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A Review of the Use of Online Curriculum Including Electronic Textbooks

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A Review of the Use of Online Curriculum Including Electronic Textbooks

by

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Chapter 1: Introduction

Purpose of the Study

There have always been different trends in education. Teachers employ best practice methods to learn about new ways to get content across to their students, new tools to use, and new ways to keep the students in their classroom enthusiastic about their learning. This is evident in the number of workshops and professional development opportunities that can be found in education today.

One of the driving forces behind professional development today is the use of technology in the classroom. Starting in the late 1990s, computer-based technology started to seep into classrooms in an ever expanding fashion. This expansion was not uniform; some teachers embraced the change, some were ambivalent toward it, and others fought against it. Bit by bit, however, technology has and is still expanding into all facets of the classroom (Braun & Joseph, 1999). The use of technology in classrooms has come from the early days of things like smart searching of the web, e-mail, and web quests being presented as great news tools for education (Braun & Joseph, 1999) to the use of social media, digital movie creation, and entire student learning platforms like Edmodo.

This revolutionary change has also affected how students are issued information in the classroom. Publishing companies are offering use of a digital textbook, also called an e-textbook, instead of a traditional textbook as a new tool to offer more interactivity for students. We are only at the beginning of e-textbooks offering a vastly different type of classroom. From e-textbooks, schools have embraced video as a way disseminate information on concepts, and are even going so far as to have entire classes in a virtual setting (Clicking on a New Chapter, 2009).

This change toward a more interactive classroom centers around a virtual textbook. With these dramatic changes comes the responsibility to figure out how to best serve the student. Educators do not want to embrace technology for technology's sake. Instead, educators need to use technological advances as a tool to enhance the learning of our students.

The Flourishing of Electronic Textbooks

E-textbooks are becoming an explosive force in interactivity in education. This is especially seen in the higher education market. According to a 2011 article, in the coming years 25% of new textbooks purchased will be digital (Reynolds, 2011). Also included in the article are discussions about the growth of several e-book companies, including Barnes and Noble NOOKstudy and Google's eBooks. The inclusion of such huge companies in the textbook world symbolizes the allure of the e-textbook market (Reynolds, 2011).

But the e-textbook change is not only being found in higher education. In South Korea, digital textbooks will be available for use in all subjects to students in elementary, middle, and high school (Seomun et al., 2013). As of 2011, in grades 4, 5, and 6, students were using digital textbooks up to 12 hours per week for the schools that were using them (Seomun et al., 2013).

With the move toward a more interactive digital curriculum, studies need to be done to see how effective not only e-textbooks are versus traditional textbooks, but also, how effective are all types of online curriculum. Also, studies need to be done to figure out where changes can be seen between traditional and digital curriculum, and how digital curriculum can be implemented in a fashion to most enhance the learning of students. The overall question is what benefits can come from a digital curriculum and the use of electronic textbooks, and how do educators use them to best impact learning in their classroom.

This study seeks to review the use of technology integrated curriculum, including digital textbooks, in the classroom and make recommendations about benefits and drawbacks. First, there is a review of the use of multimedia and technology in the classroom. This is to show the continuum that has developed from using multimedia, to using basic technology, to having multiple digital tools at the ready to enhance the curriculum. The study then describes, in greater detail, different tools of online curriculum and digital textbooks, their advantages and disadvantages, and recommendations for their best use.

Definition of Terms

Technology: For the purposes of this study, “technology” will refer to digital devices for student use, such as computers, tablets, cell phones, Chromebooks, etc.

Electronic textbook (e-textbook): a digitized or electronic form of a textbook, usually accessed through an internet connection (Lee, Messom, & Yau, 2013).

Digital textbook: used interchangeably with e-textbook.

Online curriculum: curriculum that is partly or entirely accessed through the internet.

Computer assisted learning (CAL): programs that can be used on the computer to aid in student concept mastery (Griff & Matter, 2013).

Multimedia: the combination of text, audio, and video with a computer (Fan & Orey, 2001)

Technology integration: the use of technology programs in a curriculum

Project-based learning (PBL): a curriculum that bases the learning focus on a student centered learning by doing approach, instead of a teacher focused learning by telling approach (Liu & Hsiao, 2002)

Traditional curriculum: a curriculum-based on using a paper textbook as the main source of information and resource for the curriculum (Kingsley & Boone, 2008)

Electronic voting system: a response system that allows for an educator to present information, ask a question, have the students respond via hand-held device (or their own portable digital device), and collect the responses (Kennedy & Cutts, 2005)

Adaptive learning system: a computer system that asks students questions, and, based on their answers, assesses what students have mastered and what they need to continue to study more (Griff & Matter, 2013).

Chapter 2: Literature Review

Technology in the Classroom

Ever since the late 1970s, computers have had a place in Education (Fan & Orey, 2001). Many teachers and others in the educational field have been working on how to best use these tools to help grow student achievement since then. Until the last 10 to 15 years, computers have been used for “drill and practice, educational games, and for teaching students about computers themselves” (Fan & Orey, 2001 p. 1). Computers and other technologies have more recently completely changed into tools that can be used in the classroom to transform instruction and student interaction with the content, essentially becoming better intellectual tools (Fan & Orey, 2001). The more a teacher is using these tools in the classroom, the more their students will do well (Hakverdi-Can & Dana, 2012).

Many teachers are using technologies now that allow them to retrieve information, create presentations, create video or audio, and to run simulations. According to Hakverdi-Can and Dana (2012), there is a high correlation between teachers that use these tools in their classrooms and their students that use them. In order for students to get the best use of technology in the classroom, teachers have to be able to be confident enough to use it as well.

An online curriculum including electronic textbooks includes three main pieces: the use of an online textbook, the use of digital tools in a curriculum, and also multimedia. This study reviews all three, starting with multimedia in the classroom. Multimedia is the basis for an online curriculum and a review of best practices for its use is a first step in reviewing a more complete curriculum infused with technology.

The Importance of Multimedia in the Classroom

Multimedia is often the jumping off point for bringing more technology into the classroom. Technology starts with video and audio supplemental materials for the curriculum, and usually branches from there to a teacher using the internet to find information, creating presentations using different software or web-based apps, digital cameras and simulations (Hakverdi-Can & Dana, 2012). These newer technologies require the skills learned by teachers first figuring out how to teach with different types of multimedia. Bringing in a video or an audio clip to enhance learning is the first step to teaching with multiple technological tools to supplement the concepts that are already presented by the textbook. Many of the teachers that are best reaching their students tend to have the capability to use multiple types of multimedia in their instruction and are doing so often (Hakverdi-Can & Dana, 2012). Even the most basic of technology skills can help a teacher to define concepts differently for different students, thus intensifying the chance that students will gain a complete understanding of the concept.

