GOMEZ, MIGUEL, Ph.D. TPACK in Practice: A Qualitative Study of Middle School Social Studies Teachers in a 1:1 Laptop Environment. (2016)
Directed by Dr. Wayne Journell. 310 pp.

The purpose of this qualitative study was to examine what effective teaching with technology looked like in practice within middle grade Social Studies' classrooms. An additional purpose was to understand how teachers' combine content knowledge, pedagogical knowledge, and technological knowledge when making decisions about their curriculum. Guiding this study was a conceptual framework that suggests effective teaching with technology comes from technological pedagogical content knowledge (TPACK), a knowledge that is created by combining content knowledge, pedagogical knowledge, and technological knowledge (Mishra & Koehler, 2006). Lakeside Middle School was selected for this study due to both its commitment to technology integration and its implementation of a school wide 1:1 laptop initiative. Three middle grade Social Studies' teachers at Lakeside were selected, one each from 6th-, 7th-, and 8th-grade classrooms. A multiple case study methodology was used in this study. An observation protocol, designed specifically to capture TPACK moments during observations, was developed. Multiple data sources (interviews, observations, focus group, and artifacts) were collected and analyzed for emerging themes about the TPACK practices of each teacher. Using the data collected, a descriptive case study was written for each teacher. These descriptive case studies identified examples, grouped thematically, of TPACK in practice. These descriptive case studies also recorded each teacher's beliefs about

teaching, technology in education, and their own placement within the TPACK framework. Data analysis suggested that that TPACK is developed uniquely in each teacher, shaped by their beliefs and strengths in teaching. Analysis of the data also suggested that the TPACK framework may need to be rethought, in order to fully capture TPACK in practice. Included in this are discussions about how the TPACK framework model fails to account for any of the three teachers' TPACK practices, discussions about the model's failure to differentiate between depth and breadth of TPACK knowledge, and discussions about other factors that influence TPACK in practice, including students and teaching environment. The study findings have implications for teacher educators, teachers, and policy makers. Specifically, teacher education courses need to be developed to address the lack of TPACK knowledge that preservice teachers have. Additionally, new professional development sessions are needed for practicing teachers that focus on developing both the depth and breadth of their TPACK practices.

TPACK IN PRACTICE: A QUALITATIVE STUDY OF MIDDLE SCHOOL SOCIAL STUDIES TEACHERS IN A 1:1 LAPTOP ENVIRONMENT

by

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A Dissertation Submitted to
the Faculty of The Graduate School at
The University of North Carolina at Greensboro
in Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

Greensboro
2016

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APPROVAL PAGE

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March 14, 2016
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ACKNOWLEDGMENTS

It is impossible to complete a dissertation study like this one without the guidance and support of many different individuals and groups. To that end, I want to thank Lakeside Middle School for allowing me on their campus and opening up their doors to my many questions. I want to specifically thank Ms. Goodman, Ms. Monroe, and Mr. Hamilton for giving me complete access to their classrooms and always making me feel welcome. This study owes much of its findings to their willingness to answer my many questions and elaborate on what I observed in their classrooms.

I want to thank my entire dissertation committee for all of the support and encouragement given me throughout this process. Your constructive feedback and encouragement always made me feel I was never alone as I worked on this dissertation. In particular, I want to thank Dr. Journell, who has taught me more about what it takes to be a writer than all of my previous educational experiences combined. The thoroughness of his comments and the commitment he made toward my goals in this dissertation are an examples of academic professionalism that I hope to recreate with my future students.

I would like to thank the staff of (members of) Dynamic Quest (www.dynamicquest.com) who has always supported my efforts in education, even as I

stepped away from a career in information technology. Without their support, I would never have had the time to commit to this study.

I would like to thank my entire family for their encouragement and support. My dad consistently gave me advice about navigating my pursuit of a doctoral degree. His guidance prepared me for many of the challenges I have faced during my studies. My mom was an endless supply of joy and happiness. Her support lifted me up and always brought a smile to my heart. My kids kept me grounded during this entire process, and on those days when I needed to escape, I could always turn to them for a much needed distraction of playing games or watching our favorite shows.

Finally, to my wife Katherine, thank you for EVERYTHING. You picked up the slack in our house and made all of the things I accomplished possible. I can't count how many times you changed diapers, put kids to bed, prepared meals, nursed sick kids, and in general kept things going during this process. Though pursuing my doctoral degree has been challenging, it does not even begin to compare with all of the responsibilities you have had to take on in order to allow me the freedom to pursue this dream of mine. I am so lucky to have you at my side and I look forward to walking together into the future.

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CHAPTER I

INTRODUCTION

Since the early 90s, digital technologies have shaped our society and influenced our culture in tremendous ways. These digital technologies have penetrated virtually every sector of our society in one form or another. This includes the way we shop, communicate, keep records, entertain ourselves, and perform our jobs. Our educational system and more specifically, our classrooms, have also felt this increase presence of digital technologies. A 2009 survey (Gray, Thomas, & Lewis, 2010) conducted on behalf of the U.S. Department of Education on the use and impact of technology within the classroom, reports that 97% of all classrooms have access to a computer with 93% of these computers enabled with Internet access. This has created a 5:1 students to computer ratio within the classroom. Digital technologies other than the computer have also become commonplace within the classroom. For example, interactive whiteboard systems were found in 51% of all classrooms and 78% of classrooms contained a digital camera.

However, digital technologies have influenced classrooms beyond the tools found in them. Prensky (2001) coined the term, “Digital Natives,” to refer to the current and emerging generation of students who were born into a culture in which digital technology was expected to be a part of their lives. Tools like the Internet, cell phones,

digital games, digital music, digital video recorders, and more recently, Web 2.0 applications, have influenced the way these digital natives think about and interact with the world around them. These digital natives have become adaptive prosumers (Toffler, 1980), individuals capable of seeking out their own knowledge. This is not to imply that these students are endowed with advanced technological skills, but rather that these students expect digital technologies to be a part of their lives.

What we can conclude from this research is that today's classrooms are filled with more digital technology than ever. We can also say that the students who occupy these classrooms are more accustomed to using and working with digital technologies than any generation of students. However, just having these two ingredients in the classroom does not guarantee good educational outcomes for students. Questions remain about both the effectiveness and the appropriate use of these digital technologies (Cuban, 2001; Martorella, 1997; Postman, 1992; Tally, 2007; van der Laan, 2004). Within the Social Studies, questions have been raised concerning these new technologies, specifically calling into to doubt whether or not these new technologies are simply reinforcing a teacher-centered, drill and kill curriculum (Crocco, 2001).

Even more troubling is that we continue to add digital technologies to the classroom via 1:1 technology initiatives (Bebell & O'Dwyer, 2010; Dunleavy, Dexter, & Heinecke, 2007) and bring your own device initiatives (Booth, 2013; Raths, 2012), while these questions about digital technologies and their effectiveness along with their appropriate use in education still remain unanswered. The only way we can hope to

better understand effective uses of technology is through research on teachers' use of technology in the classroom. Mishra and Koehler (2006) have argued that effective instruction with technology requires a new set of knowledge that they have termed technological pedagogical content knowledge (TPACK). This framework uses teachers' existing pedagogical content knowledge (Shulman, 1986, 1987) as a foundation from which to build and add technological knowledge.

However, before educators can begin to instruct teachers in the habits and qualities of TPACK-based instruction, researchers must first determine what TPACK-based instruction looks like, by understanding the qualities and practices of teachers who engage in this type of instruction (Brantley-Diasa & Ertmer, 2013). Such research will help define the TPACK framework into practical terms that can be used to inform other practitioners seeking to improve their technology teaching practices. This study aims to contribute to this effort by studying the TPACK-based instructional habits of three different middle school Social Studies teachers, an area yet to be studied in the literature.

Rationale for the Study

As previously mentioned, the adoption of technology for educational purposes has been and continues to be on an upward trajectory (Gray et al., 2010). However, even with this increase in technology, we are still trying to answer the same questions: is technology beneficial to the classroom and is it being appropriately used by educators (Cuban, 2001; Martorella, 1997; Postman, 1992; Tally, 2007; van der Laan, 2004)? One

way in which to answer these questions is to better understand teachers' technology teaching practices. TPACK provides a framework from which to investigate and answer these questions by examining the technology teaching practices of teachers through a TPACK lens.

This study will use the TPACK framework to describe the technology teaching practices of middle school Social Studies teachers. In doing so, this study will begin to fill in some of the gaps in the literature related to TPACK and Social Studies teachers' technology instructional practices. For example, most of the current research into Social Studies instruction using a TPACK lens has been conducted in secondary school environments, specifically ninth through twelfth grade classrooms (Beeson, Journell, & Ayers, 2014; Harris & Hofer, 2011; Swan & Hofer, 2011). The lack of research into the technology-based instructional practices of middle school Social Studies teachers represents one of the limitations of the current research available.

Additionally, little TPACK related research has been conducted into the technology-based instructional practices of Social Studies teachers who teach within 1:1 technology environments. This lack of research into TPACK within 1:1 Social Studies environments is especially important with recent trends in education indicating that 1:1 technology environments are becoming increasingly popular with school districts (Interactive Educational Systems Design, 2014). Finally, while there have been quantitative surveys designed to measure TPACK within teachers (Jamieson-Proctor, Finger, & Albion, 2010; Lux, Bangert, & Whittier, 2011; Sahin, 2011; Schmidt et al.,

2009), qualitative approaches to understanding the TPACK decisions of teachers and their application of the different components of TPACK are lacking. Specifically, descriptions of what TPACK-based instructional practices look like in practice are missing from the literature (Brantley-Diasa & Ertmer, 2013). Understanding how TPACK manifests itself with different teachers could be a key factor in developing TPACK-based professional development that meets the needs of a diverse teacher population. This study seeks to contribute to the research on TPACK by adding a qualitative perspective, based upon the descriptions of the different case studies that make up this study.

Research Questions

The following research questions guided this study:

1. In what ways will the middle school Social Studies teachers demonstrate TPACK teaching principles within a school wide 1:1 technology environment?
2. In what ways will the middle school Social Studies teachers in a school wide 1:1 technology environment combine their different forms of knowledge to construct TPACK teaching practices?

Research Design

This study is interested in understanding the technology teaching practices of middle school Social Studies teachers. In order to accomplish this, I will use a multiple case study approach to describe the technology teaching practices of my participant teachers. I will then use a cross case study analysis to compare each of the individual case studies and draw new insights. Based upon Merriam's (1998) definition of case

study research, each case study will examine the technology teaching practices of the participants using a particularistic, descriptive, and heuristic approach to case study research.

This study will take place at a K-12 private school located in the southeastern part of the United States. This private school is separated into three different campuses; elementary, middle, and high school. Specifically, this study will take place within the middle school, in the sixth, seventh, and eighth grade Social Studies classrooms. Each grade level has one Social Studies teacher, thus there are three teachers who will comprise the main participants for this study.

I will collect data from a variety of sources in order to create the rich descriptions needed for case study research. I intend to conduct interviews with the main participants and with a select number of their students. Also, I plan to collect artifacts, such as lesson plans and assignments, from the participants and their students. I will observe the participants' classes, collecting observational data through the use of an observation protocol. Lastly, I will conduct a focus group with all of the participant teachers. I will discuss data collection and analysis procedures further in chapter three.

Assumptions

Based upon my teaching experience, my experience working in the information technology field, and my experience with the pilot study that informed this study, there are certain assumptions that I have about the participants and the 1:1 technology environment that I bring into this study. First, since the setting for this study has had a

1:1 technology environment for over 14 years, I assume that integrating technology into the curriculum is a priority for the school and an expectation for each teacher. Secondly, I assume that what I consider to be technology is going to be different than what each of the different participating teachers considers being technology. This is not limited to just me, as I also assume that the different participating teachers will differ in their descriptions of technology. Consequently, I also assume that the participating teachers and I will all have different perspectives on both the appropriate use of technology within the classroom and specifically which technology might be best utilized for a given situation. Lastly, I assume that the participating teachers will have zero knowledge or very little knowledge of the TPACK framework. Thus, I assume that in my observations and conversations with these teachers that the term TPACK will not show up, but rather evidence of pedagogical, technological, and content related decision making will.

Summary

The purpose of this study is to understand the TPACK-based instructional practices that middle school Social Studies teachers employ in their own classrooms. In order to effectively and appropriately use technology within the classroom, teachers must be equipped with the type of knowledge that TPACK represents. A case study design will be used to analyze the TPACK-based instructional practices of each of the teachers. Each case will be analyzed separately and an analysis will also be made across

the three cases studies as a whole. This research will allow me to present a rich description of what the habits and practices of TPACK-based instruction looks like.

Chapter II will review the literature as it relates to TPACK in general and then specifically as it relates to Social Studies instruction. Chapter III will describe the research design of this study, grounding it first in the literature, then proceeding to describe both the data collection and data analysis process. Chapter IV will provide the findings of this research in the form of rich descriptions of each case study, as called for in qualitative research. I will also provide findings from a comparative case study analysis across all three case studies. Chapter V will discuss both the implications of this study and attempt to provide an answer to the research questions guiding this study.

Definitions

The following list of definitions is intended to provide clarification about some of the terminology used in this study.

1:1 technology initiative—A 1:1 technology initiative implies that every student is given a digital device, commonly a laptop or tablet computer, to use in conjunction with their education both at school and at home. It also implies that the teachers at that school will adapt their curriculum to take advantage of these resources.

Technology—For the purpose of this study, technology is used as a large umbrella to include all software-based programs and chip-based devices. This includes software programs, Web 2.0 applications, and other programs that enable digital

devices to function. It also includes all types of devices that use chip-based technology to run like computers, tablets, cell phones, and interactive white boards.

Technological Pedagogical Content Knowledge (TPACK)—TPACK is the new knowledge that is created when teachers combine technological knowledge, pedagogical knowledge, content knowledge, technological pedagogical knowledge, and technological content knowledge. TPACK knowledge is necessary for the effective use of technology to teach content in pedagogically meaningful ways.

TPACK-based instruction—Instruction that utilizes technology in a way that complements both pedagogy and content. This does not mean that a teacher knows about the TPACK framework and is purposefully thinking about TPACK in their planning and/or execution of instruction. Rather it means that the teacher makes sound decisions as it relates to the use of technology demonstrated by the appropriate use of technology to meet pedagogical and content needs. With TPACK-based instruction, evidence of all seven components of the TPACK framework is evident.

Web 2.0 applications—Web 2.0 applications refer to applications where the users are able to interact with the application rather than just receiving information from an application. This includes having the ability to create and manipulate content and then share that content with a larger audience.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

This review begins with a brief introduction to the concept of pedagogical content knowledge (Shulman, 1986), which provides the foundation from which the theoretical framework guiding this study, technological pedagogical content knowledge (TPACK) (Mishra & Koehler, 2006), is built. Following an explanation of the TPACK framework, a discussion about the breadth and depth of the individual circles of knowledge that comprise TPACK is undertaken. Examples of different configurations of TPACK are given along with the implications that these configurations of TPACK have for teachers. Next, skills acquisition theory is used as a means of describing the varying sizes of circles of knowledge that exist in TPACK. Then, based upon the participants of this study, a brief review of the literature about the use of technology by teachers to improve Social Studies instruction is presented. Specifically, the Internet and Web 2.0 technologies are cited as significant contributors to Social Studies instruction. Next, the application of TPACK teaching practices in Social Studies classrooms is examined thematically by reviewing the relevant research on how TPACK has been applied by Social Studies teachers in their practices. Finally, because of the setting for this study, a brief review of the literature is presented on 1:1 technology initiatives.

Theoretical Framework

A strong theoretical framework provides the backbone for conducting research and understanding phenomena. It can provide lenses to frame the study in question, criteria to analyze the data collected, theories to interpret the findings, and rationales to help frame a discussion of the findings (Berman, 2013; Leshem, 2007). This study uses the TPACK framework to conduct research and understand the phenomena being studied. The use of the TPACK framework has influenced the location chosen for this study, the participants selected for this study, the creation of the research questions guiding this study, and the analysis of the findings from this study. The TPACK framework is comprised of several different components that are essential to its functionality and application. An understanding of these components is necessary in understanding the TPACK framework as a whole.

Pedagogical Content Knowledge: The Foundation for TPACK

Pedagogical content knowledge was introduced by Shulman (1986) as a new kind of knowledge necessary for teachers that lies at the intersection of a teacher's content knowledge and pedagogical knowledge. This theoretical framework proposed that to effectively teach, a teacher must also have more than just knowledge about content and pedagogy, but they also must have the knowledge of how to effectively use pedagogy in order to teach content to others (Shulman, 1986, 1987). This means that teachers must be able to transform content and ideas into techniques and practices that are appropriate for learning for their target audience. This includes using "the most useful

forms of representation of those ideas, the most powerful analogies, illustrations, examples, explanations, and demonstrations" in their teaching practices (Shulman, 1986, p. 9). According to Shulman, "pedagogical content knowledge also includes an understanding of what makes the learning of specific topics easy or difficult" (p. 9), especially as it relates to understanding the "conceptions and preconceptions that students of different ages and backgrounds bring with them" into the classroom (p.9). When educators are teaching using their pedagogical content knowledge "the core business of teaching, learning, curriculum, assessment and reporting" (Koehler & Mishra, 2009, p. 64) are being executed. An illustration of the Pedagogical Content Knowledge framework is provided below.

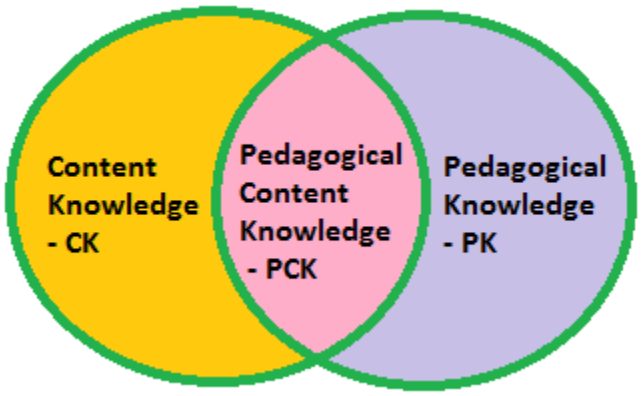


Figure 1. Pedagogical Content Knowledge.

Shulman introduced the idea of pedagogical content knowledge in part because he claimed that content knowledge and pedagogical knowledge were all too often being claimed as mutually exclusive domains of knowledge by researchers and teacher

education programs (Shulman, 1987). Thus for Shulman, pedagogical content knowledge constituted more than just a consideration of content knowledge and pedagogical knowledge, but rather the blending of these two knowledge in order to form a distinct new knowledge essential for effective teaching. This new knowledge consists of the ideas and techniques, like analogies, illustrations, examples, explanations, and demonstrations, that teachers can correctly and applicably apply in their teaching to help students with the comprehension of new topics and ideas (Shulman, 1986). The pedagogical content knowledge framework provided educators with a new way to consider what good and effective teaching looked like in both practice and in theory. In doing so, the pedagogical content knowledge framework created a new model for understanding teacher practices (Grossman, 1989; Gudmundsdottir, 1991; Shulman, 1986, 1987). Teacher practices could now be examined not from a content knowledge perspective or a pedagogical knowledge perspective, but rather a pedagogical content knowledge perspective. This exercise of combining different knowledge in order to create new types of knowledge that help explain teachers' practices is essential in the development of the TPACK framework which helps explain teachers' technology influenced teaching practices.

Technological Pedagogical Content Knowledge (TPACK)

Expanding upon the pedagogical content knowledge developed by Shulman (1986), the TPACK framework was developed as a means to capture the knowledge required by educators in order to teach effectively with technology (Koehler & Mishra,

2009; Mishra & Koehler, 2006). Mishra and Koehler proposed that a new type of knowledge, technological knowledge, should be added to the pedagogical content knowledge framework in order to construct the type of knowledge required for teachers to teach effectively with technology. The addition of technological knowledge to the components of the pedagogical content knowledge framework resulted in the creation of two new types of knowledge, technological content knowledge and technological pedagogical knowledge. When these two types of knowledge were combined with Shulman's (1986) pedagogical content knowledge, a new type of knowledge formed, which Mishra and Koehler termed technological pedagogical content knowledge (TPACK). TPACK is represented by Figure 2.

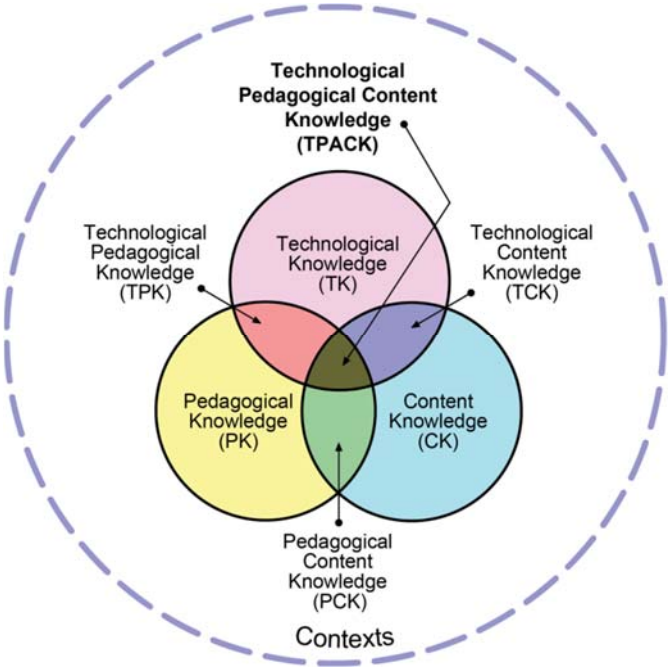


Figure 2. Technological Pedagogical Content Knowledge.

Each component of the TPACK framework is essential for the successful implementation and utilization of technology within the classroom. Table 1 provides a definition and an example for each aspect of the TPACK framework.

Table 1

TPACK Explanation

Name	Definition	Example
Content Knowledge (CK)	The knowledge teachers have about a subject or concept.	American colonial history, macro & micro economics, and world geography.
Pedagogical Knowledge (PK)	The knowledge teachers have about appropriate and effective teaching methods.	Differentiated instruction, collaborative grouping, and assessment.
Technological Knowledge (TK)	The knowledge teachers have about technological hardware & software, along with digital literacy.	Installing software, troubleshooting problems, using Web 2.0 applications.
Pedagogical Content Knowledge (PCK)	Transforming content and ideas into techniques and practices that are appropriate for learning. This means using analogies, illustrations, examples, explanations, and demonstrations as a means of understanding what makes the learning of specific topics easy or difficult for students.	Organizing students into different roles in order to create a classroom simulation of the three branches of American government

Table 1

(Cont.)

Name	Definition	Example
Pedagogical Content Knowledge (PCK) (Cont.)	In simple terms, knowing the right teaching methods to use to explain a particular piece of content to a particular group of students.	
Technological Content Knowledge (TCK)	Understanding the relationship between technology and content within the classroom and how each of these influence and limit the other.	Understanding that Wiki spaces might be a good place for students to contribute to a shared knowledgebase about ancient Egyptian culture, but realizing that Wikispaces limits the collaboration among the students.
Technological Pedagogical Knowledge (TPK)	Understanding the relationship between technology and teaching and how teaching can be affected by the technological choices made.	Using http://www.polleverywhere.com/ to periodically assess students' understanding of the lesson and then making adjustments based upon those assessments.
Technological Pedagogical Content Knowledge (TPACK)	The effective teaching of content through the use of technology.	Using Google Earth to take a virtual tour of South America to teach South American geography and culture.

However, much like the pedagogical content knowledge framework, having these different types of knowledge does not guarantee the effective teaching of content with technology. Rather it is the knowledge found at the intersection of technological pedagogical knowledge, technological content knowledge, and pedagogical content knowledge, known as TPACK that ensures effective teaching practices with technology (Koehler & Mishra, 2009; Mishra & Koehler, 2006). Much like Shulman (1986) defined pedagogical content knowledge as a new type of knowledge and not just the application of two different knowledge sets, TPACK has its own type of teacher knowledge, and not just the application of several different types of teacher knowledge within an educational setting. Furthermore, there is no hierarchical order for the different components; rather all three must be present for effective teaching with technology to occur. Despite the importance of each to form a new distinct type of knowledge, each component of the TPACK framework serves a distinct purpose (see Table 1).

Technological Knowledge

Technological knowledge refers to the depth of knowledge teachers have about technological hardware and software. This type of knowledge represents both specific abilities, such as how to use a GPS device or utilize Google Docs, and general abilities, such how the Internet works or how to troubleshoot technical issues. Technological knowledge also refers to the digital capabilities of the teacher. Digital capabilities represent the ability to come across a new technology and be able to understand its function and apply it in practice (Hicks & Hawley Turner, 2013). For example, someone

who possesses strong digital capabilities could be introduced to Google Earth, and on their own, over time, figure out how it works and how to use it.

The depth and breadth of a teacher's technological knowledge will vary greatly for each teacher and will depend a great deal upon their prior experiences with technologies. For example, with technological knowledge, a teacher who knows how to program a website in HTML would have a larger "circle" of technological knowledge about webpages than a teacher who only knows how to add a new webpage to Wiki spaces.

Content Knowledge

Content knowledge refers to the depth of knowledge teachers have about a subject or concept. For example, a Social Studies teacher's content knowledge should include subjects like geography, civics, economics, and history. These subjects should then include topics like African geography, the Electoral College, the supply and demand curve, and the rise and fall of the Roman Empire. The more information and detail a teacher has about these different subjects, the greater depth and breadth of their overall content knowledge. Teachers' content knowledge also includes their ability to add new knowledge into their existing knowledge base and the ability to evaluate and stay current with new content related information when it becomes available (Journell, 2013). A teacher's content knowledge is also relevant to the course they are teaching (Shulman, 1986). For example, a 6th grade Social Studies teacher in North Carolina may have a very deep understanding of early humans and the rise of civilizations because

that is a major component of the curriculum at that level. They may possess less knowledge of United States history because this knowledge falls outside of the content of the course.

Pedagogical Knowledge

Pedagogical knowledge refers to the depth of knowledge teachers have about appropriate and effective teaching methods. For example, a teacher's use of collaborative grouping, differentiated instruction techniques, and classroom management procedures are all examples of pedagogical knowledge. The more teaching techniques teachers possess, the greater depth and breadth of pedagogical knowledge they will have. Furthermore, their pedagogical knowledge gains depth and breadth with more experience and practice a teacher has with using these teaching methods effectively with students. Pedagogical knowledge can be viewed as the "Art of Teaching," as it involves the decisions and approaches that teachers make in response to the events that transpire in the classes they are teaching (Powell, 1992; Tamir, 1988). Pedagogical knowledge also accounts for the teachers' ability to understand their students and adapt their teaching techniques to accommodate the needs of their students. Thus, while this is a type of teacher knowledge, students play a significant role in how this knowledge is applied within the classroom based upon their characteristics and actions (Sadler, Sonnert, Coyle, Cook-Smith, & Miller, 2013; Shulman, 1986).

Technological Content Knowledge

Technological content knowledge refers to the relationship between technology and content within the classroom and how each of these influences and limits the decisions about the other. For example, a unit on the geography of Africa would lend itself to the use of Google Earth in the classroom but may limit the opportunities to use Twitter or Facebook in the classroom. Thus for a teacher who demonstrates technological content knowledge, the choice of content to teach is affected by the choice of technology to use, and vice versa. Teachers with greater depth and breadth of technological content knowledge should be better positioned to use both content and technology to expand the affordances and possibilities offered in their classroom. A teacher with limited technological content knowledge might see Facebook as a means to promote a can food drive during a unit on poverty. However, a teacher with vast technological content knowledge might choose kickstarter.com to create a classroom campaign to address community hunger. With Kickstarter.com, students can create an online service learning project dedicated to poverty in their community. This project, through Kickstarter's features, would allow students to solicit funding from donors, promote their campaign through social media, organize events, solicit feedback from the community, and produce a product such as a public service announcement, related to their service learning project on poverty. In this scenario, both teachers use technological content knowledge; however, the second teacher's greater depth of technological content knowledge provided more affordances to the students.

Technological Pedagogical Knowledge

Technological pedagogical knowledge refers to the relationship between technology and teaching and how each of these influence and limit the other. For example, teachers might decide that the use of a live webcam might be a great tool to use as a bell ringer or as an introductory hook to the day's lesson. However, these teachers also recognize the fact that they cannot control what happens on the live webcam and that its use might cause distractions among the students, or could hamper instruction by introducing off-topic discussions. Teachers who understand how their methods of teaching are influenced by the technology they choose and how the technology they choose is affected by the teaching techniques they utilize in their classroom are using their technological pedagogical knowledge. Having technological pedagogical knowledge means that teachers understand the pedagogical affordances and limitations that a particular piece of technology brings with it into the classroom (Mishra & Koehler, 2006).

Pedagogical Content Knowledge (PCK)

Pedagogical content knowledge refers to the ability of teachers to use appropriate teaching techniques to teach a particular subject or content to students. This includes transforming content and ideas into techniques and practices that are appropriate for learning. This means using analogies, illustrations, examples, explanations, and demonstrations as a means of understanding of what makes the learning of specific topics easy or difficult for students. Because there is no single best

way to teach every student the content, “the teacher must have at hand a veritable armamentarium of alternative forms of representation, some of which derive from research whereas others originate in the wisdom of practice” (Shulman, 1986, p. 9). For example, a teacher with strong pedagogical content knowledge would recognize the value of using a classroom simulation to teach students about the three branches of government, or using structured academic controversies as a means to engage the class in meaningful student-led discussions on historical topics. In each case, the teacher has chosen an appropriate method of teaching to insure the learning of the content by the students. Pedagogical content knowledge also acknowledges the influence and limitations that pedagogy places upon content choices and vice versa. The pedagogical content knowledge framework, as discussed previously, is the foundational framework upon which the TPACK framework was built. It constitutes one of the three essential types of knowledge required to create the knowledge found in TPACK.

Technological Pedagogical Content Knowledge (TPACK)

TPACK refers to the effective teaching of content through the use of appropriate technology. It combines all of the previous classifications of knowledge in order to form the new knowledge that exists in TPACK. For example, Journell, Ayers, and Beeson (2014) found that Twitter could be used effectively to teach about the 2012 presidential election in secondary Social Studies classrooms. The use of Twitter in the classroom provided teachers with a means to “incorporate current events and real-world perspectives into instruction on a regular basis” (Journell et al., 2014, p. 64). In this

scenario TPACK knowledge was used to teach the content effectively through the use of an appropriate technology. Table 2 demonstrates how this example fits the TPACK framework.

Table 2

TPACK Example—Twitter

Name	Example
Content Knowledge (CK)	Knowledge of American government and civics, especially presidential politics.
Pedagogical Knowledge (PK)	The use of discussions as a means to foster conversations and thinking about a topic, in this case the 2012 presidential election.
Technological Knowledge (TK)	Knowledge of Twitter, including setting up accounts, navigating Twitter online, and the use of hashtags.
Pedagogical Content Knowledge (PCK)	Understanding that having students participate in civic discourse with other students and people outside of school about presidential politics is a method of teaching students political science through active participation.
Technological Content Knowledge (TCK)	Understanding that Twitter can connect students with important primary and secondary sources of information about presidential politics, but realizing that other users of Twitter might not be reliable sources for information about presidential politics.
Technological Pedagogical Knowledge (TPK)	Understanding that Twitter can be a good place for students to submit comments and enter into a real time discussion about presidential politics, but realizing that those comments are limited to 150 characters.
Technological Pedagogical Content Knowledge (TPACK)	Having students use Twitter to enter into discussions about presidential politics with their classmates and other Twitter users during a presidential debate is a good way to meet the instructor's goal that students engage in civil discourse about current events.

Possessing all of the components of TPACK does not necessarily mean that a teacher will teach from a TPACK perspective. In that vein, a teacher could choose the right technology, content, and pedagogical approach and still deliver an ineffective lesson because he or she didn't teach from the knowledge borne out of TPACK. This is an important characteristic to keep in mind when thinking about the TPACK framework, as it goes beyond just the use of technology in teaching (Koehler & Mishra, 2009). Because students are digital natives (Prensky, 2001) who are not only comfortable with technology in their lives, but have also come to expect it to be a part of their lives, the need for teachers to employ TPACK-based knowledge in their instruction is essential. Teachers' capacities to meet students' technological expectations will depend on their TPACK knowledge base and the sizes of the circles comprising this knowledge.

Circles of Knowledge: A Skills Acquisition Approach to TPACK

TPACK provides a framework to understand the technology teaching practices of teachers (Koehler & Mishra, 2009; Mishra & Koehler, 2006). However, it does not provide a means for measuring the level of effectiveness with a TPACK approach to teaching that an educator might possess. In an effort to understand this, researchers began to examine and measure the amount of TPACK a teacher possesses using a variety of TPACK measurement tools. This includes devising surveys that can measure the capacity for TPACK thinking in a teacher (Lux et al., 2011; Sahin, 2011; Schmidt et al., 2009; Yurdakul et al., 2012), analyzing teachers' lesson plans for evidence of TPACK

thinking (Harris, Grandgett, & Hofer, 2010), and using a TPACK observational protocol to observe evidence of TPACK in action (Hofer, Grandgnett, Harris, & Swan, 2011).

The degrees of success and the type of TPACK instruction available to the teacher will largely depend on the depth and breadth of the individual circles of knowledge the teacher possesses, which can be represented by the size of the circles on the TPACK diagram. Four different teachers could employ a TPACK approach to the same lesson, yet their lessons would be completely different because each of them would have different sizes of circles of knowledge that they use to construct TPACK knowledge. The following four examples are presented as a means of describing and visualizing how a particular teacher's TPACK makeup might influence a teacher's technology teaching practices.

Figure 3 represents a teacher with a dominate content knowledge approach to TPACK instruction. This hypothetical diagram represents a middle grades social studies teacher with a large amount of content knowledge and average amounts of technological and pedagogical knowledge. In this scenario, the teacher likely would provide plenty of content choices and content-related materials, such as primary sources, due to her large depth of knowledge about Social Studies content. She would be able to readily answer questions from students about the content, while also being able to go beyond the textbook and curriculum in terms of teaching information about the topic or theme being studied.

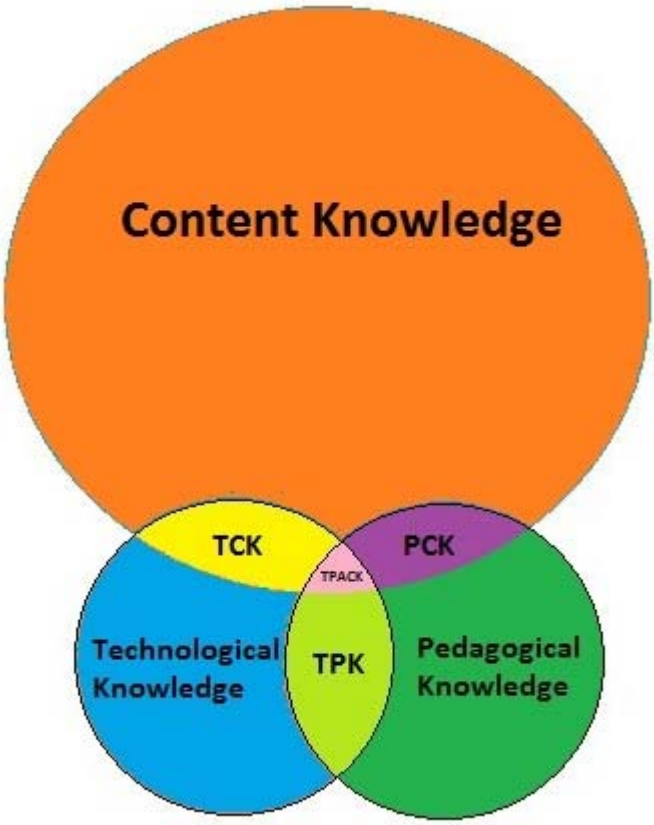


Figure 3. TPACK—Content Dominant Knowledge.

However, her choices of assignment types and classroom activities along with the varieties of technologies she is familiar with may not be as comprehensive, although she still has knowledge in these two areas that she can use within the classroom. This teacher has all of the required components to act on TPACK knowledge, yet her TPACK, as defined by the visual, is still very small. What is important in this example of TPACK is not that the teacher has larger content knowledge, but rather, the placement of the circles of knowledge. The placement of the circles of knowledge of a teacher represents how well the teacher has combined their different circles of knowledge. In this

example, even though the teacher has a large circle of content knowledge, this does not translate to a larger set of TPACK knowledge. This is because this teacher lacks the experience or knowledge of how to effectively combine content knowledge with other types of knowledge. This visual reinforces the idea that TPACK is enacted through the combination of knowledge and not a function of the "addition" of different knowledge to existing knowledge bases. A teacher with this type of model of TPACK knowledge likely would have a limited set of technologies she had identified as useful for teaching content and a few effective pedagogical approaches to teaching the content. Therefore, she might demonstrate only two or three different TPACK-based instructional practices. Per the definition of TPACK-based instruction given in chapter one, these practices constitute instruction that utilizes technology in a way that complements both pedagogical and content decisions. This does not mean that a teacher knows about the TPACK framework and is purposefully thinking about TPACK in their planning and/or execution of instruction. Rather it means that the teacher makes sound decisions as it relates to the use of technology demonstrated by their appropriate use of technology to meet pedagogical and content needs of their students. Specifically, TPACK-based activity types are discussed later in this review of the literature as examples of TPACK-based instruction. Additionally, this study's research questions are also concerned with describing what TPACK-based instruction looks like in practice within middle school Social Studies classrooms.

Figure 4 represents another possible representation of a teacher's circles of knowledge in that none of the circles are of the same size.

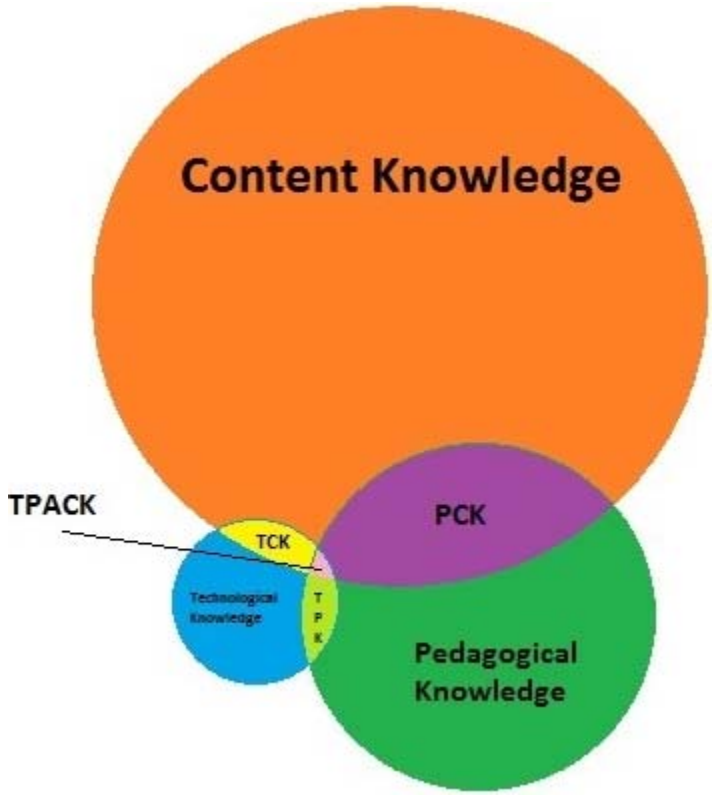


Figure 4. TPACK—Typical Teachers.

In this example, the different size circles represent a teacher who has an above average amount content knowledge, an average amount of pedagogical knowledge, and a below average amount of technological knowledge. When compared to the teacher in Figure 3, this teacher has less technological content knowledge, technological pedagogical knowledge, and TPACK knowledge. This is because technological knowledge is represented by the smallest circle. Hence her ability to connect content to

an appropriate technology, which is technological content knowledge, may be limited only to two or three different technologies that she knows. Likewise, her ability to enact technology in pedagogically meaningful ways, technological pedagogical knowledge, would also be limited to one or two different methods. As a consequence of this, her ability to craft TPACK teaching practices may be limited to one or two activities that she has been shown or has experience enacting. However, even with a smaller circle of technological knowledge, the teacher's TPACK knowledge is only slightly smaller than the TPACK knowledge of the teacher in Figure 3. Once again the relative size of the circles that represent various types of knowledge determines the ability of the teacher to enact TPACK teaching practices. In both examples, the teachers are limited in their ability to combine their different knowledge, consequently restricting their ability to produce TPACK teaching moments.

As opposed to the teachers represented in Figures 3 and 4, Figure 5 represents a teacher who has demonstrated a very high degree of success in combining the different types of knowledge that comprise TPACK. In this model of TPACK, all of the different components of TPACK are nested within each other. One way to think about this model is to pretend you are looking at it from above. A large orange content knowledge circle is laid down first, followed by a green pedagogical knowledge circle, which covers all but the outer edge of the content knowledge circle. Then a blue technological knowledge circle is laid down, which covers all but the outer edge of the pedagogical knowledge circle. The teacher's content knowledge is still the largest circle of knowledge that she

possesses, followed by her pedagogical knowledge and then her technological knowledge.

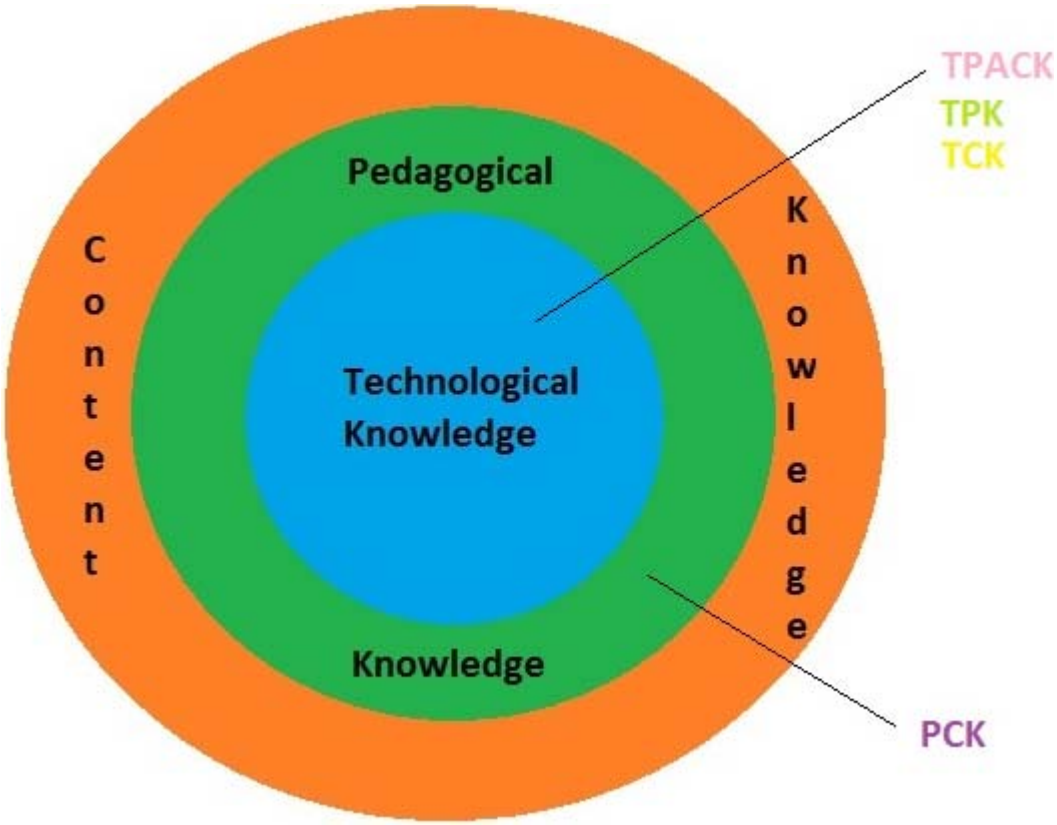


Figure 5. TPACK—Ideal Teachers.

What is important to realize about Figure 5 is due to the different sets of knowledge being nested on top of each other, TPACK is represented by the entire area in blue. This is because the entire area of blue, technological knowledge, is also on top of an area of green, pedagogical knowledge, which is itself on top of an area of orange, content knowledge. Since TPACK is formed at the intersection of content, pedagogical, and technological knowledge, the entire area in blue becomes this intersection. This

teacher still resembles a typical teacher in that she has varying amounts of content, pedagogical, and technical knowledge. Yet this teacher's ability to successfully combine these types of knowledge, reflected in Figure 5, has a dramatic effect on her ability to enact TPACK teaching practices. Her TPACK knowledge is considerably larger than the previous two teachers. In this ideal example of TPACK knowledge, the teacher possesses the ability to use all of her technological knowledge in pedagogically meaningful ways, creating a large technological pedagogical knowledge set. Furthermore, the teacher has the ability to link all of her pedagogically appropriate methods to relevant content themes enabling her to wield a large pedagogical content knowledge approach to instruction. Lastly, this teacher understands all of the different ways in which the technological knowledge she possesses affects the content she wishes to teach, creating a large technological content knowledge. By combining these three knowledge, this teacher is able to create a robust set of TPACK knowledge from which to teach. Once again, in this example, the placement of the circles represents the teacher's ability to effectively combine different sets of knowledge, and defines the size of the set of TPACK knowledge the teacher has. This visual reinforces the idea that a large set of TPACK teaching practices comes through the effective combination of other knowledge.

Lastly, Figure 6 represents the opposite of the teacher portrayed in Figure 5. In this example, the teacher once again possesses varying amounts of technological, content, and pedagogical knowledge as represented by different size circles. However,

in this particular case, the teacher is not able to combine these three knowledge bases into new knowledge like technological pedagogical knowledge, technological content knowledge, or pedagogical content knowledge. Consequently, without combining these different knowledge bases, the teacher is unable to create TPACK knowledge and likely would not effectively integrate technology teaching practices to help students learn the content in pedagogically appropriate ways. This visual once again emphasizes the idea that TPACK goes well beyond just having different types of knowledge at your disposal; rather, TPACK is truly the result of how teachers can combine these knowledges effectively into useful technology-integrated teaching practices that support the development of stronger content knowledge in students.

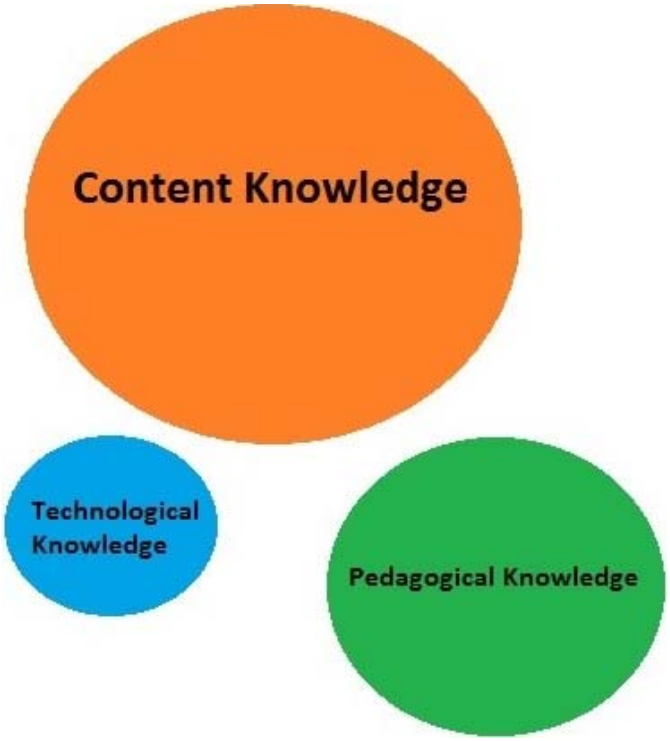


Figure 6. No TPACK.

One effective way to understand differences in the sizes of circles representing knowledge that teachers possess is to view them through the prism of a teacher's skills acquisitions process. When learning a new skill like teaching, research indicates that a person will move through five distinct stages: beginner, advanced beginner, competent, proficient, and expert (Berliner, 1988, 2001; Brandt, 1986; Dreyfus, 2004). A summary of each of these skill levels with a real-world and teaching example is provided in Table 3.

Table 3

Summary of Skill Acquisition Process

Skill Level	Description	Examples
Beginner	You learn "a set of context-free rules to guide behavior" (Berliner, 1988, p. 2). The parts of the skill to be learned must be labeled and learned.	A beginning driver would learn traffic signals, traffic signs, and indicators in the car that inform the driver of his situation A teacher learns basic rules for teaching (e.g., ask higher level questions, learn the students' names, and take role daily).
Advanced Beginner	Experience begins to guide behaviors towards enacting the skill being learned. Context begins to influence behavior. "Experience is affecting behavior, but the advanced beginner still has no sense of what is	When driving experience informs you that the interstate might be clogged with traffic around rush hour. Learning to have a procedure for sharpening

Table 3

(Cont.)

Skill Level	Description	Examples
Advanced Beginner (cont.)	important ” (Berliner, 1988, p. 3).	pencils instead of students getting up on their own. Taking the class to the bathroom on the way back from lunch instead of going to the classroom directly.
Competent	Conscious choices about the actions taken with a skill are made. Goals are rational and the choices made to attain them are rational. Additionally, while using the skill, competent teachers can distinguish between what is and what is not important.	A driver decides to park near the exit of a parking lot of a stadium so that they can leave easier, even though they may have to walk a bit further to the stadium. A teacher chooses to ignore an off-task/topic comment because they understand that it will distract from the goals at hand.
Proficient	Intuition and instinct guide the use of the skill in question. The need to consciously think about the skill is no longer needed when using the skill.	When driving in the rain knowing through instinct that you are going too fast and subconsciously letting up on the gas in order to slow down. Teachers develop “with-it-ness,” and the ability to read and understand the mood, actions, and attitudes of their class and adjust accordingly to meet their needs.

Table 3

(Cont.)

