition educational technology is the implementation of various materials to improve teaching and learning. It should be stated that educational technology's primary function is to enhance education. This means that the educator should put the educational experience first, not the use or implementation of technology. If educational technology is the primary focus the quality or intended goal of the teaching could be reduced. Educational technology, also known as instructional technology, can be separated into three different categories including equipment, programs and software, and multimedia (Kurt, 2015).

Educational technology that falls into the equipment group could include items such as LCD projectors, personal computers, document cameras, and, most notably, IWBs (Kurt, 2015). An IWB can best be described as a "large, touch-

sensitive computerized display" (Wighting, Lucking, & Chrismann, 2007, p. 80).

Teachers can use these IWBs like regular whiteboards by using a stylus to write on

the board directly. And due to the IWBs large size and visual clarity, teachers will

generally display information, such as programs or videos, on the IWB. Because the

computer can be operated from the IWB this gives the teacher the ability to directly

manipulate the information by utilizing the touch-sensitivity of the whiteboard. Due

to its general purpose and adaptability, this piece of educational technology is

commonly used throughout every content area (Wighting et al., 2007).

Educational technology within the programs and software grouping includes

items such as electronic manipulatives, computer-based practice and tutorials, and

electronic instruction. The last group of educational technology, multimedia,

includes video and audio presentations and graphical representations (Kurt, 2015).

An example of these types of educational technologies being put into practice can be

found at a United States university. At this university, the mathematics department

consolidated their course materials into videos, audio podcasts, and online practice

resources. The faculty of the mathematics department intended the resources as a

supplement to the in-class lessons and materials. This intention goes back to

educational technology's primary purpose, enhancing the educational experience

(Mirani & Ramon, 2015).

How is Educational Technology Used?

Educational technology use varies between the different content areas and

can be used generally or content specifically. Sometimes educational technology is

used to present information or allow for activities that would otherwise take too

much time without it. Other times, technology is used to make course content more interactive and engaging which affords students a unique experience. Using the mathematics department situation mentioned above the distinction between general and content specific technology can be seen. The individual components that make up the educational technology, the videos and audio podcasts, can be viewed as general as they are not unique to mathematics. Once the teacher uses educational technology to supplement mathematics instruction it becomes content specific, in this case the electronic study resources used by the students (Mirani & Ramon, 2015).

In a science classroom in Australia a teacher used educational technology in a unique way. The teacher of this classroom had taken their course and modified it to introduce something known as gamification. Gamification refers to the process of adding elements of games to non-game related activities, in this case the classwork. The primary goal of this gamification was to motivate students to complete extra coursework related to science. The teacher provided students with a "level-up" card where they could earn stars for every assignment completed, this leveling up served to motivate the students. By introducing this form of educational technology, the teacher saw a 17% increase in additional coursework completion (Barlow & Fleming, 2016).

Another instance of educational technology use can be found in the subject of mathematics. The educational technology in this situation includes a variety of programs and applications specifically used to teach mathematics. These programs include things such as Cabri, Derive, Graphic Calculus, and GeoGebra. Although the

uses in these programs varies, one common theme is the ability to present a mathematics concept visually. As a further example of this idea, the Cabri program can be used to visually represent and explain the Pythagorean Theorem. By using Cabri, students can gain an in-depth understanding of the Pythagorean Theorem by seeing and relating the area of squares to this theorem. This allows the teachers to have more options in how they approach the teaching of a new concept (Kaleli-Yilmaz, 2015).

Statistics About Educational Technology

Educational technology is effective when it is properly implemented and available for use by students and educators alike. By viewing the statistics presented by the Department of Education it can give a general idea of who has access to the necessary components to use technology. In the following statistics it can be found that 85% of children aged 3 to 18 had access to computers in 2015. Internet access also plays a large role in technology use, in 2015 78% had access to high-speed internet and 67% had access to some form of mobile internet service. The educational benefit of having access to a computer at home can be seen when viewing reading scores of 8th graders. Using the National Assessment of Educational Progress's reading scale there was a 7% increase for the average score between students who had access to a computer and those that did not (Snyder, 2018).

Another set of statistics can be found from teacher access and use of educational technology within their classroom. To start off, 97% of teachers reported that they had access to one or more computers within their classrooms and 40% stated that they used the computers often during their instructional time.

Utilizing programs, such as Word, Excel, or PowerPoint, for educational and administrative purposes are essential to educators. Regarding this point, 92% of teachers used Word, 61% utilized Excel spreadsheets in some capacity, and 63% made presentations using PowerPoint. Due to the large amount of information the internet can offer 94% of teachers incorporated it into their classroom (Gray, Thomas, & Lewis, 2010).

Factors Affecting its Implementation

Although educational technology has become more common there are many reasons and factors that affect its use or implementation in the classroom. One major reason that affects educational technology implementation is teacher opinions and perceptions about it. Some teachers do not see the benefit in integrating technology into their lessons. They may not understand how technology can be used to teach their content area regardless of their opinions (Kaleli-Yilmaz, 2015). Another teacher mindset is being unwilling to change or add new ideas to lessons. This can be due to the extra effort it requires to learn new technology, or they believe that their current methods are as effective as those that implement technology (Kadel, 2005). Similarly, some teachers believe that the use of technology is too large of a time investment for the enhancement it can bring. It can take time to prepare lessons and instructional time will have to be wasted teaching students how to properly use the educational technology (Kaleli-Yilmaz, 2015).

Another set of factors that play a role in educational technology's use are those that relate to availability. In a study completed in 2016, researchers found that 80% of teachers let the availability and amount of technology decide whether they

used technology in their lessons (Carver, 2016). Something closely related to availability are problems with the technology itself. Some teachers found that technology was unreliable, such as computers freezing when they were needed. This then requires teachers to change their lessons part-way through if the technology required is unavailable for a technical reason (Kaleli-Yilmaz, 2015). Similarly, high-speed internet access may not be available to the students and teachers. One pre-service teacher described an instance where their students were going online for the lesson, this caused the internet to slow down to an unusable point. Due to the problems with the internet the teacher had to use a backup lesson that did not use technology (Herron, 2010).

One final factor that many teachers state for their nonuse of educational technology is the unfamiliarity and lack of training they have with technology. There can be two reasons for this lack of training, it is either not provided or too large of a time investment is required to effectively learn and use technology. When learning a new technology, it can take a personal time investment that goes on outside of regular classroom hours, something that many teachers are unwilling to partake in (Kadel, 2005). Being unfamiliar with technology can also increase the time it takes to prepare lessons that use it, this is an issue due to the speed in which teaching takes place (Kaleli-Yilmaz, 2015). Some teachers do not receive the necessary training or exposure to educational technology due to their experience and time teaching. Newer teachers generally receive training with different types of technology during their time at university. This means that newer teachers are more

inclined to use technology provided to them (Afshari, Bakar, Luan, Samah, & Fooi, 2009).

Conclusion

By viewing the statistics about educational technology use we can see that teachers have realized the benefits it can provide in their classrooms. Despite the various issues and problems that exist preventing the implementation of educational technology there have been attempts to remedy the problems. Schools have invested more heavily in educational technology for their teachers and have attempted to offer more in-depth training. The issue of computer availability is being tackled through some unique initiatives and policies. As an example, there is the One-to-One policy and the Bring Your Own Device Initiative (Chen, Lim, & Tan, 2011; Parson & Adhikari, 2016). Along with the shift to a more technology focused education for pre-service teachers, educational technology will continue to play a large roll in the modern educational experience.

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