Using multimedia tools in the classroom can often lead to a better understanding of concepts. However, multimedia and technology by itself, without strong instruction, does not automatically translate into better understanding for students. It is up to the teacher how a teacher uses technology and multimedia in the classroom and why are very important factors as to how well the tools will impact the students (Thomas et al., 2012). If a teacher has the skills to use different types of multimedia in the classroom and chooses not to, the students will generally not use the skills they have learned either. Technology programs featuring multimedia that are implemented with clear direction and teachers that are taught the skills to implement the technology effectively can have significant impacts on scores (Thomas et al., 2012). Thomas

et al. found that instruction that featured multimedia resulted in students being able to utilize higher order thinking skills to frame and generate questions that were based on real world scenarios, not generic situations often found in textbooks (Thomas et al., 2012). Also, when the teacher utilized multimedia tools to create a recording of a lecture, the learner could then control what they listened to and when, and could apply the information learned to different situations. They were not limited to what they remembered from the lecture being spoken (Thomas et al., 2012). The study also concluded that multimedia can be a great way for teachers to differentiate what they are learning through their professional development. This differentiation can lead to teachers becoming more proficient with different multimedia tools that best suit their current skills. They would then apply these skills to their classes. Different teachers would use different styles to master the multimedia tools, so differentiation in professional development was a big benefit for the teachers as well (Thomas et al., 2012). Multimedia can be an avenue to greater concept mastery, but the teacher still needs to learn the tool and implement it effectively and enthusiastically for it to work.

Multimedia can also be the basis for different types of learning that focus on higher order learning skills. Project-based learning is a type of instruction that moves the focus of the curriculum from the teacher presenting the information to the students for them to absorb, to more of a student centered, learning by doing approach (Liu & Hsiao, 2002). Multimedia, especially in a Social Studies classroom, can bring a whole new element to project-based learning (PBL), allowing for the curriculum to really reach new levels of higher order thinking in the students. Students already have great access to multimedia in their lives, especially through the different technologies available today. Understanding that multimedia is also used as a

learning tool is important for students. This can be done through PBL based in multimedia (Liu, Hsiao, 2002). Through their study working with middle school students creating a multimedia project, Liu and Hsiao have shown that by creating this multimedia project the students were encouraged to become “independent learners, good problem-solvers, and effective decision makers” (Liu & Hsiao, 2002, p. 333). These are great skills for middle school students to have, and can be very difficult to achieve through a more traditional textbook based curriculum. The students also saw gains in their ability to work with peers in a structured environment where they have to meet deadlines and solve conflicts (Liu & Hsiao, 2002). These are also great skills for students to acquire, for working with peers is an essential skill needed in higher education and many jobs. PBL in the Social Studies classroom is important, but PBL based in multimedia helps to keep the students’ interest better than other non-multimedia based curriculum (Liu & Hsiao, 2002).

Multimedia and PBL can come together very well in a history classroom in particular. PBL based with multimedia can help foster important skills in history, such as historical analysis and interpretation (Hernandez-Ramos & De La Paz, 2009). When used effectively, students are able to take the multimedia they consume in class, analyze and interpret it, then create their own type of multimedia presentation showing understanding of the concept (Hernandez-Ramos & De La Paz, 2009). This is absolutely what the goal of a history curriculum should be, and it can be much more difficult for students to show this type of analysis and interpretation through a traditional textbook curriculum. Hernandez-Ramos and De La Paz studied the skills middle school students in an eighth grade history classroom developed as they completed a multimedia based PBL unit on westward movement, and compared that to a traditional textbook centered

curriculum teaching the same information. The authors reported “greater knowledge gains after instruction (for the experiment group) than students in the contrasting group” (Hernandez-Ramos & De La Paz, 2009 p. 167). The authors also found that those in the experiment group had a more positive outlook on learning history and social studies, and on working with others (Hernandez-Ramos & De La Paz, 2009). Any type of curriculum that affects student buy in to the subject and also raises attitudes about working with others is a worthwhile curriculum. PBL based in multimedia often does that.

Multimedia can also be used more traditionally as a supplemental support to the textbook, although with new technology this supplemental role can be much more interactive. When a supplemental program is multimedia-based, it becomes more interactive. The combination of text, pictures, animation, and sound all help to present a well-rounded understanding of concepts (Kingsley & Boone, 2006). Students are able to learn about a concept from many different viewpoints when multimedia is used. This is the main benefit of multimedia, and when that multimedia becomes interactive with the use of technology, the highest benefits to students can be seen (Kingsley & Boone, 2006). Kingsley and Boone pointed out that a supplemental multimedia program used in an American History class did boost scores on a posttest over a pretest more than traditional textbook-centered curriculum, but that other factors were in play as well. Their results showed that a multimedia-based supplemental program can be useful, but it is also important to implement the technology effectively for the best results (Kingsley & Boone, 2006). That finding is essential to the whole purpose of this study, that technology can improve on scores, but only if it is done effectively and completely.

After reviewing the best practices for multimedia in the classroom and its benefits, the study reviews best practices for the use of digital tools in a curriculum, also referred to as online curriculum. Multimedia is an important part of an online curriculum, and digital tools give students more access to it. A review of the best practices for online curriculum shows how students can benefit from the use of not only the tools themselves, but also how they can be used to expand the number of instances that students can access multimedia and benefit from it. A review also shows how online curriculum tools allow for students to more readily use critical thinking skills.

Online Curriculum Implementation

The benefits of multimedia built into a curriculum are well documented, as detailed earlier. As technology has progressed, many educators have been able to take multimedia and expand upon it, moving more and more of their curriculum online, using web based programs as either supplemental materials to the class or moving their entire curriculum online. This could include using the internet or software to augment what is happening in a traditional classroom, such as using webquests to review concepts or using a response system to check for understanding. There are many different ways that an online curriculum could be implemented, and many more ways are being created with the advent of web-based applications for presentation, assessment, or organization. Below I identify three ways that an online curriculum has been studied as well as the benefits and detriments of each.