Skill Level	Description	Examples
Expert	"Have an intuitive grasp of a situation and seem to sense in nonanalytic, non-deliberative ways the appropriate response to make" (Berliner, 1988, p. 5). The skill is no longer viewed through the prism of a skill, but rather just something that can be done.	You can listen to music, carry a conversation, and adjust to the level and speed of the traffic while driving without noticing the details of driving. A teacher can deviate from the lesson plan and teach to the moment, without prior planning, and without thinking about this transition. It is just a natural extension of the teachers' thought process and desire to teach students.

As people progress through these levels, they gain a greater ability to use the skill in question. Thus, one possible way to view the growth in size of the circles representing content, pedagogical, and technical knowledge that a teacher possesses is through their progression along the five stages of skills acquisition. As teachers progress along the skills acquisition track their capabilities to employ TPACK-based instruction in their classrooms should increase. However, there is a distinction between the knowledge and the skills of these teachers. Theoretically, Berliner (1988) acknowledges knowledge as both a result of experience and new information that an individual acquires about a certain domain. However, Berliner is careful not to equate an increase

in experience with growth in skills acquisition, conceding that “we don‘t know yet how to carve out experience from expertise” (Brandt, 1986, p. 7). Yet, Berliner acknowledges there is a relationship between the two recognizing that “We‘re quite sure that a person with many years’ experience is not necessarily an expert, but all our experts have ten years or so experience” (p. 7). Knowledge does not progress through the five stages of skills acquisition, rather as knowledge increases, your ability to progress through the five stages of skills acquisition increases. Another way to view this is that an individual’s placement within the skills acquisition model is not a result of the number of skills you have available, but rather how you use the skills you have available. Following Berliner’s line of thinking quoted above, having lots of skills does not mean an individual is an expert, but experts tend to have lots of skills. For example, Berliner (1988) warns about the difficulty lateral entry teachers will have with the teaching profession. Nuclear physicists lateral entry teacher could have expert level skills with the content of physics. But in terms of teaching, without pedagogical knowledge, and the skills that go along with it, these teachers would be a beginner on the skills acquisition model for teaching. In this example, “the content knowledge that they possess will not help them much, particularly with hard-to-teach students or in tough teaching assignments” (p. 26). Thus, a teacher with expert pedagogical knowledge, advanced beginner technology knowledge, and proficient content knowledge will enact TPACK differently than another teacher with different levels. Theoretically, as a teacher moves toward expert levels of skill acquisition in regard to the different types of TPACK knowledge, she will increase

her ability to enact TPACK teaching practices within the classroom. Using this skills acquisition approach to the growth of TPACK within teachers could be useful for both identifying an initial level of TPACK within teachers and to help them grow their understanding of TPACK teaching practices from an initial beginner level to an expert level.

Critiques of the TPACK Framework

As noted by the literature previously discussed, the TPACK framework is widely used as a means for understanding the technology teaching practices of teachers. However, blind acceptance of this framework's ability to accomplish this is neither healthy for understanding a phenomenon nor is it a rational approach to research. A critique of the TPACK framework, or at the very least, an analysis of the effectiveness of the TPACK framework is therefore a valuable tool for establishing the credibility of the TPACK framework as a tool to understand the technology teaching practices of teachers.

Unfortunately, there has been very little and limited research undertaken along these lines. Using Google Scholar, Eric database, and H.W Wilson database not a single article was returned on the subject of TPACK and critiques. A general Google search for TPACK and critiques returns just two blog posts (Olsen, 2012; Perkins, 2009) that have thoughtful critiques of the TPACK framework. However, it should also be noted that one of these blogs has not had an update since 2011, thus diminishing its status as a trusted source of information.

A search of the *Journal of Research on Technology in Education* on TPACK and critiques does return a single peer reviewed article offering a critique of the TPACK framework (Brantley-Diasa & Ertmer, 2013). Brantley-Diasa and Ertmer (2013) offer up several different critiques to the TPACK framework, including speculating if TPACK "may be too large (vague or ambiguous) of a construct to enable reasonable application" (Brantley-Diasa & Ertmer, 2013, p. 103). Citing the seven different knowledge bases that comprise the TPACK framework, the authors argue that TPACK takes a concept that is straightforward, technology integration, and packages it in a framework that is too big to be useful. In their view, the TPACK framework takes an already complex framework, pedagogical content knowledge, and more than doubles the components, going from three to seven. The authors speculate that this might make the framework difficult to use both theoretically and practically (Brantley-Diasa & Ertmer, 2013).

Brantley-Diasa and Ertmer (2013) also critique TPAC questioning if it truly represents a new framework or if it is actually an unnecessary new label for pedagogical content knowledge. In their critique they call into question the need for a new technological knowledge component to the pedagogical content knowledge framework. They cite the fact that "Shulman described a teacher's curricular content knowledge as the knowledge of instructional materials that are useful for teaching a certain content including materials such as software, visual materials, and films, among others" (Brantley-Diasa & Ertmer, 2013, p. 106). While vocabulary like computers, the Internet, and Web 2.0 fail to show up on this list, it is not hard to conclude that they could be

captured by Shulman's use of "among others." Additionally, if these technologies had been more widespread or available at the time, it is not hard to imagine that they also would have been included in Shulman's description. This then raises the question of "whether these types of digital tools are sufficiently different from other, more traditional tools, to require their own category of knowledge" (Brantley-Diasa & Ertmer, 2013, p. 106).

Lastly, Brantley-Diasa and Ertmer (2013) critique TPACK-based upon the fact that eight years after its introduction, there is still not a clear picture of what TPACK looks like in practice. They cite the fact that many of the TPACK measurement instruments often only ask if TPACK is present or not. Additionally, they mention that a majority of the current measurement instruments rely on the participants to self-report if they have TPACK or not. Thus Brantley-Diasa and Ertmer (2013) argue that "we are still missing a thorough description of what TPACK or its components, look like in action" (Brantley-Diasa & Ertmer, 2013, p. 116). This study aims to address this critique in particular as it seeks to describe the TPACK-based instructional practices of middle school Social Studies teachers.

Notwithstanding the previous critiques, the lack of scrutiny of the TPACK framework is concerning, although part of this could be attributed to the relatively newness of the framework and the need to establish TPACK literature in the first place prior to being able to offer a critique of this literature. Regardless, this study offers the following two critiques of the TPACK framework as a means of balancing the framework

and acknowledging the shortcomings of the framework from the perspective of the author. While these critiques are not part of the literature related to TPACK, I feel that they are important to include here, as part of the larger discussion of critiques to the TPACK framework since they influence my opinion of the TPACK framework and help inform this study.

The first critique of the TPACK framework comes from the implications and interpretations that Figure 2 can invoke within the reader when analyzing this visual representation of the TPACK framework. Because the image is static, it can give the impression that technological content knowledge, technological pedagogical knowledge, and pedagogical content knowledge must all intersect at the same moment in time, in order for the knowledge required for TPACK to exist. While Mishra and Koehler (2006), creators of this visual representation of the TPACK framework, don't imply this at all in their discussions of the TPACK framework, the visual nevertheless can give that impression to the reader. A much more representational visual of the TPACK framework would be animated in nature and three dimensional in representation. For example, a better visual might be of an animated meat grinder. In this animated visual, circles of knowledge, of various sizes would be deposited into the meat grinder. Sometimes the circles of knowledge would be deposited one at a time, other times they would be deposited at the same time. A visual like this would correctly impart to the viewer the true nature of the TPACK framework. That teachers use different sizes of circles of

knowledge at different moments in time to create the technology teaching practices they use in their classroom.

The second critique of the TPACK framework comes from the lack of accounting for students within the framework. Students are not represented in either the visual depicting the TPACK framework nor are they part of the discussion about the TPACK framework that Mishra and Koehler (2006) depict. Because students comprise such an enormous part of the education equation and the act of teaching is directly related to delivering instruction to students, the omission of students could be justified as a legitimate critique of TPACK. In response to this some could rationalize that Pedagogical Knowledge includes students within its domain. It could also be understood that since TPACK is concerned with the technology teaching practices of teachers, thus students fall outside of this scope of study. Regardless if students are found or are not found within the TPACK framework, a stronger case should be made and provided by the TPACK framework in order to eliminate any confusion on the matter.

TPACK in Social Studies Education

The need to integrate technology into the curriculum comes from a variety of sources, including schools, parents, students and administration (Berrett, Murphy, & Sullivan, 2012; Kim, Kim, Lee, Spector, & DeMeester, 2013; Pellegrino & Quellmalz, 2011; Polizzi, 2009; Prensky, 2001; Winner & Holloway, 1983). With this need, researchers have looked into how TPACK can be used as a means for creating a technology enhanced curriculum (Baran, Chuang, & Thompson, 2011; Guerrero, 2010;

Harris, Mishra, & Koehler, 2009; Manfra & Hammond, 2008). This includes looking at TPACK's influence within particular content areas (Guerrero, 2010; Hammond & Manfra, 2009; Lee & Manfra, 2012), the use of particular technologies to enhance instruction (Bull, Hammond, & Ferster, 2008; Manfra & Hammond, 2008; Mishra & Koehler, 2009; Swan & Hofer, 2011), and TPACK's influence in creating professional development opportunities for teachers (Doering, Veletsianos, Scharber, & Miller, 2009; Niess, van Zee, & Gillow-Wiles, 2011; Polly, 2011a, 2011b).

These studies have led to new understandings about the potential of technology to impact learning along with the role teachers have in developing this type of knowledge. It is beyond the scope of this study to discuss every research effort that has been undertaken on the TPACK framework specifically or every research effort that has used the TPACK framework as a guide in its implementation. Rather, I will focus specifically on the research on TPACK in social studies education.

A Brief History of Technology Use in Social Studies Instruction

In the 70s and 80s the use of digital technologies and software applications as a means to support instruction began to increase within our schools (Carey & Gall, 1986; Cuban, 1986; Sturdivant, 1985; Winner & Holloway, 1983). Teachers had new ways to deliver Social Studies content to their students via the introduction of these new technologies. Instructional technologies have given Social Studies teachers a vast new tool set from which to inspire, engage, and teach their students because of these

instructional technologies. What follows is a brief history of the instructional technologies used in Social Studies since the 1980s.

During the 1980s and early 1990s, the use of technology within the Social Studies classroom initially took the form of instructional technologies designed to improve the delivery of content or drill and skill software applications designed to help reinforce content taught to students (Bolt, 1986; Ediger, 1987; Flouris, 1987; Glenn & Rawitsch, 1984; Rockman, 1986). These technologies allowed Social Studies teachers to reshape their lessons by providing their students with new ways to experience Social Studies content. While many of these experiences still remained at the lower levels of Bloom's Taxonomy (Bloom & Krathwohl, 1956), there were attempts to move beyond these lower level uses of technologies. For example, Social Studies teachers began to use technologies to assist students with conducting research (Cohen, 1987) and producing projects (Vlahakis, 1988). However, logistical considerations, like the lack of adequate funding, teacher acceptance, realistic expectations, school board acceptance, clear policies, and the lack of training still played a significant role in the availability and use of technologies in the Social Studies classroom (Deluca, 1983; Dockterman, Snyder, & Tom Snyder Productions, 1986; Sturdivant, 1985; West, 1986). Teachers, administrators, and technology developers were still trying to figure out the best way to integrate technology into the classroom.

Instructional technologies within the Social Studies classroom reached a turning point in the mid-nineties with the adoption of the Internet as a means of

communication and as a research tool (Boldt, Gustafson, & Johnson, 1995; Marker, 1996; Risinger, 1996; Wilson & Marsh, 1995). Social Studies teachers who embraced the Internet as a means to enhance instruction were able to deliver content to their students in a variety of new ways, especially as the capabilities, availability, and affordances of the Internet increased over time. This allowed Social Studies teachers to use the Internet to engage students, develop information literacy, and allow students to have more ownership in their learning (Smith & Hicks, 1999). For example, the Internet provided Social Studies teachers with a means to foster critical thinking skills in their students by having them evaluate Social Studies websites related to the content matter they were studying (Shiveley & VanFossen, 1999). The Internet also expanded the content available for Social Studies teachers to teach, including incorporating current events into the classroom and entering into discussions about social and controversial issues (Risinger, 2000). Of all the contributions that the Internet provided Social Studies teachers, its ability to provide access to digital primary source materials might have been the most influential (Hicks, Doolittle, & Lee, 2004; Hofer, 2004; Lee & Molebash, 2004; Lee, 2002; VanFossen & Shiveley, 2000).

Today, Web 2.0 applications are providing a second turning point in regards to technology and Social Studies instruction. Web 2.0 applications are web-based or mobile application-based software programs that empower the user to control their experience within the application. Two of the basic tenets found in most Web 2.0 applications are the ability to produce something by engaging with the Web 2.0

application and the ability to collaborate and share with others. Social Studies teachers can leverage these features of Web 2.0 technologies to promote collaboration among students and to provide students with new mediums with which to produce assignments related to the Social Studies content they are studying (Blankenship, 2009; Bull et al., 2008; Heafner & Friedman, 2008; Hong, 2008). Web 2.0 technologies can also provide Social Studies teachers opportunities to engage students with Social Studies topics outside of the classroom in virtual spaces without the time limits that a traditional class period imposes (Holcomb, Beal, & Lee, 2011; Hostetler, 2012; Journell, Ayers, & Beeson, 2013; Lee & Probert, 2010).

Some Social Studies teachers leveraged the functionalities of Web 2.0 applications in their classrooms through the use of blogs, wikis and online discussion boards as a means to engage students in both meaningful discussions and historical analysis (Bolick & McGlinn, 2004; Heafner & Friedman, 2008; Hostetler, 2012; Manfra, Gray, & Lee, 2010; Manfra & Lee, 2012; Stoddard, Hofer, & Buchanan, 2008). These Web 2.0 applications require students to use historical analysis to initially understand the topic they are reading. Afterwards, students react to the topic and collaborate with each other by reading and replying to each other. These types of Web 2.0 applications, when used correctly, can foster the type of historical thinking that the current Social Studies curriculum requires (National Council for the Social Studies, 2013).

Web 2.0 technologies have also led to the emergence of digital literacies in Social Studies classrooms as a new means for teachers to build reading and writing skills.

Digital literacies refer to reading, writing, listening, and speaking of text through the use of digital tools including software, hardware, and digital mediums/spaces (Forzani & Leu, 2012; Greenhow & Gleason, 2012; Hagood, 2012; Leu et al., 2011). The need to both understand and be able to navigate new literacies, such as those in digital formats, within the classroom is critical for success in the middle school classroom (Forzani & Leu, 2012; Hagood, 2012). Teachers who embrace and use new literacies effectively have the potential to transform the learning experience for students (Forzani & Leu, 2012) and discover a rebirth and newfound motivation towards their own teaching practices (Hagood, 2012). An example of this in the digital realm can be seen in Greenhow and Gleason's (2012) research into Twitter as a new form of literacy emerging within schools. In their research, the authors defined Twitter's use by teachers as a form of new literacy that enabled students to communicate their thoughts and ideas through not only a technology-mediated medium, but also within a social context that Twitter provided.

It should also be noted that because of the sheer volume of Web 2.0 applications that are currently available and because of the rapid evolution that these Web 2.0 applications undergo, research into their usage within a Social Studies classroom can quickly become outdated. For example, the Web 2.0 application Flickr (www.flickr.com) was once considered the ideal place to store, categorize, and share pictures on the Internet. Today, Instagram (http://instagram.com/) and Pinterest (https://www.pinterest.com) also serve this need. Thus any research done in

conjunction with a particular Web 2.0 application, and technology in general, runs the risk of becoming obsolete, especially if the research focuses on the specific usage of an application or technology and not on generalizable knowledge that can be gained from using the Web 2.0 application or technology. This scenario is also true for research into Social Studies teachers' TPACK teaching practices. In sum, research into the technology teaching practices of Social Studies teachers should focus more on the qualities of TPACK they demonstrate in their instruction and less on the specific technology used in the delivery of instruction.

While the specific term TPACK is absent in this brief history of technologies within the Social Studies classroom during the eighties and nineties, its application by teachers during this time was not. TPACK was not created until 2006 with Mishra and Koehler's introduction of the term TPACK. Yet, the essence of TPACK has been in practice since the first usages of technology in the classroom (Brantley-Diasa & Ertmer, 2013). Some teachers were already using the different components of the TPACK framework to create TPACK knowledge when teaching with technologies (Dockstader, 1999; Ertmer, Addison, Lane, Ross, & Woods, 1999; Hardy, 1998; Snoeyink & Ertmer, 2002). These were the teachers who often advocated for the inclusion of technologies as part of the classroom experience (Dockstader, 1999; Ertmer et al., 1999; Hardy, 1998). Mishra and Koehler gave the technology teaching practices of these teachers a name and developed a theory from which to understand how to teach effectively with

technology. With this theory now available, researchers have been able to use it as a lens to understand the technology teaching practices of Social Studies teachers.

TPACK in Social Studies Instruction

Recently, researchers have begun to investigate how Social Studies teachers use technology in their instruction through the lens of the TPACK framework. These TPACK in action studies help describe TPACK in practical terms, providing examples of the characteristics and qualities that these Social Studies teachers possess that represent TPACK knowledge. While there are relatively few of these studies available, the ones that exist are excellent examples of research into the TPACK teaching practices of Social Studies teachers. What follows is a brief thematic description of the existing literature that investigates the TPACK teaching practices of practicing Social Studies teachers.

One theme that emerged in the literature is the enactment of TPACK in Social Studies classrooms through the enhancement of traditional classroom activity types by linking relevant and appropriate technologies to them (Harris & Hofer, 2009; Harris et al., 2009; Harris & Hofer, 2011). For example the use of discussion groups has been enhanced by the inclusion of relevant technologies that support this activity type, such as discussion boards and blogs (Harris et al., 2009). What is significant with these activity types is that they represent more than just the addition of technology to a well-established pedagogical content knowledge based activity. Rather, they are the enactment of the definition of TPACK, as these new activity types represent the appropriate use of technology for a particular pedagogical choice.

In social studies classrooms these updated technology-based activity types are considered examples of TPACK-based instruction, or how TPACK can be operationalized. These activity types can take on many forms, depending on the different goals the teacher has in mind with the students. Harris and Hofer (2011) categorized the different activity types into seven distinct groups. Table 4 provides an example of a technology-based activity type for the Social Studies classroom for each of the seven different groups of activity types.

Table 4

Examples of Technology-Based Activity Types for Social Studies Classrooms

Activity Type Group	Activity Type	Technology	Example in Social Studies Classroom
Knowledge Building	Experience a field trip	Live Web Cams. Google Earth	In order to build basic knowledge a Social Studies teacher could begin class by showing students a live webcam of the location that their unit is going to cover. Then, after using the webcam as a hook, the teacher could take the students on a virtual tour of the location using Google Earth.

Table 4

(Cont.)

Activity Type Group	Activity Type	Technology	Example in Social Studies Classroom
Convergent Knowledge Expression	Complete maps, charts or tables	Spreadsheet or Database software. CIA World Fact Book Website	A Social Studies teacher could have students select a different country within a geographic area they are studying, and ask students to complete a fact-based spreadsheet or database about their country using the maps, charts, and tables found on the CIA World Fact Book website.
Written Divergent Knowledge	Create a diary	A Blog. Google Images website.	A Social Studies teacher could have students read the novel Weedflower and create a blog entry for each chapter as if they were the main character in the book. They could include Images from the Internet when relevant.
Visual Divergent Knowledge	Draw a cartoon	The following cartoon creating websites: Toondoo.com, Bitstrips.com, Pixton.com	A Social Studies teacher could have students use comic strip creating websites to create a cartoon that captures

Table 4

(Cont.)

Activity Type Group	Activity Type	Technology	Example in Social Studies Classroom
Visual Divergent Knowledge (cont.)			a significant historical moment in the unit being studied. For example, students could create a cartoon of Marco Polo's travels to China.
Conceptual Divergent Knowledge	Develop a knowledge web	The following brainstorming websites: Coggle.it, Bubbl.us, Popplet.com	A Social Studies teacher could give a student or groups of students a topic from the unit. Then these students could use the brainstorming website to organize information about the topic in a visual/spatial manner.
Product-Oriented Divergent Knowledge	Create a film	Video creation products: iMovie, Microsoft Movie Maker, wevideo.com Digital cameras, digital video, and audio recorders.	Building upon the brainstorming activity, the Social Studies teacher could then have groups create a film that tells the story of their topic from a historically accurate point of view. Students could use digital cameras and digital video recorders, along with video editing

Table 4

(Cont.)

Activity Type Group	Activity Type	Technology	Example in Social Studies Classroom
Product-Oriented Divergent Knowledge (cont.)			software/websites, to edit and produce a film.
Participatory Divergent Knowledge	Engage in civic action	Skype, Instant Messengers, chat rooms, and email.	A Social Studies teacher could partner with a teacher in another country and hold Skype-based virtual town halls among the students so that they could have the opportunity to talk to each other and learn about each other's culture. Students could then communicate directly with the students they meet through email, instant messengers, and other social media methods.

It should be noted, however, that because technology goes through rapid transformations, the establishment of defined activity types are only valid until the next innovation. For example, Microsoft Word is listed as a technology used to write a diary in the updated activity types associated to technology (Harris et al., 2009). However, today there are countless specific and themed blogs that allow for students to create and maintain a diary that provides features that are far great than what Microsoft Word

can provide. Therefore, the activity type should focus on the pedagogical activity and whatever the most appropriate digital tool is to support it, rather than focusing on specific software or apps.

Another theme that emerges from the literature about the TPACK-based instructional practices of Social Studies teachers is the negative effect on instruction due to a lack of knowledge of teachers in one or more of the core components of TPACK (Beeson et al., 2014; Hofer & Swan, 2008; Swan & Hofer, 2011). In order to teach with a TPACK approach to instruction, a teacher must satisfy two requirements. First, they must possess an adequate amount of knowledge about all of the components of the TPACK framework. Second, they must be able to successfully combine these different knowledge bases to create a TPACK approach to instruction. For example, Swan and Hofer (2011) identified how the lack of technological content knowledge caused Social Studies teachers to be unable to design and implement lessons in economics using podcasting as a means of delivering content. These teachers could not demonstrate a content-based rationale for using podcasting to teach economics and thus were unable to enact TPACK teaching practices in their classrooms.

Beeson et al. (2014) spoke to the second requirement needed to create TPACK, the ability to combine all the components of TPACK into one's instruction. Both teachers in their study were described as highly-qualified teachers who embraced teaching with technology. Yet, there were significant differences between them in their technology teaching practices in both terms of complexity and authenticity. The Social

Studies teacher with little evidence of TPACK knowledge frequently missed opportunities to use technology to help shape pedagogy and content, and in some cases misappropriated technology that confused the understanding of civics topics being studied. This teacher could not combine the TPACK components in a way that could facilitate student learning by leveraging successful TPACK practices. However, the Social Studies teacher who demonstrated TPACK knowledge in his teaching practices "used technology as a tool for exploration and creation" (Beeson et al., 2014, p. 122). This teacher was able to successfully combine the TPACK components in a way that facilitated learning by using successful TPACK practices.

Producing TPACK knowledge by combining the different components of the TPACK framework might require practice with merging these different knowledge bases together (Hofer & Swan, 2008). For example, Hammond and Manfra's (2009) technology-based giving, prompting, and making model for Social Studies instruction is an example of how Social Studies teachers can gain practice with merging these knowledges. Giving refers to the teacher relaying information to the student about the content using technology. An example of this could be a PowerPoint presentation about a topic that the teacher presents to the students. Prompting refers to the teacher soliciting feedback and reactions to the information that is being taught through the use of technology. An example of this is to show students a controversial historical image in the PowerPoint and then illicit feedback from the students about the image and their reaction to it. Finally, making refers to allowing students to create a representation of

their understanding of the content with technology. An example of this is to have students create a digital storybook or an audio recording of their understanding of the topic or lesson. Professional development, including the use of TPACK building models like the giving, prompting, and making model, (Hammond & Manfra, 2009) are critical components in helping teachers gain practice in building TPACK fluency (Wright & Wilson, 2009). This also implies that TPACK will look different for different teachers, depending on their strengths with the different components of TPACK. This makes TPACK a moving target that is very personal and situational for each teacher (Hofer & Swan, 2008; Manfra & Hammond, 2008).

A third theme that emerged from the literature on TPACK within the Social Studies classrooms is the professional growth that teachers experienced when using TPACK teaching practices in their instruction. By using a TPACK approach to plan for teaching with technology, they planned technology activities in ways that were more mindful, calculated, and mixed and their instruction became more student-centered (Harris & Hofer, 2011). Additionally, their self-imposed standards for technology use within the lesson were raised as teachers became more familiar with technology, resulting in wiser technology decisions (Harris & Hofer, 2011).

Professional growth with TPACK also includes developing a sense of when it is appropriate to call upon TPACK teaching practices (Wilson & Wright, 2010). Wilson and Wright's (2010) research demonstrate that TPACK knowledge can be called upon for entirely different purposes. In their investigation, one Social Studies teacher called

upon TPACK knowledge to create opportunities for learning for his students. The other Social Studies teacher calls upon TPACK knowledge as part of a deliberate and thoughtful process used during instruction. The TPACK teaching practices of these two Social Studies teachers demonstrate that not only does TPACK manifest itself differently in each teacher, but it can also be applied for a variety of reasons by teachers within the classroom. Local conditions in the school, classroom, group, or even with students will often dictate how a teacher choses to utilize TPACK teaching practices (Lee & Manfra, 2012).

Given that research into how TPACK is used in teaching the Social Studies is relatively new, there are still several gaps in the literature that could use further investigation. For example, most of the current research into Social Studies TPACK instruction has been conducted in secondary school environments, specifically ninth through twelfth grade classrooms. The lack of research into the TPACK teaching practices of middle school Social Studies teachers represents one of the limitations of the current research available. Additionally, little research has been conducted into the use of TPACK in Social Studies classrooms that are situated within 1:1 technology environments. This lack of research into TPACK within 1:1 Social Studies environments is especially important with recent trends in education indicating that 1:1 technology environments are becoming increasingly popular with school districts (Interactive Educational Systems Design, 2014). Finally, while there have been quantitative surveys designed to measure TPACK within teachers, qualitative approaches to understanding

the TPACK decisions of teachers and their application of the different components of TPACK knowledge are lacking. Understanding how TPACK manifests itself within different teachers could be a key factor in developing TPACK-based professional development that meets the needs of a diverse teacher population.

This study contributes to the literature about TPACK teacher practices in Social Studies classrooms by addressing the limitations previously mentioned. The use of qualitative methods to describe the "shape and size" of the different components of TPACK is employed as a new means of understanding the TPACK teaching practices that the participating teachers possess. By situating this study within a middle school setting, this study helps expand the research into TPACK beyond that of a ninth through twelfth grade environment. Lastly, this study takes places within a 1:1 environment. This is important because not only does it add to the scarce research about the TPACK teaching practices of teachers in a 1:1 environment, but it also contributes to the conversation about the essential skills teachers need to be able to effectively teach in a 1:1 environment.

One to One Technology Initiatives

One to one (1:1) technology initiatives are becoming more widespread in schools due to the increased availability of funding to support these initiatives, the reduced cost of running these initiatives, and the advancement of technology within our schools (Penuel, 2006; Towndrow & Vallance, 2013; Warschauer, 2006). Because these 1:1 programs create immersive technology learning environments for both students and

teachers, they provide the perfect setting for investigating TPACK teaching practices. Because this study is situated in a school that has had a 1:1 initiative for 15 years, a brief review of the literature as it relates to 1:1 initiatives is offered.

1:1 Technology Initiative: A Description

1:1 technology initiatives are efforts by schools to provide every student attending a portable digital device to use as part of their educational experience. Laptops and tablet computers are the most common type of 1:1 technology implementations, but smartphones, brought by students, could also be part of a bring your own device (BYOD) 1:1 initiative. While each implementation of a 1:1 will certainly be unique to a given school or school district (Storz & Hoffman, 2013; Tusch, 2012), there are some common qualities found across all 1:1 initiatives. First, students and teachers are expected to use these digital devices as part of the curriculum. Second, Internet access is provided to students while on school campus with the availability, in some contexts, to have Internet access through third party services off campus. Third, the availability of both software for instruction and technical support for resolution of problems is available to both students and teachers as part of the 1:1 initiative. With these characteristics in place, 1:1 initiatives have sprung up in the last 15 years as policy makers and educators try to meet the educational demands of the 21st century by providing a new experience for students in the classroom (Towndrow & Vallance, 2013; Windschitl & Sahl, 2002; Zuber & Anderson, 2013).

1:1 Technology Initiatives: Apple Classrooms of Tomorrow (ACOT) and Beyond

Many of the tenets and qualities of 1:1 initiatives were born out of the Apple Classrooms of Tomorrow (ACOT) project undertaken by Apple Computers, universities, and local school districts (Baker et al., 1993; Sandholtz et al., 1997). This ten-year project focused on providing schools and students with access to computers, computer accessories, and computer software. Teachers were given training on how to use and troubleshoot these computers and onsite technical coordinators were provided to help these teachers and students succeed with their efforts in using these new technologies (Sandholtz et al., 1997). The ACOT project differed from previous technology-focused initiatives that viewed technologies as machines that could teach. An example of this is a geography program that teaches the location of states through drill and practice. ACOT positioned technology as a tool, much like a pencil or whiteboard that is used by teachers to meet the needs of the curriculum and the learning goals of each student (Baker et al., 1993; Dwyer, Ringstaff, & Sandholtz, 1991; Sandholtz & et al., 1997).

The ACOT project provided several key takeaways for researchers. First, it was determined that student achievement was maintained for students participating in the ACOT project at a level consistent with students outside of the project (Baker et al., 1993). This is important because students and teachers had dedicated time to learning and working with the technology provided by the ACOT project. This means they had less time to spend on traditional curriculum topics, yet they maintained the same gains of students outside of the project. Students also demonstrated an increased amount of

collaboration with peers along with adopting higher processing skills like critical thinking and problem solving (Baker et al., 1993; Dwyer et al., 1991). The ACOT project also changed the way teachers approached instruction. Teachers began to incorporate "team teaching, interdisciplinary project-based instruction, and individually paced instruction" (Dwyer et al., 1991, p. 48) as a result of their participation in the ACOT project. The ACOT project opened the door and provided some valuable ground work for subsequent 1:1 technology initiatives to take place, setting the stage for the growth of 1:1 initiatives starting in the very late nineties (Dunleavy et al., 2007).

Today, 1:1 initiatives are becoming more commonplace. A survey by the National School Boards Association in 2010 revealed that 37% of the school districts surveyed had already launched some type of 1:1 initiative within their schools (National School Board Association, 2010). Since 2010, the adoption of 1:1 initiatives has increased due to the reduced cost of implementing a 1:1 initiative and the increased availability of wireless communications and portable technologies (Storz & Hoffman, 2013; Towndrow & Vallance, 2013). Furthermore, a recent Nielsen survey determined that 70% of all students aged 13 to 17 owned a smartphone (Nielsen, 2013). Thus, for many schools their students are already positioned to enter into a 1:1 initiative using the technology the students bring from home. Even if schools do not adopt an official 1:1 policy, many teachers who are comfortable with using instructional technologies are leveraging these smartphones in their own classes.

1:1 Technology Initiative: Research Results

There is no doubt that 1:1 initiatives have been increasing steadily since the late nineties. With this increase in the use of 1:1 initiatives, initial research into 1:1 initiatives has provided both a set of best practices from which to create a 1:1 environment and the insights into the types of benefits that teachers and students can enjoy from being in a 1:1 environment. Research into this phenomena is still in its infancy and it could be argued that judging the efforts of a 1:1 initiative prior to it having a chance to take root and establish itself within a school is misguided (Schrum & Levin, 2012). Preliminary research into 1:1 initiatives has revealed several different important lessons for educators and policy makers. These insights, especially ones concerning teaching practices, are significant factors when thinking about TPACK's role in a 1:1 environment.

Research into 1:1 initiatives has resulted in the discovery of a number of best practices for implementing a 1:1 initiative along with the documentation of general expectations of teachers, students, and policy makers should have when implementing a 1:1 initiative (Penuel, 2006; Schrum & Levin, 2012; Tusch, 2012; Warschauer, 2006). Best practices for setting up and maintaining a 1:1 initiative include having onsite dedicated support staff, including the use of students, to support the devices (Schrum & Levin, 2012; Tusch, 2012); extensive and ongoing teacher professional development to support their use of these devices (Penuel, 2006; Schrum & Levin, 2012); and creating the financial and funding infrastructure to maintain the 1:1 initiative by determining the

cost of ownership, selecting appropriate vendors, and seeking out sources of funding to help offset the cost (Schrum & Levin, 2012; Warschauer, 2006). These best practices can be used as a starting point for new 1:1 initiatives and help avoid some of the growing pains associated with any new endeavor.

Research into 1:1 initiatives has also revealed important information about the experiences of teachers and students who participate in 1:1 initiatives. For example, while it is commonly thought that older teachers might resist 1:1 initiatives, research indicates that this is not the case. Rather it is the "personal mind-set, attitude, and approach to teaching and learning" (Tusch, 2012, p. 43) that determine a teacher's acceptance of 1:1 initiatives. Research also confirms that teacher participation in a 1:1 initiative has led to changes in their pedagogical choices, including the way they create classroom management procedures and the delivery of their curriculum (Storz & Hoffman, 2013). Research into the effectiveness of 1:1 initiatives has led some researchers to advocate for a 1:2 model "to achieve a balance between productivity, student engagement, social activity, and individualized learning" (Larkin, 2012, p. 101). Perhaps one of the most important findings from research into 1:1 initiatives is that teaching in a 1:1 setting is something more than just teaching with technology (Dunleavy et al., 2007). It requires giving teachers an opportunity to learn, through experience and professional development, instruction, assessment, and classroom management practices that work best in a 1:1 environment (Dunleavy et al., 2007). This information is particularly relevant when we think about the TPACK teaching practices

of the participants of this study who find themselves in a middle school 1:1 environment.

Summary

This literature review began by examining the TPACK framework through an initial discussion of pedagogical content knowledge, the foundation for the TPACK framework. The TPACK framework is then presented through a systematic discussion of all six components of the TPACK framework; technological knowledge, pedagogical knowledge, content knowledge, technological pedagogical knowledge, technological content knowledge, and pedagogical content knowledge. TPACK, the new knowledge formed out of the combination of these six forms of knowledge, is then discussed and offered as the theoretical framework guiding this study.

Following this discussion and explanation of the TPACK framework, examples of different configurations of TPACK are given along with the implications that these configurations of TPACK have for teachers. The case is then made for using skills acquisition theory as a means for understanding and describing the sizes of the circles representing the depth and breadth of the three kinds of knowledge that compose a teacher's TPACK Knowledge. Next, a critique of the TPACK framework is offered as a means of providing a more robust interpretation of the framework.

Because the participants of this study are Social Studies teachers, a brief review of the literature is offered about the use of technology by Social Studies teachers. Their use of the Internet and Web 2.0 applications are offered as two critical components that

have dramatically impacted the possibilities and affordances of technology usage within the Social Studies classroom. Since this study is interested in using a TPACK lens to understand the technology teaching practices of social studies teachers, research that uses a TPACK lens to study the technology teaching practices of Social Studies teachers is then presented thematically.

Finally based upon the setting for this study, a brief review of research into 1:1 initiatives is undertaken focusing on describing the qualities of 1:1 initiatives, the impact of the ACOT project along with the status of 1:1 initiatives today, and lastly a discussion of the findings from research into 1:1 initiatives.

CHAPTER III

METHODOLOGY

Introduction

I begin this chapter with a description of both the research design and methodology used in the planning, implementation, and analysis of this research study. Next I provide a description of the case study design I chose for this study along with my rationale to justify it as the most appropriate methodological approach for this study. Third, I present the research questions that are used to guide this study. My positionality, in terms of its relation to this study, is then disclosed. Next, I give a brief description of the pilot study that informed this study, along with its impact on the creation of this study. Fourth, I provide a description of both the setting and participants who comprise the major actors in this study. Fifth, I provide a description of both the data collection methods and the analysis procedures used in this study and sixth, a discussion of the validity and reliability of this study is presented. Finally, I explain the limitations of the study, including a discussion of any ethical issues that may accompany this study.

Research Design

There are multiple ways to study a phenomenon, each with its own set of advantages and disadvantages. The key is to choose the appropriate research approach

for a study that maximizes the advantages while limiting the disadvantages. Because this study will examine the technology teaching practices of middle school Social Studies teachers in a 1:1 environment, it requires a research approach that will allow for the study of individual teachers as well as a comparison of these teachers. A multiple case study design will satisfy this requirement by allowing me to examine the technology teaching practices of three middle school Social Studies teachers to answer the research questions guiding this study.

Case Study Research

Since the introduction of case study research as a means of conducting qualitative research, scholars have defined case study research through a variety of different lenses. Yin (2009), for example, approaches case study research by focusing on the research process. For Yin, case study research contains two parts: the scope of the case study, and the technical details that define the process of executing the case study. Yin proposes that case study research can be either qualitative, quantitative, or mixed in nature, depending on the technical details that define the process of executing the case study.

Stake (1995) takes a more holistic approach in his description of case study research. For him, case study research is defined as "the study of the particularity and complexity of a single case" (p. xi). He indicates that this happens when a phenomena is of special interest and case study is used "to understand its activity within important circumstances" (p. xi). Stake views case study research strictly through a qualitative lens

emphasizing “episodes of nuance, the sequentiality of happenings in context, [and] the wholeness of the individual” (p. xii). It is not that a quantitative approach to case study research is unattainable or unwarranted, but rather, for studying educational phenomena, a qualitative approach to case study research is necessary to hear the stories of each case. This narrative approach to the uniqueness and commonality that each case presents allows for the understanding of the case through the actions and events that define it.

Other researchers have offered their own definitions of case study research that generally fall between the boundaries offered by Stake and Yin. These other definitions include general descriptions of case studies as the investigation of an instance in action (Macdonald & Walker, 1975), or scientific definitions like “the properties of the class to which the instance being studied belongs” (Guba & Lincoln, 1981, p. 371). Wilson (1979) offered an all-encompassing definition of case study as a process “which tries to describe and analyze some entity in qualitative, complex and comprehensive terms not infrequently as it unfolds over a period of time” (p. 448). Finally, case study research can simply be understood as a research design that allows the reader to draw upon and extend their own experiences when thinking about the findings reported about a phenomena (Merriam, 1998).

Case Study Research Design: A Justification

Despite distinct differences by which these researchers define and create a case study research design, they have all contributed significantly to the acceptance and

adoption of case study research as more than just a means of conducting data collection, but rather an accepted means by which to investigate a phenomena (Merriam, 1998). Choosing the right case study definition along with the appropriate case study research design has as much to do with the phenomena being studied as it does with the beliefs of the researcher undertaking the investigation (Merriam, 1998; Stake, 1995; Yin, 2009). Thus, for the purpose of this study, I will use Merriam's definition of case study research as a reflection of my own positionality as the investigator of the different cases involved in this study. Merriam (1998) acknowledged that "case studies can be defined in terms of the process of actually carrying out the investigation, the unit of analysis, or the end product" (p. 34) However, Merriam defined case study research as particularistic, descriptive, and heuristic in nature, a definition that is aligned with my own view of case study research.

A particularistic view of case studies signifies that they focus on specific situations, phenomena, and events. Thus, case studies are important for what they reveal "about the phenomenon and for what it might represent" (Merriam, 1998, p. 29). Merriam defined case studies as being descriptive in nature because "the end product of a case study is a rich, thick description of the phenomenon under study" (p. 29). This thick description includes "as many variables as possible and portray their interaction, often over a period of time" (p. 30). While a particularistic view and a descriptive account of case studies are concerned with the "what" of a phenomena, a heuristic approach to case studies, as defined by Merriam, "illuminates the reader's

understanding of the phenomenon under study" (p. 30). As a result of this, a heuristic outcome of case study research can "bring about the discovery of new meaning, extend the reader's experience, or confirm what is known" (p. 30).

In this study, each of the three participating teachers' technology teaching practices within their Social Studies classroom constitute the particularistic phenomena that I will examine and also represent a bounded system for this study. An exhaustive portrayal of these three different cases filled with details about the cases, narratives from the participants, and a study of them conducted over a period of time will provide the rich description of these cases reported in the findings of this study. I will provide the heuristic contribution to this study by extending the reader's and the field's knowledge about the TPACK-based instructional practices of middle grade Social Studies teachers through my interpretation and discussion about the significance of these case study findings.

Specifically, I will use a psychological case study (Merriam, 1998) approach since the focus of these case studies is to better understand the teachers and their teaching practices with technology through the TPACK framework. I intend to present these case studies as descriptive case studies as they are useful "in presenting basic information about areas about education where little research has been conducted" (Merriam, 1998, p. 38). Additionally, I will use all of the individual case studies to undertake a comparative case study, which involves the analyzing and collecting of data across several different cases (Merriam, 1998; Stake, 1995; Yin, 2009). I plan to use a

comparative case study approach to allow for greater variation across the cases to emerge, thus creating an opportunity for a more compelling interpretation of the cases to be created (Merriam, 1998). This comparative case study approach "strengthen[s] the precision, the validity, and the stability of the findings" (Miles & Huberman, 1994, p. 29).

Research Questions

The following research questions guided this study:

1. In what ways will the middle school Social Studies teachers demonstrate TPACK teaching principles within a school wide 1:1 technology environment?
2. In what ways will the middle school Social Studies teachers in a school wide 1:1 technology environment combine their different forms of knowledge to construct TPACK teaching practices?

Positionality

I hope that by clearly articulating my own positionality, I can strengthen the standing of my research and build trustworthiness in my findings. I spent fifteen years in the information technology field as a network and security engineer. In this role, I was predisposed to think that there was a technical solution to the problem facing a particular situation. Because of this experience, I am able to program in several different computer languages including Java, C++, .NET, HTML, and PHP. I am proficient with multiple operating systems, including Linux, Microsoft, and Apple-based systems. I have extensive experience installing computer and Internet-based security and intrusion

detection systems used to safeguard computer systems. I am also very familiar with the installation, maintenance, and administration of several computer-based applications, such as email systems and database platforms. While all of this could suggest that I have a predisposition to advocate for technology inclusion at all times, in reality this experience taught me about the necessity of choosing the right technology at the right time, a concept that is well supported in the TPACK framework.

I am a strong supporter for the inclusion of technology as a tool to help improve the educational experiences of everyone involved with our schools. My focus on the TPACK framework along with my desire to better understand what it looks like in practice and how teachers create it comes from my strong desire to see technology correctly utilized within educational settings. Because I have such a strong personal belief in the power of technology to provide transformative experiences for our students and teachers, I am even more invested in making sure that the TPACK framework succeeds. Much like when I was installing firewalls in years past and needed to implement the correct solution to my client's need, in education, it needs to be the right use of TPACK at the right time. For this reason, I am personally drawn to the question of what TPACK looks like in practice.

I used several different methods in my research in order to check for these biases and insure that my positionality towards this study does not interfere with the data collection or the data analysis process. First, I conducted member checking with the participants to insure the quality of the data collected. This includes having

participants review transcriptions of interviews and collecting original artifacts directly from the participants. I also used peer review member checking to insure that the data analysis process is not influenced unduly because of my experiences with technology. I also had to be careful with the way in which I used my prior experiences with technology to inform my observations of TPACK-based instruction. I did not want to discount the knowledge I bring to this study nor did I want to have these experiences cloud my judgment. One way I accommodated this was by triangulating as much data as possible during the data collection process.

The Pilot Study

A pilot study is often referred to as a trial version of a full scale study (van Teijlingen & Hundley, 2001). While a pilot study does not guarantee a successful full-scale study, it is a useful resource in helping to design a research study. A successful pilot study can assess the feasibility of a study, help develop and test the accuracy of data collection instruments, identify logistical concerns, and help develop research questions and a research design (van Teijlingen & Hundley, 2001). A pilot study is a useful glimpse into what a research study might look like and if used correctly, can enhance the quality of the study following it.

The Pilot Study: A Description

I piloted this study in the spring of 2014 with the eighth grade Social Studies teacher at Lakeside (pseudonyms have been used for all names and other identifying information in order to protect participants' identities) Middle School. I observed two

different classes three times a week for a period of three and a half months. During this time, I took daily observational notes using a TPACK focused observation protocol. Additionally, I conducted formal and informal interviews with both the participating teacher and a select number of his students about the technology teaching practices of their teacher. I also collected classroom artifacts that reflected the TPACK-based instructional practices of the teacher from both the participating teacher and a select group of students. I reported and analyzed the findings of this case study as part of a manuscript written about the pilot study research effort.

The Pilot Study: Influence on This Study

The pilot study influenced this study in three distinct ways. First, the pilot study provided me with an opportunity to gain familiarity with the setting for this study. Because of the duration of the pilot study and the frequency of my visits to Lakeside Middle School, I was able to become familiar with the facilities of the middle school, the staff who worked at the middle school, and the culture that permeated the middle school. These insights afforded me insider status by the conclusion of the pilot study and positioned me to begin this study with a greater understanding about the culture of Lakeside Middle School along with an established base of support from the staff at Lakeside Middle School. In simple terms, I became comfortable with Lakeside, and Lakeside became comfortable with me because of the time spent on location during my pilot study and the mutual trust and understanding that both parties built.

Secondly, the pilot study allowed me to test data collection and data analysis techniques, which enabled me to reflect on which techniques and efforts resulted in beneficial results and which ones needed to be tweaked or dropped in order to have a successful case study research effort. For example, I modified the TPACK observational protocol several times during and after the pilot study in order to better capture the TPACK-based instructional practices of the teacher. I also revised interview questions that were confusing to the interviewee and included unscripted questions that arose during the course of the interview that provided valuable data. From a data analysis standpoint, the pilot study allowed for the development of an initial coding protocol for the data collected. Additionally, from a practical standpoint, since I am a novice researcher, the opportunity to engage in data collection, data analysis, and then data reporting was an important experience for me to build upon.

Finally, the pilot study allowed me to refine and focus the research questions for this study. In order for a case study to be most effective, the right questions must be asked and the case study must be designed in such a way as to provide the best possible opportunity to answer those questions (Creswell, 2007; Merriam, 1998; Stake, 1995; Yin, 2009). Research questions that were not effectively written were reworded or dropped. New research questions were adopted based upon the data collected and the questions that arose during the pilot study. Thus the pilot study offered an opportunity to test the initial research questions and refine them based upon their effectiveness and appropriateness.

The Setting

In order to understand the TPACK-based instructional practices of middle school Social Studies teachers, I will make a deliberate attempt to find a sixth through eighth grade educational setting that both self-identifies as being a technology-rich learning environment and has an established commitment to technology-infused teaching. One such way of demonstrating these criteria is through the use of a 1:1 technology initiative within the school. A 1:1 technology initiative implies that every student is given a digital device, commonly a laptop or tablet computer, to use in conjunction with their education both at school and at home. It also implies that the teachers at that school will adapt their curriculum to take advantage of these resources. Lakeside met these criteria.

Located in the southeastern part of the United States, Lakeside is a kindergarten through twelfth grade private school that fits the technology-infused learning environment described above. Lakeside has 1:1 technology for its sixth- through 12th-grade students. Lakeside's 1:1 technology initiative has been in place since 1999 and is designed to provide every sixth through 12th grader a laptop to use at home and at school. Founded in 1970, Lakeside has 100 full time faculty members and over 900 students. The racial/ethnic composition of the student body is as follows: 86% of the students are white, 8% of the students are African American, 6% of the students are Asian, and less than 1% of the students are Hispanic or multiracial. Tuition at Lakeside can range from $6,000 to $21,000 per year, depending on the student's grade level.

Financial assistance is available to students and their families based upon financial need. Over 20% of the students at Lakeside receive some type of financial assistance.

Much like other schools, Lakeside offers a cafeteria, a media center, and athletic facilities including sports fields, a gym, and a basketball court. Lakeside also has a help desk located in the media center that supports the 1:1 technology initiative by allowing students to get a loner laptop in case of technical failures with their current laptop, Lakeside also provides students with wireless access to the Internet through their assigned laptop. Students are able to access the Internet both during class and during non-instructional time (lunch and before and after school). This study will coincide with the opening of Lakeside's new middle school building. Prior to the 2014-2015 school year, the middle school building at Lakeside had only housed students from sixth through eighth grade. However, the new middle school building was designed to facilitate students from fifth grade through eighth grade. It was designed to resemble a rectangle, with an open courtyard in the center. Fifth and sixth grade occupy one of the long sides of this rectangle and seventh and eighth grade occupy the other long side.

In general, each classroom was designed and equipped with similar technological features including an interactive whiteboard system that is preconfigured to work with the laptops the teachers are issued. A teacher can walk into any classroom and use their laptop to interact with the interactive whiteboard system, although each teacher is preconfigured to work with the interactive whiteboard system in their own respective classroom. An integrated sound system is also connected to the interactive whiteboard

system, allowing teachers the ability to integrate music or sounds into the classroom via their laptop's connection to the interactive whiteboard system. Wireless Internet access is provided throughout the campus, including areas outside of the classroom. All student and teacher issued laptops are preconfigured to connect to the wireless Internet upon boot up.

The Participants

I purposefully chose the primary participants for this study based upon their status as the only Social Studies teachers within the middle school. The middle school students who were members of these Social Studies classes provided a secondary resource from which to approach the research questions guiding this study. Because students will be the ones most directly influenced by the technology teaching practices of their teachers, their insights will provide meaningful data about the technology teaching practices of middle school Social Studies teachers.

The Participants: Mr. Hamilton

Mr. Hamilton is the eighth-grade Social Studies teacher at Lakeside. He is a married white male in his forties and, at the time of the study, had thirteen years of classroom experience, seven of which were at Lakeside. Before becoming a teacher, Mr. Hamilton received his BA in History and his MA in History from well-known universities in the southeastern part of the United States. In addition to this teaching experience, Mr. Hamilton also teaches undergraduate history courses at a local college. As the middle school student council faculty representative and the coach of the middle

school boys' soccer team, Mr. Hamilton assumes several leadership responsibilities at Lakeside. The curriculum for Mr. Hamilton class covers American history through thematic lenses, including the economic history of the United States, the rise and evolution of democracy in the United States, and America's military history.

The class I observed Mr. Hamilton teach had nineteen students. There were nine females and ten males. There was one Asian American female and the rest of the students were white. I interviewed two students in Mr. Hamilton's class, Debbie and Stephanie. Both students were 14 years old and female.

Mr. Hamilton's class had a square layout, with fourteen tables available for student seating 28 students. Each table could accommodate two students. Mr. Hamilton's teacher station was in the front left corner of the room. He had a whiteboard that ran the length of the front of his room. Power strips were installed along all of the exposed walls near the floor allowing students access to power, for their laptops, in case their batteries were low. Additionally, Mr. Hamilton's room was equipped with a wireless projector system with a built in sound system.

The Participants: Ms. Monroe

Ms. Monroe is the seventh-grade Social Studies teacher at Lakeside. She is a married white female in her thirties and, at the time of the study, had fourteen years of classroom experience, five of which were at Lakeside. Ms. Monroe received her undergraduate degree in elementary education and her graduate degree in special education from well-known universities in the southeastern part of the United States.

In addition, Ms. Monroe is certified as a gifted education specialist. As the middle school seventh grade team leader and the coach of the middle school boys' and girls' tennis teams, Ms. Monroe assumes several leadership responsibilities at Lakeside. The curriculum for Ms. Monroe's class covers world history through geographic lenses, including the history of China, the history of India, and Middle Eastern history, including a study of world religions from a historical perspective.

The class I observed Ms. Monroe teach had seventeen students. There were nine males and eight females. There was one African American female and two African American males. The rest of the students were white. I interviewed five students in Ms. Monroe's class, Sally, Rebecca, Brittany, Kendra, and Tyrone. Tyrone was an African American male, age thirteen. Kendra was an African American female, age thirteen. The rest of the students were twelve years old, white, and female.

Ms. Monroe's class had a rectangular layout, with fifteen tables available for seating 30 students. Each table could accommodate two students. The tables had wheels on them that allowed for the easy reconfiguration of the classroom. Ms. Monroe's teacher station was in the front right corner of the room. She had a whiteboard that ran the length of the front of her room. Power strips were installed along all of the exposed walls near the floor allowing students access to power, for their laptops, in case their batteries were low. Additionally, Ms. Monroe's room was equipped with a wireless projector system with a built in sound system. Ms. Monroe

had a podium in her room that she used to stand behind with her laptop connected to her projector system.

The Participants: Ms. Goodman

Ms. Goodman is the sixth grade Social Studies teacher at Lakeside. She is a white female in her late sixties and, at the time of the study, had thirty-two years of classroom experience, eleven of which were at Lakeside. Ms. Goodman received her undergraduate degree in health education from a well-known university in the northeastern part of the United States. In addition, Ms. Goodman is certified as a gifted education specialist. As the middle school sixth grade team leader and a veteran of many years of teaching, Ms. Goodman assumes several leadership responsibilities at Lakeside. The curriculum for Mr. Goodman's class covers ancient world history, including the history of ancient China, the history of ancient Japan, and ancient Egyptian history.

The class I observed Ms. Goodman teach had fifteen students. There were seven males and eight females. There were two African American females. The rest of the students were white. I interviewed four students in Ms. Goodman's class, Sally, Miley, Ben, and Tabitha. Tabitha was an African American female, age eleven. Ben was a white male, age ten. The rest of the students were eleven years old, white, and female.

Ms. Goodman's class had a rectangular layout, with twenty individual student desks and two tables along the back of the room. Ms. Goodman's teacher station was in the front right corner of the room. She had a whiteboard that ran the length of the

front of her room. Power strips were installed along all of the exposed walls near the floor allowing students access to power, for their laptops, in case their batteries were low. Additionally, Ms. Goodman's room was equipped with a wireless projector system with a built in sound system.

Data Collection

I conducted this study over the course of thirteen consecutive weeks at Lakeside middle school. I visited Lakeside every Monday, Tuesday, Wednesday and Thursday. Each day, I observed two different class periods from different grade levels. Following this pattern, I ended up observing one class period from each Social Studies teacher at least three times a week. On a few occasions I modified my schedule to attend classrooms in which the teacher indicated that their lesson would be infused with instructional technology. Over the course of the entire study, I observed each of the three different Social Studies teachers approximately 39 times.

During my time onsite at Lakeside, I utilized a number of different data collection techniques in order to accumulate different types of data. I used some of these data collection techniques daily (e.g., observations), others I planned in advance with the participants (e.g., formal interviews), and still others collected when the opportunity presented itself, such as asking students for a copy of their assignment or engaging in small talk with the participants. All of the data collection techniques contributed to the three case studies that comprise this study.

I recorded observations during every classroom visit using a TPACK observational protocol (see Appendix A) that I developed based on a combination of TPACK-based literature, the experiences of my pilot study, and my own experiences of teaching with technology. I recorded these observations directly onto my laptop while the observation was taking place. After leaving Lakeside, I either drove directly to a nearby coffee shop where I spent at least thirty minutes adding relevant details to my observations that I might not have been able to fully capture at the moment of occurrence, or I was provided with a small room at Lakeside where I could work out of sight from the participants and other members of the school. Additionally, I used a tape recording application on my cell phone to record the thoughts and reflections I had about the day's events during my drive away from Lakeside. I added other relevant information, like follow up questions based on my observations, to the observation protocol. Finally, on rare occasions, I audio recorded the instruction of the Social Studies teachers using the tape recorder application on my cell phone when I felt that the conversation and lesson plan that I was observing was heavy with TPACK instruction. This allowed me the ability to focus on TPACK in action, rather than having to try and keep up with recording every nuance being said.

I purposefully collected artifacts from the teachers that demonstrate their TPACK-based instructional practices and from students that demonstrated their response to TPACK-based instruction. I collected a majority of these artifacts in digital format. None of the teachers at Lakeside middle are required to submit formal lesson

plans. However, I collected evidence of their lessons via their notes, their assignments, informal conversations, their contributions to their classroom web-based content management system, Haiku Learning (www.haikulearning.com), and other items that reflected a TPACK-based approach to teaching. I also collected samples of completed student assignments along with artifacts that were produced as a response to TPACK-based instruction from students.

I conducted informal interviews with each of the teachers after each classroom observation. Generally, these informal interviews centered on the events that took place during the observation, especially TPACK-based instruction that I observed. In other cases, these informal interviews concentrated on other aspects of teaching that could help me better understand the teacher as a person and as an educator. I occasionally recorded these informal interviews on my cell phone, but other times, in an effort to preserve the spontaneity of the conversation, I added the informal interviews to the observation protocol at a later time. I informally interviewed select students before and after class about the TPACK teaching practices of their teacher. I only selected students who agreed to participate in this study to participate in those interviews. Once again, I recorded a few of these conversations, but the majority of them were included in the observational protocol.

I conducted a formal interview at the end of the study with each of the teachers. These interviews used an interview protocol as a guide (Appendix B) and were semi-structured (Merriam, 1998) in nature. These interviews lasted between forty-five

minutes and an hour. Additionally, I conducted formal interviews with students from each of the three different Social Studies classrooms. I only selected students who agreed to participate in this study. I purposefully selected students, from those that have given their permission, in order to have a representative cross-section of students based upon their classroom ability levels and other demographics including gender and race. I used their Social Studies teachers' advice to help inform my decisions. I used a semi-structured interview protocol as a guide for these interviews (Appendix C). These interviews lasted between twenty and forty minutes. I audio recorded and transcribed all the formal interviews.

At the very end of this study, I held a focus group with the three Social Studies teachers. I used a focus group discussion guide to structure, facilitate, and serve as an interview protocol for this discussion (see Appendix D). The focus group lasted about an hour and I audio recorded and transcribed our conversation.

Table 5 is a visual representation of which data collection methods I used to answer the research questions guiding this study.

Table 5

Data Collection Methods

Research Questions	Data Collection Methods			
	Observations	Interviews	Artifact Collection	Focus Group
In what ways do the middle school Social Studies teachers demonstrate TPACK teaching principles within their classrooms in a school wide 1:1 technology environment?	X	X	X	X
In what ways do the middle school Social Studies teachers combine their different forms of knowledge to construct TPACK teaching practices?	X	X		X

Data Analysis

In this section, I describe the data analysis procedures that I used to make meaning of the data I collected during this study. I list data analysis as its own section in this chapter as a way of providing a clear picture of this essential component of qualitative case study research. However, in practical terms, data collection and data analysis go hand in hand in qualitative research, with initial analysis of data collected informing future data collection efforts (Creswell, 2003; Creswell, 2007; Merriam, 1998;

Schram, 2006; Stake, 1995). Thus, while I list data collection and data analysis separately in this chapter, they are both "a simultaneous activity in qualitative research" (Merriam, 1998, p. 151).

I used a constant comparative approach to analyze the data collected (Glaser & Strauss, 1967; Merriam, 1998). Using this approach allowed me to capture reoccurring patterns that emerged within the data and assign categories and subcategories to them that relate to the phenomena of the case study being analyzed (Merriam, 1998). By using the constant comparative approach, I can compare the initial data collection with the components of the TPACK framework as a means of classifying it into appropriate categories and subcategories. I then compared future data against the initial data collected and the components of the TPACK framework in a cyclical process that continued for the duration of the study. Thus, I analyzed all of the data I collected over the course of this research effort, with initial data collections informing future data collection efforts (Creswell, 2003; Creswell, 2007; Merriam, 1998; Stake, 1995).

I designed the observation protocol with TPACK in mind. This observation protocol was organized into themes, matching the components of TPACK: technological knowledge, content knowledge, pedagogical knowledge, pedagogical content knowledge, technological content knowledge, technological pedagogical knowledge, and TPACK (Appendix A). Thus, as I took observation notes, I coded the information using the components of TPACK as the themes. This initial coding of the data was then recoded as needed into appropriate categories as they began to emerge from the data.

All participant interviews and the focus group discussion were semi-structured in nature and I transcribed them into digital documents. Following best practices, I conducted the interview as a conversation and followed a protocol that has been previously reviewed by a colleague (Kvale, 1996). I then coded these documents via the same approach taken with the observational data.

I coded all teacher artifacts collected using the same criteria as the interviews and observations. However, with student artifacts, I used a different coding system. Since student artifacts are only collected when they are perceived to be a result of TPACK teaching, I coded these artifacts as effects of TPACK instruction. Then I coded these artifacts or portions of these artifacts into subcategories based upon the type of effect that the TPACK instruction had.

The use of coding to analyze qualitative data is one of many appropriate methods in which to analyze qualitative data, especially when the coding is applied against multiple data sources (Creswell, 2003; Glesne, 2011; Merriam, 1998; Miles & Huberman, 1994). Because of my extended period visiting Lakeside, I performed spot checks on my coding analysis by having informal conversations with my participants about what I have coded for a certain event or artifact, thus noting if they agreed, disagreed, or had another interpretation about that event or artifact.

Validity and Reliability

In order for any research study to have a meaningful effect on an audience or a field of study it must inspire confidence that the research is trustworthy in nature. This

can be accomplished by conveying a sense of validity and reliability in the research study to those experiencing the study. Reliability refers to the ability to repeat a study and still achieve the same results. Validity can be subdivided into two different types, internal and external validity. Internal validity refers to the ability of the findings from the study to reflect the reality of the setting and participants. External validity refers to the ability to generalize the findings of the study to another situation or a larger theory. By purposefully seeking to address and build validity and reliability in a study during the data collection and data analysis periods, a research study can be well positioned to build a sense of trustworthiness in its findings (Merriam, 1998).

Internal and External Validity

I addressed internal validity in my research study using a variety of methods. First, I triangulated both the data I collected and I used triangulation during the data analysis process. I also utilized member checking, prolonged time in the field, and peer examination to address internal validity. Finally, I also addressed internal validity by accounting for my own biases. I used the interviews, observations, and artifacts I collected as both a way to triangulate the data collected during the constant comparison analysis done during and after data collection and as a way to increase internal validity within the findings of this study (Creswell, 2003; Denzin & Lincoln, 2011; Merriam, 1998). I also used member checking by the participants as a means of establishing the internal validity of the results (Creswell, 2003; Denzin & Lincoln, 2011;

Merriam, 1998). I gave all participants a copy of their interview transcript to ensure the accuracy of their statements.

I held debriefing sessions after and in between classes so that the initial interpretations I made from my observations could be clarified and validated by the participants. The participants also answered questions I had about the artifacts as part of the member checking process. I made a long term commitment to observing the phenomena in this case study (Merriam, 1998). I spent over one hundred and twenty hours at Lakeside in an effort to understand the phenomena being studied, thus contributing to the internal validity of the study. I discussed my findings with other colleagues and faculty members which allowed for peer evaluation of the findings, thus increasing the internal validity of the study. Finally, in an attempt to build internal validity, my positionality is included in this chapter, acknowledging the biases and predispositions that I bring as the researcher into this study.

A major reason for undertaking a case study of a phenomena is to understand it at greater depth and "not to find out what is generally true of many" (Merriam, 1998, p. 208) in the same situation. For this reason, this study does not and should not be generalizable beyond the three classrooms being studied. However, reader generalizability calls on the reader to determine the extent of which the findings of the study might be applied to other settings. One way of facilitating reader generalizability is by providing thick deep descriptions of each of the case studies and of the analysis done across all three of the case studies (Merriam, 1998).

Reliability

Because teachers and their behaviors are not static and settings can impose changing circumstances, it can be contradictory to think of qualitative case study research as something that would be conducive to a high degree of reliability. The very nature of case study research would suggest that conducting the research again would yield results that differed from the original participant to some degree due to human nature of the teachers and their interaction with their setting. Thus instead of thinking of reliability as the ability to conduct the study repeatedly and achieving the same results, it should be thought of as the dependability or consistency of the findings (Lincoln & Guba, 1985). This would mean that readers of the study would "concur that, given the data collected, the results make sense. They are dependable and consistent" (Merriam, 1998, p. 206). In order to achieve this sense of dependability and consistency with the findings, this study established a chain of evidence so that others, including peer debriefers and readers, could see how codes were linked to their data sources, and how emerging patterns and themes were tied to those codes. In other words, I used an audit trail to authenticate the findings of this study by providing readers with a clear sense of "how data was collected, how categories were derived, and how decisions were made throughout the inquiry" (p. 207).

Limitations of This Study

Limitations

While I believe that this research will begin to answer the question of what TPACK-based instruction looks like within middle school Social Studies classrooms, there are limitations to this study that are important to note. For example, I conducted this study in just three classrooms, thus this study only represents three versions of what TPACK looks like in practice. In fact, I believe that because each teacher combines their content knowledge, pedagogical knowledge, and technological knowledge in unique ways, TPACK in action will be different for every teacher; therefore, these results may not have implications beyond these classrooms other than to give some perspective on what TPACK looks like in practice. Furthermore, because I could not be in each classroom at the same moment, the length of time I spent in each classroom and the choices I made about which classroom to observe also limited my study.

Also, I went looking for TPACK in practice in a place where I felt I had the best chance of finding it. By no means am I suggesting that Lakeside is a typical school. Just by the fact that it has had a 1:1 laptop initiative for over thirteen years makes it unique among its peers. Rather, this study just reflects the data for this environment. The examples of TPACK in practice I provided in the findings reflect the reality of Lakeside and of the three Social Studies classroom teachers that participated in this study.

Next, as discussed in the setting section, Lakeside is a private school. The fact that this research occurred in a setting not typically found in public schools limits this

study. Classroom demographics and teacher student ratios for Lakeside are not representative of a traditional public school setting. Additionally, because Lakeside is a private K-12 school, it is not beholden or restricted by policy makers and school districts. Thus, Lakeside is able to make decisions about technology in context with their own school environment and not as a blanket policy to be adopted across a large setting of schools.

Finally, my experiences as a beginning researcher limited all phases of this research design. Because of my limited experiences collecting data I may have missed opportunities for data collection while in the field, due to my inexperience with collecting and more importantly recognizing potential sources for data. Furthermore, important findings could have been missed due to my inexperience with data analysis. Lastly, my lack of experience with reporting on case study findings hampered my ability to produce thick descriptions of each case.

Summary

I began this chapter with a description of case study design and then explained why this qualitative research method was best suited to meet the needs of my study. Then, I presented the research questions guiding this study. I then described my positionality as it relates to the research questions. Next, I discussed the pilot study that preceded this study and its influences on this study. I then described the setting and the participants who will take part in this study. A separate discussion on data collection methods and data analysis methods is then presented, while acknowledging that these

two components are very much interdependent on each other. I then deliberated issues of validity and reliability along with how this study will address these concerns. Finally, I discussed the limitations of this study.

CHAPTER IV

FINDINGS

Introduction

This chapter reports the findings for this study. Each case is presented separately and begins with a brief vignette capturing a particular moment that represented the teacher's operationalization of TPACK within the classroom. Next, the teacher's beliefs about education and technology's role in it are explored. Then, I offer thematic examples of how each teacher was able to operationalize TPACK in their classroom. Finally, at the end of each case, each teacher provides their own representation of what they believe their TPACK looks like along with a brief explanation. I removed all identifiers from any image and pseudonyms were used for all participants. I also secured permission from all students who are depicted in images within these findings.

"Technology is just a game we all play differently"—The Case of Ms. Goodman

Ms. Goodwin raised her voice and asked everyone to give her their attention. She was at her desk, and a student was standing next to her. The class was conducting research using their laptops about the ancient cities of Petra and Ephesus. Once everyone was looking in her direction, she asked the class out loud, "Class, someone raise their hand and tell me how you would find facts about Petra or Ephesus?" Many

students raised their hands, and she called on one girl who said she would open up Google and just type "Petra facts" into the search bar. Ms. Goodman then said, "Yes, you could do that, anyone else have something different?" She called on another student that said she used Yahoo for searches. Ms. Goodman once again affirmed the answer and asked if someone else had another idea. Another student mentioned that you could go to You Tube and find videos about Ephesus and Petra. Again, Ms. Goodman affirmed the answer. This scene repeated itself with four more students giving answers on how they could use the technology at their disposal to learn about Petra and Ephesus. Finally, Ms. Goodman asked the entire class, "Which one of these is correct?" The class just stared at her; an awkward thirty second pause settled into the classroom, and you could tell on the faces of the students that none of them wanted to answer. Finally, one girl raised her hand and said, "Ms. Goodman, I'm not sure which one is correct, but I don't think any of them are wrong." Ms. Goodman just smiled at them and faced the boy standing beside her at her desk and replied loud enough for everyone to hear, "You see Jacob, there are no wrong answers, just do what you think will work best." Then Ms. Goodman stood up and, before indicating for them to resume their research, she gave them one more bit of advice: "Remember class, technology is just a game we all play differently" (Observation notes, January 27th, 2015).

In this brief vignette, Ms. Goodman's discussions with her students demonstrated her ability to apply TPACK in practice. In an unscripted moment, Ms. Goodman took a student's concern over how he should be researching his topic, and

used it as a teachable moment, helping her students understand that there were many suitable ways to accomplish the task. More importantly, Ms. Goodwin emphasized that the answer was less about how they used the technology but rather what they were trying to accomplish with the research. This approach to teaching with technology captures Ms. Goodman's beliefs about both teaching in general and technology's role in education.

Ms. Goodman's Beliefs

Beliefs about teaching and education. Ms. Goodman expressed to me, on several occasions, that education should be inspiring. She believed education that was inspiring created a sense of curiosity and enthusiasm in both students and teachers. Ms. Goodman felt that in order to create this sense of inspiration, teachers had to engage their students with questions. Ms. Goodman characterized these questions as questions about ideas, questions about things we don't have answers, questions about emerging topics and events, and questions about ourselves and our beliefs. I asked Ms. Goodman if she ever felt that students might get turned off by not being able to answer her "questions". Ms. Goodman indicated that she was not worried about that, explaining that "learning how to ask a good question is as important as learning any Social Studies fact."

Ms. Goodman also believed that teachers should instill a desire in students to become lifelong learners. When I asked Ms. Goodman what she thinks teaching and learning should be, she replied by saying that she wanted "to open the kid's mind to

realize there's a whole lot more out there that we don't know, and that they learn about things every day." This desire to transform her students into lifelong learners reverted to her initial claims about teaching needing to be inspiring for everyone involved. Ms. Goodman noted that the "things you do in class" did not matter nearly as much as the need to create an inspiring classroom. Ms. Goodman stressed that in her class, for her students, "Every day is a new adventure about learning things, and grasping things, and paying attention to the world, paying attention to their environment and all the things that come into their world, and making sense of it." Thus, for Ms. Goodman, transforming students into lifelong learners was part of her process of creating an inspiring classroom.

Beliefs about technology role in education. Regardless of teachers' or schools' preparedness to teach with technology, there is an ever increasing push by policy makers and the general public to make the inclusion of technology a part of the curriculum. Because of this, I asked Ms. Goodman about the role technology plays in shaping education. Ms. Goodman thought of technology as a component to her teaching. She indicated that "the emphasis is that technology is the tool where you teach whatever subject you're going to teach." Ms. Goodman did not want the technology tool to become the focus of the lesson or the teacher's goals; rather, she felt that "depending upon the subject that you're teaching, you've set your goals as a teacher and you say, 'This is my subject. This is what I want the kids to get out of that. These are my goals. These are essential questions.'" Here, Ms. Goodman points out her

belief that effective teaching with technology does not begin with technology, but rather first understanding the objectives a teacher has for a particular class or unit should be the emphasis.

Ms. Goodman did see technology as one of several "tools" that offered opportunities for "high quality and effective teaching." She viewed technology as a potential means to provide her students with the variety in instructional strategies that she believed was essential to learning. She did not believe in either a total commitment to using technology nor ignoring its potential, claiming that "some of those lesson ideas may involve the computer. Some of them may not." Rather, Ms. Goodman believed that technology provided her with the opportunity to incorporate a variety of learning strategies, referencing the "need to have a mix, because in today's world it's as important to learn to work in a group setting, to work as an individual doing research, to work at discussing things, presenting material to a group."

I asked Ms. Goodman about the technological knowledge teachers might have and how that affects technology's role in education. She began by indicating that a teacher's technological knowledge would directly impact their ability to use technology in their teaching. "If you have just a little bit, then your ability to use technology is going to be more limited in terms of how you use that in your lesson planning." However, Ms. Goodman also indicated that a teacher's technological knowledge was essential for identifying where technology might improve upon existing teaching techniques. Ms. Goodman explained that

> as you gain more information about various different ways to use the technology, you can then find that something that you've used before, for example that virtual museum that I did with the kids, something that you may have used a particular program before, you can now substitute this particular program in technology to do the exact same thing. Maybe even better. Maybe even looks better.

Ms. Goodman also expressed the importance of transitioning to a technological pedagogical knowledge mindset, and not just "being fast with a computer," in order to be mindful of how technology shapes instruction. For example, in discussing the hurdles that teachers face when choosing to teach with technology, Ms. Goodman indicated that when using technology, a teacher had to take into account both the benefits and drawbacks that the technology would provide the lesson:

> Now, fraught within that is trying to teach the kids how to use that app. Sometimes it's a pain in the tuchus because you have to spend so much time teaching the app or teaching the program to the kids that you almost say, "Geez, I could have done this a whole lot easier if I'd just done it the old way." But if the benefits of using what you're getting as a result outweigh what you did before, well cool.

In thinking about the role of technology in education, I asked Ms. Goodman to think about the challenges a new teacher would face in using technology in their Social Studies class versus the challenges a veteran teacher would face. Ms. Goodman spoke to the idea of combining technological knowledge with content and pedagogical knowledge to create TPACK as she discusses the differences between the experiences of the two teachers. She felt that both new and experienced teachers would have

difficulties teaching with technology, however for very different reasons. She acknowledged that "the new teacher may have a strength because they've been computer literate probably most of their life. They've been adept at using computers since they were young, they don't have the hang ups that older people have about screwing up the computer and doing the wrong thing." However, she also recognized that these new teachers lacked "the knowledge of their subject, so that they can just say, 'That [Technology] would work really well with this, because I know my subject matter so well, that that will work with that." With experienced teachers, Ms. Goodman felt that they had stronger pedagogical and content knowledge because of their experiences in the classroom. Yet this also did not translate into effective teaching with technology because despite the fact that they knew "their subject matter really well", they didn't have the technological knowledge to know "about a particular computer program that might do the job better."

Beliefs about what effective teaching with technology looks like in practice. I asked Ms. Goodman to describe what she thought, effective teaching with technology looked like. She began her answer by stating that "the technology use should not be the thing that I notice first. That what I'm noticing first and foremost is a clear sense of where that teacher wants to go, what the teacher wants those kids to learn." This belief ties back to Ms. Goodman's original beliefs about teaching and the role of technology in education. However, in evaluating the effectiveness of the technology Ms. Goodman indicated that she would "then look at, did the technology help that teacher get to that

place or was it a block to getting in that place? Was too much of the effort or energy wasted in the technology and it was all about that and less about actually learning something?" Thus, for Ms. Goodman, the effective use of technology was not tied to the technology itself, but rather its implementation within the lesson and its ability to enact the type of learning experiences she embraces. Ms. Goodman furthers clarified this point by giving an example of what ineffective teaching with technology might look like. Ms. Goodman referred me to an online word search website, *Thewordsearch.com*, that she indicated other colleagues used because it was "kid friendly and very robust." Ms. Goodman made the distinction that from a technological knowledge point of view, the website was evidence of effective technology. However, she indicated that despite the fact that the website was well organized and the technology was indeed robust, "If a teacher is just having the kids do a lot of online quizzes or the equivalent of the old word searches that they used to give, [Laughs] what's the point? That's not really teaching kids anything except how to look for a word." Thus, Ms. Goodman's effective teaching with technology in practice requires more than just good technology, but rather technology that must be used to further the essential goals of the lesson.

Ms. Goodman also believed that with effective teaching with technology the responsibility is with the teacher to be effective with the technology, not the student. To illustrate this point, Ms. Goodman told me, "I've had a lot of talks with my own children, who are trying to say to me, 'Mom I don't think that kids learn with technology.' I said, 'That's probably because you haven't had a teacher use technology

well.'" Specifically, she mentioned how technology can become a distraction, which can cause ineffective teaching with technology. In discussing how to tell the difference between technology as a distraction and technology being put to good use, Ms. Goodman stated that rather than just "playing around on the computer," effective teaching with technology focused on "gathering information, putting it in some kind of format, evaluating information, using the information to reinforce."

Ms. Goodman indicated that another characteristic of effective teaching with technology was the need to be a reflective teacher, especially since many of the technologies are new or are being tried for the first time by teachers. In talking about her own reflective practices, Ms. Goodman explained, "Every day, as I'm driving home I think about what I did that day and whether it worked or not. If it didn't work, I think about what could I have done differently to have made it work? Or, should I just throw it out completely and go back to square one and say, 'OK, that didn't work. That was just a complete disaster. Let's think of something else'?" With technology, Ms. Goodman felt that being reflective about your practices was even more important, especially since she did not believe that her technological knowledge was as robust as it could be.

> In my case probably even more important, since I haven't grown up around technology like our kids have. So much of what I do with technology is new, so I have to think about how it went if I want to be successful. I can't understand how someone could use a technology in their classroom, and not step back and ask themselves, "Did this work?" You can't luck into effective teaching with technology, being reflective is essential.

I asked Ms. Goodman to give me an example of what combining all the knowledge found in TPACK might look like. What follows is Ms. Goodman's example, from her own teaching of what TPACK looks like in practice.

> First thing I do is I get in the computer, and I start kind of a review of the literature? [Laughs] When I type in whatever my topic is, and I look at lesson plans, "What have other people done with this?" I get all the information I can get from everybody. I look through them and I sift, and I say, "I like this." "Nah, this isn't where I want to go at all." "Oh, that looks good over there. I wonder if I could combine this with that, take in that and throw that and make it at all work."

Ms. Goodman then addressed the need to focus on the essentials of what her goals are for her students.

> Now, "What do I want the kids to get out of this progression of information? How do I want the kids to demonstrate that they understand this stuff? What is it that all of this would look like if they understood it?"

Ms. Goodman then added technology into the mix by introducing it as a vehicle to meet her goals for the lesson.

> Then I start thinking about, what kind of vehicles might there be? What kind of thing might there be out there that would work in that kind of case? Do I know of a software or app that could help? Have I seen some technology used elsewhere? Have any of my kids suggested something that I could use? I might have three or four things in my head, and I just kind of bounce them and think about the time frame I have, "How long do I have to do this? Would that be enough time for the kids? Am I experienced enough to use this or that technology?" Then I do it.

Me: And that is TPACK in action?

Ms. Goodman: “I believe so”

After having this discussion about what effective teaching with technology looks like in practice I circled back to my original question and asked Ms. Goodman to describe what she would see if a teacher was using technology effectively.

> The most important thing I would see if I saw a teacher using technology effectively is that I saw what the teacher’s goals were and I saw them moving toward those goals and the technology was just adjacent to or woven into the lesson.

Ms. Goodman’s beliefs about the TPACK conceptual framework. I asked Ms. Goodman her thoughts about the theory as it was constructed and how she felt it reflected the realities of teaching, especially when we consider what effective teaching with technology looks like. Ms. Goodman gave her initial thoughts and then brought up a critique about TPACK mentioned previously in Chapter Two, which is the need to include students as part of the framework outside of what is assumed to be pedagogical knowledge.

> Well, what I see very often is that those circles are not ever intersecting, but are floating in three different directions and it’s very rare to see somebody combine all three.
>
> Especially, in middle school, it’s difficult because then in middle school you’ve got another component, and that’s knowledge of the child. Which might go along with pedagogical knowledge, but it’s also understanding how kids work.

Ms. Goodman clarified her statement about the circles not intersecting by describing how, in her opinion, a majority of teachers have a particular circle of knowledge that becomes the driving focus of their craft. She specifically spoke to how some teachers never leave their comfort zones found in pedagogical knowledge, content knowledge, or technological knowledge. Ms. Goodman did agree that if a teacher could combine all three circles of knowledge, then they would most likely be "teaching in a way where students are inspired, engaged, and most importantly learning." Thus, Ms. Goodman agreed that "in theory, TPACK makes a lot of sense," for capturing what would be needed for effective teaching with technology to happen. However, she felt that in reality, beyond her concern for the lack of students in the model, she had met "very few teachers that demonstrated all three circles in their teaching practices."

When I asked Ms. Goodman if her teaching practices reflected the TPACK model, she initially hesitated and considered my question. She finally stated that when she did use technology in her instruction "it had a purpose that aligned with both the content and the methods of instruction I planned on using." However, she indicated that when using new technologies, at least initially, she had to "experiment to get it just right." Ms. Goodman also indicated that for her, TPACK only existed for the very small set of technologies she had learned and integrated into her instruction. She did, however, say that she combined her content knowledge and pedagogical knowledge in almost all of

her practices, thus reflecting, in her opinion, effective teaching practices as defined pedagogical content knowledge.

Examples of TPACK Operationalized

Theme #1: Using technology to account for students' interest and needs. One way that Ms. Goodman demonstrated effective teaching with technology was to use technology to hook her students based on their interests. For example, one day she used her students' interest in video games to hook them and introduce them to a new unit of study. Ms. Goodman began by asking her students, "Who here likes to play computer simulation games?" Of the 13 students, only two did not raise their hands. She went on to have a discussion with the students about computer simulation games, discussing specifically the fun and boring parts of these games, and why they enjoyed playing them. Students displayed good knowledge of computer simulation games, bringing up several titles in the *Sim* franchise and also advocating for other games where you simulate the careers of the characters, like *WWE 2K14* (a wrestling game). Ms. Goodman also displayed a solid understanding of computer simulation games, talking about games like *Civilization, SimCity*, and even telling the students a story about the first time she played *Oregon Trail*.

Using this topic as a starting point, Ms. Goodman and the class then created a list of characteristics that a good computer simulation game has. She then asked the class to narrow it down to one person, asking them to think of what they would have to know to simulate a person in a computer game. Students replied back with physical

descriptions like height, weight, sex, eye color, and so forth. They then started talking about personality characteristics that you would need to know in order to accurately simulate a person in a game. Lastly, the discussion turned towards needing an understanding of the beliefs of the person being simulated. All thirteen students participated in the discussion and by the end of the discussion she had a student-created list of what you would need to research about a person in order to create a good simulation of them in a computer game.

This hook/warm up activity took almost 20 minutes to complete. Afterwards, she explained to the students that they were going to simulate real life historical figures as part of a unit on ancient Middle East history, and that the students were expected to role-play their chosen historical figure in class on a future date. I asked Ms. Goodman why she had chosen to use computer simulation games as a means of introducing this project, especially since the project itself did not have any particular requirement to use technology, although students were expected to use their laptops and the Internet to conduct their research. Our conversation sheds some insight into what TPACK in practice looks like in her classroom.

> Me: What gave you the idea to introduce this project the way you did, by brainstorming computer simulation games?
>
> Ms. Goodman: I think you have to be astute enough to be paying attention to your kids, your students, to say, “This is their lives.”
>
> Me: So you think this is part of their funds of knowledge, computer game simulations? Is it a way to reach them?

> Ms. Goodman: Oh gosh yes. They learn so much better with technology. They have so much more fun. They become so much more engaged when they talk about things they are familiar with like games.
>
> Me: How about you? You've been teaching 30 plus years and you don't strike me as a gamer, how are you comfortable teaching with this approach?
>
> Ms. Goodman: Why not reach them where they are? Say, kids are here [positions her hand at head height]. I may still be down here [positions her other hand at her waist], but I have to move to where my students are to be with them.
>
> Me: So what does that say about effective teaching with technology?
>
> Ms. Goodman: It says that effective teaching with technology is also just plain effective teaching. We should always strive to teach our kids where they are at. regardless if you use technology or not.

It is clear from our conversation that Ms. Goodman purposefully used her students' interest in technology as a means for hooking her students' interest and introducing a new project to her students. On the way out of class that day, I struck up a conversation with Becky, a young girl in Ms. Goodman's class about what happened in class that day. I asked her about her thoughts on the living museum project and more specifically what she thought about how Ms. Goodman introduced the project at the beginning of class. She indicated that she was excited about the project because it was not a research report, even though she knew she would have to still do research. She even began to tell me the names of a few of the people she was thinking about researching for the project. As far as Ms. Goodman's use of computer simulation games as a means to introduce the assignment, Becky did not think that it was anything special

when I first asked about it stating “We do brainstorming all the time in Ms. Goodman’s class.” I followed up with her, asking what she thought about Ms. Goodman’s choice to use computer simulation games as the method of introducing the topic. Becky said, “So it’s not really about the project, she could have written it down on paper and I would have known what to do, I feel she had us brainstorm in order for me to know *how* to do it.”

I came into class one day and saw a note (see Figure 7) that a student had left on the whiteboard for Ms. Goodman. While the note itself is not an example of digital technology, its message does speak to the way Ms. Goodman’s teaching practices used digital communication tools and her learning management portal to encourage dialogue with her students and facilitate a digital learning environment that accounted for her students’ needs.

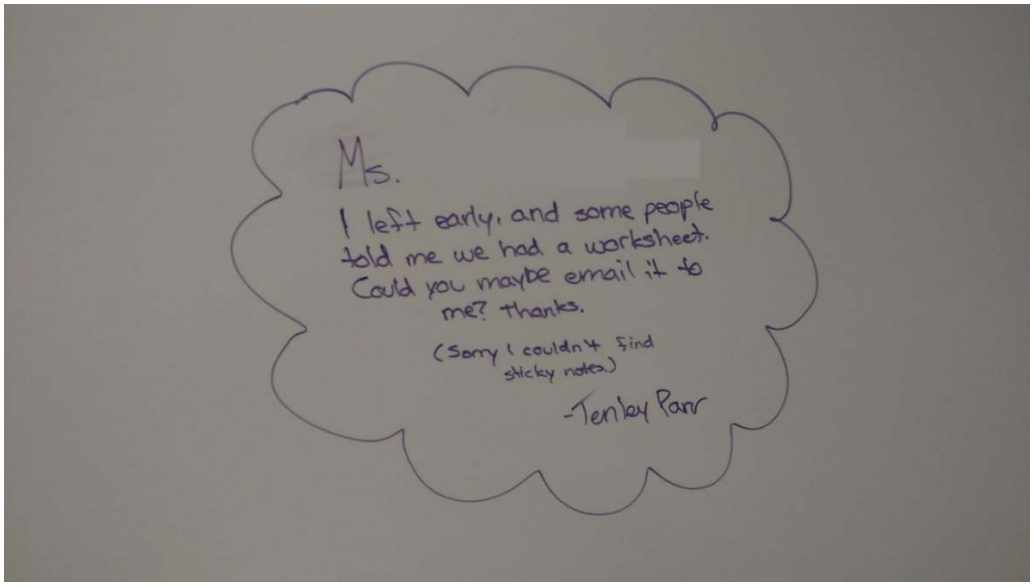


Figure 7. Student Whiteboard Note.

In terms of digital communications, Ms. Goodman relied on e-mail exclusively. As part of the 1:1 environment maintained in her school, each of Ms. Goodman's students was provided an e-mail account using a service called First Class. Students were able to easily access their e-mails through the laptop they were provided. Ms. Goodman had the ability to e-mail each student individually, and she could also send e-mails to all the students she taught through preconfigured e-mail lists. Students also had the ability to e-mail Ms. Goodman and their classmates as well. This e-mail service contained many of the standard functions found in most common e-mail applications, and students were encouraged to use it to also communicate with people outside of school, including family, friends, and organizations. Students were also encouraged to use their e-mail when signing up for Web 2.0 applications online. I spoke to some students about their use of e-mail for Ms. Goodman's class; their responses reflect what they believe the effective use of e-mails looks like in practice, and how unlike some of their other teachers, Ms. Goodman's use of email was accounting for their needs as students.

> Me: Does she communicate with you all through email a lot?
>
> Miley: Yes.
>
> Me: Do you think she does a good job of it? Is it too much? Is it helpful?
>
> Miley: It's helpful. Because I know some teachers I have eighty emails from them and it's really bad. There's this one teacher who would give us a ton of emails and that's all she does. [Laughs]

Me: OK. So a ton of e-mail can be not very useful stuff or anything.

Ben: It's not just how many e-mails they send, some teachers don't say anything important in their e-mails.

Miley: I know, and then we stop reading their e-mails! [Laughs]

Me: So you would say that Ms. Goodman doesn't overload you with e-mails and her e-mails are typically filled with important stuff?

Ben: Yup, because when we did our virtual exam, I thought we had to like make each slide, like she did. So I was like 'Oh, my god.' So I checked my email and I was like there's no way we are actually doing this. So I checked my email, and I realized that it wasn't that bad. She had it laid out step by step. So her e-mail was very helpful.

In our conversation, Ben and Miley talk about what both effective and ineffective teaching with emails looks like. They claim that Ms. Goodman practices effective e-mail communications, as opposed to some of their other teachers. However, later on in our conversation, they also shed light on another aspect of e-mail communications that they felt demonstrated how Ms. Goodman's use of e-mails accounted for their needs as students.

Ben: . . . and she is really good at e-mailing you back.

Me: Tell me about that. What do you mean?

Ben: Some teachers never reply to your e-mail, or maybe they bring it up like four days later in class . . .

Miley: Or they don't even read your e-mail. You know they got it, and they pretend they didn't "see it." [makes air quotes]

> Ben: Yes, they get mad at us if we don't read them, but when they don't nothing happens.
>
> Me: Ok, so it is important for a teacher to be responsive to your e-mails when you send them one, is that what Ms. Goodman does?
>
> Miley: Yes, she always responds back and answers my questions or like, if I, or maybe a group of us e-mail her to let her know that we are going to miss class because of chorus. She'll send us a quick little e-mail saying "OK."
>
> Ben: Yes, then you are not worried wondering if she read your e-mail or got it yet.

My conversation with Miley and Ben once again paints a description of what effective use of e-mail looks like in the classroom; in this case, the timely response to or acknowledgement of e-mails from students assures them that she is aware of their situation.

Ms. Goodman also viewed e-mail as an important tool in her teaching. On 22 different days, I heard Ms. Goodman either tell a student to e-mail her or that she would e-mail the student. One day, while walking with Ms. Goodman to the cafeteria, I asked her how she thought the availability of e-mail affected her teaching practices.

> Ms. Goodman: It is just so much easier . . . Gosh I remember when you had to send a note to the office by a certain time just to get it read over announcements. And the kids probably weren't listening anyways. Now, I can send every kid an e-mail if I want, or just a certain class, or one in particular . . .
>
> Me: So I guess e-mail has made the logistics of teaching easier for you?
>
> Ms. Goodman: Yes, of course, but not just that. I can send kids links I found or videos. Just stuff I know that is relevant to what is going on in class or something that might help them with an assignment.

> Me: So then e-mail for you is both a technology to make your life easier as a teacher and a way to supplement content to your students?
>
> Ms. Goodman: Absolutely, and it is a great way to introduce a lesson, or give students who want to go beyond what we are learning in my class a way to do so.
>
> Me: Can you give me an example of what you are saying?
>
> Ms. Goodman: . . . So then I sent them a link in an e-mail to a YouTube video that showed the insides of the Great Pyramid of Giza. I said, "just watch this, and write whatever comes to your mind." The next day, we started our unit on ancient Egypt with the kids reading what they wrote.

In this exchange, Ms. Goodman highlights all three elements of TPACK as reasons for which she chooses to use e-mail as part of her technological teaching practices. Her responses address content and pedagogical decisions that she makes in regards to how she uses e-mail. Her understanding of how to add attachments, send e-mails to mailing list, and how e-mail can be used to make the logistics of teaching easier reflects her technological competency to use e-mail as part of her teaching practices. Most of all, Ms. Goodman demonstrates with her example that her use of e-mail is centered on addressing the needs of her students.

Ms. Goodman's use of a learning management portal for her class is another example of how she used digital communication tools to meet the needs of her students. Every teacher at Lakeside was expected to use Haiku, a learning management system, as part of their classroom curriculum. Students were able to access this website from any Internet enabled device, including their laptops and smartphones, both in and

out of school. Haiku allows for the teacher to post content, attachments, and create an organizational structure to match what is happening in the classroom. Students can also check a classroom calendar, receive email reminders that the teacher creates, or email reminders they create for themselves. For assessment purposes, students can submit assignments to a dropbox, and teachers are able to post quizzes and test for students to take. Ms. Goodman used Haiku as part of her classroom; however, she admitted that unlike her real classroom, and her approach to teaching in general, she was not "married to Haiku. I probably should use it for more, but so much of what I do, I do in the moment, and it is hard to recreate that on Haiku." Despite this, her use of Haiku does represent examples of TPACK in practice through meeting the interests and needs of her students.

While Ms. Goodman readily admitted that she missed opportunities to post everything she did in her classroom on Haiku or that she could have used Haiku to extend some of the lessons, she did create an online presence for her classroom that her students could reference. Her homepage clearly laid out the expectations for the course as well as providing a menu of the different units that would be covered over the course of the year (see Figures 8, 9, and 10).

From just her homepage, students are able to get a picture of the content that will be a part of the course along with the expectations that Ms. Goodman has for the course and her students.

Ms. Goodman did not follow a particular pattern for each of the units linked from her Haiku homepage. For some of the units she created the entire Haiku page before the unit started and for others, she added content to the page as the unit progressed. For example, on her Geography Tools page (Figures 11 and 12), Ms. Goodman provided students with resources to help them understand Geography in the form of links to more information and videos. She also provided them assignments they were expected to complete. Additionally, she provided students with information about the online version of their textbook and online practice quizzes for students to self-assess. Not once during the unit, did Ms. Goodman update this section of Haiku.

Figure 8. Ms. Goodman's Haiku Homepage #1.

Figure 9. Ms. Goodman's Haiku Homepage #2.

October – December: South America

1. Caribbean South America – Venezuela, Colombia
2. Peru, Bolivia – Andes Cultures, Inca, modern problems of Bolivia
3. Brazil – History, Environmental highlights, Amazon

Special activities: Conquistadors – Exploration in the Americas, Pirates then and now, Deforestation in Brazil, "Is Free Fair?"-DR –CAFTA, Job Hunting in Brazil, Radio Drama about Bolivia

January – February: Southwest Asia

1. Arabia and Iraq: History, Roles of men and women in Islam, patterns of government today
2. Israel and its neighbors: History, Religious traditions and art, Israel and its neighbors today
3. Iran, Turkey, and Cyprus: History, Iranian revolution, Iran/Turkey/Cyprus today, the Kurds

Special Activities: Water for Arabia and Iraq, Water Caucus, Maayan and Mohammed – Differences between Jewish and Islamic people in Israel, Peace Conference – Israel and Palestine, Trade Talks between Cyprus, Turkey, and Iran, Kurdish Independence, To Join or not join the European Union (Turkey).

February/March/ April:East and Southeast Asia

1.China and its neighbors: History, Confucianism and Imperial law, China

Figure 10. Ms. Goodman's Haiku Homepage #3.

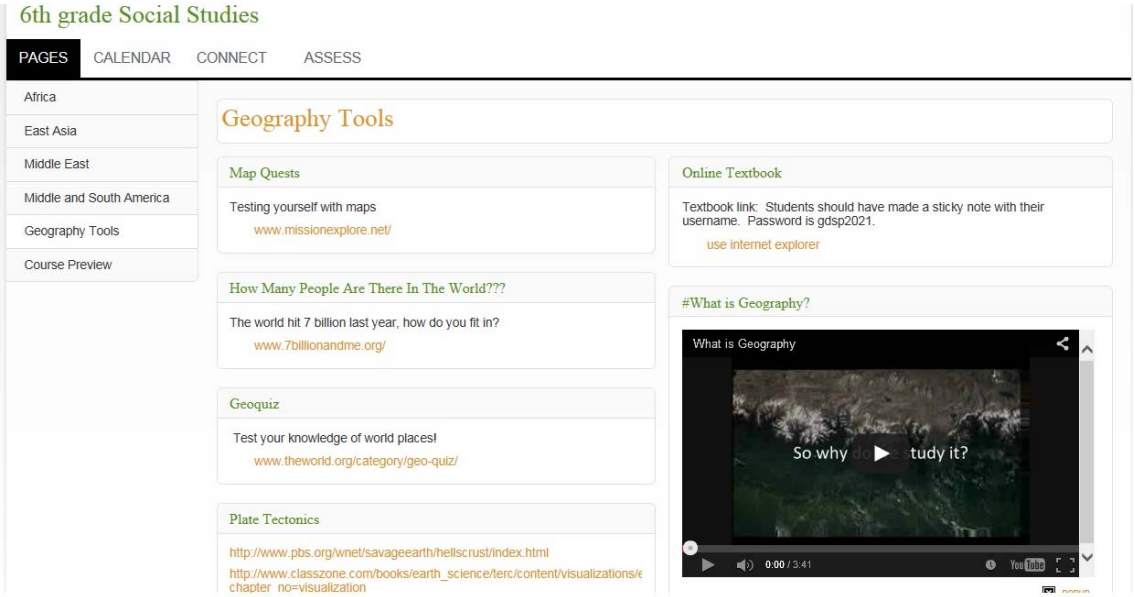


Figure 11. Geography Tools #1.

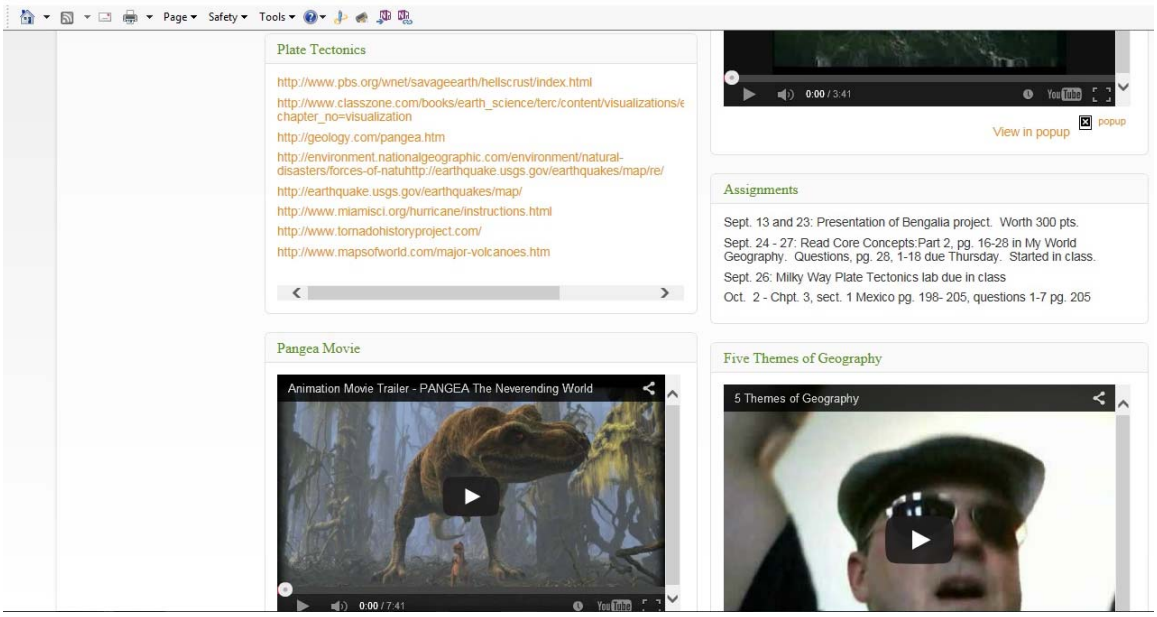


Figure 12. Geography Tools #2.

On the other hand, with the unit on Middle and South America, Ms. Goodman started with some initial information for her students but added more content (see

Figures 13, 14, and 15) and two additional subpages (Figure 16) based upon feedback she received from her students.