In a traditional textbook-based classroom, an educator wanting to get feedback on whether or not their students were understanding a concept would have to ask them the question aloud and gather responses, or have to give them an assessment and then correct them later. If

they wanted the feedback immediately, the students would have to correct the assessment. These ways always lead to easy opportunities for cheating, answering what someone else has answered, or were not time effective in getting a quick check of a concept. With online voting systems, however, technology has changed this. Educators can now pose a question to students and have them answer either using their cell phones or a different portable digital device. The feedback is automatic, there is less of a chance of cheating, and usually no one else knows how others are answering until the results appear. Often times the results appear graphically and can be projected to the students, giving them a great visual to see how the answers are spread out among the options (Kennedy & Cutts, 2005). This is a great way for the educator to get instant formative assessment data. It allows the educator to see if the students are right on track with understanding the concept, or if more instruction is needed. The questions can also be tailored to be specific to divide out different parts of a concept, showing the educator very detailed information about where more instruction is needed and where mastery has been achieved. To be most effective, however, these systems need to be used regularly and be used to modify the curriculum as the learners are providing their feedback (Kennedy & Cutts, 2005). Kennedy and Cutts found that students who were always responding incorrectly to the questions presented by the educator through the voting system did not perform well on assessments of the concepts, and those that responded correctly most of the time to the questions posed did well on the assessments (Kennedy & Cutts, 2005). It was detailed by the researchers that the lecturer did not allow for students to answer more than once to a question, and did not allow for student discussion of the question (Kennedy & Cutts, 2005). This goes against the idea that the voting system is to be used for feedback, both to the educator and the student. That feedback should

then be used to either change the track of the curriculum (the educator reviews concepts not fully mastered), or the student should actively seek out help in reviewing the concepts not mastered. The authors discussed that if the educator would have asked a question and received responses, then allowed for student discussion, and then asked the same question again, the students with the wrong answers may have learned from their peers and gotten the correct answer (Kennedy & Cutts, 2005).

As learner response systems can be ineffective, it is important that teachers be taught how to use them according to best practice methods. For this reason, it has been found beneficial to include the use of a response system in the teaching of pre-service teachers. Since undergraduate education classes can often have a high number of students, a response system allows for students to get instant feedback much easier than any other way (Campbell & Monk, 2015). The use of a response system allows for students to think about what they are learning and apply it during the lecture or class activity. This application allows for better engagement by the student and better learning (Campbell & Monk, 2015). If pre-service teachers see the positive results of a learner response system, they will generally be more likely to use them in their own classrooms.

When using a learner response system, it is important to note that the more times that the system is used, the more opportunities there are for feedback, and the more engagement an educator can have by students. The opposite is also true. The fewer times the system is used, the less comfortable the students will be with the system, and the less engagement an educator will see (Schnorr, Freeman-Green & Test, 2016). More feedback can also lead to a better relationship between student and teacher, as the teacher is more in tune with what the students

know, and the students are getting much more feedback about what they know. When students are aware of their own learning, they generally are much more likely to see what they need to study more of and have better use of their time (Schnorr et al., 2016). Students that are aware of their learning need to spend less time outside of class working to prepare for quizzes and tests. They are more confident in what they know since they have been getting feedback all throughout the classes (Chui, Martin, & Pike, 2013). Students can focus on what they do not know and prepare for that, instead of being unsure for the quiz and preparing by studying everything. It is important that the feedback be meaningful, and also that the teacher allow for students to work with the feedback they receive. Otherwise, the effectiveness of a learner response system is short-lived (Chui et al., 2013).

Student response systems are usually only going to see results if teachers know how to use them according to best practice methods. Those teachers that have been trained on how to use them are more likely to use them, and see them in a positive way. They are more likely to figure out different ways to use the technology. Generally, any good teacher is going to find ways to use formative assessment, but a teacher trained on a student response system is more likely to use it and be able to give instant feedback, and be able to give it quicker (Penuel, Boscardin, Masyn, & Crawford, 2007). Trained teachers can find different ways to use the systems, either to promote learning before instruction or to assess learning after instruction. Teachers that become comfortable with one technology may become more likely to seek out training on other technologies, and try to find new ways to use technologies to support the curriculum (Penuel et al., 2007).

As students use technology over time, a certain wear-down can set in. This can be seen especially in doing the same activity over and over again, or if the activity is seen as being too hard or complicated. Students get the most engagement out of a technology-infused curriculum that is easy to use and is seen as being valuable over time. Students usually catch on when a teacher is just using technology for technology's sake; when it is not the best way to complete an activity or to get a point across. Generally teachers do not see the burn-out factor with gaming that they see in other technology programs (Wang, 2015). There is definitely a fine line with gaming, however. It needs to be difficult enough to push students to keep going without getting bored, yet not so difficult that it keeps students from getting engaged. Competition games are usually great at keeping students engaged, even after being played several times over (Wang, 2015). The great thing about infusing gaming into a curriculum is that it often times will deepen understanding without the students even knowing it.

Advancing technology has allowed for a leap in gauging concept mastery (Griff & Matter, 2013). This advance in technology is called an adaptive learning system. The system asks students questions, and based on whether or not they got the answers correct, asks them new questions that may be more difficult or easier. This allows for the system to figure out what concepts have been mastered and what concepts need to be studied more (Griff & Matter, 2013). This technology is a great leap since it allows for students to get detailed information about where their strengths and weaknesses lay within a concept. When applied to testing (such as in the NWEA reading and math tests), this technology allows for students to know where they have mastered concepts and where they need to receive extra instruction. When coupled with an intervention type of curriculum system, this information can allow for targeted instruction to be

given to a student exactly where he or she needs it. Just as in the use of an electronic voting system, the use of an adaptive learning system is most effective when it is used according to best practice methods (Griff & Matter, 2013). When students are tasked with using the program and the parameters of program usage are not clearly laid out, there is no significant difference between using this system and using traditional textbook curriculum. Griff and Matter confirmed this with their study of six college anatomy and physiology classes from different universities. There were many variables that were not controlled such as who was teaching the course, how the professors assigned the usage of the program, and differences that come along with comparing a large number of educators who have their own styles of teaching (Griff & Matter, 2013). As is often seen, the students and educators who used the program voiced their positive opinions about the program through surveys collected by the researchers. Some described being more confident going into the tests that this program was designed to help, even though their scores did not show any improvement (Griff & Matter, 2013). Given the number of uncontrolled variables with this experiment, the mixed results are not surprising. The positive opinion about the program describes its greatest benefit, however. It gives students the confidence to know what they know, and know what they need to work on. In the hands of an educator and a school that is equipped to use these programs according to best practice methods, these types of programs can be successful (Griff & Matter, 2013).

In a middle school social studies classroom, authenticity has always been a goal (Swan & Hofer, 2013). Some of the best ways of teaching history and geography have been to “take the students there,” to give them learning experiences that help them to understand concepts on their own terms. Technology has expanded the ability of teachers to bring these experiences to the

students. One such example is a video documentary. Students are now able to research, tape, edit, and publish a video documentary (Swan & Hofer, 2013). This process engages the students in inquiry, historical thinking, analysis, and problem-solving skills. The process of making the documentary takes the students through many phases, each requiring higher order thinking skills. Without the online curriculum of the movie making program, making a documentary would not be as easy, and may not be done. In this case, the unit was almost completely done with web-based programs or applications (Swan & Hofer, 2013). The students who engaged in the making of the documentaries benefitted by having to show mastery of the concept through editing of the video, sound, interviews, and source citation (Swan & Hofer, 2013). Analysis and interpretation of historical evidence was shown as the students gained a deep understanding of their topic through the continued use of it with the movie program (Swan & Hofer, 2013). It is a type of culminating project that focuses almost entirely on higher-order thinking skills. It is also the type of project that takes a large amount of preparation and teaching of the skills by the educator. As with other online curriculum, if the curriculum is not presented effectively and with a clear goal, it probably will not be as successful.

As technology is becoming a larger part of student's lives outside of the classroom and they become more comfortable with all types of interactive tools, schools are increasingly finding ways to integrate it into their curriculum. Many teachers are finding that if they are able to integrate tech into their curriculum, students can become more engaged in what they are doing and learning increases (Shewmake, Merrie, & Calleja, 2015). This integration is starting to be developed in curriculums and disciplines that have traditionally been technology free, such as physical education (PE). PE teachers are starting to develop curriculum infused with technology

that follows their movement, such as the Nintendo Wii or the Xbox Kinect (Shewmake, et al., 2015). This technology may help some students participate that normally do not.

As discussed in the preceding paragraphs, online curriculum can be very successful in bringing out the higher order thinking skills sought after in the classroom. The success of the program, though, is usually affected by the educator that presents it and the student's ability to "buy in" to the program.

After reviewing both the best practices for the use of multimedia in the classroom and online curriculum tools and showing the benefits of each, the study reviews the use of an electronic textbook. An electronic textbook combines both aspects of an online curriculum tool and multimedia. As stated earlier, electronic textbooks are becoming a popular option for educators, and a review of best practices for them will show how they can connect multimedia tools for students with other online curriculum tools.

E-Textbook Implementation

As shown in the previous section, the use of supplemental multimedia has evolved into ever more complicated uses of technology and online curriculum. This can also be seen with the textbook. A textbook has gone from being a paper source of information, where there is very little actual interaction, to a digital format that has the capability to show video, slideshows, have shortcuts to media that provides a deeper understanding, and can change settings to help struggling readers.

The progression through the years of different materials used to enhance learning has gone from a simple multimedia approach to creating full projects using only online resources. Technology has now evolved to allow the use of digital textbooks, which are also called

electronic textbooks, or e-books. For the sake of continuity, I will be calling them digital textbooks throughout the rest of this study, though all three titles are interchangeable.

Technology has grown to the point that more and more students are going to a digital edition of their textbook online than to a traditional paper textbook (Sun, Flores, & Tanguma, 2012). The all-important multimedia that had to be accessed as supplemental materials 10 years ago now can be accessed through the book itself—with videos and interactivity increasingly being built right into the page layout. As with all new technology, however, educators have to make sure that the use of it is to aid in learning outcomes. Students can quickly become disenfranchised when technology is used just for the sake of using technology.

The study starts by reviewing the best practices for using digital textbooks as it is seen today, and follows that with a review on how digital textbooks are being used in elementary, secondary, and college settings; it also describes the benefits and problems seen at each level. As this is a new frontier of education, there was little in the way of peer reviewed studies at all levels. Some of the research articles discussed are empirical articles used to aid teachers in learning how to use these new tools.

Best Practices for the Use of a Digital Textbook

The majority of digital textbooks are just the traditional textbook in digital form (Lim & Hew, 2014). This represents the lowest level of merging technology into the classroom, a simple replacement of a paper source with an electronic one. As digital textbooks become more mainstream and more resources are being devoted to them, they are growing in interactivity. These new types of digital textbooks are allowing for more collaborative opportunities to share and also opportunities to annotate the book to customize the use of the student (Lim & Hew,

2014). With more interactivity can come better learning experiences. Collaboration allows for sharing of content; and a more personalized experience allows for better reflection and analysis by the student which leads to a better learning experience. Just reading the text online will not be any different for the student than reading the text out of a paper book. For the best use of a digital textbook, students should be allowed to use it reflectively and collaboratively. For this, digital textbooks may be best suited to those subjects that have a lot of open-ended discussion and reflective writing (Lim & Hew, 2014).

The biggest benefit of digital textbooks can be seen by their flexibility. Students can often use different settings so they can personalize their experience and suit the book to their reading style (Larson, 2015). This can mean having the text highlighted or having the ability to highlight text on their own, having the text read to them, or in some cases having the text changed to match their reading level. This allows for lower-level readers to get the same information as the rest of the class, often without the help of a personal aid. Lower readers are also helped by the fact that they can focus on the words on the page, instead of how many unread pages they have left (Lim, Hew, 2014). The interactivity of a digital textbook allows for students that used to have to leave the room when the class was reading, to stay in the room and still keep up.

With the expansion of digital textbooks, many students are beginning to recognize “text” as being more than just printed word, instead encompassing all kinds of multimedia. When students who are comfortable with digital books use an online text, they are often looking for the different settings that come along with them to make it a more personalized reading experience (Larson, 2010). As students become more and more used to digital textbooks, they are able to

manipulate the book through settings that allow them to go deeper in their learning. This creates greater engagement for the students, which leads to a better learning experience. Because of this, these multiple-use digital textbooks, which provide opportunities for better communication and information, should be embedded within reading programs, as well as programs which would benefit from a text that provides a deeper reading experience (Larson, 2010).