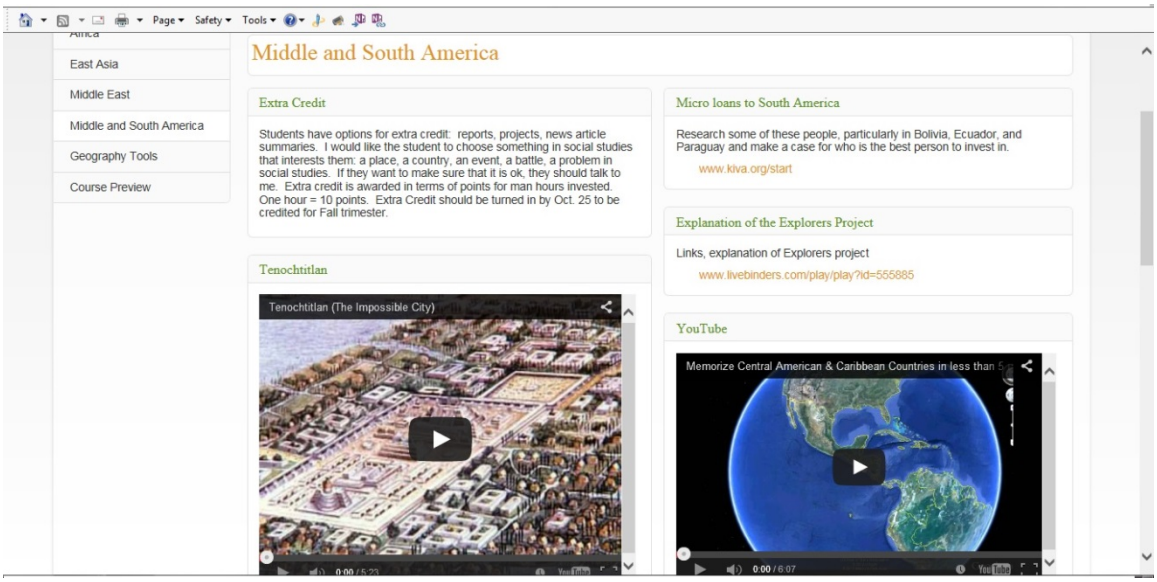


Figure 13. Middle and South America #1.

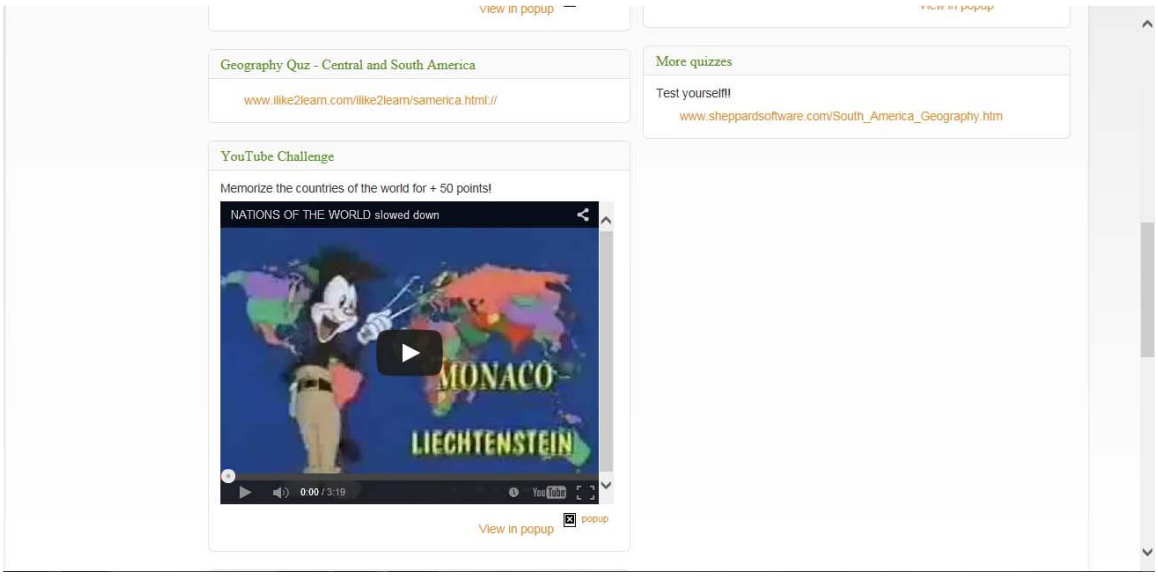
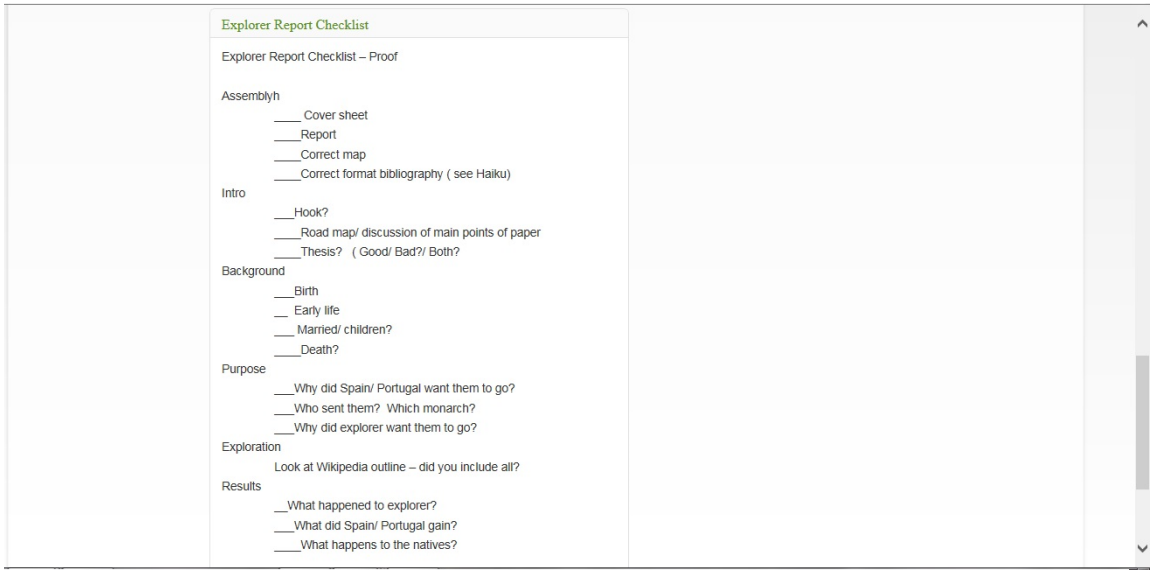


Figure 14. Middle and South America #2.



Explorer Report Checklist

Explorer Report Checklist – Proof

Assemblyh
- ____ Cover sheet
- ____Report
- ____Correct map
- ____Correct format bibliography (see Haiku)

Intro
- ___Hook?
- ____Road map/ discussion of main points of paper
- ____Thesis? (Good/ Bad?/ Both?

Background
- ___Birth
- __ Early life
- ___ Married/ children?
- ____Death?

Purpose
- ___Why did Spain/ Portugal want them to go?
- ___Who sent them? Which monarch?
- ___Why did explorer want them to go?

Exploration
- Look at Wikipedia outline – did you include all?

Results
- __What happened to explorer?
- ___What did Spain/ Portugal gain?
- ____What happens to the natives?

Figure 15. Middle and South America #3.

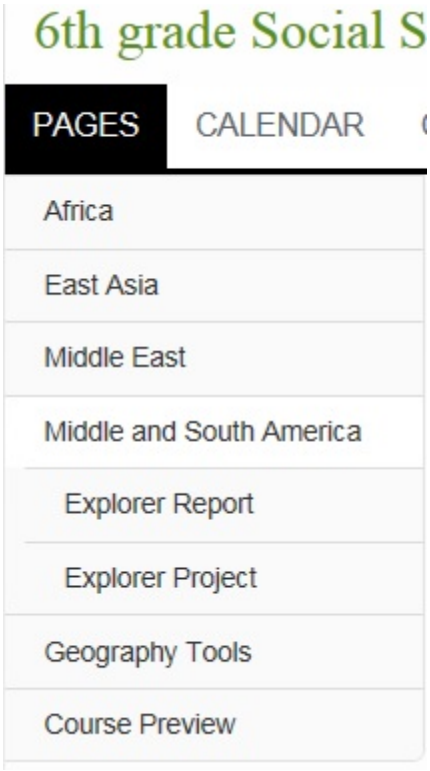


Figure 16. Middle and South America #4.

In talking to Ms. Goodman, she explained,

> The students weren't getting it [explorer project & explorer report], so I first added a check list for them, and then when some of them still had questions, I figured I would explain everything in detail on Haiku, so I created two new sections so they could refer to it later.

Later, she also described how she had added the cartoon video of the countries of the world because a student had e-mailed it to her. She also mentioned that she added the section about extra credit because several classes had inquired about it during the unit. All of these decisions were based upon the feedback she was getting from her students and then using Haiku to meet the interests or needs of her students.

In discussing her Haiku page, I asked Ms. Goodman if she thought her Haiku page reflected effective teaching with technology, especially as it related to the TPACK model. Ms. Goodman remarked that she thought it did, although she readily admitted that it was not the only example of how it could be done and that there could be even better ways of using Haiku of which she was unaware. For example, Ms. Goodman explained, ". . . for me, the most important thing is that Haiku is reflective of what the student needs." I followed up with her, asking if this thinking about the needs of her students represented her pedagogical approach to teaching with Haiku. Ms. Goodman said that "I think so, but it's not like I'm sitting at home thinking, only in terms of pedagogy, content, or technology when I'm adding stuff to Haiku." I followed up by asking her what she was thinking about when she decided to add material to Haiku.

> Ms. Goodman: . . . you're thinking about all of it, and then you just make the best decisions possible for your students about what you add to Haiku. I don't want to confuse them or make their lives harder, so when I add stuff to Haiku, I ask myself, "Is this important?," "Will it help them?," "Are they learning?"
>
> Me: . . . so in terms of the TPACK model I showed you, Haiku fits in how?
>
> Ms. Goodman: . . . and so Haiku is the output of my TPACK.

Theme #2: Using technology to dress up pedagogy. Ms. Goodman believed that she could use technology as a way to improve upon the practices she was already using in her classroom by allowing her to dress up her teaching practices in ways that might better address the needs of her students. She also felt that using technology offered her additional possibilities in her assignments that were not possible without the use of technology. Thus, for many of the examples of effective teaching with technology I observed in Ms. Goodman's class, technology was used as a way to transform her existing practices into something more robust.

I observed an example of this over the course of a few weeks during a unit on ancient Japan. It was the seventh day of a 15-day unit. The entire unit was based upon a game adapted for classrooms called *War Lords of Japan*. Ms. Goodman had found the game at a teaching conference five years earlier and had adopted it into her curriculum. As it was originally intended, the game was designed to be played on a traditional game board and in small groups of 4–6 players. However, after using the game once several years back, Ms. Goodman modified the game by utilizing technology to both organize her materials and provide her students with an online source to use in playing the game.

In Ms. Goodman's modified version, students were divided into groups of at least four students. Each student was given a role in the game such as an accountant or strategist. The point of the game was to earn points through the completion of classroom assignments. These points could then be used to purchase armies or feed existing armies. The groups had to conquer the other teams based upon their location on a map of Japan. Each class had a map of Japan assigned to them and each group was assigned a certain province on the map (see Figure 17).

Figure 17. War Lords of Japan Game.

Once students had conquered all of the groups in their class, they could "jump" maps and attack armies in other classes. Every time a group was defeated, those students became part of the conquering group. The game played out until there was

just one group left. Each student had to complete seven history assignments, three geography assignments, four cultural assignments, and five arts/crafts assignments about ancient Japan. Students were free to complete more assignments in order to earn more points.

The game itself did not require any particular use of technology. In fact, the original rules and descriptions of the game did not call for the use of technology in any way. However, Ms. Goodman adapted the game in two ways in order to take advantage of the 1:1 environment in which she taught in. First, she created a *Live Binder* (http://www.livebinders.com) website for the unit. This website included fifteen different sections that the students could explore, and each section was dedicated to a different aspect of ancient Japan (see Figure 18).

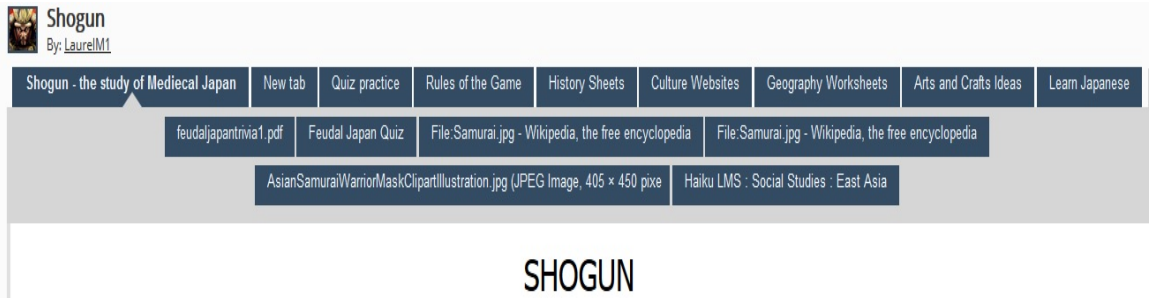


Figure 18. War Lords of Japan Live Binder #1.

As the unit went on, Ms. Goodman added two additional sections for quizzes. Ms. Goodman readily admitted to me that she was not an expert with *Live Binder*, and as Figure 18 shows, some of the sections are mislabeled or the name for the section is repeated. Despite these errors, students found the *Live Binder* website extremely

helpful in completing their assignments during the unit. I asked Miley, one of Ms. Goodman's students, her opinion of the *Live Binder* website.

> Miley: I love it. Oh My God, it makes doing the assignments so much easier. I don't have to search all over the internet for something and waste my time.
>
> Me: Is it easy to use? Do you think it is organized well?
>
> Miley: Well, you just have to click around and find what you need. It's not hard. I think it is well organized.
>
> Me: What did you find most helpful about it?
>
> Miley: It lets us focus on the game, we can go to the website, get what we need, and finish our work to get our points. Like the history part, everything we need to complete our history assignments can be found in all the stuff she added in there.

The history section of the *Live Binder* website that Miley referenced was filled with PDF documents that the students can download and read (see Figure 19).

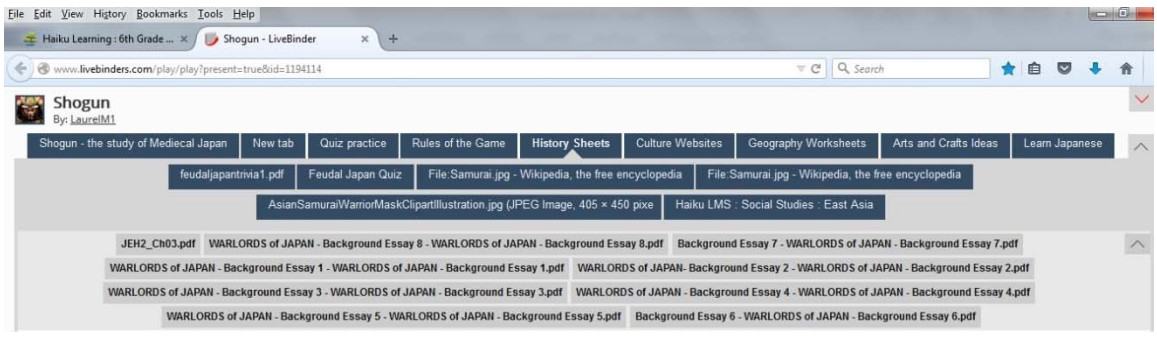


Figure 19. War Lords of Japan Live Binder #2.

My conversation with Ms. Goodman about her choice of content for the *Live Binder* website sheds some insights into her technology teaching practices.

Me: How did you decide what to include in your Shogun website?

Ms. Goodman: Oh, it is just a combination of a whole lot of things. I included all of the material that I think is relevant from when I was first introduced to this game. I've also added things that I feel it is important for kids to experience.

Me: Like what?

Ms. Goodman: Like the culture and crafts activities. The geography piece is really important to me, I'm a big believer in geography literacy.

Me: How about the learn Japanese tab, can you speak Japanese?

Ms. Goodman: I can . . . I can [Laughing], although I don't practice it much. To be honest, that is new for this year, a student asked about it in another class, so I decided to add it in. There are so many websites out there that you can use to help students learn languages.

Me: But why *Live Binder*? Why did you choose to use that tool for this unit?

Ms. Goodman: Because who has time to put together thirty packets of information and keep up with it all. With the website, I can add everything in one place and the kids all know where to go to get it. Plus, I don't have to pick up lost papers all over my floor or hallways now.

In this conversation with Ms. Goodman, she indicated that her choice of using technology allowed her to improve her pedagogy by meeting an organizational need for her students. It also provided her students a centralized location to find everything they needed for the unit as well as a means for Ms. Goodman to give them experiences she felt were important, like the culture and arts/crafts sections. *Livebinder* also provided her with a means to adapt to the needs of her students, such as adding in the section on learning Japanese because a student requested it. Many of these additional features,

like learning Japanese, were only possible because of Ms. Goodman's decision to use technology to enhance her traditional instruction.

The second way Ms. Goodman adapted the game to take advantage of the technology was in modifying the rules of the game to accommodate her 1:1 classroom. At the beginning of the unit, Ms. Goodman announced that she would not be doing any direct teaching of the material, but rather students would be responsible for learning all of the information on their own, using their groups for support, the *Live Binder* website, the Internet, and the assignments they had to submit to earn points. Students were expected to come in everyday, grab physical or digital copies of the assignments, and begin their work. She met with each group once during the class and reviewed/graded completed assignments, and gave feedback to the group, along with assigning points for their armies and taking the groups' commands for the game. At the end of the unit, there was a unit test on all of the material.

I asked Ms. Goodman if she was at all worried that they would not learn the material. She indicated that she was not, that in her experience, the thrill of the game motivated the students to work extra hard on the assignments to earn points. She also indicated that past experience had taught her that fifteen days was the perfect amount of time for the assignment. More importantly, she talked about how she modified the game for their 1:1 environment.

Me: What changes did you make to the game

Ms. Goodman: I took paper assignments and changed them into word documents so that the kids could just download them and work on them on their laptop.

Me: Did you make any other changes?

Ms. Goodman: I use a lot more visuals now, because the kids can use their laptops to see pictures and videos. Sounds, too.

Me: So you kind of gave the game a digital update?

Ms. Goodman: Yes exactly, I didn't really change the game, I just made it fit better with what we do here.

For the entire 15 days, it was normal for me to see students come in, open up their laptops, and begin working in their groups. Students would chat about the game and sometimes unrelated things, but all of the group members stayed focused on their assignments, sometimes working on them in pairs. It was very normal to see a student focused on their laptop completing one of the assignments (see Figure 20).

Figure 20. Students Working on War Lords of Japan Assignments.

When I asked Tabitha later on in the semester what unit did she learn the most from over the past four months, she immediately came back with the unit on ancient Japan. Our conversation sheds some light on how Ms. Goodman's use of games and technology motivated Tabitha.

> Me: Why do you think you learned the most from the unit on ancient Japan?
>
> Tabitha: Because it was fun. I wanted to win.
>
> Me: So because it was fun you learned . . . or was it something else . . . or more?
>
> Tabitha: I don't know, I think it's cool how teachers use your competitiveness to get you to learn, like jeopardy games. We did that one in science. The Shogun one was a competitive game that made it all a little more interesting.
>
> Me: So it was the competition that motivated you to learn everything . . . anything else?
>
> Tabitha: I like how I didn't have to use a book if I didn't want to. I hate carrying around my Social Studies book. All I needed was my laptop and the supplies for the origami I made. I can turn everything into the dropbox or just e-mail it to her.

Tabitha's remarks capture how Ms. Goodman's use of the game motivated her students to learn and how her dressing up of the *War Lords of Japan* game with technology created an environment conducive to learning.

Another example of Ms. Goodman using technology to enhance her traditional teaching practices can be seen in how she modified a traditional research essay into a virtual museum and how she modified a travel brochure assignment to take advantage of digital publishing tools like *Microsoft Publisher*. With both of these assignments,

students produced digital artifacts to reflect their understating of the material being covered. The following conversation took place between myself and two of Ms. Goodman's students, Miley and Ben. We were talking about their experience completing these digital artifacts as part of their coursework for Ms. Goodman's class.

> Ben: I liked the virtual museum, but I just don't like researching. It's because the first time I did research I failed, because I had never done it before.
>
> Me: But didn't you have to research a bunch of stuff to do the virtual museum?
>
> Ben: Sure, but it didn't feel like research, it was different.
>
> Miley: Yeah, because you have the topics. You have it all set out for you, so the teacher can't tell you if it was too short or too long.
>
> Ben: I felt like I knew what to do, with reports, I never know what to write.

In this conversation, Ben and Miley brought up the virtual museum assignment that the students had to complete on China. For this assignment, Ms. Goodman had the students download from Haiku a PowerPoint template that was configured to operate like a virtual museum. They could choose any topic relating to China's history or culture for their virtual museum. For example, Miley's virtual museum was about the Terracotta Warriors of ancient China. The virtual museum started with a main lobby (see Figure 21) that displays the chosen topic and then there were different hallways where particular information about the topic was presented.

Figure 21. Virtual Museum #1.

When students clicked on a hallway, they were taken to that particular room where they saw three different pictures representing the contents of that room (see Figure 22).

Figure 22. Virtual Museum #2.

Then, if they clicked on one of the pictures they were shown an information card about the picture and the topic of that room (see Figure 23).

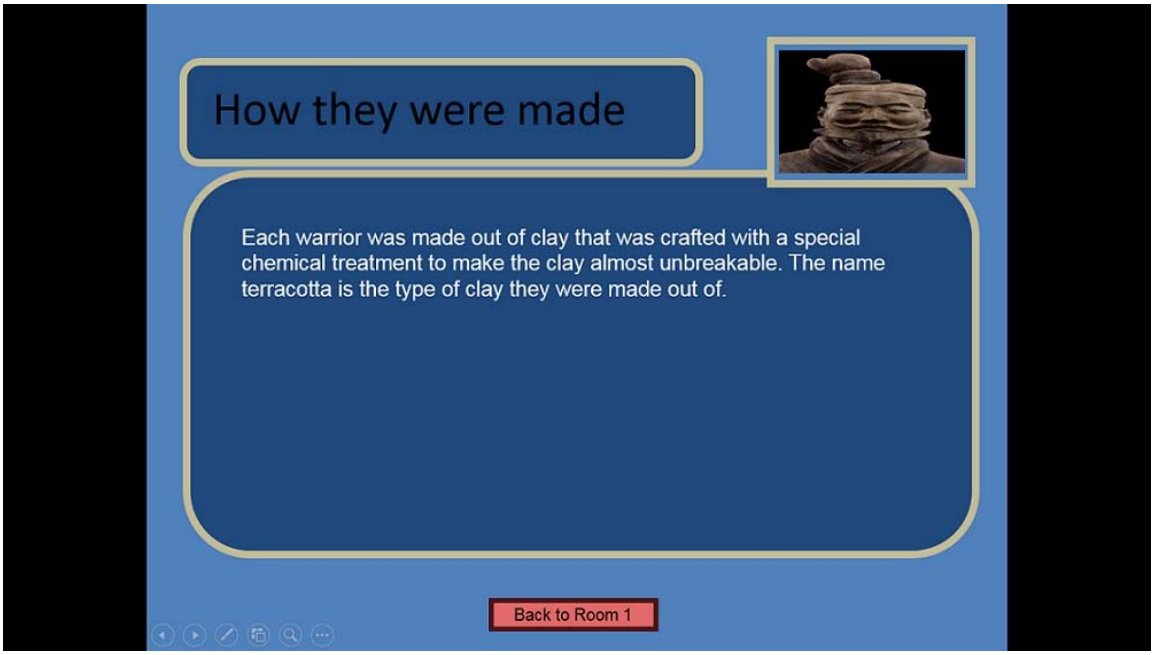


Figure 23. Virtual Museum #3.

Students were given two weeks to complete the assignment, of which they received four dedicated days in class to work on it. Students were expected to use the Internet and the resources found in their classroom textbook along with the information on Haiku to complete the assignment. As was normal for Ms. Goodman, students were also expected to give their classmates a quick two-minute presentation of their completed virtual museum on the assignment due date.

Ms. Goodman did not create this virtual museum PowerPoint herself; rather, she downloaded it from an online source. This was the fourth year she had used the virtual

museum. Before she started using the virtual museums, Ms. Goodman had her students write research papers about China. She commented to me how she felt that students didn't really remember or understand what they were writing when completing their research paper. Thus Ms. Goodman used the virtual museums, "to get them to do the same thing I originally wanted, but maybe in a way they would like a little bit better." This belief by Ms. Goodman matches the sentiments that her students expressed earlier in discussing their experiences with the virtual museum project. I asked Ms. Goodman about how she had found this resource and how she had first learned how to use it.

> Me: Why the virtual museums, how did you come up with that?
>
> Ms. Goodman: I went home one day and thought to myself, there has to be a way to create a museum for the kids. So I went online to Google and just typed in online museum. . . . That really didn't work, but I remember somehow I stumbled across virtual museums, and bingo, I had it. I found another teacher who had created this template and I figured I'd give it a shot.
>
> Me: But you mentioned earlier that you are not good with PowerPoint, and that you rarely used it. How then did you learn this virtual museum template and how it worked?
>
> Ms. Goodman: I let the students figure it out for me. I say to a couple of the students in the class, "You might want to try this," and give them a chance to work through it. Work through the kinks with them. Usually those are kids who are probably the computer savants in your class anyway, the ones who would be more likely to venture out and try something new. You say to those computer savants, "Try this." Or you might even give them extra credit, "If you try this, I'll give you extra credit," so they're much more able to work out the kinks and stuff like that. That's one way, let the kids try it out first.

In this case, Ms. Goodman did not have much familiarity with the technology, but understood enough about the technology and what she wanted to accomplish academically to have her students give it a dry run for her to see if it fit what she wanted for her students. By the time I witnessed this activity, several years after she first used it in her classroom, Ms. Goodman had the technological knowledge to support this assignment. She had successfully modified it to meet her pedagogical and content needs.

Ms. Goodman may not have been a *PowerPoint* expert, but she was very knowledgeable about the software *Microsoft Publisher*. She used this knowledge to design another digital artifact assignment for her students based upon a previous assignment she used in her class. Students were to pretend they were a travel company and design brochures about the ancient cities of Ephesus or Petra. Originally, these brochures were created with paper and folded into tri-folds to create the travel brochures; however, after becoming familiar with Microsoft Publisher, Ms. Goodman modified this assignment to take advantage of the additional possibilities the publishing software provided. These digital brochures had to include a history section about the city, at least three pictures related to the city, at least two sections that described important features of the city, and a back page with a creative travel company logo and contact information (see Figures 24 and 25).

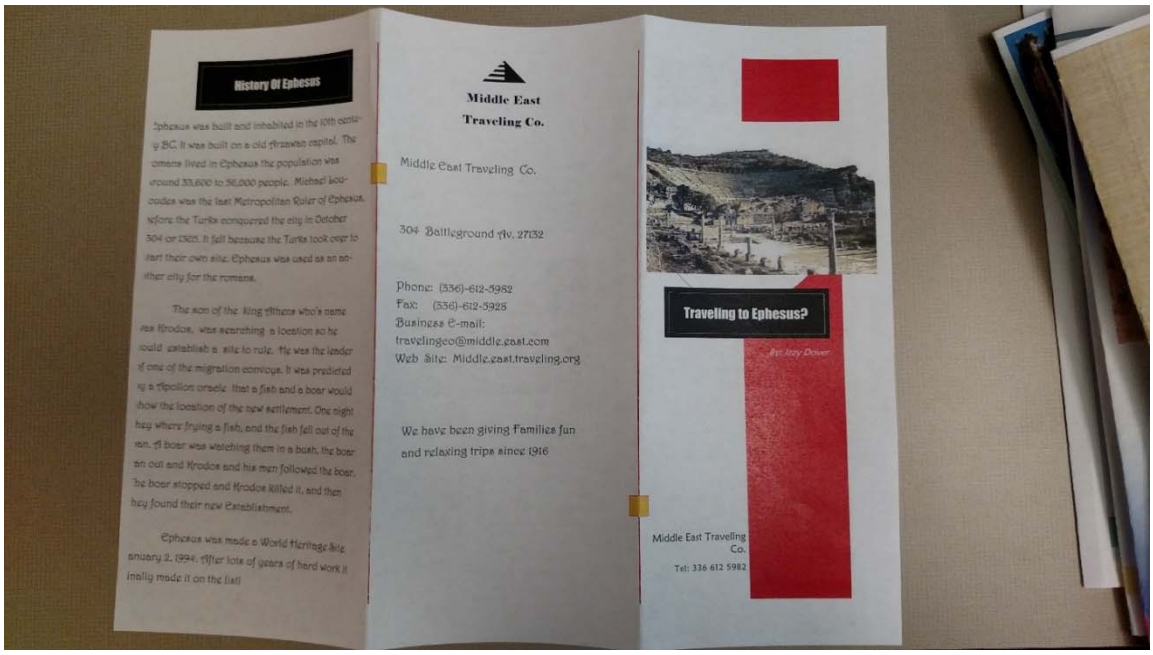


Figure 24. Ephesus Travel Brochure #1.

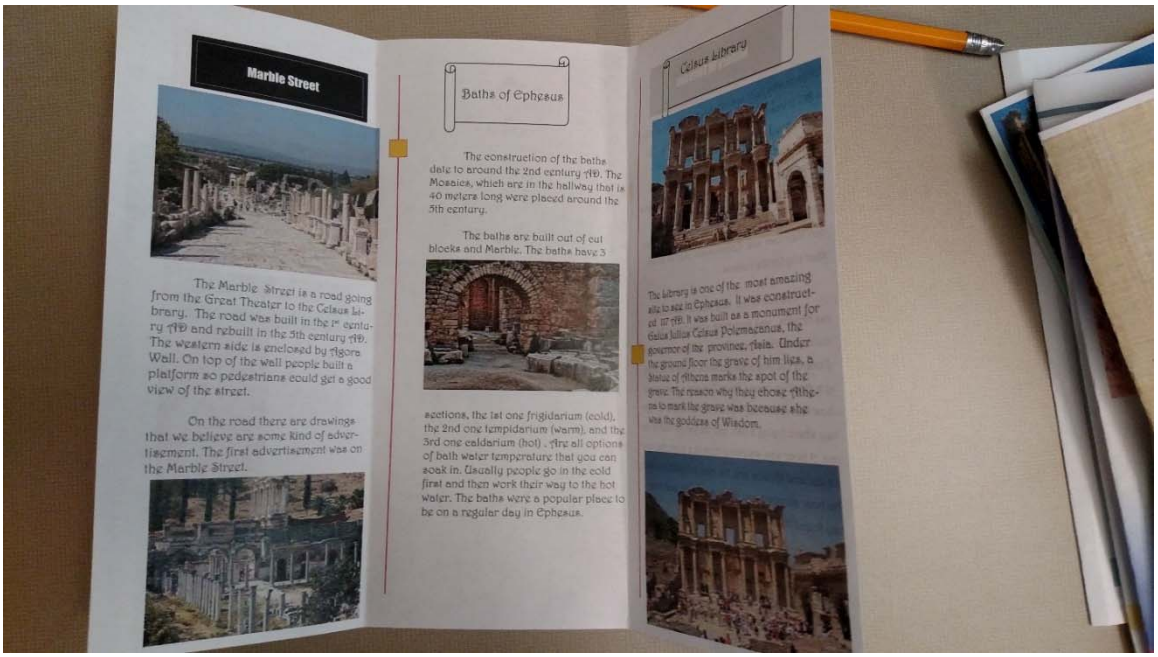


Figure 25. Ephesus Travel Brochure #2.

She spent half a class demonstrating how students could use *Publisher* to complete this assignment. She also posted instructions and helpful hints on Haiku for her students. Students were given the rest of the class to try the software and become familiar with it. The students worked on this assignment the next four days of class. Ms. Goodman provided technical support to students who had trouble using *Publisher* and the students once again used their textbooks, Haiku, and the Internet to research the needed information about their chosen city.

It was clear that Ms. Goodman was an expert in *Publisher*; she was able to rattle off commands from memory, she was able to resolve all the issues that the students presented her with, and she knew how to do some advanced layering techniques that *Publisher* allows. While there was a dramatic difference in her technological knowledge about *Publisher* and *PowerPoint*, her approach and purpose to using them was almost identical. I asked her about it after class one day to better understand her reasoning for using student produced digital artifacts.

> Me: So I've noticed that for a lot of your assignments, you like the students to produce something, why is that? How does technology fit in? Or does it?
>
> Ms. Goodman: . . . I think there are a lot of reasons. It is a better way of measuring learning, the kids enjoy doing these types of assignments more, I enjoy grading and teaching this way A LOT more. [Laughing]
>
> Me: But why use technology?
>
> Ms. Goodman: Well, you're seeing the technology, I'm not. We do other assignments where the kids have made cuneiform from clay, a mock UN, classroom skits, so technology is just one piece I use to give variety to my class.

> Me: When you think about the assignments you do using tech vs. the ones you do that don't use tech, do you plan them differently, going back to our TPACK model, is it different for the tech stuff vs. the other things you do.
>
> Ms. Goodman: I don't think about them differently. They are one and the same. It is always about creating spaces where kids can learn and it just so happens that one assignment does that with clay and the other does that with Publisher.

For Ms. Goodman, the technique was not as important as giving students an opportunity to demonstrate the knowledge they had gained in creative ways. Ms. Goodman was able to use technology to give her traditional classroom practices a digital update. As she mentioned to me, "the kid that can make this incredible virtual museum, and you look at it and you say, 'Wow! Well done. This is really cool.' That to me is real learning."

Ms. Goodman's students also enjoyed using technology to produce these artifacts. In a conversation with Becky, she commented that she liked the creativity that the assignments allowed. Beck, Miley, and Ben all agreed that they much preferred creating the artifacts than writing a report, even though they all acknowledged that the work was probably the same and they had to still research their topic and learn about it. While no attempt was made on my part to formally assess how much of the information the students retained about the material they had learned in their digital artifacts assignments, in our conversations during observations and in our formal interviews, all three students displayed a solid amount of retention about the material covered in their

digital artifact. Miley was still able to go into details about the Terracotta Warriors and Becky was able to give me a list of reasons why I should go visit ancient Petra.

Ms. Goodman did not just modify traditional assignments with technology to improve her students' experiences. She also modified assignments with technology to improve her ability to teach and enhance her pedagogy. One day I was speaking to Ms. Goodman outside of her classroom about her unit on China and how she still couldn't decide what to do for the final eight days. She had decided against looking at the Taiwan-China dynamic because she felt that it didn't work well last year, and she wanted something that focused on the realities of modern China to "dispel all of these weird ideas about China that they [students] have." During our conversation, Mr. Milton walked out of his door and interrupted us, saying that he had just finished up teaching his science students how to graph data in *Excel* and how to select the correct type of graph for the type of data being presented. Having overheard our conversation, he asked Ms. Goodman if she would be interested in having them apply this knowledge in her class by graphing data about something in Social Studies. Instantly, Ms. Goodman said yes, and over the next 10 minutes Mr. Milton and Ms. Goodman collaborated on how she could have students use data about modern China to create a presentation about China in graphical terms.

Before the start of the next day's class, Ms. Goodman had designed a new digitally produced artifact that was to be a joint venture between her class and Mr. Milton's class. Students conducted research in Ms. Goodman's class about five different

issues concerning modern China: population growth in rural vs urban China, marriage rate, clean water access, education levels by sex, and average income in rural vs urban China. Students used their textbooks, the Internet, and special sections about each of these five topics that Ms. Goodman added to Haiku. Students researched and collected data while in Ms. Goodman's class and then they converted the data into graphical charts using *Excel* in Mr. Milton's class. Mr. Milton assessed them on their ability to create the charts and Ms. Goodman assessed them on their ability to correctly interrupt the charts and make meaning about what the data said about modern China. Students had to insert the charts into *PowerPoint* or a similar application in order to present their findings to the class (see Figures 26 and 27).

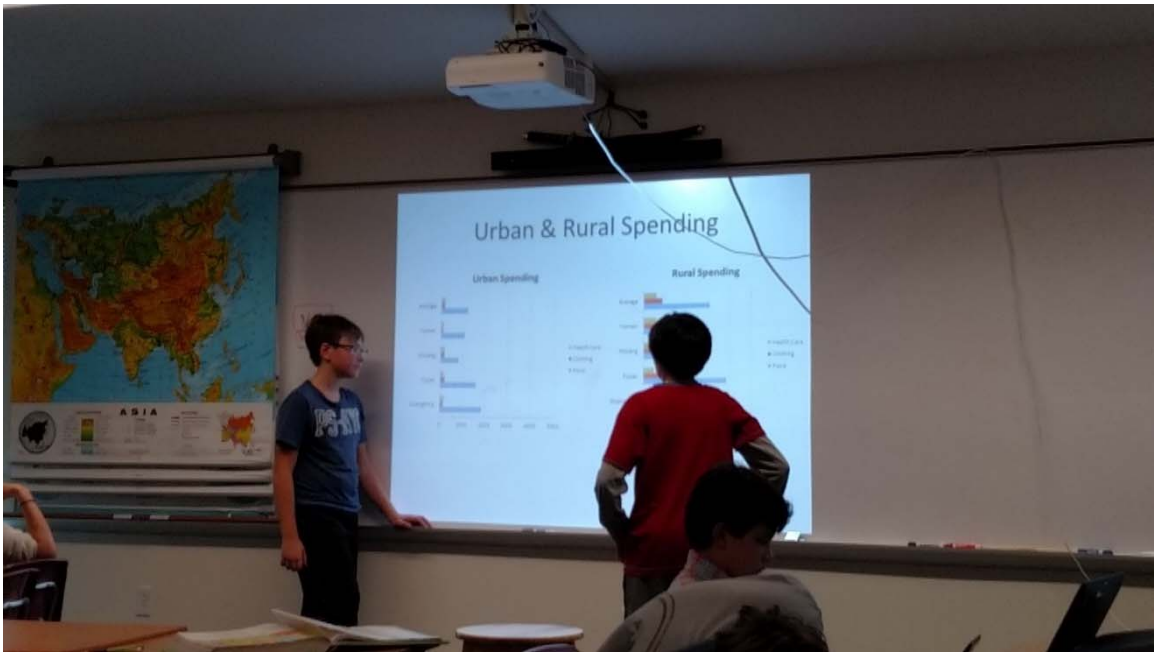


Figure 26. Excel Chart on China #1.

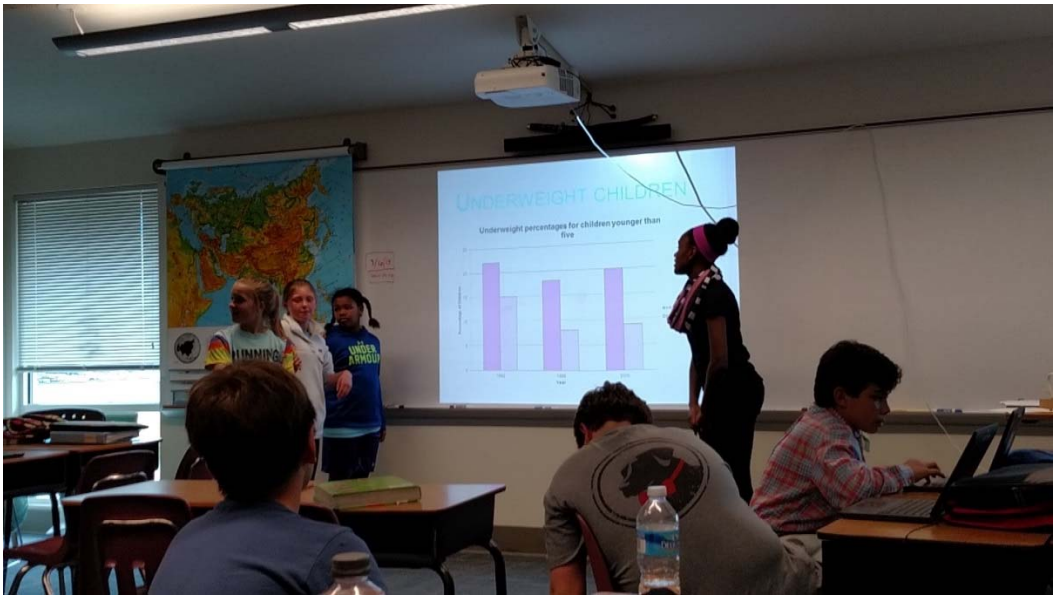


Figure 27. Excel Chart on China #2.

Students had to also offer suggestions for what they would do if their data indicated there were problems ahead for modern China (see Figure 28).

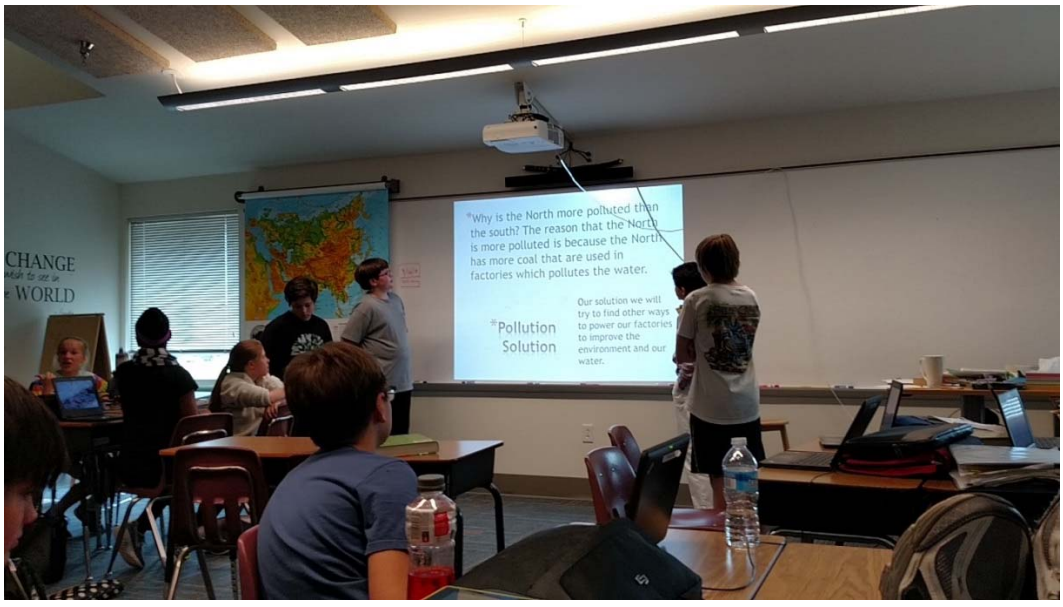


Figure 28. Modern China Solutions.

After the assignment was completed, I asked Ms. Goodman to reflect on how it went. She indicated that she thought it went well, especially since it was thrown together at the last minute. She also stated that she was very pleased with the quality of the charts the students had produced and that Mr. Milton was happy to have had an authentic reason to create charts with his students. She felt like the students needed more practice interpreting the results, but she believed she could adjust for that next year. She also mentioned how having technology available enabled her and Mr. Milton to plan and execute this collaborative teaching endeavor. Once again, I asked her to think about the assignment in terms of being an example of teaching effectively with technology, especially as it related to enhancing her pedagogy and teaching practices.

> Ms. Goodman: . . . and so I don't think this is the type of thing you can do without technology. They could have something other than excel, but I think this project lends itself perfectly to using technology.
>
> Me: So, and I'm not trying to put words in your mouth, but it sounds to me like you are saying that it is the design of the project that is key in determining if you should use tech.
>
> Ms. Goodman: Yes, exactly, why would I have them use a computer to experience what cuneiform writing is when we can create it with our hands with clay. By the same token, why create charts by hand when they can manipulate some piece of software to do it for them, giving us more time to spend on the meaning of charts.
>
> Me: So part of effective teaching with tech is knowing when to apply it?
>
> Ms. Goodman: Not just that, I'd go on to say that most technology fails in the classroom not because of the technology, I mean how many times does a computer actually have an error, once a year, if that?

Me: It is rare . . .

Ms. Goodman: Exactly, technology fails because we don't apply it correctly, or we use it when we shouldn't be using it.

Our conversation indicates one of the criteria Ms. Goodman uses when thinking about what TPACK in practice might look like, the appropriate and timely use of technology in teaching. It also reflects how for this assignment, technology was essential in allowing her teaching practices to meet the pedagogical goals she and Mr. Milton had for her students.

Ms. Goodman's TPACK Model

Before conducting the final interview with Ms. Goodman, I asked her to create her own model that would represent her as a teacher, based on the model of TPACK discussed in Chapter II. Ms. Goodman's model for her TPACK knowledge contained two large pedagogical knowledge and content knowledge circles with a much smaller technological knowledge circle (see Figure 29).

Due to the way Ms. Goodman represented her TPACK model, her TPACK, technological content knowledge, and technological pedagogical knowledge were all very small in size. Ms. Goodman also represented her technological knowledge as small, especially when compared to her content knowledge and pedagogical knowledge.

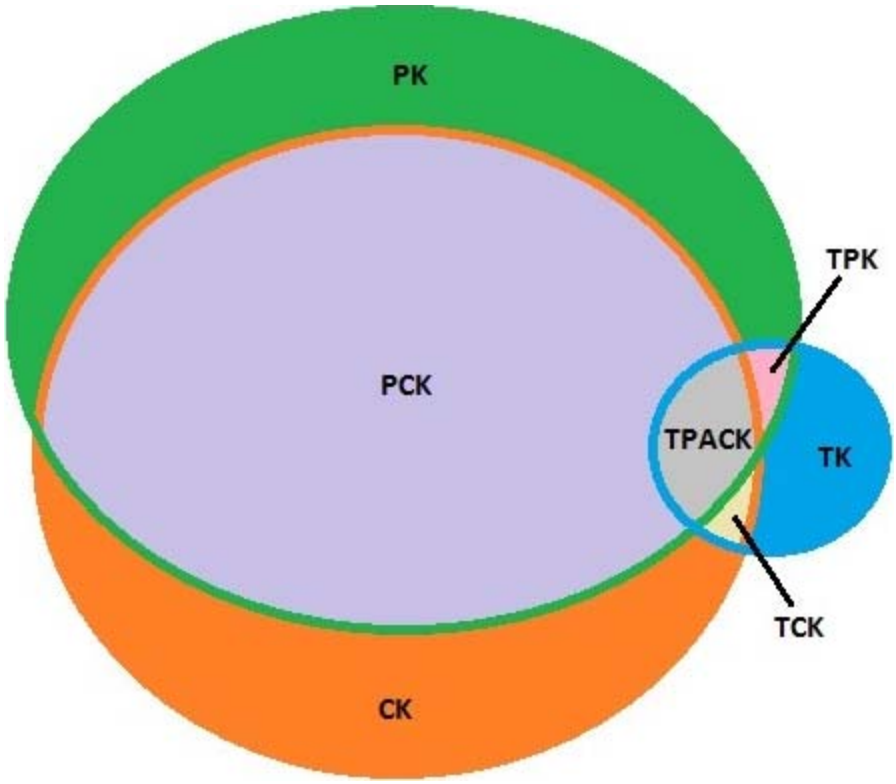


Figure 29. Ms. Goodman's Interpretation of her own TPACK.

I asked Ms. Goodman why she had chosen to represent her TPACK model the way she did. Our discussion sheds some insight on her thoughts about her own TPACK model.

> Ms. Goodman: Pedagogy is the key for me, that is how I was trained, that is what I enjoy most about teaching.
>
> Me: So it is your strength?
>
> Ms. Goodman: Yes, so I made it the biggest circle. Then I made content almost as big.
>
> Me: Why?

Ms. Goodman: You don't teach 30 plus years and not eventually learn the content. [laughs]

Me: [laughs] Dumb, question on my part, that makes sense, anything else?

Ms. Goodman: My technology is the smallest, because I don't feel like I am some type of tech guru. I'm also not of the technology generation.

Me: Ok, anything else? It looks like content and pedagogy overlap a lot.

Ms. Goodman: I think the more you teach, the more those two overlap. They become one and the same.

"Teaching without technology is like painting without a brush, you could do it, but why would you?"—The Case of Ms. Monroe

Ms. Monroe's class commenced as it always did; students walked in, sat down at their desk, and tried to answer the daily geography quiz warmup. As they were completing the warmup activity, Ms. Monroe walked to the center of her whiteboard, which had been completely erased, and wrote in big capital letters, PowerPoint. When the five minutes was up for the warmup, Ms. Monroe began class by asking the students, "What is this?" as she pointed to the word on the whiteboard. Students raised their hands and blurted out "PowerPoint." Ms. Monroe agreed but prodded them for more by asking, "But what is PowerPoint?" Several students gave their answers to this question, some offering very technical descriptions of PowerPoint and others offering examples of what you could do with PowerPoint. Students even built off of each other's answers by adding additional features that were a part of PowerPoint, like sound and animation. Some even commented on how you could play games, like Jeopardy.

Ms. Monroe agreed with everything they said, but when they had finished answering, she said to them "good answers, but wrong." The students let out a moan and began to offer a protest feeling that they were indeed correct. Ms. Monroe signaled for them to be quiet and then asked them, "Do you want to know what this really is?" Almost the entire class answered yes back to Ms. Monroe. She paused for about 20 seconds, which she later admitted to me was for dramatic effect, and then told them while pointing at the word on the whiteboard, "This is the death of education." The students laughed, and Ms. Monroe proceeded to talk to the students about how she believed there was a purpose and place for PowerPoint, but that it seemed like to her that it was being overused by students and teachers. She also felt like it was causing presentations to turn into a "collections of facts," rather than students making "meaning of what they are learning." Ms. Monroe and her students then had an informal discussion about how they should be using technology for their school assignments. When I asked her afterwards about the reason behind taking ten minutes out of her class to have this discussion, she responded back to me that she wanted her students to use technology better. Ms. Monroe explained that it was a reminder that she too had to be more creative in the ways she used technology, to not fall into "a routine of convenience that doesn't benefit the students." I asked her why use technology at all, why not just avoid the problems that it can cause altogether. Ms. Monroe summed up her belief in technology as a key component of her teaching by explaining to me that "teaching

without technology is like painting without a brush, you could do it, but why would you?" (Classroom Observation, February 18th, 2015).