Digital Textbooks at the Elementary Level

At the elementary level, educators usually have the benefit of students being more malleable and not quite so set in how they want to gain their information. Also, at this level, students are still usually excited about learning and also excited about using something new (De Oliveira, Camacho, Gisbert, 2013). For those reasons, educators at this level can have a great benefit in using digital textbooks. The students studied readily dove in to using the textbooks, stating after the study that they preferred using them to traditional textbooks (De Oliveira et al., 2013). The use of the digital textbooks and the multimedia found in them allowed for the educator to become more of a guide in the classroom, instead of the main source of information. This allowed the educator to move about the classroom more freely and to help with student learning on a more one-on-one basis (De Oliveira et al., 2013). As we have seen with PBL, it is favorable when the teacher can become more of a guide to a student's own learning instead of dispensing information. The educators that used the digital textbook also generally liked the tool, though they were discouraged at the limited amount of information it held (Oliveira et al., 2013). At this level, students who have teachers that implement a digital textbook according to best practice methods should see the use of it grow certain skills, such as peer to peer communication and active learning (De Oliveira et al., 2013).

Digital textbooks are starting to be used in all of the different disciplines. Classes that may have a hard time using a traditional textbook are starting to see the benefits of a fully implemented digital curriculum. To truly see the benefit, students need to be able to interact with the digital textbook in some way (Elmetwaly & Mabrouk, 2014). Digital textbooks have all the information that students can get from a traditional textbook, with expanded options. Digital textbooks allow for more interactivity with information, which is useful for students to explore deeper into the information and enhance curiosity, something that is critical for students at the elementary age. This is the most useful, however, when the entire curriculum is enhanced digitally, not just a small part of it (Elmetwaly & Mabrouk, 2014).

Digital textbooks can also be used to engage students in higher-order thinking skills when they create their own digital textbooks. With programs such as iBook, students can research content, design, develop, and publish their own digital textbook (Encheff, 2013). Students completing this particular task demonstrated better writing in multiple ways: “better organization and connection of ideas, increased use of academic vocabulary, and an increased use of clarifying details and analogies” (Encheff, 2013, p. 61). Content knowledge was also improved (Encheff, 2013). This process involved a lot of teacher planning and preparation, and probably would not have been as successful if the teacher did not know how to utilize the iBook program. With the program learned, however, the students were pushed to use higher-order thinking skills nearly the whole time the curriculum was in use, and gained necessary skills and confidence for the future (Encheff, 2013).

Digital books for young readers run the gamut of features. Some are quite advanced, with features such as a built in dictionary, interactive pieces, and animation, while others are

basic and are really just text on a screen (Zipke, 2014). Publishers are finding that the more they put interactive elements into their books, the more engaging they tend to be. Digital books are starting to be less and less like actual books, and more like games where students are immersed in the story, and that may change depending on choices they make (Zipke, 2014). This makes for quite an engaging experience for the reader, but it is still up to the teacher to make sure that the books provide reading skills as well. Immersing the students in a digital book helps the student understand what is going on, so it can be great scaffolding for those students who struggle with understanding the story because of lower comprehension skills (Zipke, 2014). Even though the book can be engaging, the more immersive it is, the stories still need to have all the elements that make them good—such as plot and character development. A digital book that has many immersive elements, but is quite boring, may not be enjoyed by the students and will be less likely to do them any good when they are trying to build up their reading skills (Zipke, 2014).

Digital Textbooks at the Secondary Level

For the secondary level classroom, digital textbooks can provide much more interactivity than traditional curriculum can. Students at the secondary level have gained the skills to make full use of this interactivity. The types of interactivity that a digital textbook allows (multimedia, video clips, animation, games) usually spark the interest of students at the secondary level (Lee et al., 2013). At this level, the ability of teachers to pick and choose content that is in the textbook, as well as books always having the most up to date information, becomes of greater importance (Lee et al., 2013). Lee et al. studied issues with using digital textbooks, as well as technological ways to fix the issues. They reported schools that have difficulty implementing

digital textbooks because of the cost of hardware associated with the books, as well as the cost of the books themselves. They also discuss improving the quality and accuracy of the content (Lee et al., 2013). Often times the online editions of the texts can be rushed to be available online and errors are made in the content. The researchers also describe some fixes for issues with the texts. They pointed to the most current technologies (multi-touch screens) as a way to justify the cost (Lee et al., 2013). These technologies can be used for much more than just an online textbook so the hardware becomes a learning tool beyond what it was first used for. Also, the authors speak about web 2.0 programs. Web 2.0 programs are interactive websites that allow for collaboration and sharing via the internet (Lee et al., 2013). This connectivity can help the users of the books offset some of the problems with content accuracy. Overall, the authors caution against people thinking that digital textbooks will change education forever, but also caution against people thinking that they cannot improve a student's learning (Lee et al., 2013). The authors pointed out that "Although e-Textbooks have great potential to enhance the education system, the greatest hurdle remains on how stakeholders, including governments, schools, parents and students, make full use of these technologies" (Lee et al., 2013, p. 42).

In this age, taking full advantage of learning tools requires the students to believe that the teacher is utilizing methods that are authentic and relevant. With the prevalence of technology in the world of secondary students today, oftentimes tools that have a technological component are seen as being more relevant to their learning. When studying the use of interactive maps in seventh grade geography classes, Linn (1997) found that even though the results of using the interactive maps were no different than using traditional maps, the students enjoyed using the interactive maps better. If the students felt that the activity was more relevant to their lives and

they enjoyed it better, then they usually produced a better product (Linn, 1997). Just as with students in the elementary grades, students in secondary grades are still enthused about using new types of technology to expand their learning.

While many digital textbooks still look a lot like their traditional counterparts, there are some that are developing more features that are tailored for the secondary student. These features are meant to bring the student deeper into the text and the knowledge held there, helping them to make links to previous learning, as well as helping them to make a bridge from one subject to another (Huang, Liang, Su, Chen, 2012). This can be done through hyperlinks to videos, online content, or even links to other parts of the text. The students seem to appreciate the more interactive elements that allow them to make these connections and sate their curiosity. It can be a great tool for research, allowing students to make connections to other topics that they normally may not have made. Many of these newer books developed for secondary students allow the teacher to track how the students use the book and how well they are understanding the readings. This gives the teacher data to use for future differentiation opportunities (Huang et al., 2012). These new types of digital textbooks have the opportunity to become great tools in the secondary classroom, as long as they are used to push the students to expand their learning.

Digital Textbooks at the Higher Education Level

Digital textbooks at the college or university level bring on a different type of interactivity. Textbooks at this level tend to have searchable text, embedded dictionaries, and hyperlinks to related topics. This is on top of the usual multimedia found in digital textbooks, such as video, audio, and animation clips (Sun et al., 2012). Digital textbooks have seen a large expansion in recent years with more students checking out and buying the textbooks (Sun et al.,

2012). The books offer advantages over the traditional textbook, but as in other technology discussed, the books at this level need to be used effectively to be the best tool they can be. This idea was solidified in a study conducted by Sun et al. on college students that used traditional textbooks and those that used digital textbooks. For those that used the digital textbooks, the researchers found that the perceived aid from the interactivity of the book enhanced the learning of the students. This also made them more attentive and involved in their courses, which reinforced their learning (Sun et al., 2012). The benefit of the digital textbook at this level is that it can be a great tool to enhance self-learning (Sun et al., 2012).

At the higher education level, the rate at which digital textbooks are becoming a larger part of the textbook market is growing each year (Reynolds, 2011). This expansion is not expected to slow down, but instead to speed up (Reynolds, 2011). There are many reasons for digital textbooks to find a home on campuses across the United States. Textbooks are becoming more and more expensive, and digital textbooks can be cheaper to produce and sell (Reynolds, 2011). Also, with much of the content being discussed in courses moving online, it makes sense for the textbook to move online as well to be able to access this content (Reynolds, 2011). Along those same lines, the resources being produced for students are easier to integrate with a digital textbook than with a traditional one (Reynolds, 2011). The additional cost that comes along with using a digital textbook can be difficult for students, when considering that it takes additional hardware, such as a tablet computer (Corlett-Rivera & Hackman, 2014). This can be difficult to justify with additional higher education costs. That said, the popularity of tablets and smart phones only seems to be increasing, with more and more students having the hardware to use the portability of a digital textbook, just as a traditional textbook. Also, students at ever-increasing

rates can join textbook rental companies or can rent the books from colleges or universities themselves. Students renting books will take market-share from new book sales, thus pushing down the profits of book publishers. With production costs of digital textbooks much less than traditional textbooks, it should push publishers to promote digital textbooks over traditional textbooks (Reynolds, 2011). These are all reasons to see why digital textbooks are becoming such a presence on college campuses. That said, it is still up to the user to make sure that they fully use the interactive features of the digital textbook. That is the only way that a digital textbook will prove a more effective tool than a regular paper textbook.

Pre-service teachers in higher education should be taught how to implement best practice methods for all the benefits of a digital textbook in order for it to become the tool that it can be. This is really the first step into making sure that digital textbooks are being used effectively. The more that teachers who are preparing to go into the field are used to implementing technology within the curriculum, the more comfortable they will be with it, and the more effective it will be (Larson, 2012). This is especially true for elementary education majors going into the field. They have the chance to really get students comfortable with digital textbooks at a young age if they use them according to best practice methods. With all the variable reading levels at the younger ages, digital textbooks are a great way to differentiate what is being read in class. Books for children's and young adults' are becoming more and more available for use with different settings that can be looked at by the teacher to make the best experience for students (Larson, 2012). Young children do not always have the same connection to a traditional paper book as older kids and adults, so a digital book is still seen as novel and new. If pre-service

teachers embrace digital books at a young age and use them according to best practice, young students may be more likely to embrace the technology as well.

This progression from multimedia to online curriculum to digital textbooks has been driven by the ever improving technology of our age. Many in the education field figured out long ago that multimedia aids students in achieving their learning outcomes, and have been figuring out ever since how to best implement that multimedia. That has lead now to digital textbooks. This type of textbook, as part of an online curriculum, can have a great appeal to students. They do not all, however, end up raising scores or improving learning outcomes. It is important to figure out how to use digital textbooks according to best practice to make sure we are utilizing them the best way we can to maximize learning.

Chapter 3: Summary and Recommendations

Based on the review of multimedia, technology, and online curriculum including digital textbooks in the previous sections, the following is a summary and recommendation on how best to implement those digital tools in the classroom. The recommendations are ones that I have made based on the literature review that has been completed in Chapter 2 and on other research. I summarize the review of each section, multimedia, online curriculum, and the use of digital textbooks, and then I will make recommendations as to the best practices for their use in the classroom.

Summary of the Importance of Technology and Multimedia in the Classroom

Teachers and others involved with education are always looking for ways to engage students, keep their interest, and develop their skills for attaining and retaining knowledge. To this end, teaching techniques that are learner driven and focused seem to be the best at keeping students engaged and interested. When students are already interested in what is happening in the classroom because of how it is taught, they are going to be more likely to become fully involved with the in-class activities and engage in their own learning. When students are engaged with an in-class activity, they become less focused on what they are doing and more focused on the information that they are manipulating; effectively, they stop worrying so much about how to complete an assignment and start really focusing on what you want them to learn. This is one of the goals of education—students being able to critically think about information and use it to gain insight into the subject. One of the tools that we need to use to get to this level of engagement is technology and multimedia in the classroom.

Students in all grades, from kindergarten to seniors, are increasingly coming to school as digital natives. They are being introduced to and using tech devices at very young ages; in essence growing up with technological tools readily available. For many students, using technology is second nature. They know how to use different devices and are used to having them around. This is useful for educators, since they do not have to spend as much time teaching how to use a device or program. There is usually a common language, or at least symbols, that programs use so that it is easy to learn one and then transfer that knowledge to another. For example, nearly all programs have the settings under a “cog” button, many are now self-saving, and also many are now giving users the option to sign in with Google, Yahoo, or Facebook information. This is useful since students now do not have to worry about usernames or passwords for many programs.

“Digital natives” means that students are coming to technology very early on in life, as opposed to “digital immigrants,” which are people that are learning technology later on in life. Since students are digital natives, they are more used to using technology to help solve problems or go deeper for information, and it is often a go-to response for them. In many situations it is commonplace to see students searching the internet for something that is being discussed. This response for them, which seems to come naturally, allows for them to add to their learning on their own without prompting from others.