Ms. Monroe's Beliefs about Technology's Role in the Classroom

Beliefs about effective teaching with technology. I began our conversation by asking her to describe a teacher who is effectively teaching with technology. Ms. Monroe described the teacher as someone who is "integrating it into whatever they are studying. It's not just used for *Word* or used for *Excel*. They're making use of various technology tools that are available to enhance whatever they're teaching." Ms. Monroe believed that for technology to be effectively used within the classroom, it had to become seamless with everything else that was done in the classroom. If too much attention was paid to the technology, whether during the course of the lesson or in the planning stages beforehand, then she felt that technology became too static, unable to meet the changing needs of teachers or their students. Ms. Monroe thought one would see effective teaching with technology "when it's organic, when it just happens."

Ms. Monroe also believed that any teacher could learn to use technology in an effective way within their classroom. She felt that even teachers who did not initially possess a high level of technological knowledge could become effective with their technology teaching practices as long as they had the right approach to teaching with technology. As Ms. Monroe explained, "If someone has a fixed mindset, no, you will never be able to teach them about any of this, or be open and willing to try it. Someone that's open and willing? Yeah, I think you can."

This idea that effective teaching with technology was connected to the teacher's beliefs and attitudes toward teaching and technology shaped Ms. Monroe's beliefs about what effective teaching looked like. Instead of assigning certain qualities to a level of technological knowledge or pedagogical knowledge, Ms. Monroe felt effective teaching with technology was more about the disposition of the teacher than their actual set of circles of knowledges. Ms. Monroe used herself as an example when describing the type of disposition needed to be effective with technology. Ms. Monroe expressed that

> you just need to feel comfortable with it. If it's something you haven't used before like a Haiku Deck, don't try to be something that you're not. I think you need to be upfront. Technology is changing every single day. Like with that Powtoons I have never seen that before. It looks cool. I am not afraid to let them try it and be there along the way where I can.

Finally, I asked Ms. Monroe what she would tell preservice teachers to help them become effective teachers with technology.

> I think they should strive to incorporate technology in every single thing they do, it might not always pan out that it works that way but even just incorporating something like Evernote, I mean it's boring note taking, but just incorporating technology into it, the kids all of a sudden think it is some amazing tool. I think these kids . . . this is what they know, they do not know paper, pencil, and if you teach that way it's going to bore them. In any lesson I come up with I always try to find something to bring into it technology wise. I mean, even if it is a video tour or using new presentation platforms just something to enhance it.

Her answer once again stresses that effective teaching with technology is more about your approach and attitude and less about the technological, pedagogical, or content knowledge you may possess. Ms. Monroe's answer also highlights the important role technology has in building connections to students and their own experiences, including their learning styles and preferences. This notion that technology can be used to differentiate instruction is something that emerges within her own practices.

Ms. Monroe's beliefs about the TPACK conceptual framework. Our conversation about the TPACK framework was less about the framework itself and more about what it implied for teachers. For example, Ms. Monroe began by asking me whether the three circles of knowledges presented in the TPACK framework were equal. I refrained from answering and turned the question around, asking her what she thought. Ms. Monroe explained that she could not see how they could be, especially in light of her belief that she lacked a lot of content knowledge (her first year teaching seventh grade), and yet she felt that she taught effectively with technology. I asked Ms. Monroe about the timing of combining the three circles of knowledge found in TPACK and how that could affect the ability to effectively teach with technology.

> Me: Well, could you plan how you want to pedagogically and technologically do something? And then later on fit the content in?
>
> Ms. Monroe: Absolutely.
>
> Me: Why?

> Ms. Monroe: Because very rarely does it all come together in one moment. Everyone thinks about things differently. You might start off with a really cool tech toy and then figure out how to use it in your classroom. Other times, you might have seen a real innovative lesson plan, and you think, I wonder how I could do that with my content and could I use technology to do it. So it just happens, all three are constantly interacting back and forth with each other.

Ms. Monroe's answer indicates that for her, effective teaching with technology is not restricted to just the knowledge that is born out of TPACK; rather, it can also be the layered application of the three components of TPACK over time.

Ms. Monroe then gave me an example from her own teaching that she felt reflected this notion that effective teaching with technology requires knowledge about content, technology and pedagogy as an ongoing process.

> Ms. Monroe: When we did like this Silk Road project, I will be the first to admit I know nothing about the Silk Road. I don't think I ever learned about China.
>
> Me: So your content knowledge was lacking, so what did you do?
>
> Ms. Monroe: In looking at different projects just that are out there and exist. I came up with this whole presentation thing. How I want to go about doing it. I feel that was the pedagogical part of it and thinking about how I want to go about doing a lesson.
>
> Me: And then what?
>
> Ms. Monroe: The technology, I had to have it to know about some of these platforms I was going to ask them to choose between in order to complete their presentation and to help them with that. But content came afterwards, with me learning about the silk road so I would be able to help them if they had questions along the way.

Ms. Monroe then suggested that effective teaching with technology is not a new type of knowledge, but rather having the ability to use content, pedagogical, and technological knowledge together without letting one limit or degrade the others. Ms. Monroe explained that "for any lesson, if I think back to fourth grade, I definitely had the pedagogical and the content. Then I would somehow figure out what technology I wanted to pull into that. It can work in different orders, the important thing is in how they came together." It was this idea of how technological, content and pedagogical knowledge come together that Ms. Monroe deviated from the TPACK framework the most. She did not see effective teaching with technology as a "new" TPACK knowledge that was born out of combining all three types of knowledge. Ms. Monroe explained that "I don't see it so much as if I have this new knowledge or special ability because I know content and pedagogy, and technology." Rather, she explained that "I think I have just learned, with practice, lots of practice, how all three fit together." Thus, for Ms. Monroe, there was no need to create a new knowledge; rather, teachers needed practice with all three to learn how to fit them together.

Ms. Monroe's students' beliefs about her technology teaching practices. I asked two of Ms. Monroe's students their opinions about Ms. Monroe's ability to teach effective with technology. The students I interviewed agreed that Ms. Monroe used technology effectively in her teaching practices. They specifically highlighted two characteristics of her teaching when discussing her technology teaching practices. First, the students indicated that Ms. Monroe used technology to make the class fun. They

explained that Ms. Monroe's projects were more engaging because you could use different technologies to complete them. They also indicated that Ms. Monroe was very "in the know," citing her use of *Instagram* and *Twitter* in class as evidence of using fun apps to teach Social Studies. Second, the students explained that Ms. Monroe used technology to offer them choices in how to complete assignments and projects which Rebecca noted reduced her stress about the project. Rebecca claimed that "she uses it [technology] to give us choices, like we can make a video, or a website." When I asked her what affect this choice had on her, Rebecca stated that "I feel like I can find something that I'm good at, I'm not stressed that I will be forced to do something I don't like."

I followed up with the students and asked how they knew Ms. Monroe was effective with her teaching with technology, explaining that fun doesn't always mean effective. Tyrone pushed back saying that "even if fun doesn't equal effective, I can tell you that if I'm bored, I'm definitely not learning anything." When I questioned how much of a factor Ms. Monroe's use of technology in her teaching played in their learning, both of them were steadfast in their belief that it had played a major role in their learning. Both students kept going back to the notion that the choice in technologies allowed them to "personalize" their learning. Tyrone described his choice of technologies to use as an "investment" he made in the topics being discussed in class. Rebecca indicated that her choice of technologies allowed her to find the types of projects that made her feel "comfortable with the project and expectations."

Finally, I tried once more to have her students explain what Ms. Monroe's effective teaching with technology looked like. Her students mentioned that because of her use of technology, the course and the information became more interesting to them, something they felt she was aware of and deliberately used to enhance her instruction.

> Me: I know I've kind of asked this already, but how did Ms. Monroe's use of tech help you? What did she do? This is the major question I'm trying to figure out here.
>
> Tyrone: It made things more interesting. We still studied history . . .
>
> Rebecca: And geography.
>
> Tyrone: Yes, and geography. [Laughing] But creating videos, websites, emailing my pen pal, all of that made it feel different than what I normally get.
>
> Rebecca: I felt like she used technology for two reasons. Because she loves it and she knows we are into it too.

Examples of TPACK Operationalized

Theme #1: Technology as a means to teach organizational skills and facilitate learning. Ms. Monroe described herself to me as an "organizational freak." The way she used Haiku, communicated with her colleagues, and organized her classroom reflected this opinion. However, Ms. Monroe expressed to me that she felt that her students could learn her material better if they practiced their organization skills along with using technology to facilitate learning. I followed up with Ms. Monroe in an e-mail,

asking specifically about how one teaches students to use technology for learning. She began by discussing the importance of modeling the behavior for students:

> Me: Students generally know how to use to technology, or they are generally able to quickly adapt to its use. However, they don't usually know how to learn with technology. How do you bridge that gap?
>
> Ms. Monroe: I completely agree with this statement. I feel the best way to help students with using technology as a learning tool is by modeling your own thought processes and model that behavior. For example, when I taught lower grades google searches were not usually useful for them because they didn't know what to google. It took me talking out loud about what goes through my head as I am trying to research something and then modeling that in front of them, for them to use it to their benefit. And practice, practice, practice!

Ms. Monroe then pivoted to the importance of observing and monitoring your students to understand their current practices with technology. She explicitly mentioned the potential for technology to hinder learning as much as it can help the learning process. Ms. Monroe commented that "the biggest thing is to observe students when they are using technology. You quickly learn if they know how to use technology as a tool or if it hinders their learning." However, she dismissed the idea that a student's initial inability to use technology meant that it could not serve as a means to facilitate learning. Ms. Monroe noted that "They are so quick to learn things that just a quick lesson or discussion about something usually leads to them mastering it pretty quickly."

An example of Ms. Monroe's belief about the ability of technology to serve as both an organizational tool and a tool to facilitate learning was her introduction of the

website *Evernote* (https://evernote.com/) to her students. *Evernote* is an online workspace that allows one to connect to it from a variety of Internet enabled devices. On this workspace, one can create notes, which then can be organized into appropriate categories. Users can share their notes with other users of *Evernote* and even users who are not a part of *Evernote*. Users can also insert multimedia into their notes and links to other websites.

Ms. Monroe spent about 30 minutes one day presenting *Evernote* to her students and then modeling for them how to use the application for her Social Studies class and potentially other class they had. Ms. Monroe started by providing her students with technical help, such as how to get to the website, how to register for an account, and suggestions for usernames and passwords. Once every student was logged into *Evernote*, Ms. Monroe transitioned to showing the students the functionality that was available in *Evernote,* modeling for them how to create a new note, make a new folder, and insert links or images. She had her students follow along on their laptops while she demonstrated to them with her laptop (her screen was projected onto the whiteboard). Once students had this basic overview of *Evernote*, she gave them about eight minutes to play with the software on their own and discover other uses of the software. In a short time, students had figured out how to change the color of the font, how to share their notes with each other, and some of her students were even able to log into their *Evernote* workspace from their smartphones. After giving her students a

chance to explore *Evernote* on their own, Ms. Monroe spent the rest of the class giving them examples of how they could take notes using *Evernote* for her class.

Two weeks later, while students were working on an assignment about Confucius, I noticed that six of the students were using *Evernote* on their laptops to record information that they were gathering (see Figure 30).

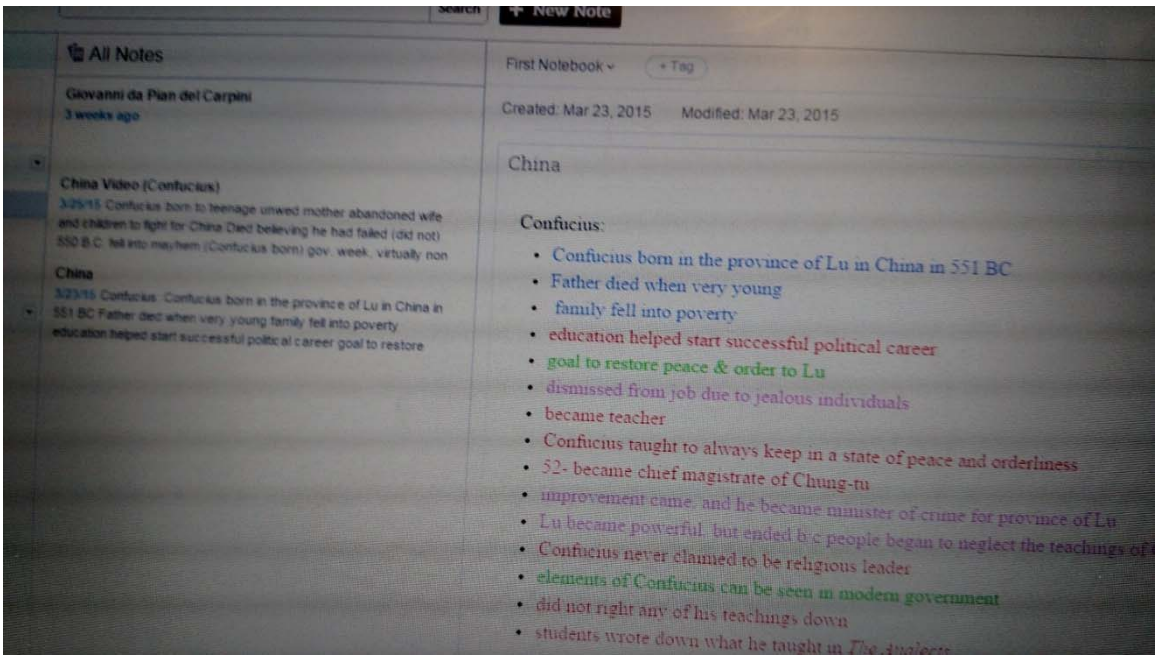


Figure 30. Evernote Confucius Notes.

I asked Brittany why she had decided to use *Evernote* for taking notes. Our conversation speaks to Ms. Monroe's advocacy for using technology to help students build organizational skills and improve their learning efficiency.

Me: So you're using *Evernote*, any reason why?

Brittany: I really like it.

Me: Why? What does it do for you?

Brittany: I like that I don't have to write everything down on paper. I also don't have to worry about losing anything.

Me: Any reason why you color coded your notes or is it just for decorations?

Brittany: Yeah, like Ms. Monroe showed us, I'm using blue for family and personal facts. That way when I write this up, I can find what I need quickly.

Me: So would you say Ms. Monroe did more than just teach you how to use *Evernote*, that she taught you how to use it effectively? Because that is what I'm trying to observe here, how do teachers use technology effectively?

Brittany: Yes, she's great. She is always giving us hints or advice on how to do things better.

As I continued observing students that day, I noticed other students were using *Google Docs* to record their notes on Confucius. Still others just had a simple *Microsoft Word* document open on their computer. While these students were not using *Evernote*, they did color code their notes on *Google Docs* and *Microsoft Word* (see Figures 31 and 32).

Other students I observed took their notes on paper. I asked Ms. Monroe about this diversity in note taking techniques and the fact that so many of her students were color coordinating their notes. Ms. Monroe indicated that she didn't want to force a particular organizational style on her students. She felt it was better if she left it up to them to decide what worked best for them. However, she was encouraged by the use of color in their note taking, expressing to me that "it means they are working with the facts that they are writing down at some critical level in order to categorize them." I

asked her if this was proof that she has succeeded in teaching them how to be more organized and efficient with their learning. Ms. Monroe replied back saying that "I wouldn't say it is proof, but I think it is encouraging to see them give it a try and build some practice with these techniques."

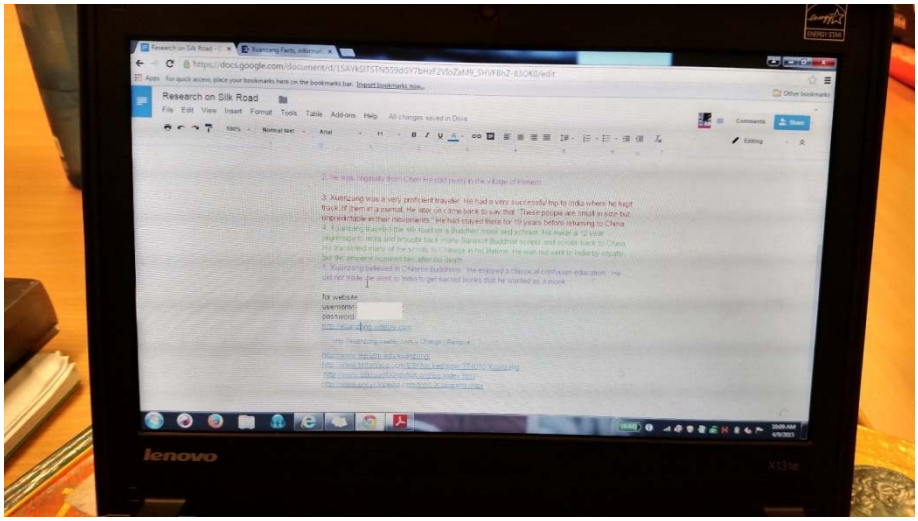


Figure 31. Google Doc Notes.

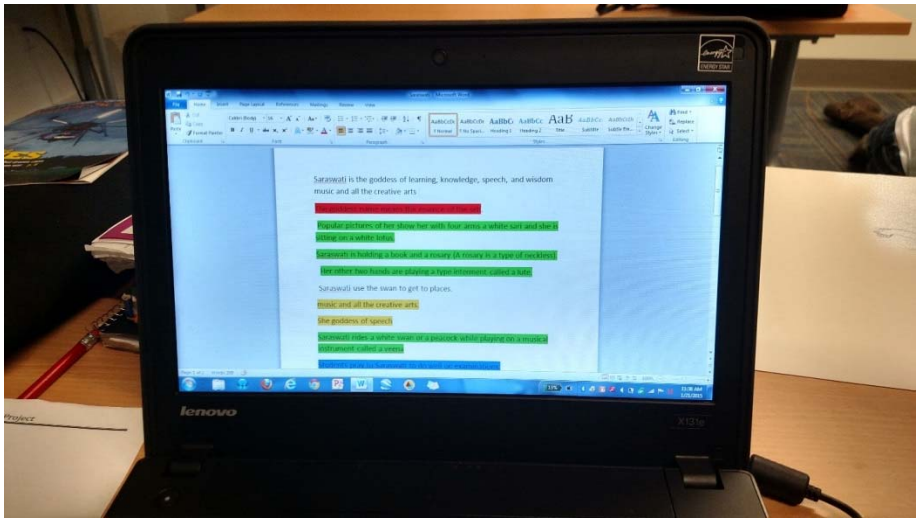


Figure 32. Microsoft Word Notes.

During two separate interviews with two different students, the topic of *Evernote* came up, unsolicited by me, as examples of how Ms. Monroe had used technology to help them become more organized and make them better learners. First Tyrone brought up how Ms. Monroe was constantly introducing them to new tools that could help them in their studies and make learning more productive.

> OK. We did this *Evernote*. Ms. Monroe introduced us to Evernote and I thought that was great because you can take notes on it and then they would save. Also, I like *Google Docs* because you can have a huge *Google Doc* and group members can record information onto it, and it's automatically saved. Everyone can add to it so you're not the only one who can see it. Everyone is able to see your progress, your work.

Then Rebecca spoke to the organizational benefits of Ms. Monroe's technology tools.

> But also she uses it while she did *Evernote*. I personally like it. A lot of people have walked in and been like "I don't have this paper." With *Evernote* you have your notes on the computer, unless it is dead. You can do it on any computer, you just have to sign on.

Ms. Monroe's use of *Evernote* and *Google Docs* to teach her students organizational skills was a planned intervention she had thought about prior to introducing those technologies and techniques to her students. On other occasions, Ms. Monroe used teachable moments that occurred naturally in her classroom to reinforce her beliefs about organizational skills and improving her students' ability to learn with technology.

One day, for example, the class I observed was delayed in starting for about 25 minutes because of a fire drill. Because her original plans for the day no longer fit the time she had left for the class, Ms. Monroe decided to talk about how she used her smartphone to stay organized. She encouraged students to take out their own smart phones as she talked. Ms. Monroe suggested several different apps that they could use to stay organized, including the Haiku app that would integrate their phone with the Haiku website and all of the calendar entries and alerts that Haiku provided. Since Ms. Monroe used an iPhone, she was able to directly help students who also owned iPhones with questions they had. For students who used other types of smart phones, she gave advice and solicited suggestions from students who owned those types of phones about what apps and techniques they used. I asked Ms. Monroe afterwards if she had planned this and her thoughts about why she felt this was the best use of the shorten time the students were in her class.

> Ms. Monroe: Yes and no. I mean, I had no idea I was going to do this today, but I've known I wanted to have a talk with them about how to better use their smartphones for school.
>
> Me: Make the connection for me, between wanting them to know how to use their smartphones better and your Social Studies class?
>
> Ms. Monroe: They spend so much time on their phones already, it made sense to me to see if I could use that to my advantage.
>
> Me: How? I think I know where you are going with this, but for the record, can you explain that for me?

> Ms. Monroe: Sure, it is really simple, or at least I think it is simple, if I can teach them how to use their phones to help with their studies, then for some of them, they will take advantage of it.

Ms. Monroe made extensive use out of Haiku as part of her classroom experience. Specifically, she mentioned to me that she envisioned Haiku, and its features like the calendar alerts and the online gradebook, as the online manifestation of her real life classroom. Ms. Monroe felt that Haiku offered an opportunity for her to model organizational skills with her students, while at the same time creating an online environment that would help facilitate learning in her classroom. Ms. Monroe also readily identified herself as a technologist, commenting on several different occasions that she enjoyed finding new apps or websites that she could integrate into her class. Ms. Monroe's use of Haiku reflected this technologist approach as she implemented and took advantage of several of the advanced features found within Haiku. When discussing content on Haiku with her students, Ms. Monroe made it a point to emphasize both the organization reasons while the information was presented the way it was along with how it could help facilitate their learning.

For example, every assignment that Ms. Monroe gave to her students during my time at Lakeside was posted on both the calendar in Haiku and it also had its own section on Haiku. By posting the assignment on the calendar her students would receive reminders from Haiku about the assignment when they logged into their personalized Haiku from their laptops. I asked Ms. Monroe why she felt the need to do this, and she

explained that “I’m not just teaching them history, I’m teaching them how to be organized, how to prioritize, and how to follow through on something.” Furthermore, Ms. Monroe ensured that Haiku was always current with what was happening in the class. As the units of study for her class changed, Ms. Monroe always kept Haiku updated with the most current and relevant information, once again using Haiku to reflect what was actually happening in her classroom. Sally, one of Ms. Monroe’s students, commented on this aspect of Ms. Monroe’s instruction, explaining that Ms. Monroe “is so easy to be prepared for. Everything you need is on Haiku and if you have a question she is really good about e-mailing you back.”

Ms. Monroe’s Haiku presence began with a homepage that gave the students an overview of the class. This homepage included a section on student evaluations, a calendar, a course description, a scope and sequence for the class that students could download as a *Microsoft Word* attachment, essential questions, a brief comment about differentiated learning, a photo gallery that she updated as the units of study changed, and other relevant information that might be appropriate at the time (see Figures 33 and 34).

From this homepage, students were able to use the navigation menu on the left to navigate to units that they were currently studying or special projects that were part of the class at that time. This navigational menu changed throughout the year as Ms. Monroe added new units and removed old ones. Additionally, Ms. Monroe would

change the special projects that were a part of the menu as these projects were completed and new ones introduced.

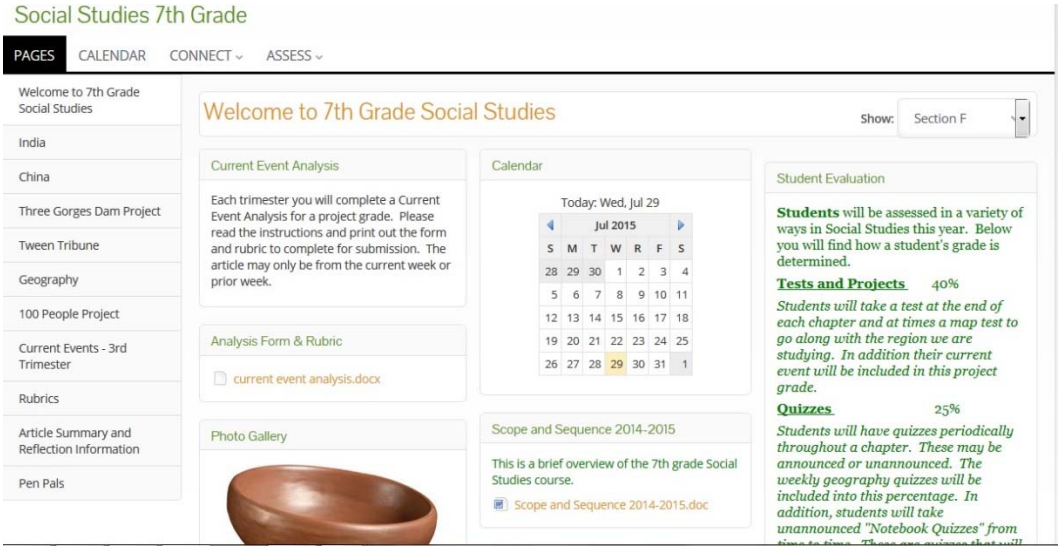


Figure 33. Ms. Monroe's Haiku Homepage #1.

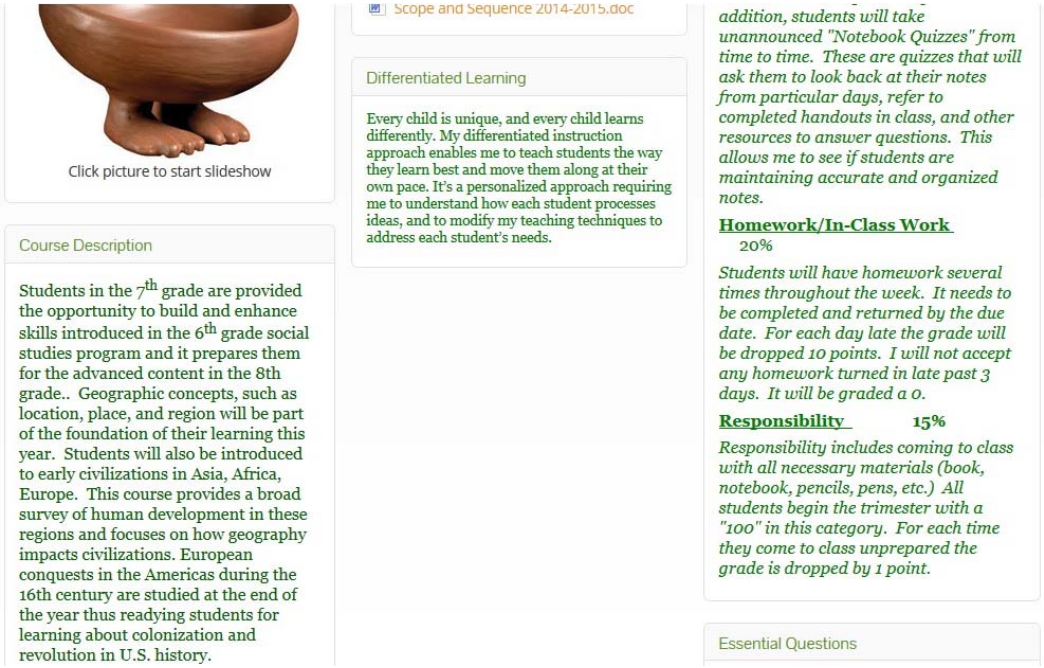


Figure 34. Ms. Monroe's Haiku Homepage #2.

Within each unit link, Ms. Monroe would start by posting a few simple items about the unit of study. Then as the unit progressed, Ms. Monroe would add more content to reflect what was happening in her classroom. By the time the unit was nearing completion and students were preparing for the unit test, the Haiku page had become a vast resource for students to use in preparing for their exam. Ms. Monroe's India page is a good example of this (see Figures 35 and 36).

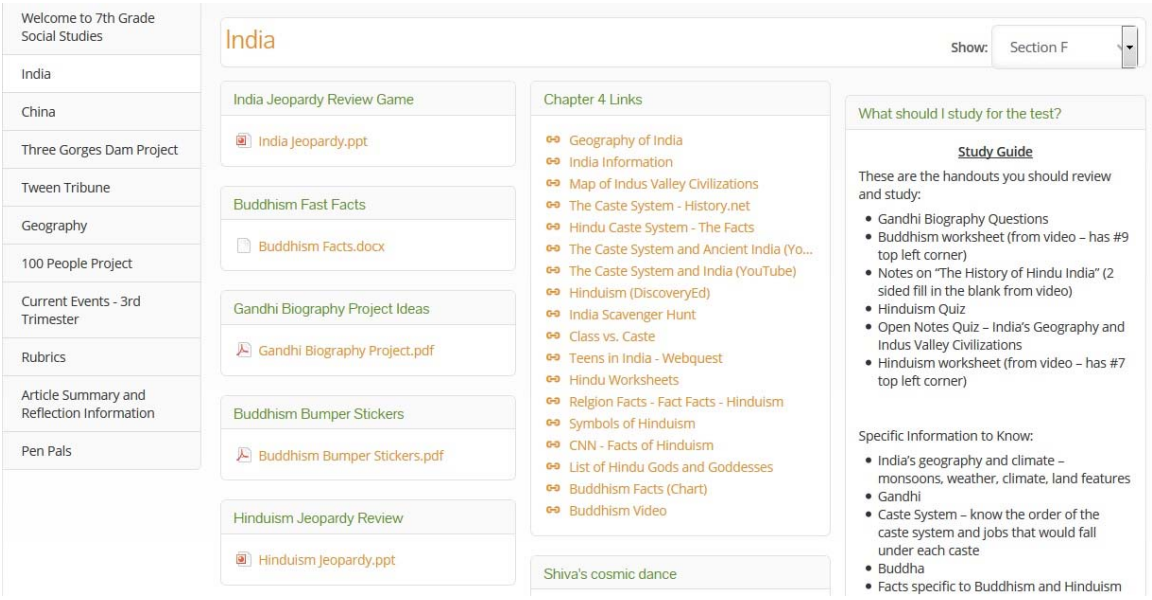


Figure 35. Ms. Monroe's India Haiku Page #1.

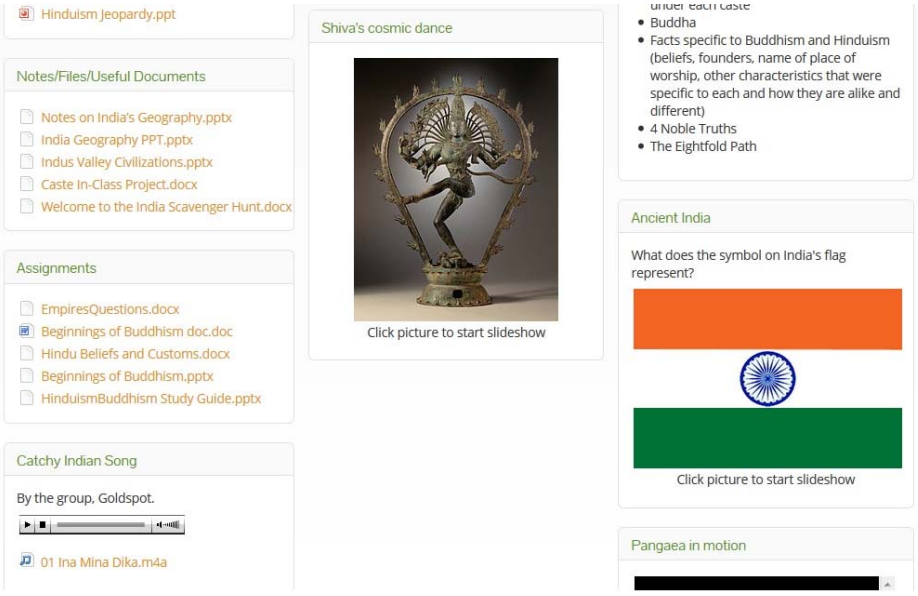


Figure 36. Ms. Monroe's India Haiku Page #2.

Ms. Monroe started this Haiku page with just the "Chapter 4 Links" section, and within that section, she only had one entry, "Geography of India." As the unit progressed, Ms. Monroe added content and ideas that came up as a result of discussions or lessons she taught in her class. For example, when she used a PowerPoint presentation in class to talk about India's geography, she added those notes to the appropriate section, "Notes/Files/Useful Documents" by the end of that school day. When one of her students played a song for her that was India related, Ms. Monroe used it as an opportunity to discuss Bollywood with the students and included the song as part of the India page. I asked Ms. Monroe why it was so important to keep Haiku updated in almost real time with what was happening in her classroom. Ms. Monroe commented that "If I don't do it right then, in that moment, then I've lost a

chance to make a meaningful reinforcement with them [students]." Ms. Monroe continued by saying that ". . . so then if I added it a week later, or a month later, I've lost the chance to make that instant impact, they will move on to the next thing."

Ms. Monroe also used Haiku to specifically address special projects or assignments that she created. On these special projects pages, Ms. Monroe would include detailed information about the project in the form of a rubric, expectations for the project, resources to help with the project, including videos and audio files, and often steps that should be taken to complete the project as a guideline for her students. For example, during her unit on China, Ms. Monroe decided to have students create a video about the Three Gorge Dam project. She chose this topic partially because the science teacher was teaching about dams at the same time and also because she felt like it was something different than what was stereotypical about China like the Great Wall. Prior to announcing this project, Ms. Monroe created a new page in Haiku called Three Gorge Dam (see Figures 37 and 38).

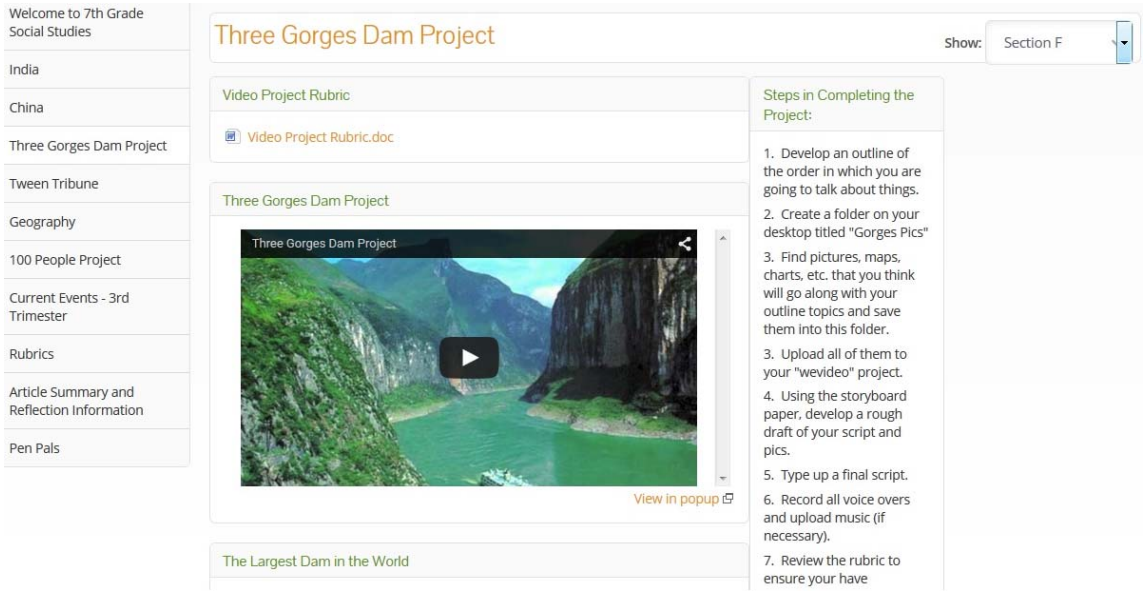


Figure 37. Three Gorges Dam Project #1.

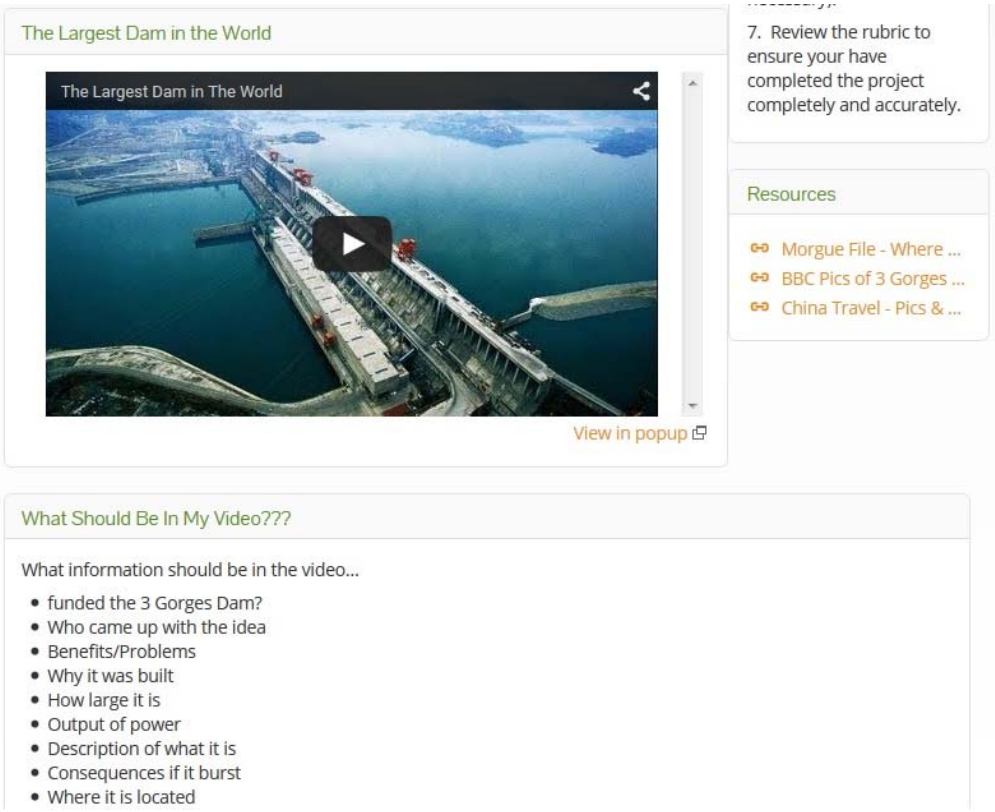


Figure 38. Three Gorges Dam Project #2.

Ms. Monroe prepopulated this page with all of the information her students would need to complete this project. On the day she announced the project, Ms. Monroe enabled the link to this new page on her Haiku website. During class, Ms. Monroe had her students follow along with her on their laptops as she introduced the project and reviewed all of the requirements with them. Ms. Monroe's students had positive feedback about how she designed these project pages in Haiku. I asked Rebecca and Brittany their thoughts about how Ms. Monroe introduced new projects along with how she used Haiku to support those projects.

Rebecca: I like it.

Me: Why?

Brittany: Because she gives a rubric and explains everything you need for the assignment.

Rebecca: and also she gives us a place to get started. That is the hardest part for me, I never know how to get started and with Ms. Monroe's stuff she always gives you a start.

Me: I think I understand what you mean, but I want it in your own words, what do you mean, "she gives you a start?"

Brittany: There is always a video or some type of download . . .

Rebecca: And she gives you suggested steps [makes air quotes], that you can follow to complete the project.

Me: Does her suggested steps limit what you can do, do you ever feel she is too controlling?

Brittany: No, it's not like that. More like a list of what you need to do to finish it.

Ms. Monroe was able to recognize several different ways in which Haiku could add value to her teaching. Beyond the previously mentioned organizational benefits for herself and her students, Ms. Monroe's use of Haiku also facilitated the learning experiences of her students. As evident from her students' comments, Ms. Monroe's use of Haiku enabled her students to better complete the assignments she designed for them. Additionally, by mirroring her classroom instruction on Haiku, Ms. Monroe created a resource of information that her students were able to call upon later in the unit to help with assignments, projects or prepare for assessments. Evidence of this desire to facilitate learning for her students came up when I asked Ms. Monroe why she gave students websites to start with rather than just having them search the Internet on their own. Ms. Monroe felt that having a centralized place to give students links to relevant Internet resources cut down on the confusion that can come from starting a search on Google's homepage. She commented that "If they start with the websites I have found for them, then they are better prepared to evaluate other websites they find on their own."

Theme #2: Using technology effectively to differentiate her instruction. A teacher's ability to differentiate instruction is often associated with evidence of effective teaching. Teachers can differentiate at least four parts of their teaching based on a student's readiness, interest, or learning profile: environment, content, process, and product (Tomlinson, 1999). During my conversations with Ms. Monroe, she repeatedly brought up this definition of differentiated instruction when talking about her classroom

practices and choices. In our conversation, Ms. Monroe began by explaining how choice was important in how she differentiated instruction.

> I think it's all about the power of choice. It's all about just giving kids choices. It might be the choice that you want them to choose, in the end, but they don't really know that.

Ms. Monroe connected this idea to the interests of her students, indicating that their ability to retain the information would be better and their motivation higher if students were given choices in how to complete an assignment.

> I know that they have a wide variety of interests. That if I give them choice, they are going to be more engaged in doing it. If I just say Christopher you're doing a poster, he is not going to complain because it's not his style, but he's not going to remember anything from it. It doesn't let him be creative. To me, it's not even that hard, you just have to gather a few things and say these are your choices. They got to be able to find something within that that hits them. They never seem to have a problem.

I asked Ms. Monroe about this process of gathering everything she needed to create a differentiated assignment. Specifically, I wanted to know how it connected to the types of knowledge found in TPACK.

> Me: That process of gathering this thing or stuff like that. Is this a pedagogical process, a content process, a technical process? All three? What is that?
>
> Ms. Monroe: I think it's pedagogical in the sense that I know I just have to do it, it's just best teaching practices. It's technology because I don't like to recreate the wheel and I don't have time to do it. It's also technology because so many apps and websites already have tools and features designed to differentiate learning. You'd be a fool not to use them. And it's content because, well, just

because it is, I'm teaching something right? There is something to be learned from the assignment.

Because I was looking for evidence of effective teaching with technology, I asked Ms. Monroe to expand upon what she meant with her description of the technological process. Ms. Monroe explained that she could use almost all technologies to differentiate for her students, that key was not the technology itself, but rather her ability as the teacher to identify how the technology could be used to differentiate.

Me: You just mentioned that there were already a lot of differentiated learning features in apps, software, website, and with tech in general. I would argue that there are teachers who would say just the opposite, that technology is very limiting or that there isn't room for differentiation. So can you speak to your own teaching, explain to me how you see differentiation in technology?

Ms. Monroe: I think it is like those creativity test out there, you know the ones that ask how many uses can you find for a box or a chair.

Me: Like the paperclip one.

Ms. Monroe: Yes exactly, well technology is the same way. Some things are obvious, like the ability to change lexile levels on a webpage to help struggling readers. You see that and you say "OK, I can use this." Other times you have to look for it and be creative with the ways in which technology can be used to help differentiate the product or content or process.

I then followed up with Ms. Monroe asking her what that looked like in practice:

Me: But how do you do that second part? What does that look like? How are you able to see technology for the possibilities it could afford in teaching, especially when thinking about differentiated instruction?

Ms. Monroe: First, I think you have to be open to seeing it. I think the biggest fear people have is they are scared of the technology. You can't see the possibilities if you are scared.

Me: Ok.

Ms. Monroe: I also think you need to take the time to learn the tool, if I don't know anything about *Google Apps*, then you won't have any idea of what is possible, you are limiting yourself. So you have to spend time with the technology, you have to be committed.

Me: Ok.

Ms. Monroe: And then, this is kind of silly, but the more you use technology in your teaching, the more it just comes to you. Like you know what to look for. You know what you should be able to do with a web app, and it just helps guide and inform your instruction.

These beliefs about the use of technology to help Ms. Monroe differentiate her instruction were evident throughout my time observing her classroom. As she mentioned in her previous comments, some of the technologies Ms. Monroe used had clearly defined ways of using it to differentiate. For example, Ms. Monroe created every one of her students a login account for the *Smithsonian Teen Tribune* website (http://tweentribune.com/), which contains current event news stories about several different subjects and is designed for K-12 students. She created an assignment for students which asked them to read a total of ten articles and complete the quiz that went along with each article. The website would send Ms. Monroe a report about how each student performed on their ten quizzes. Students were given eight weeks to complete the assignment, and in speaking to Ms. Monroe, she indicated that the main

reason she assigned it was to engage students with what is happening in the world around them. She commented to me that "They have no idea about current events, unless it a singer, an athlete, or something like that. I want them to build a habit of knowing what is going on around them." For this assignment the *Teen Tribune* website already had a clear and defined way to help with differentiation. Every article's lexile level could be modified up or down, thus increasing or decreasing the reading difficulty of the article (see Figure 39).

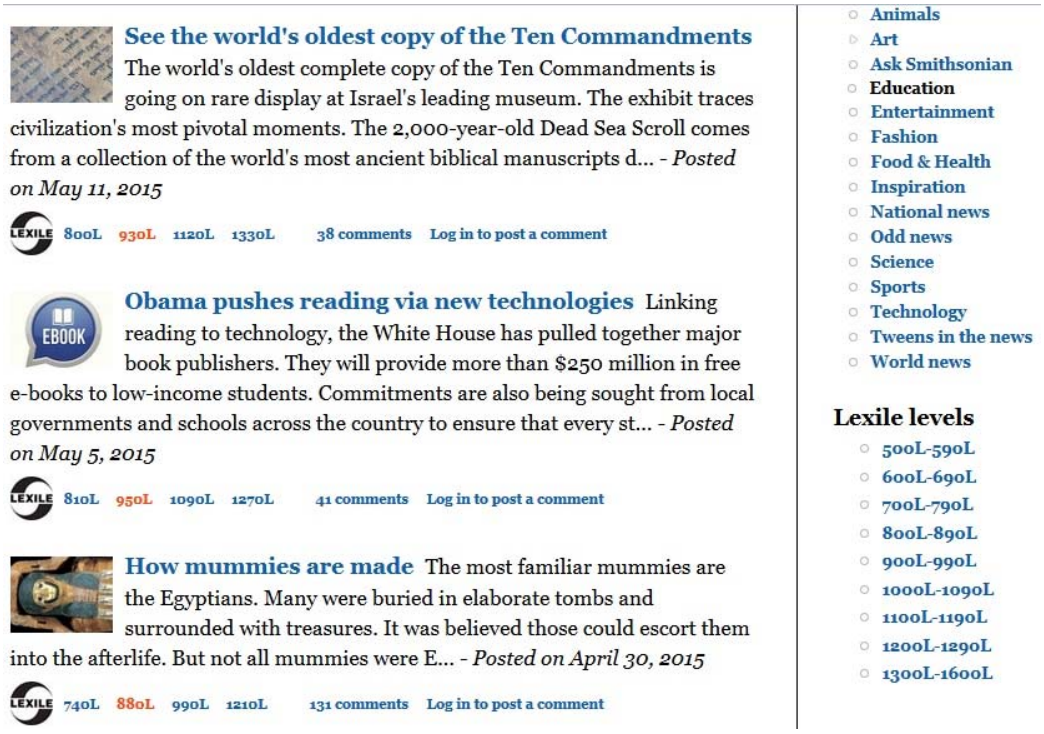


Figure 39. Teen Tribune.

Ms. Monroe, when introducing the assignment, informed students that they could modify the reading level to meet their needs. She then gave them strategies for

engaging with the article, like reading at an easier level first and then at a harder level or in reverse from harder to easier, depending on what made them most comfortable. She also demonstrated how to switch the lexile levels of the articles. I asked Ms. Monroe about her use of *Teen Tribune* and if it represented effective teaching with technology, especially as it related to differentiation.

> Me: So why Teen Tribune? What made you think about using it for your class?
>
> Ms. Monroe: I wanted something that the students could do on their own, that would be easy to manage, and engage them more with current events.
>
> Me: So how did you end up with Teen Tribune?
>
> Ms. Monroe: I just searched online until I found something I liked. To be honest, I saw this on another teacher's website. I checked it out and I thought, "Hey, this could work."

Ms. Monroe's next comments seem to capture the TPACK process she went through when thinking about the usefulness of *Teen Tribune* for her class.

> Ms. Monroe: . . . and so it fit perfectly with my goal of introducing my students to current events, I felt like I had a match for what I wanted to do with them.
>
> Me: So you had the content you wanted, how about the tech and the pedagogy to use it?
>
> Ms. Monroe: Well, I spent about an hour really using the website. It was easy and pretty intuitive. The toughest part was just creating everyone's account, not hard, but time consuming.
>
> Me: I could see that . . .

> Ms. Monroe: I knew I could teach the students what to do if I just modeled it for them in class, so that's what you saw today, we just went through the steps together as a class.
>
> Me: And the lexile levels stuff, how did that play in?
>
> Ms. Monroe: That was at the beginning, it was a factor in picking *Teen Tribune* in the first place.

On other occasions, Ms. Monroe's use of technology to differentiate her instruction was not as clear cut as the ability to modify lexile levels. Ms. Monroe often combined her belief in student choice with the differentiation of products to create differentiated projects. During my 13 weeks of observing Ms. Monroe's class, she assigned five different major projects for her students to complete as either a group (three times) or as individuals (twice). In all but one of these projects, Ms. Monroe gave her students the ability to choose the technology that best fit how they were going to complete the project. Often Ms. Monroe would write on the whiteboard acceptable suggestions for completing the project along with identifying which technologies were not suitable for the project (see Figure 40).