Being digital natives also means that many students are not afraid to experiment with technology. Teachers are allowing students to have much more free reign with web-based programs, and are seeing some great results. Web programs are being built for creation and interpretation, and students are running with their own ideas. For example, a program such as

Padlet, a web based corkboard, allows for students to post whatever they want in the form of text or images, video, or a link. They can change their background, the orientation of the layout, and the structure of the posts. All this variety allows students to personalize what they are doing and can lead to more engagement.

Recommendations for the Use of Technology and Multimedia in the Classroom

Technology and multimedia are important, but need to be used wisely in the classroom. There are many ways to use technology improperly, and that leads to wasted time and a disengagement from the student. For example, using technology on a task that can just as easily be completed with pencil and paper will seem tedious and useless to the student. I have received negative feedback about reading a novel on a tech device when we could have instead read the novel in paperback form. Students have also reacted negatively toward the use of technology when it is pushed on them, such as when they are made to take notes on a Chromebook instead of using paper and pencil.

It may seem obvious, but I recommend that technology that is used in the classroom must enhance the learning and build skills. Using it “just for fun” is too limited. We have the great opportunity to create a new generation of collaborators with how we use tech devices. Programs are being created for educational technologies that focus on critical thinking, creation, and collaboration. The recommendation has to be that these are the things to focus on using technology for. If we do not we are just wasting the opportunity. It is far better to use technology to compare and contrast primary documents from the Great Depression than it is to read about it out of a textbook and fill out a worksheet. Programs that build on creation,

collaboration, and critical thinking have been around since before our technological age, but they are much more available now. We must use the technology enough that it stops being new.

Ideally, we want students to become interested and vested in the information they are using and working with, not the technology they are using.

Summary of the Use of Online Curriculum

Tools

Many educational gurus are pointing out the usefulness of formative assessment, and have been for some time. There are many different online curriculum tools that allow teachers to quickly ascertain where their students are at with their learning. This started with student response systems, sometimes called clickers. These were an early tool, but are now seen as being largely ineffective, as they only allowed for a few answers, and they had to be multiple-choice. Many programs now have gone past this, and are much more effective. Programs such as Socrative, Pear Deck and Nearpod allow for students to quickly submit short answer responses to teachers during a discussion, or as an exit ticket after a lesson. This allows for answers to go deeper and students to show a better understanding of a concept.

There are formative assessments, such as Quizizz and Kahoot, which use highly competitive games as a way to assess students. This is again a way for educators to use formative assessment that is so valuable, while also being a way for students to stay engaged with the class. These formative assessments many times can also be used as longer assignments, so students can show what they know while taking longer to complete the assessment. In this case, the assessment can become more of a summative assessment, and the program can still collect valuable information about the validity and reliability of the assessment.

Creation programs have sprung up on the web in a so many ways over the last decade. We have gone from creating a Powerpoint presentation, to creating infographics, audio recordings, documentaries, and photo stories. These programs are meant to tap a student's creativity while showing what they have learned in a different way at the same time. There are programs such as Animoto, WeVideo, or iMovie that allow students to create a documentary that can be of surprisingly great quality. These programs are great assessment tools, forcing students to think about the best way to describe content or tell a story while staying within the parameters of the assignment. They are also extremely engaging, and easy enough to use that seventh graders can create a movie in a couple of hours that would have taken days a special equipment just 15 years ago.

There are also programs that allow for even more flexibility, such as online corkboards like Padlet or Lino. These programs allow students to "post" text, video, links, or images onto a page and manipulate them. These programs can be great collaborative tools, as students work together to describe a concept through video, images, and text all in the same spot. There are also programs that allow a teacher or student great flexibility to show what they are doing on their device, such as Educreations, Blendspace, or Screencast-o-Matic. These programs allow the user to record what is happening on their screen, and also can add in a voice-over component, to show others what they are doing. This is a great way for students to complete a task on their own time and show how it was done, or for a teacher to use for a flipped classroom to show students a concept through video as homework and then work with them more one on one during the school day.

Recommendations on the Use of Online Curriculum Tools

There are many pitfalls to using online curriculum. Educators need to know how to use the technology effectively. They do not necessarily need to know how to use the exact device (or in some cases the program) completely, as students will be able to use previous knowledge to guide them. But they will need to know how to use the technology to build skills and use it for critical thinking. This can be very problematic as technology is always growing and new devices are always becoming available for educational use. A recommendation for schools to use professional development dollars and time is a must. Districts that do not spend time trying to learn best practices with digital devices run the risk of falling behind in instructional techniques, but also deprive their students of valuable learning opportunities.

A great example of evolving technology in the classroom and the need for districts to keep up is the use of student response systems. Early systems only allowed for multiple choice answers, and districts that still use these systems are missing out. I would recommend using newer programs such as Nearpod or Socrative. These programs allow for all different kinds of answers, and educators can use them to gauge students' understanding of a concept. Even better than stopping a lecture to answer a simple question, is to have the students fill out an exit or entrance ticket that allows them to fully describe a concept. Using these more in depth programs is an easy recommendation to make.

If a program is authentic to the students and they see value in its use, it will usually engage them. If this is the case, and there is a program that engages the students, it is important that the teacher uses the program enough so that the students become comfortable with it and do not lose out on the information they are gaining because they cannot figure out the technology. I

would recommend that educators find a small number of online tools that work really well for what they want to do, and focus on using them. This allows students to become well acquainted with the technology. Familiarity with a program allows students to focus on the content instead of how to use the program. I would also recommend that educators do not limit themselves to certain technologies that they are comfortable with; instead always be on the lookout for different tools that would work better.

Technology can be overused as well, so it is important that the teacher not fall into that trap. Students can become disengaged if the program becomes dull and repetitive, or if it is unauthentic for the task. I would recommend that educators be always vigilant to how their students respond to the technology they are using, and make changes quickly if it seems that students are becoming disengaged. Teachers need to be able to walk the line between keeping things interesting for the students, while at the same time, not constantly introducing something new.

Summary on the Use of Digital Textbooks

Just as with the rest of technology in the classroom, digital textbooks can have a real benefit if they are used correctly and taken advantage of. They are made to have distinct advantages over a regular textbook, but those advantages will only be seen if a teacher knows how to take advantages of them, and the students not only feel comfortable enough to experiment with settings, but also know enough about the book to take advantage of things it offers.