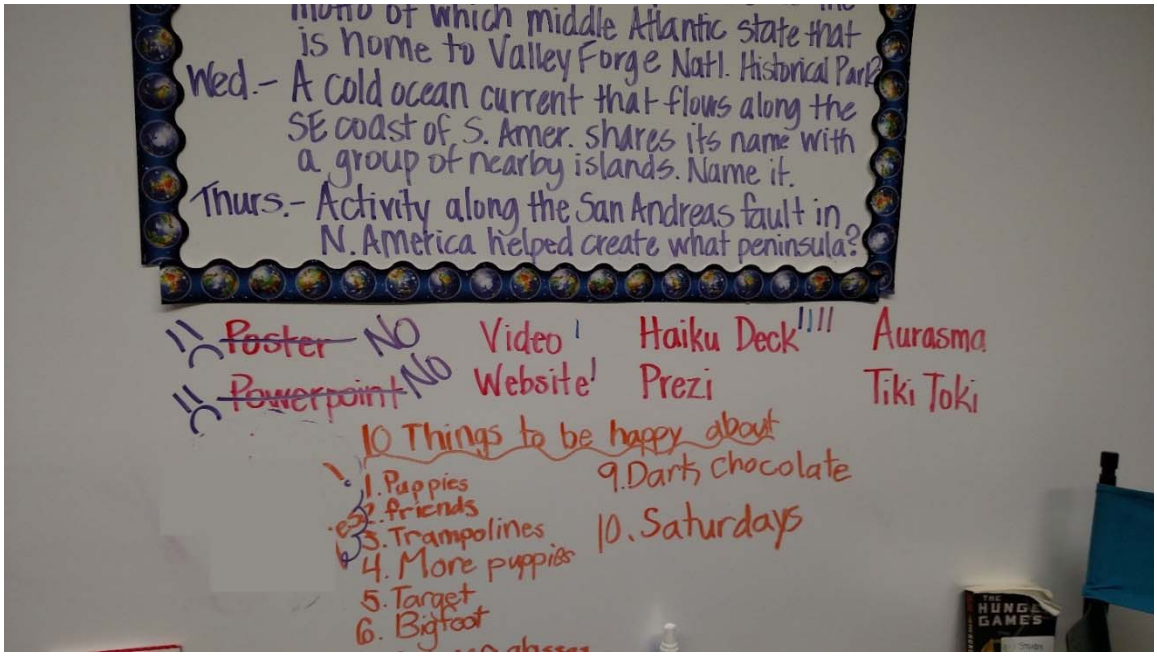


Figure 40. Student Options for Project.

Ms. Monroe also differentiated the way she introduced new topics or engaged with her students in classroom discussions. In comments she made to me one day after class, Ms. Monroe remarked that differentiation "is not just about what the students are doing. I think good teachers should be differentiating the process in which they teach. Kids get bored if it is the same thing, the same way, all the time." While Ms. Monroe didn't always use technology as a mean of differentiating her teaching methods, she did use it on several different occasions. During my observations, Ms. Monroe used videos 18 different times, audio clips/music seven different times, content specific websites (*CNN, Smithsonian, National Geographic*, etc.) 12 different times, webcams four times, and several Web 2.0 websites that allowed for interaction with her students. For example, when introducing the concept of dynasties to her students, Ms. Monroe used

the website *Padlet* (Padlet.com) to asses her students' prior knowledge and begin a discussion about Chinese dynasties (see Figure 41). Her decision to use *Padlet* is an example of Ms. Monroe using technology effectively to differentiate her own process of instruction.

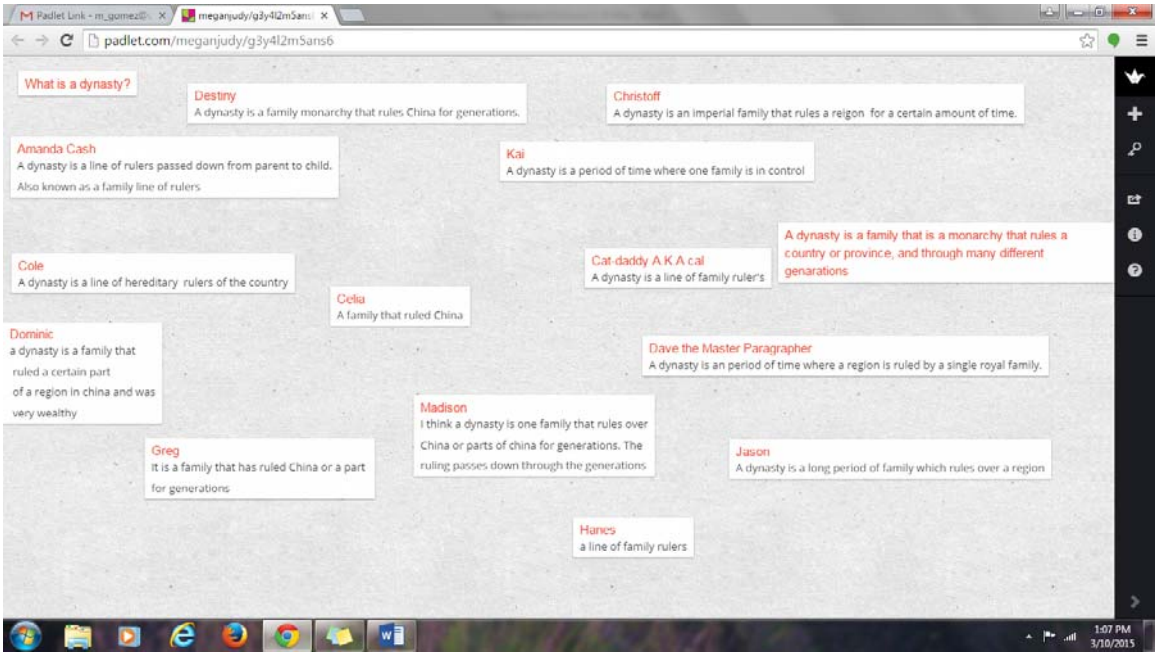


Figure 41. Padlet Chinese Dynasties.

From the students' perspective, not only did Ms. Monroe allow for them to choose which technology they wanted to use to complete four of the projects she assigned during my observations, but Ms. Monroe also cultivated a culture in her classroom that fully utilized the 1:1 environment at her school or Lakeside. In other words, Ms. Monroe was able to differentiate the learning environment by using technology's affordances to allow students freedom of movement and collaborative

grouping. During these days, students could often be found scattered across the classroom with their partners working on their laptops (see Figure 42).

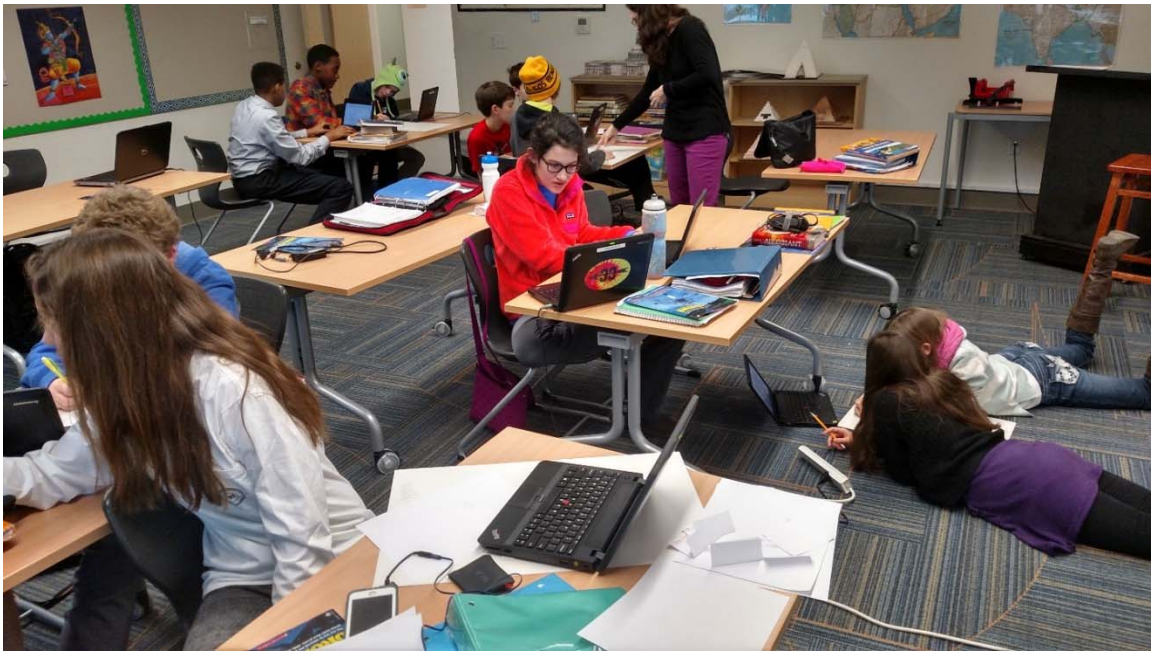


Figure 42. Ms. Monroe's Students Scattered in Class.

On their computers, students utilized both the Internet (see Figure 43), and specific applications like *Google Earth* (Figure 44), to help with their project.

Ms. Monroe made it clear that she felt like true differentiated instruction meant that "students should be learning in the means that best meets their needs." When I followed up on how technology fits in, she responded that "using technology makes it so much easier, there is so much variety, and these kids get it, some will use paper, posters, and things like that, and that's ok, but a vast majority of them embrace this type of learning, so I do too."

Figure 43. Internet Search.

Figure 44. Google Earth.

Ms. Monroe also used technology to differentiate the content that was presented to her students. For example, a few days before a unit test, Ms. Monroe would post a *Jeopardy* style PowerPoint game onto her haiku page for students to download (see Figure 45).

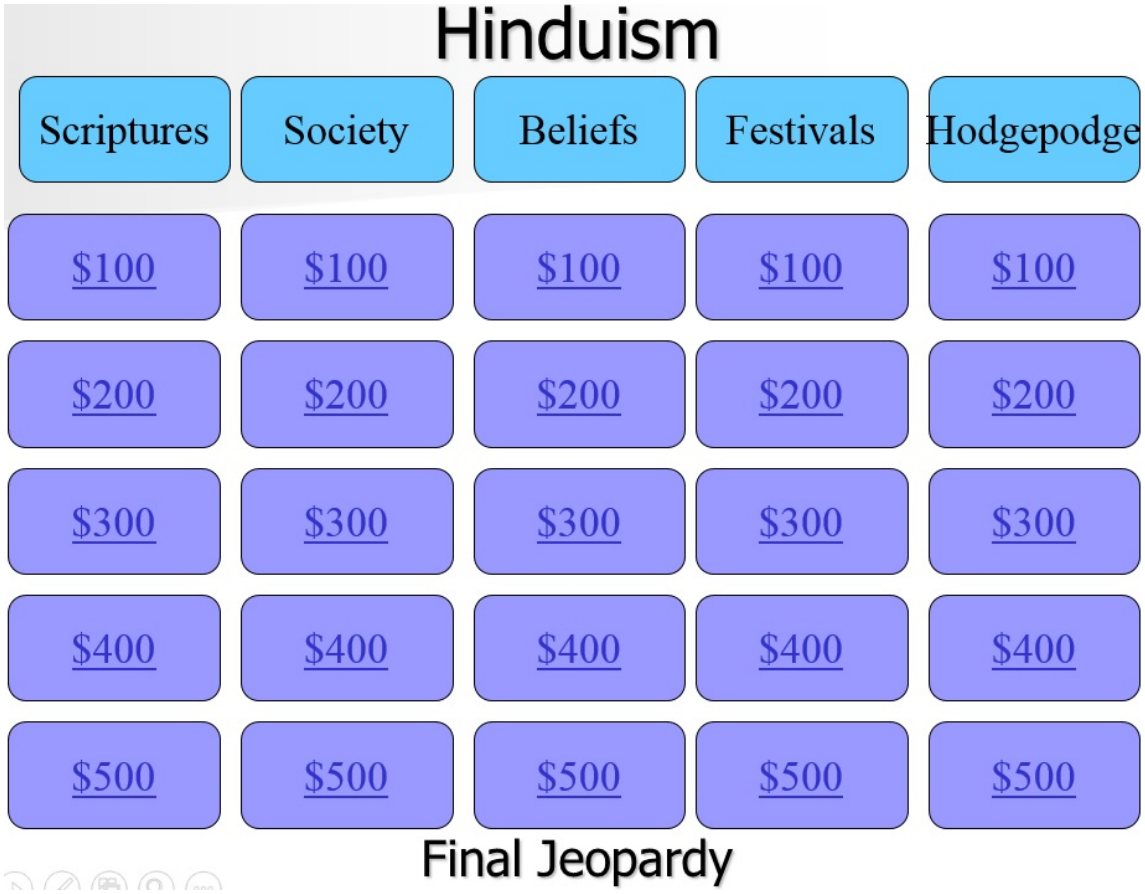


Figure 45. Jeopardy Game.

Ms. Monroe designed to *Jeopardy* review game so that as the point values got larger, the questions increased in difficulty. She made a point of explaining to the class that if they could successfully answer the questions valued from $100 to $300 then they

should expect to do moderately well on the test. If they could answer the questions worth $400, then they will be well positioned to do very well on the test. Lastly, if they could answer the questions worth $500, then they would ace the test. She explained to me that she purposefully made the questions harder as the point values increased so that her students could gauge their preparedness to take her unit exam. While the review game was clearly meant as a fun classroom activity, Ms. Monroe purposefully used the technology to differentiate the content in order to allow herself and her students the ability to formatively gauge their preparedness for the unit assessment.

Theme #3: Using technology effectively to build global connections and awareness. For Ms. Monroe, a good Social Studies education is students experiencing and interacting with the world outside of their immediate community. My conversation with Ms. Monroe illustrates her beliefs about the use of technology to make global connections. Initially she describes how technology has helped break down communication barriers and her opinion is today's students are more familiar with communicating with people who they don't know because of their technology habits.

> Me: You mentioned earlier that tech has opened up the possibilities for you as a teacher and for your students to interact with people outside of your school, can you tell me more about this.
>
> Ms. Monroe: Kids are used to talking with people from all over. Look at Twitter, Instagram, YouTube, they are texting and chatting and posting with people from around the world, not just their circle of friends.
>
> Me: So the tech has made them more globally aware?

Ms. Monroe: No, or maybe a little. What technology has done is broken down the stigma of communicating with people outside of our safe little group of friends and family that we know.

Me: Ok, so tech has made it more natural for them to communicate with people they don't know?

Ms. Monroe: Exactly.

Ms. Monroe then went on to say how technology has helped her create opportunities for her students to interact with the global community.

Ms. Monroe: . . . So then with technology, like Skype or Face Time, and especially e-mail, I can have my students talk to an author in New York or ask a question to our embassy in Japan.

Me: So you are teaching them how to use these technologies to interact with the world around them?

Ms. Monroe: Exactly, they know how to Skype and send e-mails, I don't have to worry about that. If I can create an experience for them where their e-mail or Skype makes a lasting impression on them or they learn something new from someone outside of my classroom, then I'm really teaching them a skill that is at the heart of Social Studies . . .

Me: And what is that? The skill?

Ms. Monroe: I'm teaching them to be curious, to go to the source, and showing them, in a small way that their world is much bigger than our classroom.

During my time in her classroom, I heard Ms. Monroe suggest to students to contact, through email, experts who might be able to help students with their assignments and projects 11 different times. For example, while students were working on a project on China, Ms. Monroe suggested to one group of students that they e-mail

the Chinese consulate to see if they could get some demographic data they needed for their project. The students followed her advice and ended up exchanging e-mails with a representative of the Chinese consulate. Through their discussion with the Chinese consulate the students were able to acquire all the data they initially sought, plus additional information, including images and charts to support their efforts. The students acknowledged that Ms. Monroe had helped them to use technology more efficiently. After class one day, I asked them about their experience.

Me: How did it go contacting the Chinese consulate?

Tyrone: Great.

Me: What made it great?

Tyrone: We found everything we were missing, so it helped us finish.

Kendra: And I never knew there were consulates.

Me: Anything else?

Tyrone: The power of e-mail.

Me: What do you mean?

Kendra: We were scared to e-mail at first, but really, they were very cool, and easy to talk to, or email, you know what I mean. [Laughing]

Another example of Ms. Monroe using technology to foster global connections in her students was her India Pen Pal project. Ms. Monroe used the website *ePals* (http://www.epals.com/) to make contact with a middle school teacher in India. During

winter break, Ms. Monroe and this teacher in India corresponded back and forth via both e-mail and Skype while collaborating on a project to have their respective students engage each other in dialog. When students came back from winter break, they were given the name and e-mail address of a student in India. Ms. Monroe reviewed with them the goals of the project. First students had to send an initial email to their pen pal introducing themselves and asking questions of their new pen pal. If and when their pen pal responded, students had to follow up with their pen pal. Ms. Monroe requested that she be blind carbon copied on the first two responses that her students made with their pen pals so that she could monitor the conversations taking place. She explained she was not snooping on their privacy, but rather wanted to learn from the conversations they were having since this was the first time she had ever tried an activity like this. The culminating experience for the project was a classroom to classroom Skype session that Ms. Monroe and the teacher from India coordinated together (see Figure 46).

During this Skype session, Ms. Monroe's students took turns answering questions from students in India, and vice versa. The Skype session lasted for about 42 minutes. For the vast majority of that time, both teachers stayed out of the conversation and the students were allowed to converse back and forth.

Figure 46. India Skype Session.

Because this was a new idea that Ms. Monroe had not previously used in her teaching career I was interested in understanding her thought process behind it. Our conversation describes the thinking that lead to Ms. Monroe trying the ePals project as a means of using technology to build global awareness in her students.

> Me: So start from the beginning. What were you trying to do, or accomplish, with connecting your classroom with the one from India?
>
> Ms. Monroe: You can only teach so much from books, the Internet, videos and so forth. I wanted to try and give them an authentic experience.
>
> Me: And you think that the pen pals was authentic? The skype? And I don't mean that to be critical, I just mean, you know, do you think it accomplished what you wanted to do?
>
> Ms. Monroe: Well, visiting India for a week would have been more authentic, and visiting for a month even more so. Living there for a year, would even bring

> you more experiences and understanding, but for what I can do, in my classroom, I think this does give my students something beyond what they normally experience.

Ms. Monroe's believed global awareness came from giving students many opportunities to have authentic experiences with people and institutions outside of her classroom. Having established her reasoning for doing this assignment, I asked Ms. Monroe to talk about the technology involved and how she went about utilizing and thinking about technology to create this authentic experience. Her comments about the use of e-mail describe how Ms. Monroe sees pedagogy and content connected to her technology choices.

> Me: So talk to me about the tech involved. How did you put all of this together from a technical aspect? How did those thoughts affect your pedagogical aims and content aims?
>
> Ms. Monroe: Some of this is really simple, like e-mail. My students already know how to e-mail. They know what an e-mail address is. They know how to use their laptops to send and receive e-mails, so really, all I had to do is provide them with the email address of their pen pal, and they were set.
>
> Me: So for the emailing part, you really didn't have to do much?
>
> Ms. Monroe: Not technically, but I still had to model for them how to ask good questions. I had to make sure that they were getting something out of this, especially since this was my first time doing this kind of thing.
>
> Me: So the challenge was in how do I teach using pen pals, not how do I create pen pals and let the kids e-mail each other?
>
> Ms. Monroe: Yes, that's right, and I had to make sure, or at least I tried to make sure that they were learning something too.

> Me: The content piece . . .
>
> Ms. Monroe: Nothing formal, I wasn't concerned with what they learned as much as that they were learning about their culture, their everyday life.

I asked Ms. Monroe if there were any technical challenges in doing this project. She admitted that it took a while to find a suitable classroom for exchanging emails. Ms. Monroe explained that she needed to find a classroom that fit with one of her unit of studies in her class. She also brought up logistical issues like finding a classroom that could do a Skype conversation at a time when it was suitable for both classrooms and the need to get permission from parents allowing their child to participate. In addition to that, Ms. Monroe said there were technical challenges, like learning how to use Skype and the logistics of broadcasting a Skype session from her classroom. I asked Ms. Monroe how she overcame these challenges and she responded that "you just have to dedicate the time to it. You can't do this type of thing on the fly, you have to be prepared, and then when things don't work, you just improvise." She made a link between her ability to improvise and using technology by telling me that "the more time I spend with Skype, using it, failing with it [laughs], and just poking around, the more comfortable I am and the greater flexibility I have when things go wrong, and they will eventually go wrong" [laughs]. I was able to witness this process on the day of the Skype conversation with the classroom from India. The web camera that she had initially practiced with and expected to use for the Skype session malfunctioned that morning. Ms. Monroe had a backup camera, but it lacked a stand thus making it initially

impractical to use to capture her students and send the video back to India. However, in the span of about one minute, Ms. Monroe improvised and used the backup camera along with some creative use of duct tape, to create a temporary solution to her problem (see Figure 47).

Figure 47. Webcam Workaround.

Ms. Monroe's TPACK Model

Ms. Monroe's model for her TPACK knowledge contained one very large pedagogical knowledge and one large technological knowledge circle with a much smaller content knowledge circle (see Figure 48).

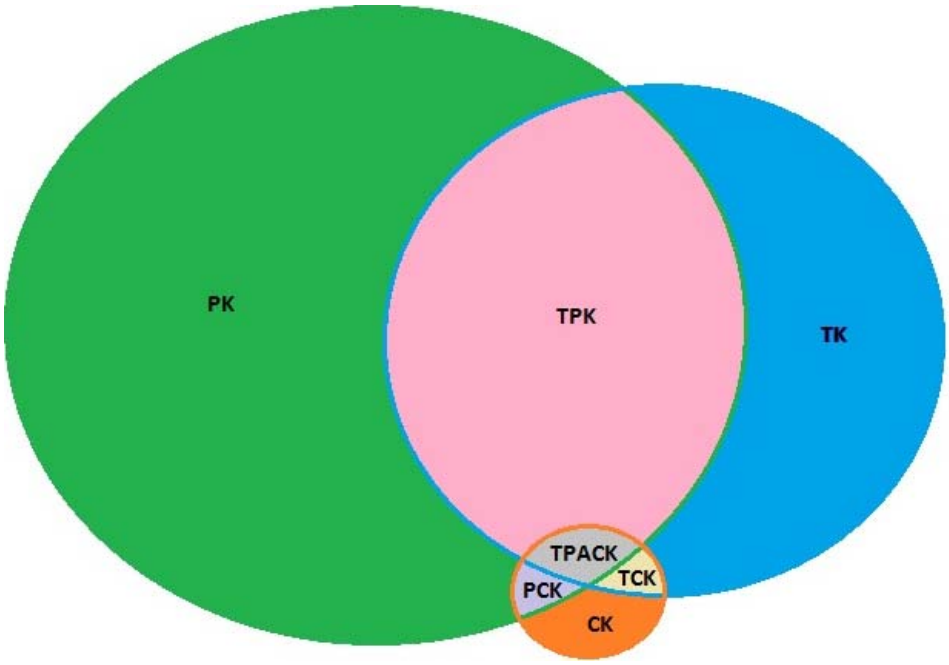


Figure 48. Ms. Monroe's version of her TPACK.

According to the way Ms. Monroe represented her TPACK model, her TPACK, content knowledge, technological content knowledge, and pedagogical content knowledge were all very small in size. I then reviewed TPACK with Ms. Monroe, specifically talking about how it was made up of different types of knowledge and that at the intersection of all the circles of knowledge effective teaching with technology occurred. I asked her to talk about her circles of knowledge.

> Ms. Monroe: I mean I would think, right now, my pedagogical and technological are probably the highest or the . . .
>
> Me: The largest circles?
>
> Ms. Monroe: Bigger, yea. Being that it's my first year teaching seventh grade social studies, I think my content is definitely the smallest. [Laughs]

Me: Ok. And if you had to say which one of these were bigger, just out of curiosity, which one would you say? Between the pedagogy and technological.

Ms. Monroe: I think I'd have to say pedagogy just because I'd been doing it even longer than the technology part of it. Not much bigger, but a little bigger.

"If they are dependent on me for the content, then I haven't taught them anything"— The Case of Mr. Hamilton

Mr. Hamilton had just announced the final project of the year. Students were to choose a topic of their choice that was related to some aspect of Social Studies. This included typical fields like history, economics, and civics, and less common fields like sociology, psychology, and anthropology. Students were free to choose any topic within those fields as they liked, although they had to get Mr. Hamilton's approval before starting. They could choose any method in which to present their research including a traditional research paper, a website, a video presentation, or any other technique that they felt appropriate to the task. Mr. Hamilton encouraged them to be creative and use technology or their hands, rather than the familiar "pen and paper." Once again, they had to secure Mr. Hamilton's approval for how they were going to present their research before beginning.

Mr. Hamilton gave the students ten minutes at the end of class to brainstorm some ideas and share them with a partner to help them get started. He walked around the room as the students began to discuss their ideas among themselves. One student, Mandy, was troubled. She complained to Mr. Hamilton that she didn't know what to choose and asked if he could pick a topic for her. Mr. Hamilton laughed it off and

suggested some outlandish ideas, to which the student laughed back and continued to lament her situation. Later, with only a few minutes left in the class, Mandy was still at a loss, and Mr. Hamilton stopped by her desk again to check in with her. He suggested to Mandy that maybe she should start by figuring out what she would enjoy making to present her research, and that might in turn help her decide on a topic that fit that medium. Mandy agreed that she would think about it that way as class ended. I asked Mr. Hamilton afterwards, if he felt like the open ended parameters of the assignment limited students like Mandy, who were used to being told what to do and how to do it. While he acknowledged that you have to be careful with students, he felt that it was important for them to learn to be independent thinkers. I asked him how this assignment accomplished that. He responded by saying that this assignment helped his students practice acquiring information on their own, processing it for themselves, and then preparing it for an outside audience. He said these were the essential skills that made for a good historian. I remarked back asking if the content they picked was irrelevant then. Mr. Hamilton indicated that it was, summing up his belief about teaching by saying "if they are dependent on me for the content, then I haven't taught them anything" (Classroom Observation, March 3rd, 2015).

Mr. Hamilton's Beliefs about Technology's Role in the Classroom

Beliefs about teaching and education. Mr. Hamilton's believed that teaching, when expertly done, instills a sense of excitement and involvement in students about what was transpiring within the classroom. For example, he described his former

middle school Social Studies teacher as an example of an expert teacher. He explained that she "was an actress, she acted history." When I asked how this made her an expert teacher, he explained that "you wanted to be in her class, you wanted to know what was going to happen in her class, there was excitement, it was interesting, you were involved."

Mr. Hamilton also believed that the teacher could never be the sole source of knowledge in a classroom. He dismisses the idea that anyone, especially in Social Studies, can know everything about the content. In particular, Mr. Hamilton challenged the notion that he, as the teacher, was responsible for providing all the information to his students. Mr. Hamilton believed this was "the big thing, especially for a history teacher, you're supposed to know everything. You can't. The minute as a historian you think you know it all, and you go, 'I know it all about this;' you might as well say, 'Actually, I don't know it all about that.'" Mr. Hamilton acknowledged the difficulties that some teachers have admitting that to their students. He explained that "It's hard to do when you're a new teacher, because you're so afraid of not being the information giver." He offered that acknowledging to students that you don't have all the answers and positioning them to be responsible for seeking out "the truth about history" allows the students to practice thinking like an historian.

Beliefs about technology's role in education. Mr. Hamilton believed that technology, when used appropriately, was one of several tools at his disposal as a teacher. While he did agree that oftentimes technology afforded teachers a variety of

options in their teaching practices, he did not see it as an essential component in becoming an expert teacher. He commented on how there are "these schools that are semester long high schools where you go up there, and you're camping in the mountains for three weeks, and they are teaching you AP US history, they have nothing. But yet, a really great teacher can still do that." Mr. Hamilton believed that in order to successfully teach in that way "you have to have a lot more content on the side to bring in. You have to have a lot more of an artistic flare to make it happen, because you don't have the pretty bubbles [Technology]."

Mr. Hamilton did believe that technology offered an opportunity for teachers to position students as leaders and authorities within the classroom. He explained that when a teacher has a student "take the lead with a piece of technology," the student becomes the expert, and then can share that knowledge with other students and even himself. Mr. Hamilton believed that when students have an opportunity to teach others they were learning at the "highest levels possible." Mr. Hamilton felt that using technology in his classroom provided him with an opportunity to give his students these types of experiences. He commented that he had witnessed several occasions where students were able to teach other students the concepts and ideas they were studying through their use of technology, some of which Mr. Hamilton was completely unfamiliar. Mr. Hamilton felt that technology was uniquely positioned to enable this type of student-lead learning.

Despite all of the pedagogical benefits that Mr. Hamilton believed technology afforded educators, he mentioned that technology could also serve "as an anchor" around education and learning. Specifically, Mr. Hamilton mentioned that teachers often get married to one or two pieces of technology. He claimed this was causing those teachers to not evolve with the changing nature of technology. Because of this, he suggested that it leads to teachers focusing too much on the ins and outs of that particular technology, and the learning suffers because of it. Mr. Hamilton admitted "there's no technology that I'm going to teach anybody that will still probably even be used in seven years." As an alternative, Mr. Hamilton suggested that teachers learn how to adapt technology and consistently repeat a pattern of "try, experiment, fail, learn, and find ones that you're good at." To prove his point, Mr. Hamilton asked rhetorically, "beyond *PowerPoint* and *Word*, what program have we used as a regular consumer of technology for a long time? By long time I mean more than five or seven years."

This need for teachers to adapt their technology habits in order to support education led Mr. Hamilton to claim that to use technology with education, you had to have a type of "digital literacy." Mr. Hamilton noted that some software, like "variations of *Word* and spreadsheets and *Excel*" were "not even considered technology anymore" but rather "the basic, 'Can you survive in an academic environment?'" In commenting about this new digital literacy, Mr. Hamilton did believe it was "a form of literacy. So for teachers, their ability to use *Word*, shouldn't be viewed as some special

tech skill they have, but rather nothing more special than their ability to read, write, and communicate with others."

Beliefs about what effective teaching with technology looks like in practice. Mr. Hamilton mentioned two characteristics, willingness to try and integration of the technology into their curriculum, as evidence of what he would see when witnessing effective teaching with technology. Mr. Hamilton explained that this willingness to try was "not a matter of fear of it" but rather that you are making a commitment to using technology as part of your instructional practices. Mr. Hamilton noted that he believed if "the kids see you fail. That's fine." He believed that reflecting afterwards on what had happened was essential in mastering the use of any pedagogical tool, which in his opinion he felt technology was.

Mr. Hamilton also strongly believed that effective teaching with technology meant that you had fully integrated technology into the "practices and habits you have as a teacher." Mr. Hamilton believed that one and done approaches to using technology within the classroom did not represent effective teaching with technology. Rather, Mr. Hamilton argued that technology needed to transform into a seamless part of your instruction, in order to demonstrate effective teaching with technology. He explained that "you can't do 'today's technology day.' It's always Thursday. Thursday is technology day. That does not make any sense. It has to be hidden almost, where it's something you do rather than, 'And here's my technology component.'"

Mr. Hamilton believed that effective teaching with technology was a teachable skill you could develop in teachers, commenting on the fact that it wasn't so much a technological skill they needed to learn, but a sense of self efficacy about their ability to teach with technology. He explained that first "you can give people tools that make it easier and then you get teachers to understand that technology isn't any different than anything else you use in your teaching, you just have to try it out. It's less about the technology and more about your belief that it can help you in your teaching."

Mr. Hamilton believed that effective teaching with technology meant that a teacher knows how to adapt technology into their lessons rather than their ability to use a piece of technology well. He felt that because technology changed so fast, knowing a particular piece of software was useful only for a limited amount of time. However, Mr. Hamilton explained that if

> you think about anything we teach them and a couple programs that some of the students use this year I've never heard of. I was, 'That's cool. Show me how that works. Neat.' You made a cartoon, a digital cartoon, moving pictures and it'll be obsolete in four years because the next one will be almost movie grade.

Mr. Hamilton explained that not knowing this software was "ok, because I was able to take what they brought me and adapt it into what I was trying to impart on them. It's didn't matter that I didn't know the program, they did, and I knew how it could fit in." This ability of knowing how to "fit in" technology was a key component to effective teaching with technology for Mr. Hamilton.

Reflection on his own technology teaching practices. I concluded my conversation with Mr. Hamilton by asking him to reflect on his own practices. I asked him to identify what he does in his own teaching that he believes makes him effective with technology. I asked him to give me both personality traits and actual techniques he uses. Mr. Hamilton listed the following personality traits as essential to his success with technology in the classroom:

- Patience
- Tech Geek, which he described as being interested in technology and new applications/software
- Practice . . . Lots of it
- Willingness to try, even if it meant failing

Mr. Hamilton also commented on several techniques he used when teaching with technology. First, he mentioned giving students a choice in the types of technology they use to complete the assignments you give them. He argued that by giving students choice, you are engaging their interest, and thus fear of the technology among students seemed to dissipate. Secondly, Mr. Hamilton mentioned that he always practiced with the technology before using it himself in his class. For example, he referred back to the wireless mouse he used while teaching to control his laptop. Mr. Hamilton commented that if he had tried to learn how to use the wireless mouse while teaching his students, it would have been more of a distraction, and would have severely hampered the students' ability to learn. He made it a point to reiterate to me, that technology should

"be just another tool we use to teach." In Mr. Hamilton's final reason for why he thought he was successful with technology, he alluded to the type of knowledge found at the intersection of all the knowledge that make up TPACK. He expressed to me that he thought he was successful with technology because "it always has a purpose, it's there to enhance the content the students are learning, and it's there to help me teach it to them better. It's never there because I say to myself, 'I could use some technology here.'"

Examples of TPACK Operationalized

Theme #1: Using technology effectively to improve the students' experiences with content. During my time observing Mr. Hamilton's class, it became apparent that he had a vast amount of content knowledge at his disposal. He was able to not only recite factual details about history, but also articulate nuanced positions about historical events through a variety of historical perspectives. One of the ways Mr. Hamilton demonstrated effective teaching practices was by consistently using technology in his classroom to complement and enhance the content he was presenting to his students. Perhaps the single most significant example of this can be found in his use of Haiku for his class. Almost everything Mr. Hamilton did in his classroom was captured and augmented on Haiku. Mr. Hamilton expressed to me that Haiku gave him a chance to incorporate videos, audio, and links to other resources, that in turn could give his students a more authentic and critical thinking experience in his class.

Mr. Hamilton noted that he liked to use Haiku to keep himself and his students organized. On every webpage, Mr. Hamilton provided a menu on the left that his students could use to navigate to the different sections of his Haiku website. This included a course overview webpage, three separate webpages dedicated to resources relevant to US history, economics, and US government, a webpage dedicated to the textbook used for the class, a webpage for "coffee talks" about current events, and a webpage for that contained subpages with more information related to assignments and topics covered in that trimester (see Figure 49).

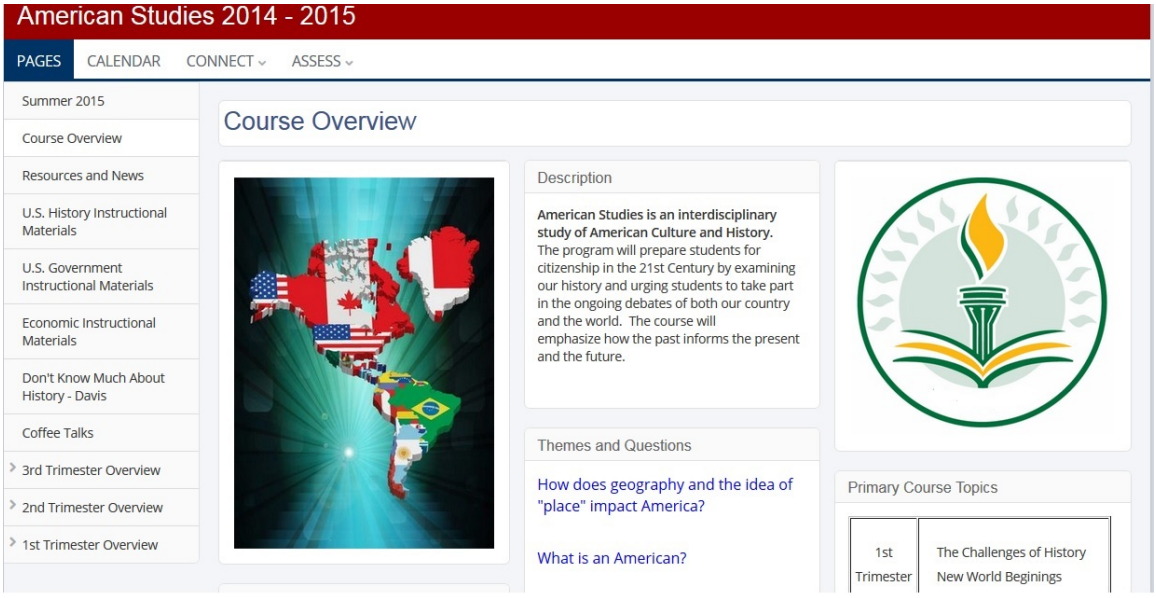


Figure 49. Mr. Hamilton's Haiku Course Overview Page #1.

On serval occasions Mr. Hamilton's students commented to me about how helpful Haiku was and how easy it was to navigate to find what they needed. My conversation with Debbie reflected this opinion.

Me: So why do you think Mr. Hamilton's Haiku is so much better than your other teachers' Haiku?

Debbie: Because I know where to find things in Mr. Hamilton's class. Some teachers never put things in the same place on their Haiku pages, Mr. Hamilton always does, and even if he didn't, you would just know where to look anyways.

Me: Why is that? How would you know?

Debbie: Because it makes sense. If it is something directly related to what is happening in class, then I just go to the current page we are on, but if he says something like, "You can go online to Haiku to see more about this," then I know he has added it to one of his resource pages he made for us.

Mr. Hamilton's course overview page included things typically found on such a page, like methods of assessment, themes and questions, primary course topics, and the ability to download *Microsoft Word* documents detailing the course overview and notes about the course (see Figure 50).

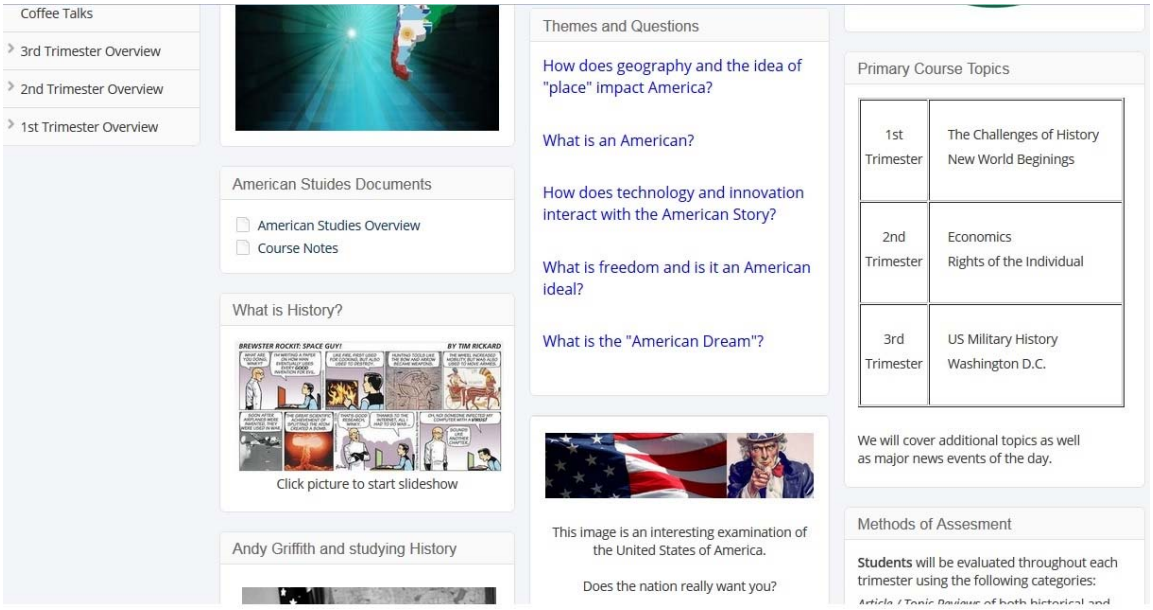


Figure 50. Mr. Hamilton's Haiku Course Overview Page #2.

However, other items on the course overview speak to Mr. Hamilton's desire to make his course inquiry-based to enhance his students' experiences with the content. Mr. Hamilton told me that he believed history was filled with narratives; some were false while others were competing versions of the truth. He felt that it was important to teach his students how to think about history with an eye towards critically interpreting what had happened within the context of that time period. Mr. Hamilton also felt strongly that the best way to open up students' eyes to the need to think of history in critical terms was to challenge their conventional wisdom using pop culture references, audio, video, and technology. An example of this can be seen in Mr. Hamilton's use of three different videos on his course overview page that are not about his course, but rather about what it means to study history (see Figures 51 and 52).

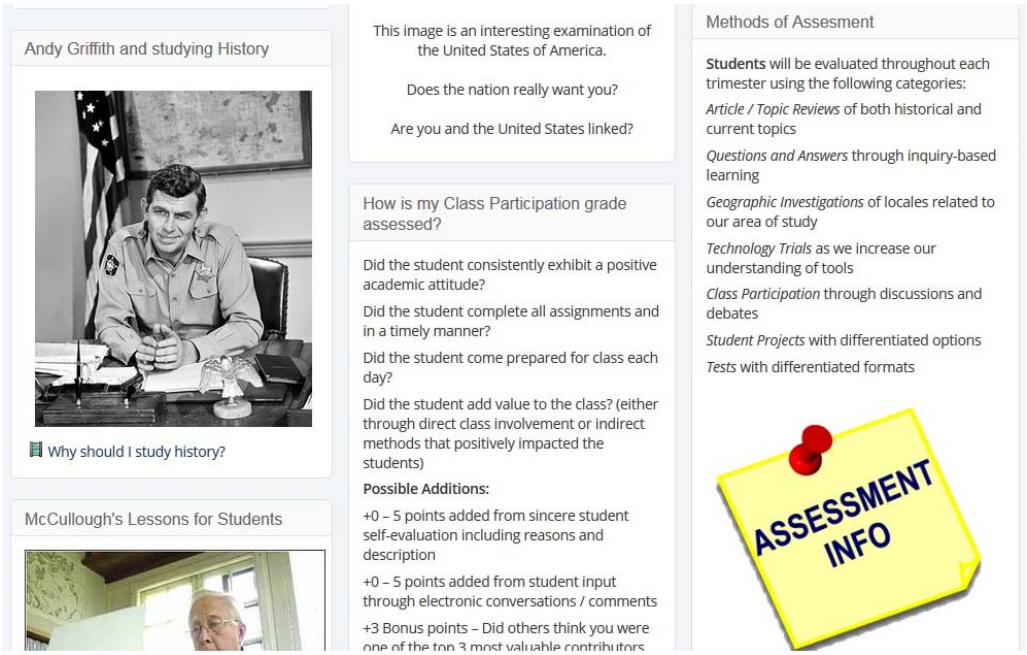


Figure 51. Meaning of History Videos #1.

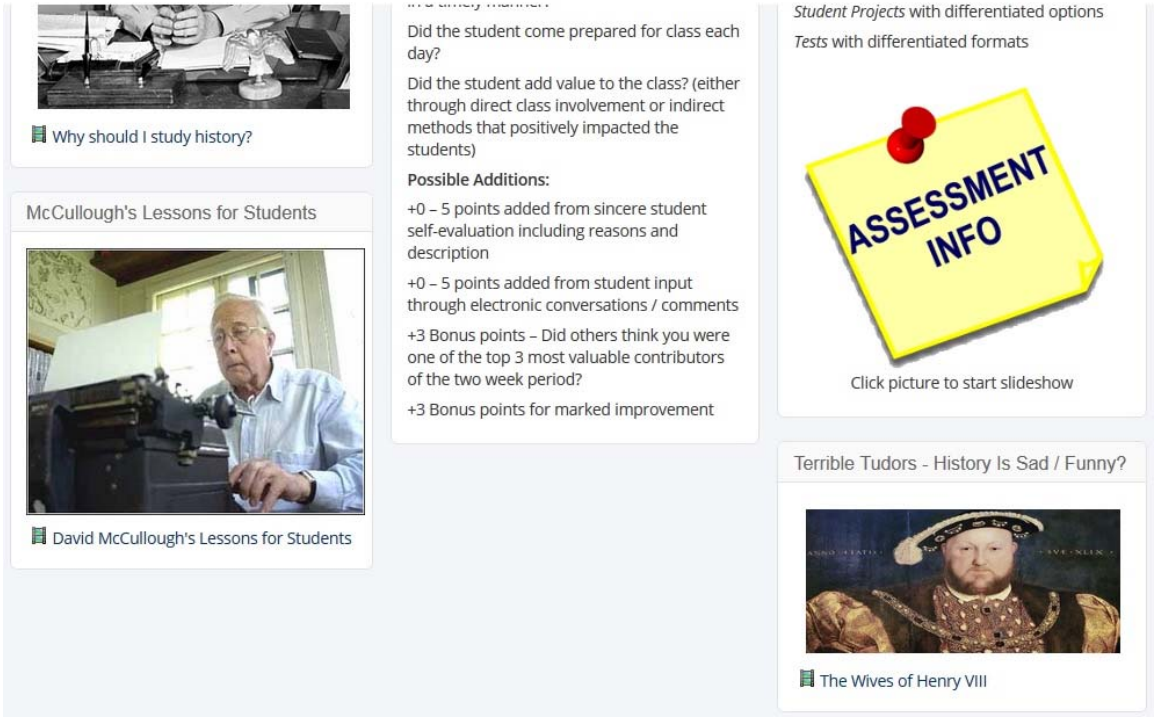


Figure 52. Meaning of History Videos #2.

Each of the resource pages Mr. Hamilton created follows this same pattern. During a conversation we had while looking through his Haiku website, Mr. Hamilton explained to me that there were three reasons why he created the resource pages:

> Me: So why did you include these three resource pages? What was your thinking behind them?
>
> Mr. Hamilton: I think they serve as a launching pad for students. A place they can get information quickly, without having to sift through the Internet.
>
> Me: Ok.
>
> Mr. Hamilton: I also wanted to make it interesting, appeal to different learners and learning styles. I didn't want just a bunch of text on a page, but a true resource page, where information was presented in a variety of formats.

> Me: Ok, so that would kind of be the second way, what else, the third?
>
> Mr. Hamilton: These pages allow me flexibility on how I teach my class. If a student finds an interesting link, I can add it to the page, or if they ask about a topic, I can go find some videos about it or maybe a song, and add it to the page.

An example of Mr. Hamilton's beliefs about these resource pages can be seen by looking more closely at one of these pages. For example, on the resource page dedicated to the topic of U.S. government, Mr. Hamilton explains the purpose of the page by writing "this page hosts a combination of videos and interactive learning pages from a number of different sources. Please use these materials to further your understanding of our government." On this page Mr. Hamilton provided his students with helpful websites links, notes and important data in Microsoft Word format, YouTube and other video links, links to audio resources, links to videos and websites that offer online classes, and a link to *iCivics* (https://www.icivics.org/), a website that has educational games dealing with U.S. government (see Figures 53, 54, and 55).

Mr. Hamilton dedicated one page of Haiku to the course textbook *Don't Know Much About History* by Kenneth C. Davis. On this page Mr. Hamilton provided the audio recordings of the book along with a brief biography of the author, a link to the website for the book, and notes that were designed to go along with the audio recordings, including an example of how to take notes (see Figures 56 and 57).

Figure 53. U.S. Government Haiku Page #1.

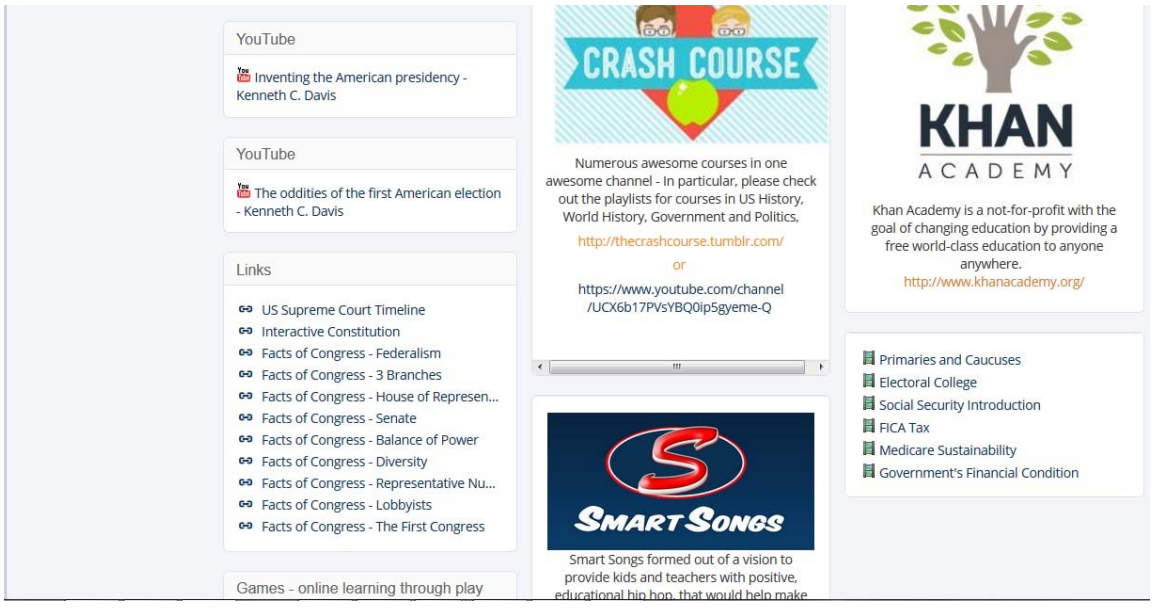


Figure 54. U.S. Government Haiku Page #2.

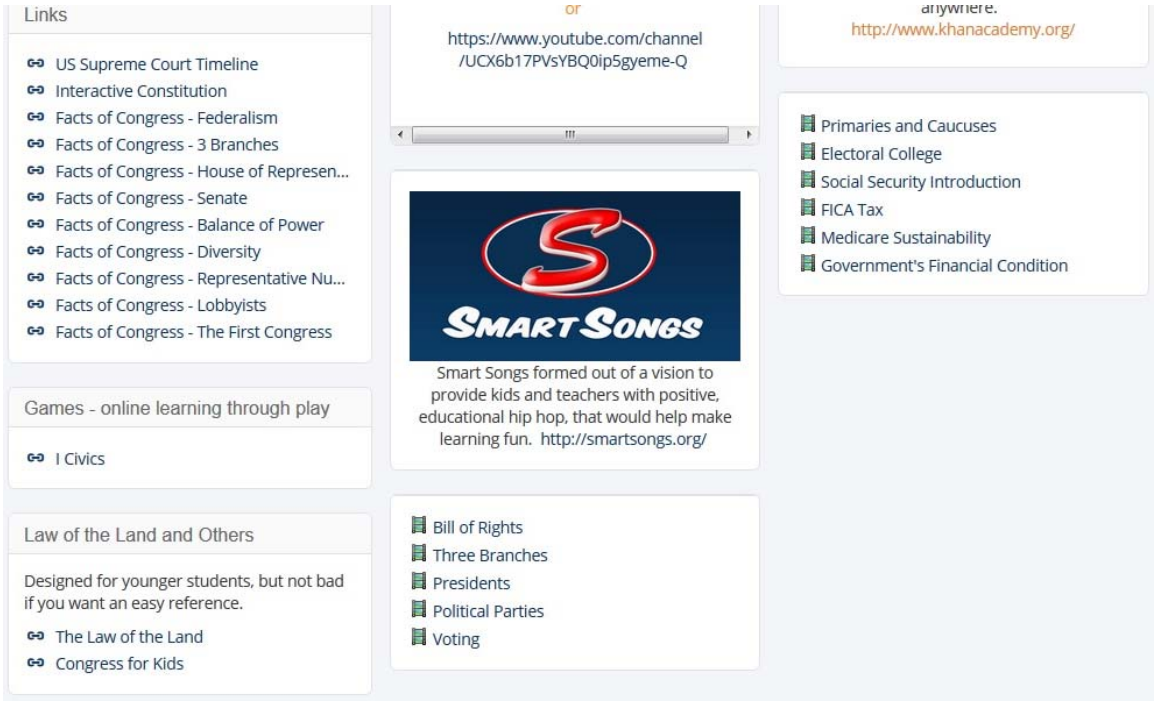


Figure 55. U.S. Government Haiku Page #3.

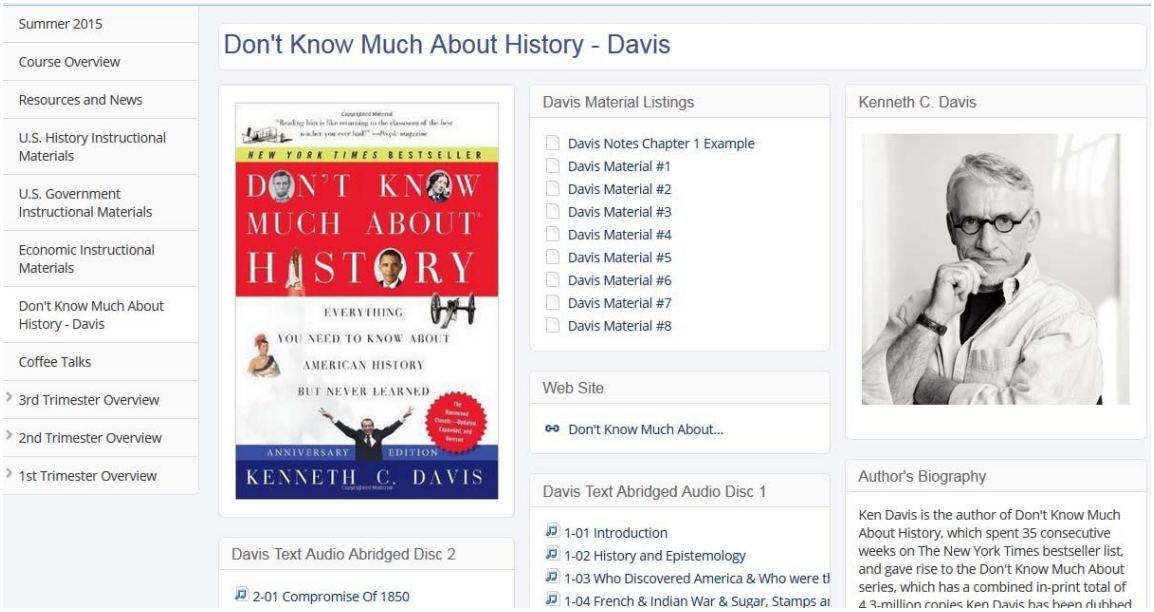


Figure 56. Textbook Page #1.

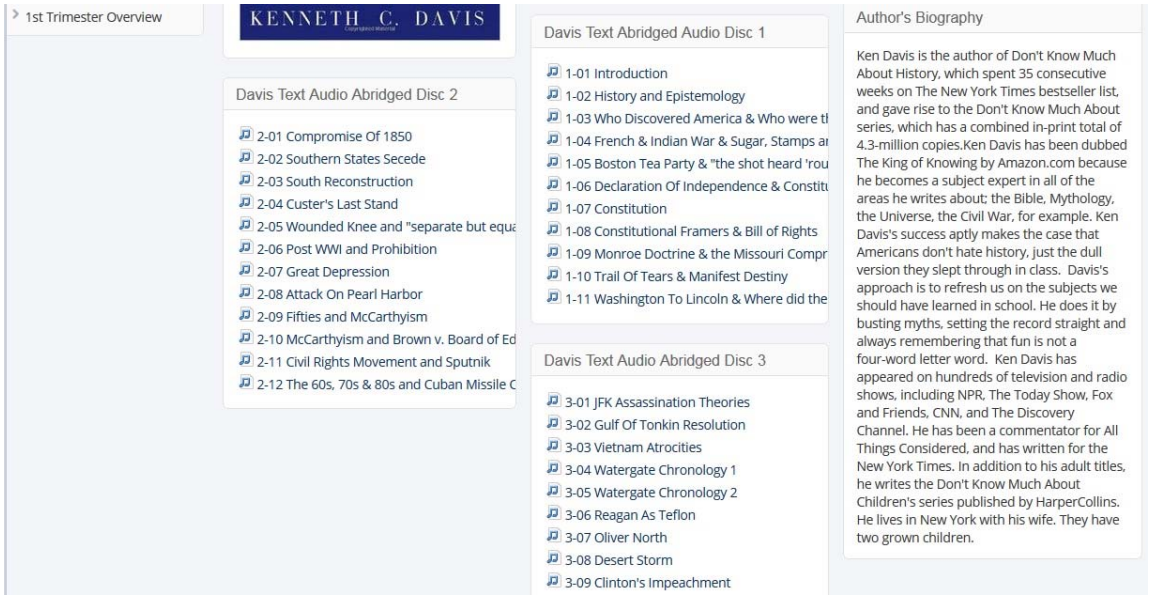


Figure 57. Textbook Page #2.

In discussing this page, Mr. Hamilton commented on how audio recordings allowed those students who were either poor readers or had difficulty reading for understanding another means by which to learn the content. He also liked how this book reinforced his own beliefs about developing critical thinking skills in his students while allowing them to be exposed to historical counter narratives.

Mr. Hamilton used his Coffee Talk page on Haiku as the central repository for an ongoing assignment throughout the year. For this assignment, students were given five or six topics at the beginning of the semester. As partners, students were supposed to prepare and learn about each of the topics and then schedule a time to meet with Mr. Hamilton during which they would have a 20-minute discussion about a few of the topics. Mr. Hamilton explained to me that this assignment was as much about the students learning about current events as it was about allowing for students to have the

opportunity to engage orally in historical discussion. Mr. Hamilton believed that Social Studies teachers should model civic practices, including the art of meaningful and respectful discussions about Social Studies issues. On the Coffee Talk page, students could download copies of the different topics for each semester's Coffee Talk (Mr. Hamilton added these as the year went on). Students could also find suggestions for how to prepare for a Coffee Talk and examples of previous Coffee Talks in the form of playable videos (see Figures 58 and 59).

Finally, Mr. Hamilton created three pages within Haiku, one for each trimester of the school year. Mr. Hamilton only displayed the appropriate trimester page for that period of the school year, hiding the other two as the year went on. Mr. Hamilton used the main trimester page to recap what had happened that trimester in his classroom. This recap was intended for the families of his students so that they could stay up to date with what their student had been doing in his class. Mr. Hamilton explained that this was an easy way of keeping those parents who wanted to be involved "in the loop about my class." Each trimester page contained at least one and up to five subpages related to the material Mr. Hamilton planned on covering that trimester. For example, Mr. Hamilton's second trimester page has five subpages (see Figure 60), each focusing on a different topic for that trimester.

Figure 58. Coffee Talk Page #1.

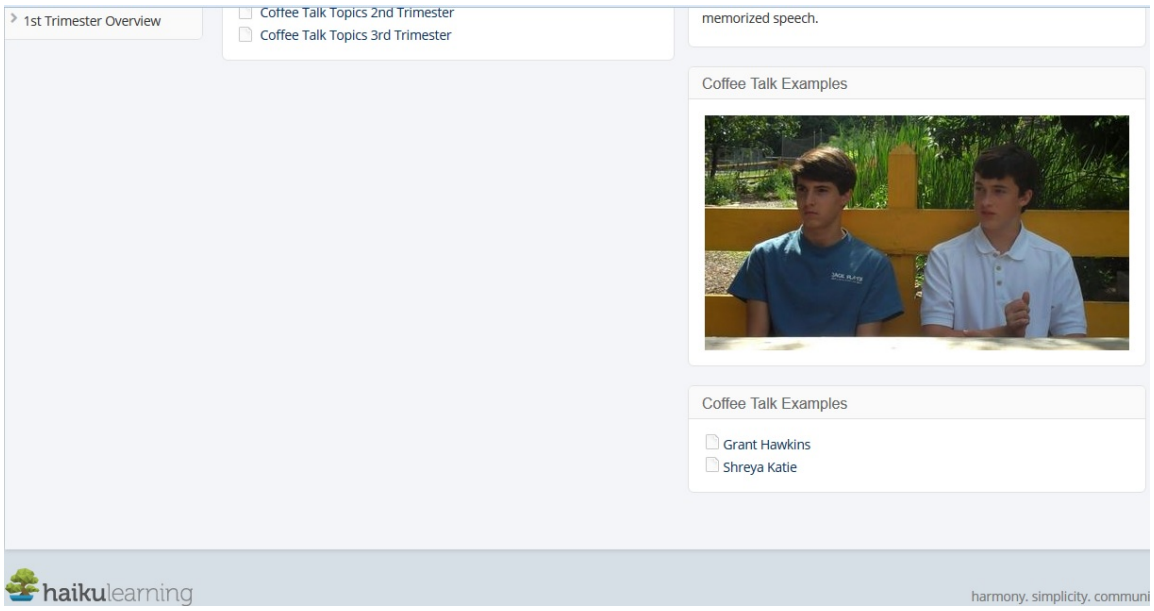


Figure 59. Coffee Talk Page #2.

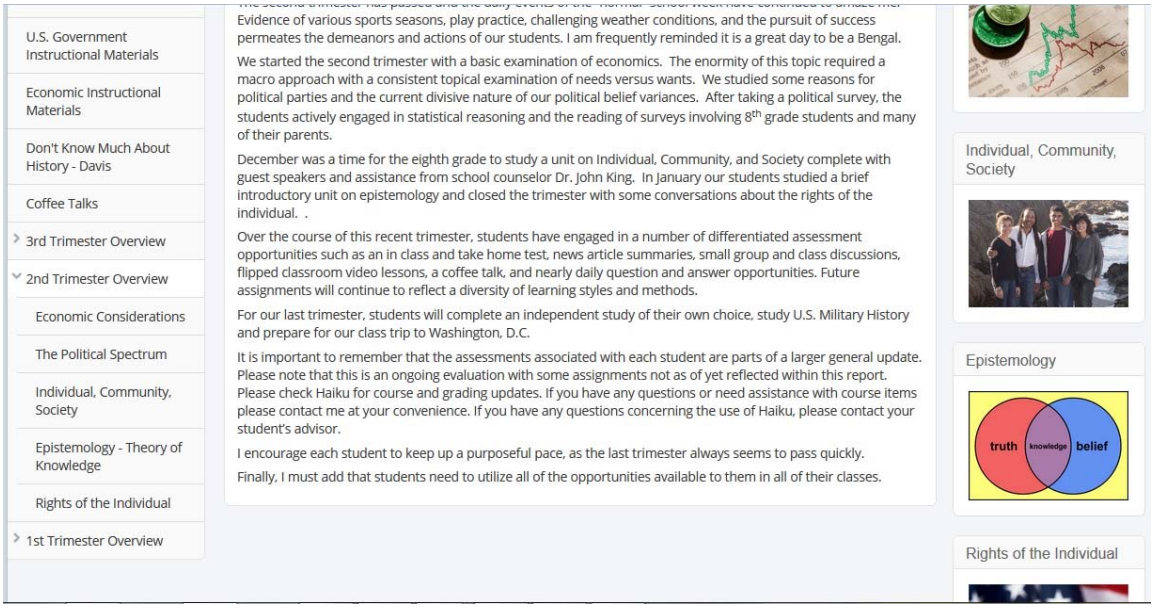


Figure 60. Second Trimester Page.

In each of these subpages, Mr. Hamilton once again followed the pattern of using videos, audio files, images, links to websites, pop culture, and other downloadable content to provide his students with an online companion to what he was teaching in his own class. A good example of this can be seen by examining Mr. Hamilton's subpage for the third trimester, a page entitled US military history. On this subpage, Mr. Hamilton provided the following resources for his students to complement his unit on US military history:

- Sixty-one different video clips
- Twenty-one pdf documents form the magazine Upfront
- Sixty-seven pictures organized into a slideshow
- Twelve songs related to the U.S. military history

- Three links to other websites about US military history
- A link to an audio blog about US military history
- Four downloadable Microsoft Word documents related to the notes the students were expected to complete as part of the unit of study.

Mr. Hamilton organized the page so that the content was presented in roughly the same order in which he reviewed it in class. In the end, despite the sheer amount of information that Mr. Hamilton provided his students, the page appeared will organized and easy to navigate (see Figures 61, 62, 63, and 64).

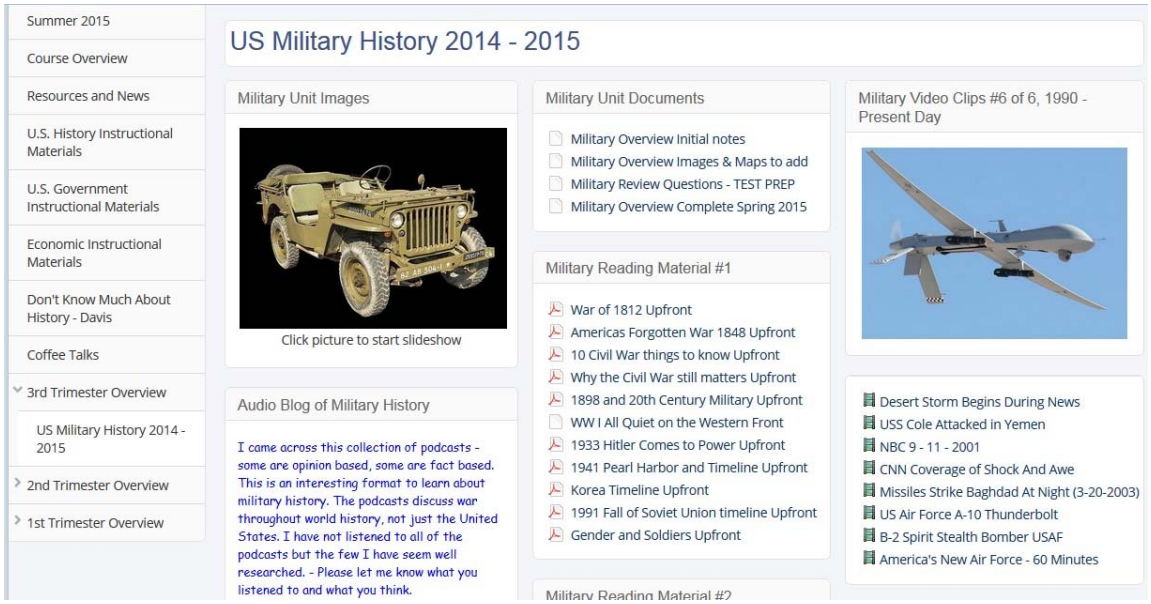


Figure 61. U.S. Military History Page #1.

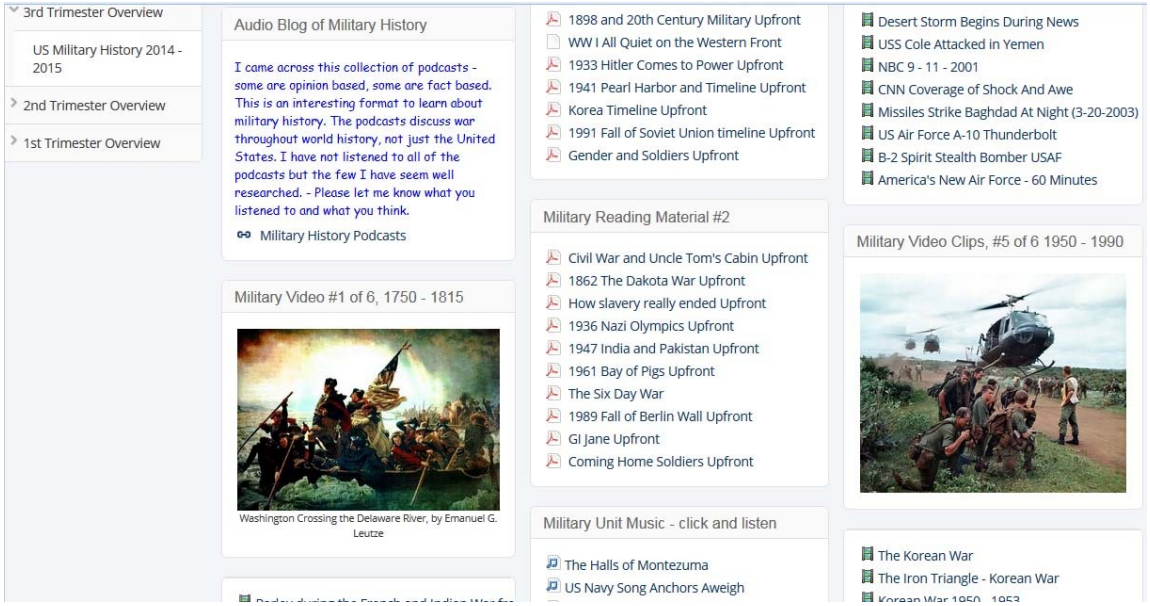


Figure 62. U.S. Military History Page #2.

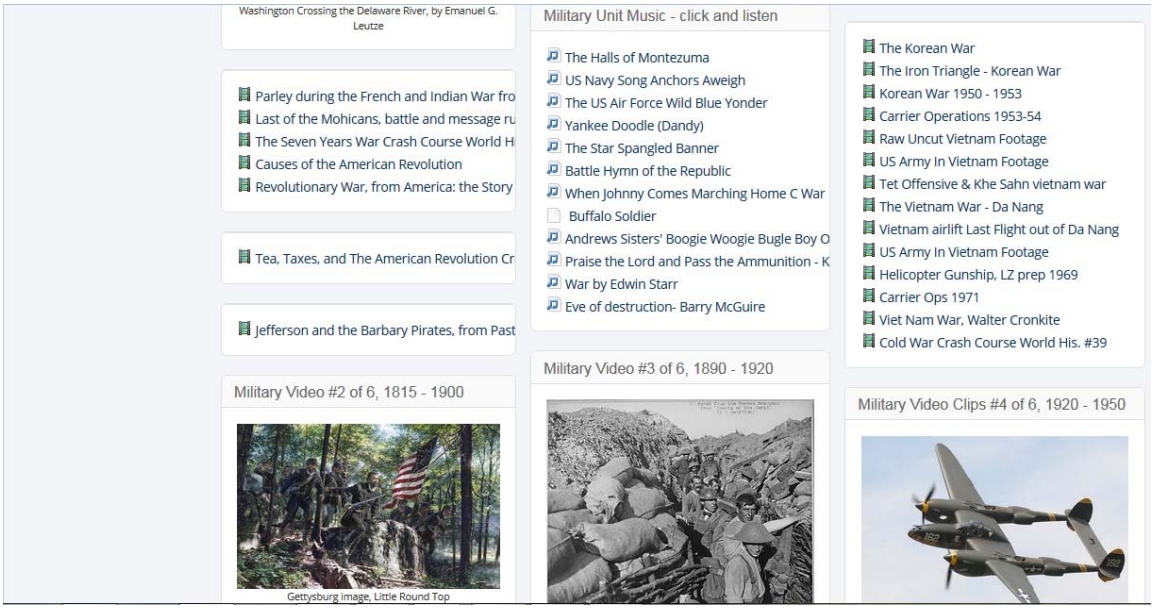


Figure 63. U.S. Military History Page #3.

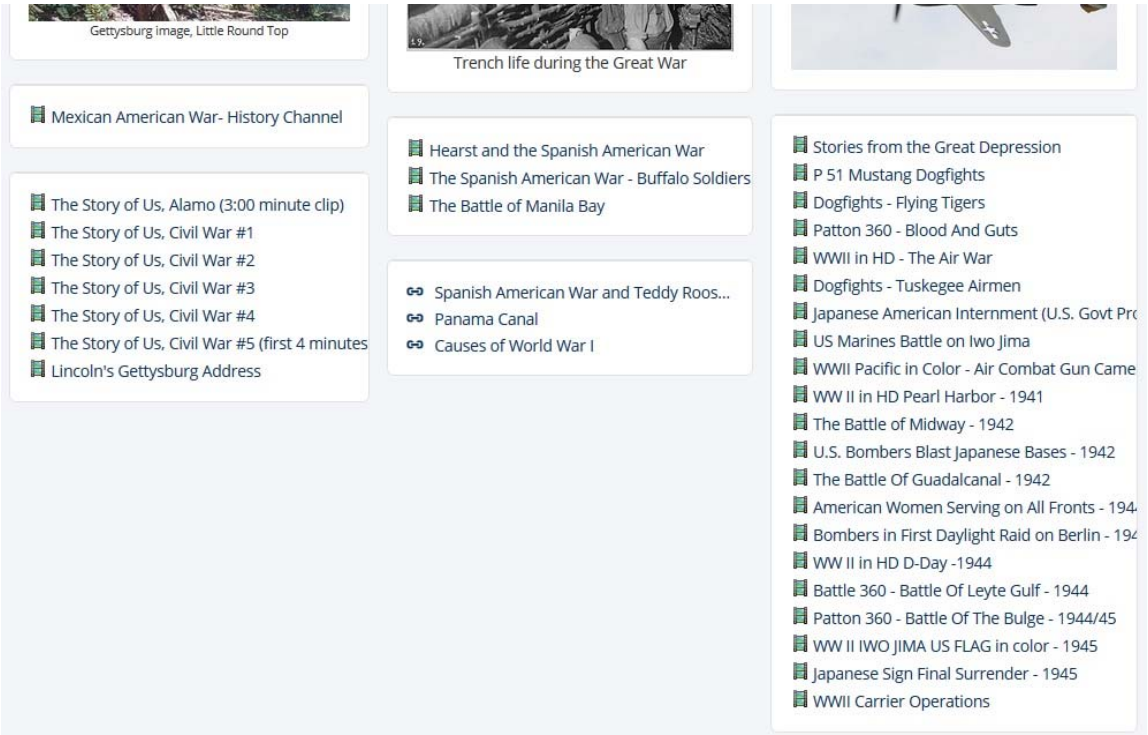


Figure 64. U.S. Military History Page #4.

During our review of his Haiku website, I asked Mr. Hamilton about the amount of content that he had made available to his students on this U.S. military history page.

> In truth, most of what's on there, I won't use. I won't have time. For a lot of that, it's present so that if there's a student who wants to do more, they can on their own, and I'm giving them a starting point for it.

However, after continuing to review the U.S. military history webpage with Mr. Hamilton, his pedagogical reasoning for the decisions he made with the webpage became clear, as well as how his technological and content knowledge influenced those decisions. I begin by asking how his Haiku page worked with his in class teaching.

> They work in conjunction. If you missed it, if you were gone this month, we've had where someone is going to be out of country for two weeks. I would say, "Just go to my haiku page and download this video and this video. That will get you where you need to be." That's why that's built that way. There's just no way, again, that we're going to cover all that.

I followed up with Mr. Hamilton by asking about the variety of formats in which the information was presented. He responded by talking about the decision process that went into using music and images on his haiku page.

> Mr. Hamilton: I've got music there from certain time periods. I bring those in if we have time. Some classes move at a quicker pace, I can do a little more here and there. Classes that move at a slower pace I recommend, hey this is a good way to go through it. If you scroll up, this part here, the picture slides show. It's in order except for the first one. I keep the Jeep there just, because it's my favorite picture.
>
> Me: It's got the military look.
>
> Mr. Hamilton: Absolutely. If you go through it each of these are either famous paintings or modern artist renditions. There's a small caption giving background information on the picture.

Our conversation then turned to how Mr. Hamilton uses the information on his Haiku page to inform his assessments and how he likes to use Haiku as a means of introducing his students to historical primary sources.

> Mr. Hamilton: What I'll do, some of those pictures will go right to the test that will be online.
>
> Me: It also seems like at this point you start to get into primary sources as well. Even the paintings are primary sources, but you really start getting into some.

> Mr. Hamilton: You get, the one in the Civil War's you get a couple stills, but once you get to the 20th century, it becomes more actual. There is so much real footage and audio that has been preserved. I can describe the effects of Allied bombing raids, but seeing footage of Berlin, that makes it real.

Oftentimes, discussions or examples that emerged from his classroom would be added to the appropriate page the next day. For example, during their unit on epistemology, I observed Mr. Hamilton enter into a discussion with his class about the differences between a man and a machine. He gave an example, using the character Data from the television show *Star Trek*, *The Next Generation*. Using Haiku, Mr. Hamilton complemented their classroom discussion by adding video clips that related directly to the philosophical discussion they were having and a link to a website were students could watch the full episode online (see Figure 65).

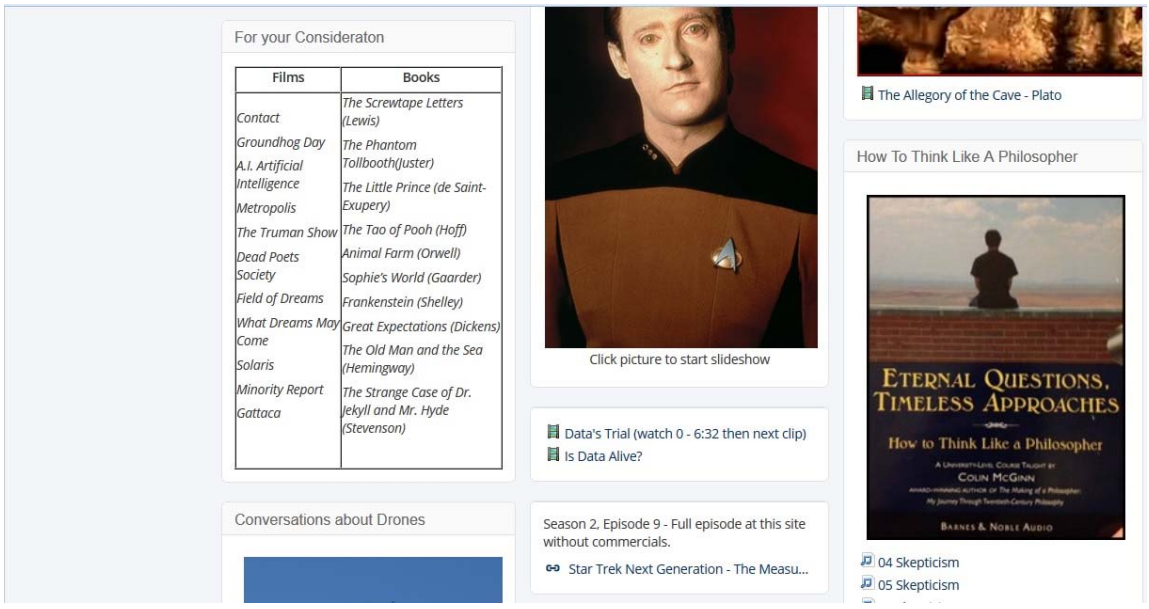


Figure 65. Man vs. Machine Discussion.

One example of Mr. Hamilton using technology to enhance the content was his use of digital note taking with his students to help them learn the material he was covering. Typically, the concept of digital notes implies that the notes are created and maintained with some type of technology. This is something simple like a *Microsoft Word* document or a *Google Doc*. In other cases, digital notes utilize more robust note taking technologies, like the web-based application *Evernote* or *OneNote*. However, for Mr. Hamilton, taking digital notes meant more than just recording information using one of these technologies. He wanted students to learn how to take effective notes, which for Mr. Hamilton, meant that the notes needed to be connected to larger ideas and be meaningful. In other words, he wanted the digital notes to enhance the content being studied and add to the students' learning experience.

> Me: . . . so then, you mentioned this a bit before, but you said that there was an art to taking notes, can you explain that?
>
> Mr. Hamilton: Anybody can slap a date down on paper or on a Google Doc, but what does that date mean? How does it relate to this other date? What are the connections?
>
> Me: So you want your notes to be meaningful? How do you do that with your students? With tech?
>
> Mr. Hamilton: Well, I think technology gives me the means to make it meaningful. I can design their notes, give them strategies, help them take meaningful notes, and learn how to make connections with what they are writing down.
>
> Me: So you use your notes to teach them how to be better note takers?
>
> Mr. Hamilton: I'd say that I use my notes to make them better historians.

For most of the units I observed, Mr. Hamilton allowed his students to decide how they would complete their note taking assignments. Mr. Hamilton told me that he felt he had to allow students to choose the format of their notes, while as the teacher he worked on helping them make the connections. However, Mr. Hamilton provided his students several different examples and digital files on Haiku they could use to take notes and complete assignments based on the material covered in class. Mr. Hamilton would start by providing students with the assignment in a digital format that could also serve as their digital notes for that material. For example, on the course textbook page on Haiku, Mr. Hamilton provided his students with a *Microsoft Word* copy of the assignment that was to be completed (see Figure 66).

As Figure 66 shows, Mr. Hamilton utilized the audio clips he had available on Haiku, their textbook, and his classroom discussions to provide his students with the information necessary to complete the assignment. Mr. Hamilton mentioned that for some students, this format was sufficient to also serve as their digital notes. He also mentioned that he gave away where the information is located, because he was ". . . less concerned with them finding the information and more concerned with them understanding what it all meant."

Davis Material #1

Part 1 **Directions**: Listen, take notes and understand the following material from **"Davis Text Disc 1"**. You will find the audio files on the **American Studies'** ***Don't Know Much About History*** Haiku page under the block labeled **"Davis Text Disc 1"**.

Audio Topic	Key Points	Location
Introduction		Davis Text Disc #1, track #1
History and Epistemology		Davis Text Disc #1, track 2
Who discovered America and Who were the Pilgrims? *(the first 5 minutes is related to the first reading question found in part 2 – skip the last nearly 3 minutes as it will be completed at another time)*		Davis Text Disc #1, track #3

Part 2 **Directions: Read, take notes and understand the following material from your Davis text**

Question	Key points	Location
Who really "discovered" America? *(see the Audio Topic note for the same topic)*		pages 3-6
If he wasn't interested in the Bahamas, what was Columbus looking for in the first place?		pages 6-7
So if Columbus didn't really discover America, who did?		pages 8-11
Okay, the Indians really discovered America. Who were they, and how did they get here?		pages 11 - 14
Where were the first European settlements in the New World? *(just the first few paragraphs on page 17, not the following list)*		page 17

Figure 66. Textbook Sample Notes Template.

Mr. Hamilton also explained that because of the digital nature of the document, students were no longer constrained by issues of space; they were free to write as much as they needed to complete their thoughts. Mr. Hamilton remarked that ". . . if they were to fill this out on paper, things would get left out, choices would have to be made, there is only so much room on a sheet of paper." Thus, the students' use of these digital notes allowed them greater freedom to interact with the content and make important connections with the material being covered.

Mr. Hamilton also commented on how giving students the assignment digitally offered them the opportunity to change the format to their liking. For example, on the same Haiku page where students found the original assignment (see Figure 66), Mr. Hamilton also provided two additional examples of the assignment as potential options for how students could complete the assignment and take their notes (see Figures 67 and 68).

Figures 67 and 68 demonstrate how Mr. Hamilton used technology to support his goal of helping and encouraging his students to take meaningful notes, and not just "jotting something down on a piece of paper." Students were encouraged to arrange their notes visually and to incorporate colors or other techniques to help them in their understanding of the material. In other cases, Mr. Hamilton encouraged his students to use their notes as an opportunity to make connections between topics. For example, during his unit on the rights of man, Mr. Hamilton provided his students an example of what their notes might look like (see Figure 69) as they worked on it themselves.

Davis Notes **Chapter 1** **Brave New World**

Who really "discovered" America? (pg 3-6)

Overview	"In 1492 sailed the Ocean Blue" quote which tells us nothing but we all still know it Columbus – national holiday, revered by Italian-Americans and Hispanics Portugal, England, France rejected trip sponsorship, Spain said no once, later said yes Busted Myth – Queen Isabel (and Husband King Ferdinand) did not sell the jewels to fund the trip –
Why do it?	Spain: 3 ships were not a risk when compared to the potential payoff – fear of Portugal's growing wealth from exploration helped convince the King and Queen - Nina, Pinta, Santa Maria (flag-ship) Columbus: promised title "Admiral of the Ocean Sea", % of profits, governorship of new lands
Where did he land?	Columbus named it San Salvador – probably in the Bahamas (some discrepancies persist about exact location) same trip he visited modern day Cuba and Hispaniola
Who did Columbus encounter?	named natives "Indians" – Columbus though he was off the coast of India or near Indonesian Islands
What did he find?	no real gold, tobacco (in Spain by 1555 – will become a huge money maker later for the English colonies) – he left volunteers on Hispaniola, in a fort made from the remains of the Santa Maria.
End Result	3 total trips back and forth, enslavement of local populations, death of locals from war, labor and disease Odd quote about natives being easy to control with 50 men and guns…prelude to enslavement

Figure 67. Textbook Notes Example #1.

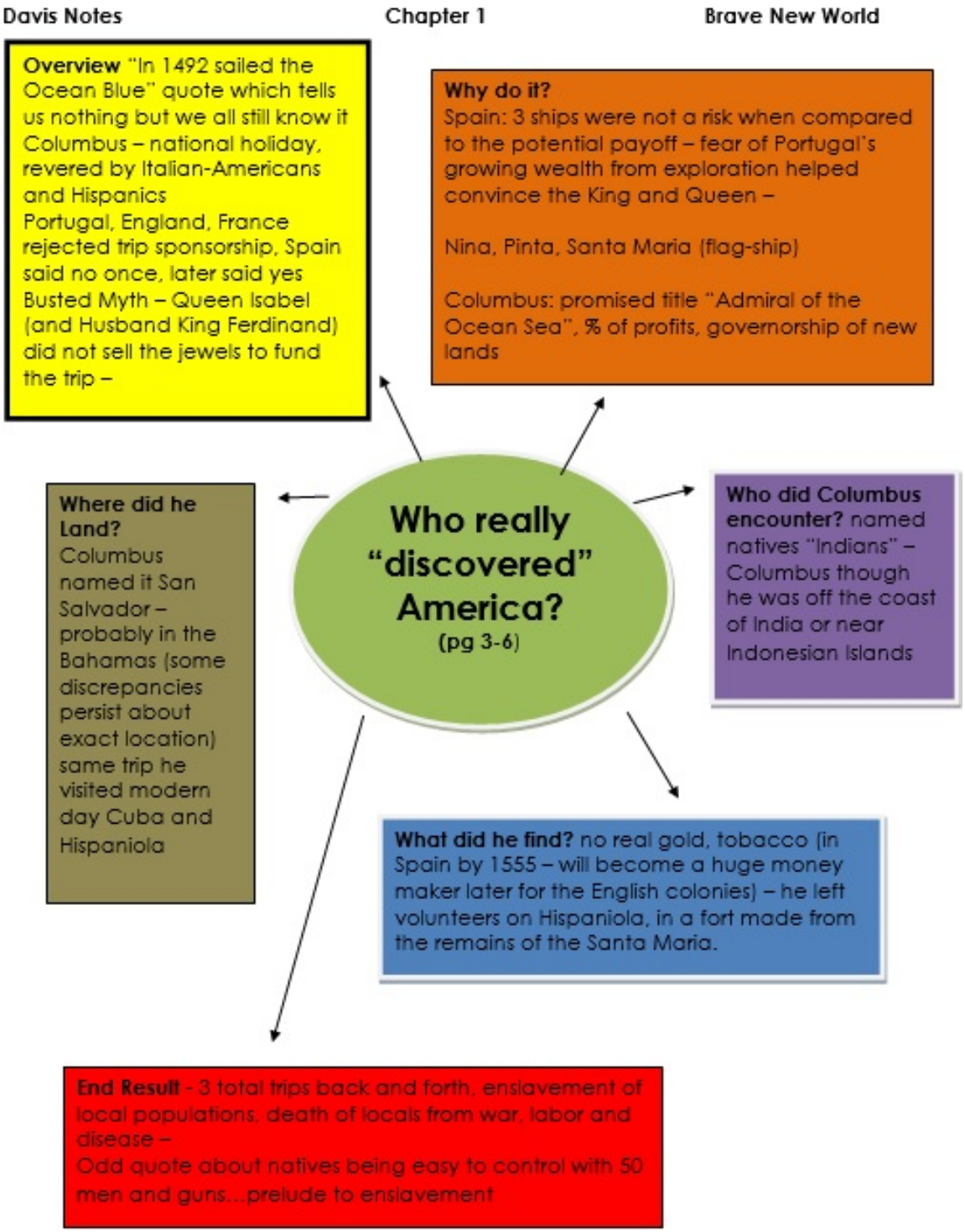


Figure 68. Textbook Notes Example #2.

Rights of the Individual Overview

A sampling of "Civil Rights" points of interest (photos from Wikipedia ex. those noted differently)

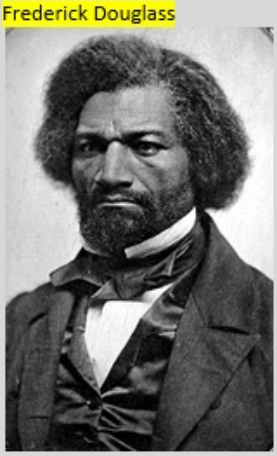
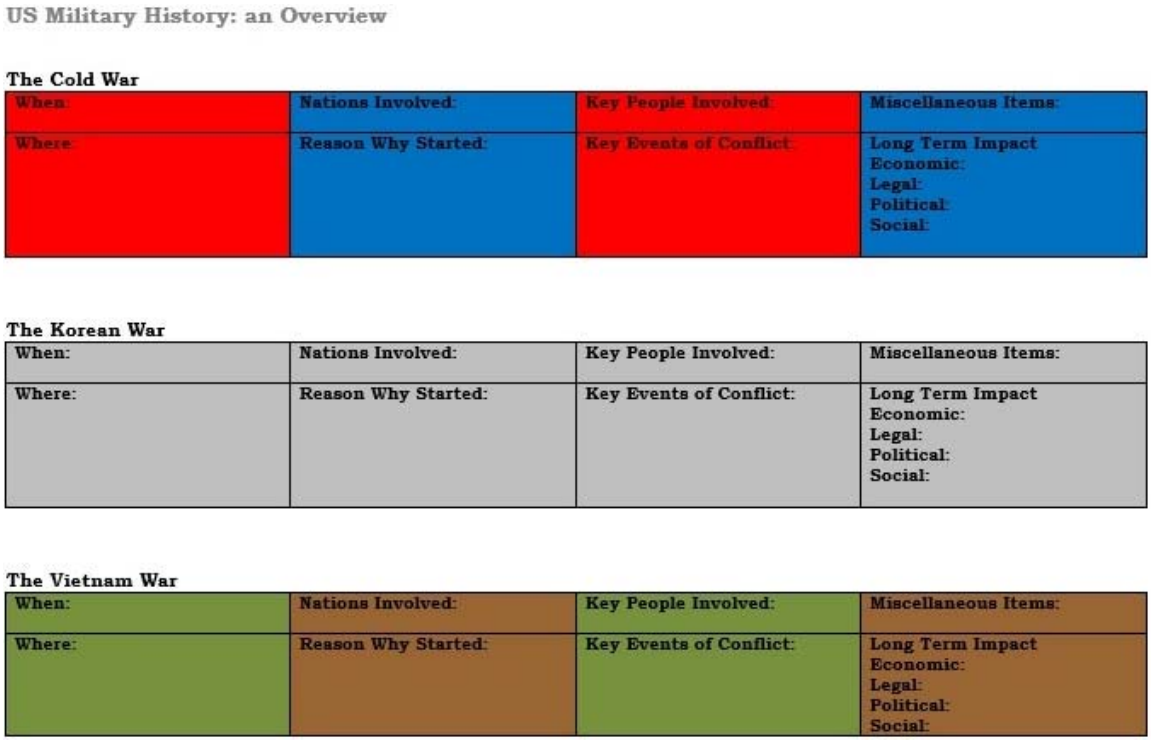
Name / Group / Item	Brief Biography	Why important
Dred Scott 	1799 – 1858 Born a slave Moved to Illinois to work for his owner (a free state determined by popular vote) Abolitionists helped Scott sue for his freedom Supreme Court ruled against Dred Scott He died a slave	Property = property The case determined that slaves were property just like livestock and other possessions. The right to "property" (Locke reference, Jefferson reference "pursuit of happiness") A Civil War issue Then isn't slavery legal everywhere in the U.S.? 6 minute clip discussing the case http://www.youtube.com/watch?v=9j3IKSs2ZoA
Frederick Douglass 	1818 – 1895 Born a slave Taught to read and write Teaches other slaves to read and write Catches heat for teaching others Runs to the North Becomes a vocal abolitionist - great orator Writes autobiography His freedom is purchased Becomes part of elite Northern society Actor portraying Douglass - 4 minute video clip: http://www.youtube.com/watch?v=BR_QOCwVRg8&feature=related	Many Northerners had never met a Slave, so the Southern stereotypes were thought to be true **Southern Stereotypes:** Slaves were not intellectually capable Slaves were sub-human Slaves were property not people Frederick Douglass proves the Southern stereotypes wrong. How can you meet this intelligent, well-read and spoken individual and not wonder how many other great individuals are still in the South? If you see him as human, how many others in the South are human? Changed the minds of influential Northerners

Figure 69. Rights of Man Notes.

Once again, Mr. Hamilton made use of images, colors, and links to external content to demonstrate to his students how to make meaningful use of the information they were covering. While these preceding examples of digital note taking demonstrate how Mr. Hamilton wanted his students to use digital notes to make meaningful tools for

learning, his final unit of the year required students to apply these concepts as part of an assignment to create a digital notebook about US military history.

For his final unit, Mr. Hamilton provided his students with a basic template from which they were expected to fill out and create their own digital notes (see Figure 70).



US Military History: an Overview

The Cold War

When:	Nations Involved:	Key People Involved:	Miscellaneous Items:
Where:	Reason Why Started:	Key Events of Conflict:	Long Term Impact Economic: Legal: Political: Social:

The Korean War

When:	Nations Involved:	Key People Involved:	Miscellaneous Items:
Where:	Reason Why Started:	Key Events of Conflict:	Long Term Impact Economic: Legal: Political: Social:

The Vietnam War

When:	Nations Involved:	Key People Involved:	Miscellaneous Items:
Where:	Reason Why Started:	Key Events of Conflict:	Long Term Impact Economic: Legal: Political: Social:

Figure 70. U.S. Military Unit Notes Template.

Mr. Hamilton also had a final section labeled “long term impact,” where he applied his ELPS approach to the content by having his students critically think about the content from economic, legal, political and social perspectives. Additionally, he took every opportunity to use colors and images to help students remember key ideas and make association. For example, he used blue and red for the Cold War section and used

camouflage for the Vietnam War section. Once students were finished with the U.S. military unit, I asked Debbie to send me her completed notes. For comparison purposes with Figure 64, I focused in on the section of the notes dealing with the Cold War (see Figures 71 and 72).

Debbie's notes for this section were roughly two and a half pages long and she completed every section of the Cold War chart. Debbie ended up including details and facts in her notes and asking questions like "Is this why we love Reagan?" Additionally, she followed Mr. Hamilton's example by including images related to the cold war immediately following her notes (see Figures 73 and 74).

When:	Nations Involved:	Key People Involved:	Miscellaneous Items:
1945 (48?) – 1989 (91?) Trust issues for a number of years leading up to this time period	**USA vs. USSR** (aka Soviet Union) NATO Members US, France, England, Canada, West Germany The North Atlantic Treaty Organization Warsaw Pact Members Everyone who Many others often involving support of enemies	**US Presidents** Truman, Eisenhower, Kennedy, Johnson, Nixon, Ford, Carter, Reagan, G. H. Bush (the first one) **USSR Premiers** Stalin, Khrushchev, Brezhnev, Andropov, Chernenko Gorbachev **Others** Fidel Castro (CUBA) Political Leader, 1959 – current Prime Min. Margaret Thatcher (GB), 1979-90 Lech Walesa (POL) Trade Union 1980-90, Pres. 1990-95 Pope John Paul II, Catholic Pope 1978 – 2005: he did not like communism because Communism generally did not allow religion	Military Industrial Complex: people in the US making cool things to kill people with. If you had an idea to stop the Soviets and it was good The Domino Theory if ICBMs Intercontinental ballistic missile SLBMs MIRVs SDI / "Star Wars" (not the movies): Strategic Defense Initiative Iran Hostage Crisis (1979, 52 people for 444 days) **Films (too many to list here):**

			Good Night and Good Luck, Thirteen Days, Doctor Strangelove, Salvador, The Good Shepherd, The Year of Living Dangerously, The Hunt for Red October, Fail-Safe, The Day After
Where: Worldwide. Europe Asia Latin America Africa	**Reason Why Started/Maintained:** The US and Soviet Union are the biggest world players. Becomes like a huge kickball game where they are picking teams Democracy vs. Communism Capitalism vs. Socialism Fear of Communism **[RED SCARE]**; fear of all things communist as if there are communists hiding behind trees waiting to jump out and scare people. World War II issues Truman Doctrine 1947	**Key Events of Conflict:** (US drops atomic bombs on Japan to end WWII 1945): some people think that this happened because we wanted to scare the Soviets Berlin Blockade/Air Lift 1948 – 49 USSR successfully tests their first atomic weapon 1949 Korean War 1950 -1953 Sputnik 1957: a basketball shaped thing that they sent into space Vietnam 1955 – 1975 Berlin Wall 1961 – 1989 U2 incident 1960	**Long Term Impact** **Economic:** The US and USSR spent HUGE amounts of money funding other nations, fighting "proxy wars" with varying degrees of military involvement, and building up defense programs – eventually bankrupting USSR, US funding Science and Math: we were scared by Sputnik

Figure 71. Debbie's Cold War Notes #1.

	Arms Race Nuclear Age: Soviets go with missiles, but the US starts with bombers and then went to developing new missiles Reagan Doctrine 1980s – 1991: people who like him say that he killed Communism, but that is not totally true.	Bay of Pigs (Cuba) 1961 Cuban Missile Crisis 1962 SALT 1 1971 President Nixon's visit to China 1972 SALT II 1979 Iranian Revolution 1979: there are 52 American hostages for 444 days. We had been supporting Iranian government because we liked them but it was then overthrown. Soviet Invasion of Afghanistan 1979 – 1989: we helped the rebels to fight the Soviets. We helped to train Osama Bin Laden during our spat with the Soviets Solidarity Movement in Poland 1980 – 1990 (current) US Invasion of Grenada 1983: Revolutions of 1989 (Pol, Czech, Hun, Bul, Alb, Rom) Germany Unification/Reunification 1990	**Legal:** 15 Independent nations with the dissolution of the USSR, Additional new nations: Croatia, Slovenia, Bosnia and Herzegovina, **Political:** Is this why we love Reagan? Mantra of Communism = Bad and Capitalism = Good (reverse for Soviets) **Social:** "Better Dead than Red", Fear of **"mutually assured destruction"** - in film, literature, music, TV...

Figure 72. Debbie's Cold War Notes #2.

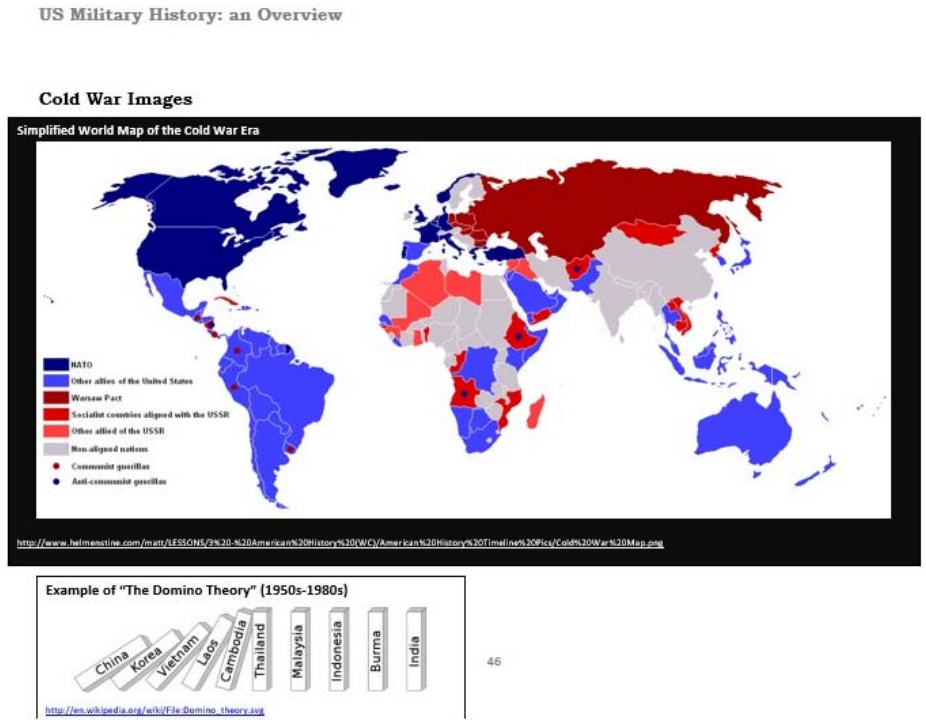


Figure 73. Cold War Images #1.