A digital textbook has the best advantages for a student that struggles with reading. Of course not every digital textbook is the same, but most have settings that are beneficial specifically for low readers. The first is the option to read the book to the student. If students

are really low, this can be a great help. Students are able to follow the text of the book as it is read, so they can match how the words sound with what they look at, helping them with words that can be very subject specific and foreign to the student. Another option that can be quite beneficial for the low reader is the ability to highlight text. Low readers are often taught to highlight passages that may have particular meaning, such as main concepts, thesis sentences, or passages that they had trouble with. The ability to do this in a text, without actually harming the book or having to make paper copies of pages, can be very time saving and beneficial. Lastly, some digital textbooks allow the user to click on an icon that automatically highlights main ideas and supporting details. The skill of being able to pull out main ideas and supporting details is a very important one if the student is going to be able to understand what is being read. With this setting, a low reader can automatically pull out those parts of the story and better understand what they are reading. Again, this can very beneficial for those texts that are more subject-specific and can be hard for a student to understand because they are so technical.

Digital textbooks can be very beneficial for curriculum enhancement as well. It is very common for digital textbooks to have videos and other multimedia embedded within the book. This allows for a deeper study of some concepts than with a traditional textbook. Whereas a traditional textbook might have just one picture trying to enhance a concept, a digital textbook might have a whole slideshow that students can flip through, going much deeper into a concept. With a traditional textbook, teachers would have to spend their own time putting together the images and presenting them, but with a digital textbook that multimedia is already built in, and the teacher can use their time focusing on building a discussion around it instead.

Digital textbooks have also been able to bring all the supplemental materials that have traditionally been separate from the text into one centralized place. Oftentimes in a digital textbook, vocabulary help, such as flashcards or glossaries, will be in a prominent spot for the students to access easily. This can come in very handy, as they can check for the meaning of a word with a single click rather than having to go to the back of the book or a dictionary and look it up. It saves time and also is more inconspicuous for a student who may be self-conscious about not knowing vocabulary. Digital textbooks have also started to have assessment in one place, be it formative or summative. Many times students will fill out the assessment online, and it can be accessed by the teacher to check. This is meant to streamline the process of assessing and grading, and can be very beneficial. Also, the assessment is usually able to be modified by the teacher to fit what was covered in the class. Not having to worry about so much planning with assessment will free up time for teachers to plan other activities that will supplement the curriculum. As educators know, time management is a huge part of the job, and anything that streamlines parts of the job is beneficial.

Digital textbooks can also be beneficial if looking at cost. Often times, at a higher educational level, they can be rented instead of purchased. If buying, they are often cheaper than a traditional textbook as well. Sometimes digital textbooks can be updated with current information by a publisher, rather than coming out with a new edition. This can save schools thousands in textbook costs. Also, there is an environmental savings to digital textbooks as well, as you do not need to go through the materials used to make new books.

Recommendations on the Use of Digital Textbooks

Digital textbooks are by no means without their problems. At its core, it is still an exact copy of a traditional textbook. If none of the additional benefits are used by teachers or students, then it is no better, and can be much worse, than a traditional textbook.

Take the idea of screen time; something that has become an issue for many today with the saturation of digital devices in our lives. There are studies coming out about the problems that arise with eye strain by using computers for too long, and issues that include headaches and blurred vision. Screens shine light right into our faces, which is harder on the eyes than reflected light on a book. This is not a problem if students are only looking at their computer or using it for a digital textbook for an hour or two a day, but as digital textbooks become more prevalent in the classroom, they will start reading from a digital device nearly all the hours in a school day and will very likely encounter problems. I recommend mixing up the use of digital tools with the use of traditional tools throughout the day. Instead of coming up with some sort of schedule teachers try to use to make sure they are not overstraining their students, it is easier to just mix up techniques. There are teaching techniques that work perfectly well with traditional methods, and it is an easy recommendation to make that they should be used when it is applicable. When reading novels in class, for instance, there are many testimonials of people liking reading a paperback better than reading a text. With a paperback book you can see how far you have come, how far you have to go, and see the experience as more of a journey. This is not nearly as possible with a digital text. There is a tactile experience to reading a novel that many enjoy, and that has just not been duplicated yet by any digital reader.

Some schools have enough worry about technology and physiology that they have sworn off technology in the school all together. There is a Waldorf school in Los Altos, California, that has taken that route. Teachers there teach with traditional tools such as blackboards, and desks that only contain traditional textbooks and pencils. What makes this even more interesting is that the school is populated with many students whose parents work at tech giants such as Google, Yahoo, and Apple (Richtel, 2011). I would recommend that teachers always reflect on how they use technology and focus on only using it when it best fits the situation.

A digital textbook can be a difficult transition for students, especially if they have to sign in to use it. For students who want to read a passage from a traditional textbook, they get a book, open to a page, and then read. For a digital textbook, a student might have to spend time logging in, clicking around to get to the correct area, and then read the passage. This might cost valuable class time. I would recommend students be given specific instructions on how to log in explicitly and in writing if possible. Also, having them practice logging in often and throughout the year will cut down on the time it takes.

Ultimately, the biggest problem with digital textbooks come from not using them enough, or correctly enough to take advantage of the benefits. If a teacher is not comfortable with the text, then they will just use the digital textbook as a regular textbook, and now nearly all the benefits that I have outlined with using them are gone. If students are not pointed toward the settings they can change to take full advantage of the text, then they will not see the benefits that can so greatly help them understand what they are reading. True, as digital natives they may experiment and figure it out for themselves, but it will take some time and not all of them will have the full effect. It is a very easy recommendation to see that educators need to be

comfortable enough with the settings that they can show lower readers the different things they can do with a digital textbook that will help them.

If a class has both traditional copies and digital editions of the same textbook, which many classes do, and the teacher only makes use of the traditional copies, then the benefits of the digital copy will never be seen. It is recommended that educators use the digital textbook whenever it best suits the activity so that students will get used to how it works. Some students may run into the problem of not having internet access at home, which means they can only access the textbook at school. There are obvious problems with that, which schools have rectified by having traditional copies to check out. Again, here these students are probably not gaining the full benefits of the digital textbook.

In the end my recommendation for the use of digital textbooks all comes down to both the teacher and students using it often enough to become comfortable with the settings of the book and are able to personalize the experience. It is incredibly important that a digital textbook only be used when it is best suited for the activity, but that when it is best suited, it is used every time. This is the only way that digital textbooks really make a difference in an educational setting.

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