Figure 74. Cold War Images #2.

I spoke with Debbie to get her opinion of Mr. Hamilton's vision of note taking and if it had made any impact on how she understood the content Mr. Hamilton was teaching.

Me: So, tell me about all the notes you've taken this year for Mr. Hamilton. What did you think about that?

Debbie: There was a lot of note taking, like a lot.

Me: And was that a good thing? Bad thing?

Debbie: Definitely a good thing.

Me: Why?

Debbie: Because I learned so much this year, and the notes really helped me.

Me: How did they help you?

Debbie: I didn't really know how to really take notes until Mr. Hamilton showed us how this year. Like last year, I just wrote stuff down, but half of what I wrote I never used and the stuff I didn't write down is what I needed for the test.

Me: Ok, so tell me, what did he teach you about note taking?

Debbie: I learned that your notes have to have a purpose, and you have to tie everything together as much as possible. The more you tie it together, the more you remember and the more it makes sense.

Me: And as far as technology, did that play a part?

Debbie: Oh my God yes, I color code everything now, even in my other classes. I link to websites, add pictures, videos, it is like a buffet in my notes. [Laughing]

Me: [Laughing] And the tech allowed for that?

Debbie: Definitely, Mr. Hamilton encouraged us, I can't imagine taking notes the way he taught us on paper or in a composition book, it just wouldn't work.

Theme #2: Using technology to enhance pedagogy. One of Mr. Hamilton's central beliefs was that technology should be used to improve his pedagogy. This meant that while the students may not be experiencing the effects of his use of technology directly, his teaching was better informed or his capabilities enhanced because of it. For example, Mr. Hamilton often used his laptop, connected to an overhead projector, to display videos, notes, images, or other relevant information to his students while teaching. However, Mr. Hamilton explained to me that being tethered to his laptop to control and manipulate what was displayed on the projector limited his ability to walk around the classroom. He explained that this was important for two reasons. First, it would limit his ability to practice classroom management techniques. Second, it led to him teaching from one spot the entire class, something that he felt lowered the energy in the classroom. To alleviate this issue, Mr. Hamilton bought a wireless mouse that he could carry with him as he walked across the room (see Figure 75).

Figure 75. Mr. Hamilton's Wireless Mouse.

Mr. Hamilton used this device expertly in his teaching. During my thirteen weeks of observations, I never once noticed Mr. Hamilton have trouble using his wireless mouse. He was able to resize images, switch between items on his laptop, search the Internet, use the mouse arrow as a pointer, and highlight text without any difficulty. I asked Mr. Hamilton how he had become so good at using the wireless mouse. He commented to me that he had spent an entire summer using it several years back to get practice with it. Mr. Hamilton described the evolution of his technical knowledge with the wireless mouse stating that "at first I was clumsy with it, but like anything, like riding a bike, the more you do it, the better you get at it. Pretty soon, it just became a natural extension of how I teach."

Another example of technology improving Mr. Hamilton's pedagogical practices was demonstrated by his use of technology to "flip the classroom" and place students in charge of their learning. The practice of flipping a classroom centers around the idea that students will receive their instruction outside of the classroom via audio, video and other learning platforms. Then, while in class, students are able to practice the skills that they learned or work on more authentic assignments allowing for more personal teacher interaction. While Mr. Hamilton did not flip his classroom in this traditional sense, his ability to continue his class, even while he was away from the school, demonstrated how his use of technology improved his pedagogy.

On two different occasions Mr. Hamilton missed consecutive days of class. On the first day Mr. Hamilton was out, his substitute teacher was particularly confused and

unsure about what she should be doing. Mr. Hamilton had left her with instructions stating simply that the students were informed about what they needed to do and that they would be working independently over the next three days on various assignments during class. I asked Stephanie, one of Mr. Hamilton's students, if she knew what she was supposed to be doing over the course of the next three days that Mr. Hamilton was due to be out.

> Stephanie: Yup, he sent us an e-mail over the weekend.
>
> Me: Can you send it to me? And that e-mail has everything you need to get things done while he's gone?
>
> Stephanie: Sure, no problem . . . Yes, it lists everything we need to be working on and then we have his Haiku page to get everything we need.

In this case, Mr. Hamilton's Haiku page, described in the previous example, facilitates classroom instruction while he is gone, allowing for students to continue working and progressing through their unit of study. The e-mail Mr. Hamilton sent the student listed all of the assignments the students could work on and the corresponding due date for each assignment (see Figure 76).

While I am freezing in Boston...

This should keep you warm.

Due Date	Assignment
02/25	Watch Crash Course US History #2 – found on youtube.com – about 13 minutes in length - at home or in class with earbuds/head phones at the discretion of Ms. Tuckfield.
02/25	Complete and submit Article Review #10 – see Haiku Assignments page for directions
02/25	Complete and submit Questions, an Introduction – See Haiku Assignments for details
02/25	Complete conference logs and submit to the ADVISING Page Dropbox labeled SPRING Conference Log
03/02	Review David Material #3 (completed in OCT 2014) so that all information is understood
03/05	Watch Crash Course US History #3 – found on youtube.com – about 12 minutes in length - at home
03/06	Complete Davis Material #4 – information can be found on HAIKU, Assignment listings and Don't Know Much About History Haiku Page
varies	Other course work as directed

Middle School Division

Figure 76. Mr. Hamilton's E-mail #1.

All seven of the assignments listed in Mr. Hamilton's e-mail were to be completed using the information located on Mr. Hamilton's Haiku website. Much like in a traditional flipped classroom environment, Mr. Hamilton encouraged students to do parts of the assignments at home and other parts in school. During the entire time Mr. Hamilton was out, I never observed the substitute interacting with the students or the students engaging with her, except for logistical reasons like needing to use the bathroom. I spoke with Stephanie again on the last day Mr. Hamilton was due to be out. Our conversation speaks to how Mr. Hamilton was able to use the technology available via his Haiku webpage to continue his classroom while he was out.

> Me: How do you think the last three days went? Do you feel like you were able to continue learning without Mr. Hamilton around?
>
> Stephanie: Yes, for sure, I got almost everything done, except I need to just watch one more video.
>
> Me: So Mr. Hamilton was able to continue his class without him being here, with Haiku and just e-mailing you all?
>
> Stephanie: Well, I miss his jokes and the way he makes us laugh, but all the information I need was already ready for me, so I didn't really need him for that.

On the other occasion when Mr. Hamilton was away from school, he also sent an e-mail to his students detailing what his expectations for them were while he was out. Because it was a week away from the trimester ending, Mr. Hamilton sent his students less specific instructions. His e-mail simply reminded his students that his take home

test was due on Friday, his first day back, and some other important deadlines (see Figure 77).

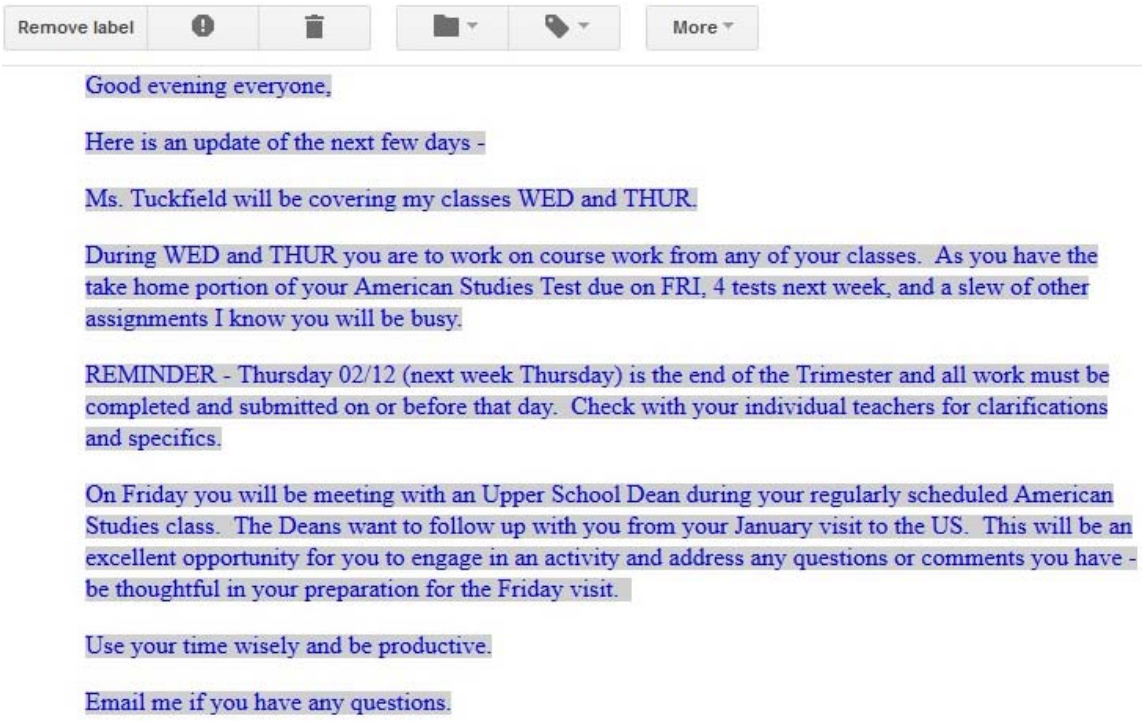


Figure 77. Mr. Hamilton's E-mail #2.

Once again, during these two days, Mr. Hamilton's class continued to function as normal. Students came in, and began their work, and left when their classes ended. I asked one of his students, Debbie, if the lack of specifics in his e-mail left her wondering what to do with her time.

> Debbie: Not really, I know what needs to be done. I have my take home test to finish, and I'm just going to use these next two days to do that.

Me: But what do you do if you have a question or need something? What happens then?

Debbie: I just send Mr. Hamilton an e-mail. He gets back to us really quickly.

On the second day Mr. Hamilton was out, before the class ended, I asked everyone in the class to raise their hand if they had been in communication with Mr. Hamilton via e-mail or Haiku over the last two days, other than his initial e-mail to them. Of the 19 students who were in Mr. Hamilton's class, seven of them said that they had e-mailed with Mr. Hamilton. Another five mentioned that they had not e-mailed Mr. Hamilton, but had received an e-mail forwarded from another student concerning a conversation via e-mail they were having with Mr. Hamilton. I asked Stephanie, who had communicated with Mr. Hamilton via e-mail, what it meant to her to have this ability to communicate with Mr. Hamilton even when he was not physically present. She commented on how it allowed for ". . . class to continue as normal," noting that "I would have asked the same questions if he had been here, so really, nothing really changed for me."

Mr. Hamilton's TPACK Model

Mr. Hamilton's model for his TPACK knowledge contained one very large content knowledge and one large pedagogical knowledge circle, however he did not want to include a technological circle in his model (see Figure 78).

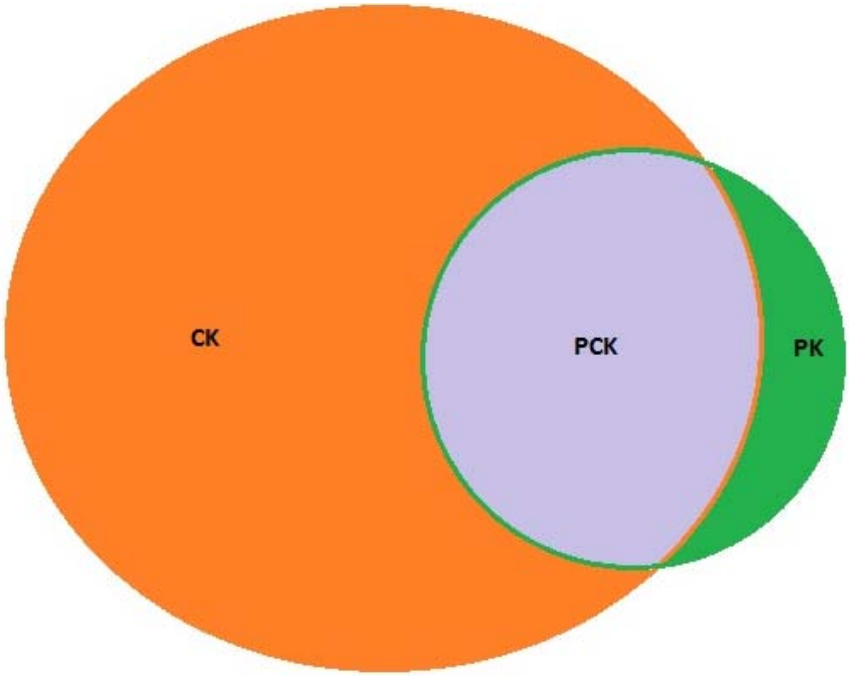


Figure 78. Mr. Hamilton's Version of His TPACK.

According to Mr. Hamilton, he felt that for his teaching, his technological knowledge was a part of his pedagogical knowledge. Mr. Hamilton made a distinction between the knowledge an individual has and the knowledge a teacher uses. He admitted that as an individual he had technological knowledge and felt that it was a fairly large circle in comparison to other knowledge he possessed. However, he felt that "pedagogical knowledge is made up of all the tricks and techniques I have, and that includes tech." For that reason, he decided not to include it in his model. He did say that he felt his content knowledge was his largest circle and that he felt it influenced the pedagogy he employed rather than the pedagogy influencing the content he taught.

Summary

This chapter reported the findings for this study. Each of three cases was presented separately. Each case study began with a brief vignette capturing a particular moment that represented the teacher's operationalization of TPACK within the classroom. Next, each teacher's beliefs about education and technology were offered. Then specific examples, organized thematically, of how the teacher was able to operationalize TPACK in their classroom were described. Lastly, each teacher's representation of their own TPACK is described.

In the first case, Ms. Goodman used technology to tap into her student's interests in order to introduce new topics of study or explain key content. She also used technology to dress up her pedagogical practices. Ms. Goodman took advantage of the affordances technology can provide to give her more flexibility in the assignments she prepared for her students. Ms. Goodman believed that technology should serve as a tool within the classroom, and that when used appropriately, it helps students learn how to ask questions of history.

In the second case, Ms. Monroe used technology to differentiate her instructions and to help students build organizational and note taking skills. Ms. Monroe also used technology to build a sense of global awareness with her students. Ms. Monroe believed that the ability to teach effectively with technology resided in teachers themselves and was tied to their beliefs about their own abilities with technology. She

felt that in order to effectively teach with technology that it had to be a consistent part of a teacher's practices and dispositional attitudes towards technology.

In the last case, Mr. Hamilton used technology to augment his pedagogical practices. He also used technology to provide his students with a richer experience with the content. Mr. Hamilton believed that technological knowledge did not exist in terms of the TPACK framework. He believed that technology, when used correctly within the classroom, became a function of good pedagogical practices.

CHAPTER V

DISCUSSION AND IMPLICATIONS

Introduction

I begin this chapter with a discussion of the findings from this research study. This discussion examines what TPACK looks like in practice, compares TPACK in theory to TPACK in practice, examines the role of technological knowledge in instruction, and asks questions about what components might be missing from the TPACK framework based upon the data collected. Then, I discuss the implications of this research from the perspective of practicing teachers, teacher educators, and educational policy makers. Finally, I discuss opportunities for future research including the need to replicate this study in both public schools and environments without 1:1 implementations.

Discussion of the Findings

What TPACK Looks Like in Practice

By examining the TPACK-based teaching practices of Ms. Goodman, Ms. Monroe, and Mr. Hamilton, an understanding of what TPACK looks like in practice emerges. Within each of the teachers' teaching practices, I was able to identify moments of TPACK knowledge in use. A comparison of Ms. Goodman, Ms. Monroe, and Mr. Hamilton gives some insight into what TPACK looks like in practice.

A comparison of Ms. Goodman's, Ms. Monroe's, and Mr. Hamilton's TPACK practices. All three teachers in this study created TPACK teaching practices within their classrooms. However, TPACK looks different for different teachers. It is personal and situated in their beliefs about teaching, while also drawing from their strengths and weaknesses with the different components of TPACK (Hofer & Swan, 2008; Manfra & Hammond, 2008). In this study, each of the teachers took a distinctly different path towards how they formed their own TPACK knowledge. Mr. Hamilton created his TPACK knowledge by beginning with his content knowledge, and then adding in his pedagogical and technological knowledge. Ms. Monroe created her TPACK knowledge by beginning with her pedagogical knowledge and then adding in her content and technological knowledge. In both cases, Mr. Hamilton and Ms. Monroe began with their strongest area of knowledge and then added in the other components of TPACK. Also, for both of them, their strongest area of knowledge was also the area they were most passionate about. Mr. Hamilton's content heavy *Haiku* page and Ms. Monroe's pedagogical approach to differentiated instruction are examples of how their strengths influenced their TPACK practices. However, TPACK is not limited to one method or approach to instruction, rather it also requires developing a sense of when it is appropriate to use TPACK teaching practices (Wilson & Wright, 2010). In Ms. Monroe's and Mr. Hamilton's cases, their TPACK knowledge was called upon for entirely different purposes, yet both served as examples of appropriate use of TPACK.

Ms. Goodman's approach to building TPACK knowledge was a bit different. She began by creating pedagogical content knowledge first, and then, after that knowledge was created, added in technological knowledge to create her TPACK knowledge. For Ms. Goodman, the process for creating her TPACK knowledge was a distinct two-part process. While Ms. Monroe and Mr. Hamilton started with a particular knowledge, they combined all three knowledge during their process of creating TPACK. Ms. Goodman chose to create PCK first, and then add TK to create TPACK. Ms. Goodman's use of *Live Binder* to support her ancient Japan game is an example of this. In previous years, Ms. Goodman had created a learning activity without the use of technology. However, when she learned about *Live Binder* at a conference, she spent time understanding the technology and then added it to her ancient Japan activity. In this case, she took her PCK inspired activity and added in some TK to create the current activity that she uses with her students. Because of the way Mr. Hamilton and Ms. Monroe chose to form their TPACK knowledge, it often appeared as if their TPACK-based activities were born out of their consideration of all three types of knowledges. For Ms. Goodman, it often felt like her TPACK-based activities were just the enhancement of traditional classroom activity types by linking relevant and appropriate technologies to them. Research indicates that this process of linking traditional classroom activities to technology-based activities is a common practice when teachers begin to develop their own TPACK practices (Harris & Hofer, 2009; Harris, Mishra, & Koehler, 2009; Hofer & Harris, 2011).

Despite the way that Ms. Goodman, Ms. Monroe, and Mr. Hamilton created their TPACK knowledge, each was able to use TPACK to deliver their instruction. However, just because all three teachers shared the ability to create TPACK, does not mean that all three teachers have the same level of effectiveness with their TPACK-based practices. Of the three teachers, Ms. Monroe's use of TPACK provided her students with the highest level and most engaging type of learning opportunities. For example, Ms. Monroe used her TPACK-based practices to create opportunities for her students to engage in email-based pen pal relationships with students from India, along with engaging in dialogue with these students via *Skype* phone calls. In this example, her students' experiences with the content were significantly altered and improved because of her use of technology. Had she not used TPACK, but rather PCK during this activity, her students' interactions with the students from India would have been limited to mailing letters back and forth. Ms. Monroe's use of technology to teach organizational skills to her students is another example of how she used TPACK to create meaningful learning opportunities with her students. Her students took the lessons she taught them and continued to use them, abet with some personal modifications, in their classroom practices well after the assignment or activity was completed. Lastly, Ms. Monroe actively sought to use her TPACK knowledge to create opportunities for differentiated learning for her students.

Mr. Hamilton's TPACK knowledge is heavily shaped by his passion for Social Studies and his own content knowledge. Thus, while his TPACK did not create the type

of learning activities and engagement that Ms. Monroe's TPACK produced, he used his TPACK knowledge to make himself a better teacher and provide a richer learning environment for his students. For example, Mr. Hamilton used his TPACK knowledge to create opportunities for his students to understand history through an analysis of primary sources. His *Haiku* page was covered with visual, audio, and written forms of primary source materials. His TPACK inspired activities often asked his students to take these primary sources and interpret the meaning and relevance behind them. This use of TPACK to enhance the content is also evident in his use of the digital notes during his unit on American military history. His use of the wireless mouse allowed him the freedom to teach without being tethered to his laptop, which allowed him the ability to engage his class with his presence and with his continued manipulation of the content being displayed. Mr. Hamilton also used his TPACK knowledge to create a feeling of classroom continuity even when he was absent for a prolonged period of time, which reduced the amount of lost instructional time that often occurs when teachers are absent. The difference between Mr. Hamilton's TPACK knowledge and Ms. Monroe's was that his TPACK was heavily focused on presenting the content to his students or maintaining his classroom presence. Ms. Monroe's TPACK knowledge was more about using all the elements of TPACK to create meaningful and engaging learning experiences for her students.

Ms. Goodman's application of TPACK knowledge is more basic than either Ms. Monroe's or Mr. Hamilton's use of TPACK. Because her pedagogical content knowledge

was so strong, she was well positioned to develop high quality TPACK-based instruction like Ms. Monroe. However, research indicates that the inability to combine all the components of TPACK together when attempting to use TPACK-based practices can have a negative influence on instruction (Beeson, Journell, & Ayers, 2014). This phenomenon is evident with Ms. Goodman because unlike Ms. Monroe, Ms. Goodman had difficulty integrating her technology knowledge into her PCK to create TPACK, often missing opportunities to use technology to enhance her lesson or misappropriating technology in a way that diminished her lesson. For a majority of her practices, she used technology as a replacement for a particular component of her lesson. Using technology may have afforded her activity more possibilities or conveniences for herself and her students, but it rarely transformed the activity like Ms. Monroe's use of email and *Skype* during her India activity. For example, her travel brochure activity was initially done with paper and the classroom textbook. She then modified the activity to replace the textbook with Internet-based resources and the folding of paper to create a brochure with *Microsoft Publisher*. If Ms. Goodman's technological knowledge had been more robust and her ability to integrate it with her PCK more profound, then she could have had her students go online and find real life travel companies that toured those ancient cities, engage with those companies for resources and information, and then have them produce a virtual trip on *Google Earth*. Ms. Goodman had the PCK knowledge to create such an activity, but not the sufficient amount of TPACK knowledge to pull it off.

The TPACK Model: Theory vs. Practice

A common theme that continued to emerge throughout the study was the difference between what the TPACK model looked like in theory versus what I was seeing in practice. These differences between theory and practice call into discussion the application of the TPACK model in practice, the placement of students within the model, and questions about TPACK that were not originally discussed when it was proposed.

Ms. Goodman's, Ms. Monroe's, and Mr. Hamilton's self-reported low TPACK. Based upon the data collected in Chapter IV, each teacher displayed evidence of TPACK knowledge. Furthermore, as discussed above, Ms. Monroe and Mr. Hamilton exhibited the type of TPACK knowledge that would indicate a prominent place within their TPACK model. Yet, when I asked all three teachers to draw their own TPACK model based upon their own self-evaluation, they all self-reported very low amounts of TPACK.

Ms. Goodman's drawing (Figure 79) produced an area of TPACK that is in line with my observations of her classroom and the data collected from her. This is not to say that Ms. Goodman lacked the ability to teach with technology, but rather like her drawing and her conversations with me suggest, her ability to teach with technology is limited in scope. In Ms. Goodman's drawing, the size and placement of her technological knowledge limited the overall size of her TPACK knowledge. Looking at her drawing it is easy to see how she began with PCK, and then inserted her technological knowledge when planning instruction. Yet the data suggests that while

her TPACK may not have been as effective as Ms. Monroe's and Mr. Hamilton's, she was able to use technology in her teaching practices. The question then becomes, does the TPACK model only measure the breadth of an individual's TPACK knowledge, but not the depth? If Ms. Goodman had used lots of technology in her teaching, but this use of technology only continued to serve as a means to dress up and replace components of previous activities, would she then have self-reported a larger TPACK? Indications from the data and our conversations suggests that she would have, meaning that for her, the TPACK model does not represent the quality of instruction but rather the amount of technology instruction offered. My drawing (Figure 80) of Ms. Goodman TPACK offers a different way to answer this question.

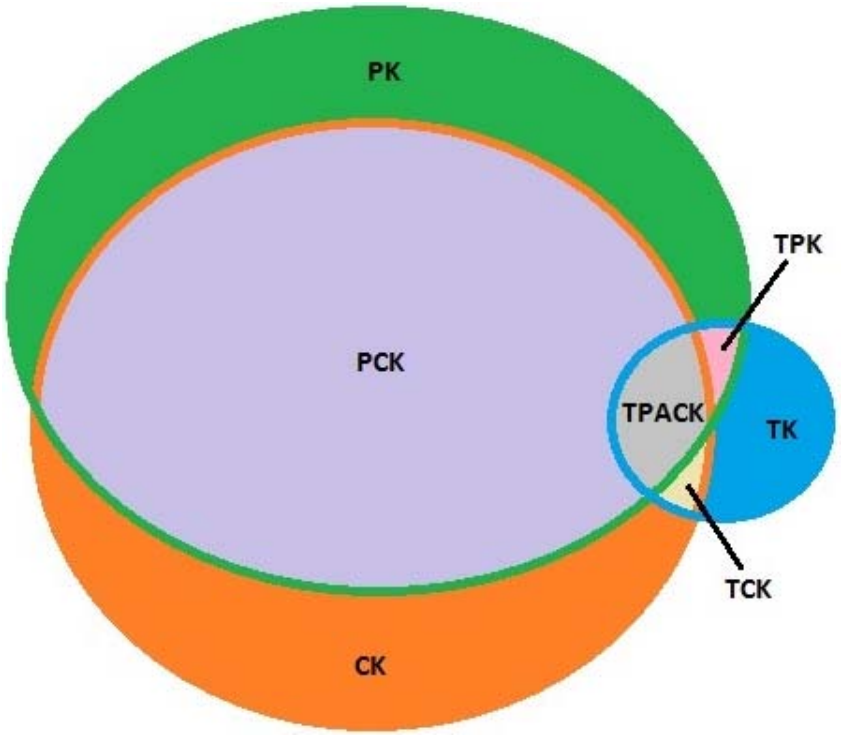


Figure 79. Ms. Goodman's Self-reported TPACK.

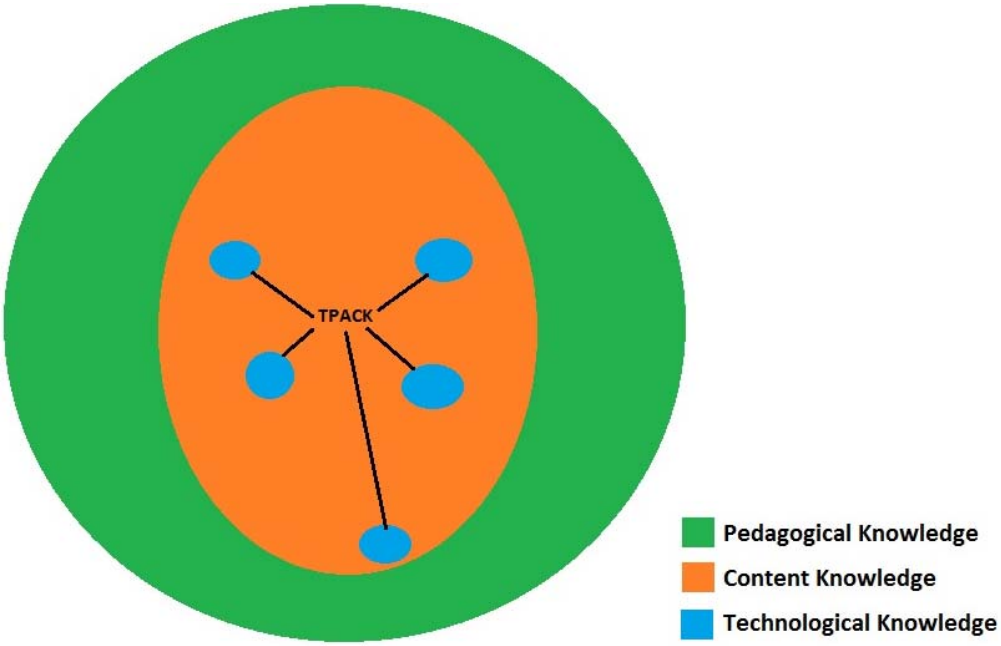


Figure 80. My Drawing of Ms. Goodman's TPACK.

In my drawing of Ms. Goodman's TPACK, I layer the different knowledges found in TPACK. I chose to do this because layering TPACK implies a constant mixing of the knowledges, which I believe more accurately reflects the type of thinking needed for successful TPACK instruction. I also believe that by layering the different knowledge, I am able to capture the depth of a teacher's TPACK. For example, with Ms. Goodman, I began by drawing a large pedagogical knowledge circle, since I believed that was her strongest area of knowledge. I then layered a large content knowledge circle on top of this pedagogical circle, reflecting my belief that Ms. Goodman possessed a solid understand of sixth-grade Social Studies content. When combined, the pedagogical content knowledge circle is quite large, reflecting that Ms. Goodman possessed both a deep breadth and depth of PCK knowledge. I then layered multiple small circles of

technological knowledge within her layered PCK. I chose to draw multiple circles to capture her self-reported and observed familiarity with only a few types of technologies. Each of these circles represents an instance of TPACK for Ms. Goodman. I feel like my model reflects her TPACK practices as the number of circles represents her familiarity with only a few different technologies, and her smaller circles represent her lack of depth with her TPACK practices. In Ms. Goodman's case, the TPACK model in theory reflected her self-reported TPACK model, yet both failed to capture the depth of TPACK knowledge that I believe my model presents.

In Ms. Monroe's case, she drew her TPACK model (Figure 81) with a very large pedagogical circle, a large technological circle, and a small content knowledge circle resulting in an even smaller area of TPACK knowledge.

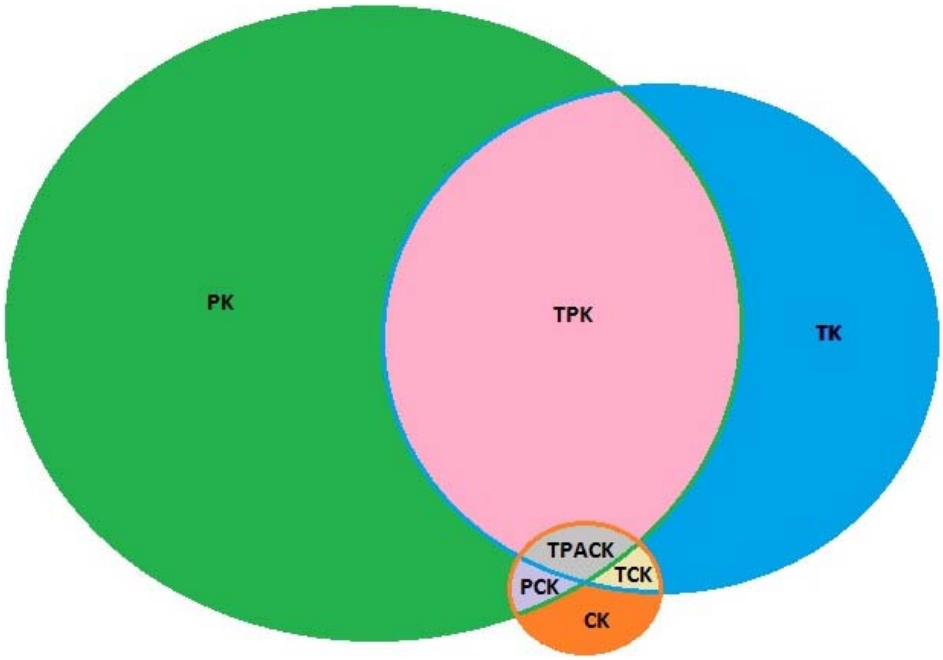


Figure 81. Ms. Monroe's Self-reported TPACK.

For Ms. Monroe, the size and placement of her content knowledge limited the overall size of her TPACK knowledge. It is true that this was her first year teaching seventh-grade Social Studies, and thus a lot of the content was new for her. Ms. Monroe was also more conscious of this deficit and made a conscious effort to always be prepared in terms of the content she was responsible for and possible questions her students might have. Thus her content circle is representative of her beliefs about her familiarity with the seventh-grade curriculum. However, her resulting smaller TPACK knowledge is not reflective of my observations, the data collected or our conversations about her teaching practices. The data suggests that Ms. Monroe should have had a very large area of TPACK, based upon both the amount of effective teaching with technology she engaged with and the depth her use of technology afforded her students. Ms. Monroe also self identifies as someone who teaches effectively with technology. As a result, for Ms. Monroe, the TPACK model and her own model fail to capture the realities of her classroom and her ability to teach effectively with technology. This then raises the question, why does the TPACK model fail to represent Ms. Monroe accurately? The TPACK model, as designed, treats each component as equal parts in creating TPACK knowledge. The evidence from Ms. Monroe implies that this should not be the case. My model of Ms. Monroe's TPACK (Figure 82) accounts for her lack of content knowledge, while preserving her strength in producing TPACK knowledge.

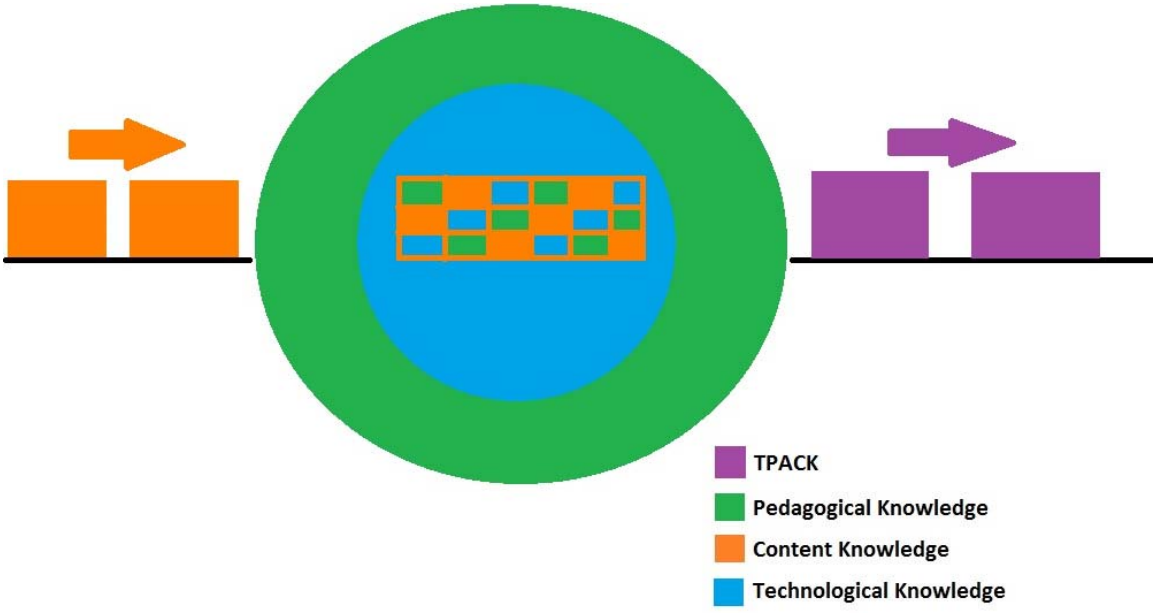


Figure 82. My Drawing of Ms. Monroe's TPACK.

In my model, a large pedagogical knowledge circle is layered with a large technological circle. This reflects Ms. Monroe's strengths in each of those areas. This large area of technological pedagogical knowledge is reflective of both her breadth and depth of knowledge. I then drew a conveyor belt where I put large boxes of content knowledge. I did this to reflect the content knowledge Ms. Monroe had. While she did not possess a large quantity of content knowledge, for the topics she taught, she did possess a solid understanding of the content when delivering lessons to students. In other words, while Ms. Monroe was unfamiliar with the seventh-grade curriculum as a whole, she was very knowledgeable and prepared to teach every content related topic he engaged her class with. These boxes of content knowledge then move through her technological pedagogical knowledge where they are once again layered and mixed

together. I define the resulting box that emerges as her TPACK knowledge. I use the conveyor belt as a means to capture the process she went through in creating her TPACK knowledge. In my model, both Ms. Monroe's depth and breadth of TPACK knowledge is represented. The multiple TPACK boxes represent her breadth of TPACK knowledge while the large size of her TPACK boxes represents her depth with TPACK. In Ms. Monroe's case, the TPACK model in theory reflected her self-reported TPACK model, yet both models failed to capture the depth and breadth of her TPACK knowledge that I believe my model presents.

In Mr. Hamilton's case, TPACK is not even present in his model (Figure 83), as he considers his technological knowledge, when used for teaching, to be part of his pedagogical knowledge.

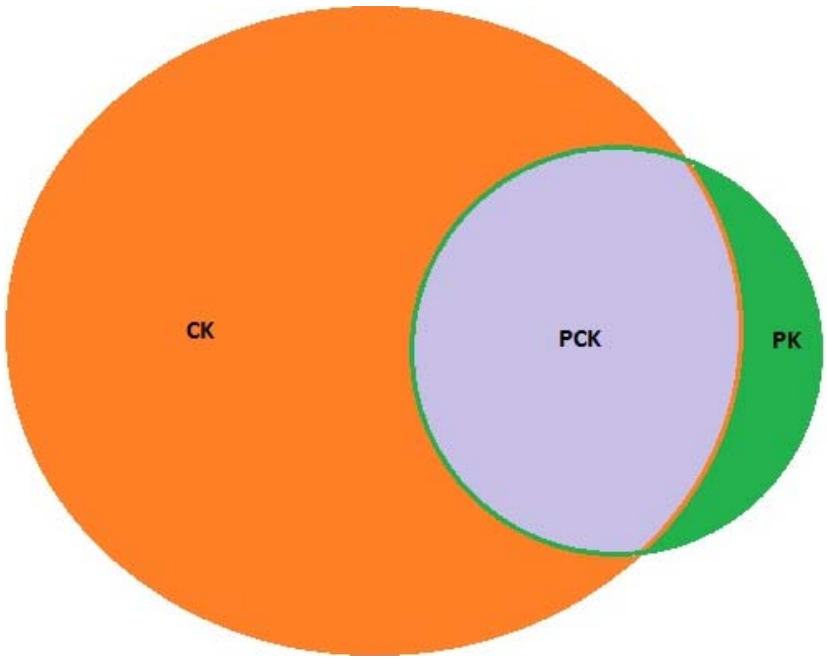


Figure 83. Mr. Hamilton's Self-reported TPACK.

Mr. Hamilton's model is reflective of the classic pedagogical content knowledge model. In his case, he drew his content knowledge larger to capture both his belief that he knew more about History than he did about teaching and his own personal interest in history rather than education. However, his pedagogical knowledge is still quite large, creating a robust pedagogical content knowledge area. Because there is no technological knowledge in his model, there is no resulting TPACK knowledge. Once again, like with Ms. Goodman and Ms. Monroe, Mr. Hamilton's model does not reflect the TPACK practices captured during this study. The data suggests that Mr. Hamilton should have had a large area of TPACK, based upon both the amount of effective teaching and engagement with technology as well as the depth of his use of technology for him and his class. Mr. Hamilton also self identifies as someone who teaches effectively with technology, and yet because of his belief that technological knowledge is a component of pedagogical knowledge when teaching, his model lacks a TPACK component. As a result, for Mr. Hamilton, the TPACK model and his own model fail to capture the realities of his classroom and his ability to teach effectively with technology. My model of Mr. Hamilton's TPACK (Figure 84) accounts for the lack of a technological knowledge component and still reflects the TPACK that Mr. Hamilton was able to produce.

At first glance, both Mr. Hamilton's model and my own model look similar. We both have a very large circle of content knowledge along with a large pedagogical content area. However, in my model, I put strands of technological knowledge within

Mr. Hamilton's pedagogical knowledge. These strands represent how technological knowledge is a part of Mr. Hamilton's pedagogical knowledge. Where Mr. Hamilton's content and pedagogical knowledge intersect now becomes his TPACK knowledge, rather than just his pedagogical content knowledge, because technological knowledge exists within his pedagogical knowledge. This large area of TPACK presents a more accurate reflection of the breadth and depth of TPACK knowledge Mr. Hamilton displayed. In Mr. Hamilton's case, the TPACK model in theory did not reflect his self-reported TPACK model, yet both models failed to capture the depth and breadth of his TPACK knowledge that I believe my model presents.

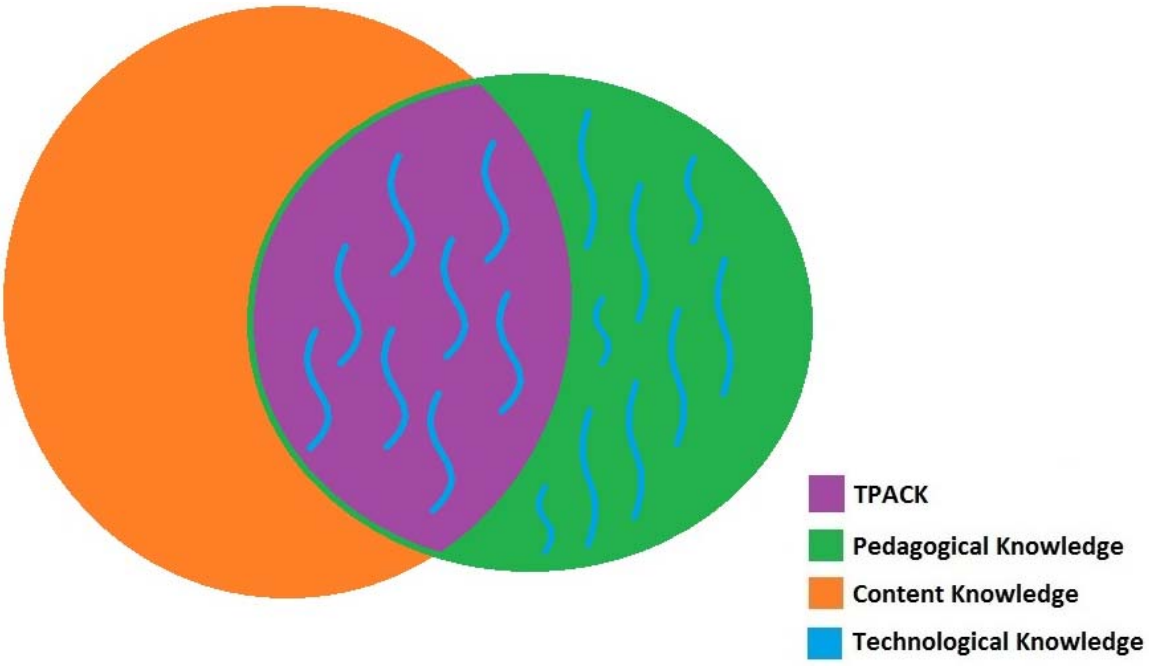


Figure 84. My Drawing of Mr. Hamilton's TPACK.

In all three cases, the TPACK model in theory failed to capture the reality of each teacher's TPACK practices. In my models, while I believe I created an accurate representation of each teacher's TPACK, I failed to create a singular model that could account for the TPACK practices of Ms. Goodman, Ms. Monroe, and Mr. Hamilton. This lack of a singular model supports the notion that the TPACK framework may be ill suited to describe the realities of what teaching with technology looks like in practice (Brantley-Diasa & Ertmer, 2013). This inability to capture TPACK practices with just pedagogical, content, and technological knowledge highlights the complexity found in trying to create *effective teaching with technology*. The data and my models both indicate that other factors play an integral part in TPACK development. This includes the process of combining these circles of knowledge and each teacher's beliefs about technology's role in teaching. Furthermore, the TPACK model in theory does not account for both the depth and breadth of TPACK skills a teacher may have in practice. The TPACK model fails to account for how teachers progress along their development of individual teaching skills. Understanding how teachers grow their TPACK skills, both in terms of breadth and depth, can help define what constitutes effective teaching with technology (Berliner & American Association of Colleges for Teacher Education, 1988; Brandt, 1986). For example, if a teacher uses technology every day, but uses it only for activities that utilize recall and memorizing of information, should they have a large TPACK knowledge? The TPACK model does not speak to this, and yet the data collected indicates this is an important consideration when thinking about a teacher's ability to

teach effectively with technology. This seems to indicate that in practice, the TPACK model does not hold up. My models offer an alternative way of capturing both the depth and breadth to teaching because they are reflective of what happened in practice. This implies that for the TPACK model to accurately capture what is happening in the classroom, both the teacher's breadth and depth with TPACK must be considered.

Students' placement within the TPACK model. Based upon the data collected in Chapter IV, each teacher expressed concern about the lack of consideration students had in our conversations about their TPACK practices. Clearly, an argument can be made that pedagogical knowledge includes knowledge about learners. However, in these three cases, when presented with that argument, each teacher clarified that this was not sufficient enough to account for the impact students had in their use of technology. For example, Ms. Goodman, Ms. Monroe, and Mr. Hamilton expressed their belief that their students' prior knowledge with technology affected the decisions they made within their own classrooms. Mr. Goodman actively sought students who could help her evaluate technology prior to using it within her classroom and Mr. Hamilton modified his assignments to include technologies that students brought to him. These examples indicate that, in practice, teachers evaluate and used their students' technological knowledge to help create their own TPACK knowledge. If this is the case, then students are missing from the TPACK model in theory.

Ms. Goodman, Ms. Monroe, and Mr. Hamilton also indicated that the success of any TPACK lesson depended on their students' ability to engage with the technology

component of that lesson. In some cases, like when Mr. Hamilton used the wireless mouse to manipulate the content during his teaching, the ability of his students to engage with the technology component was a non-factor. However, in other cases, like when Ms. Goodman had her students use *PowerPoint* to create a virtual museum, each student's interaction with *PowerPoint* affected their ability to be successful with her TPACK instruction. In Ms. Monroe's case, her students adopted different aspects of her TPACK instruction when using technology to improve their organizational and note taking skills. In each case, students had a role to play in the effectiveness of the TPACK-based instruction.

The data collected indicates that both students' prior technological knowledge and their ability to engage with the technological component of a lesson are factors that have an impact on both the types of TPACK decisions teachers make and the effectiveness of those decisions. These two factors are contained within the students themselves, and not a part of the pedagogical knowledge teachers would have about students. Thus, students should be distinctly represented in any conception of TPACK to better reflect their contributions to teachers' TPACK development.

When is TPACK, TPACK? In conversations with Ms. Goodman, Ms. Monroe, and Mr. Hamilton, each was able to identify with the idea of effectively teaching with technology. However, while the data indicates that all three believe that TPACK occurred, questions arose during our conversations about the timing of when TPACK was created and if it really mattered at all in the final result. This led to additional

questions about if a teacher could luck into TPACK, or if something could be considered TPACK if you had not planned on it before hand. All of these are interesting and valid questions that emerged from the data collected. Unfortunately, the TPACK model in theory fails to address these questions. However, based upon the data from this study, a few observations can be made.

First, Ms. Monroe was convinced that for her, TPACK was a planned event, that there was a process by which she went through in order to effectively teach with technology. Mr. Hamilton and Ms. Goodman conceded that TPACK could be planned, but also felt like TPACK could emerge from the moment. For example, Mr. Hamilton often used simple techniques, like pausing class, having students search on different search engines for information about a historical event, and then discussing the ramifications of their findings as a class. In almost all of these instances, Mr. Hamilton made the decision to have students engage in this TPACK activity based upon a comment or questions made in that particular moment in class. In fact, while he might include this activity in a later class period, he often times did not, because that class did not reach the same discussions as the previous class. Thus, the data seem to suggest that TPACK does not need to be a planned process and that it can occur in the moment. All three teachers indicated, and their classroom practices confirmed, that TPACK could be created both spontaneously in the moment and through prior planning.

Secondly, Ms. Goodman, Ms. Monroe, and Mr. Hamilton all felt that one could create TPACK by accident or without conscious choice. Even Ms. Monroe, who believed

that her TPACK was planned, indicated that she might have engaged in TPACK thinking without being aware of it. The data collected during this study reflects this idea of the teachers engaging in TPACK practices without being aware of it themselves. Mr. Hamilton, as previously shown, believed that his pedagogy accounted for his TPACK, and thus he was not conscious of effective teaching with technology, but rather if he was being effective with his teaching in general. This desire to create effective teaching moments seems to be the unifying element collected in this study, regardless of if the TPACK was planned or not. For example, with individual activities like Ms. Monroe's *Skype* session with India and Ms. Goodman's virtual museum, the use of TPACK knowledge to design and create the activity was clearly a conscious decision. However, all three teachers' use of Haiku was constructed to provide their students the help they needed to succeed, a decision that was based upon their desire to teach effectively. Despite the fact that none of the teachers viewed their Haiku pages as a product of their TPACK knowledge, as the data suggests, it was a central component to how all three of them manifested TPACK within their classroom. Thus the data indicates that a teacher need not be aware of TPACK in order to create it. It also suggests that TPACK can exist in instances where teachers view an activity or process as effective teaching, and not specifically effective teaching with technology.

These questions about the timing and awareness of TPACK are difficult to conceptualize in a graphic like the TPACK model. However, they are important questions in terms of how the theory of TPACK is applied in practice. This study

demonstrates that these questions are important concepts that should be considered when assessing a teacher's ability to teach effectively with technology. It also demonstrates the lack of context the current theory of TPACK has in regards to answering these questions.

How TPACK is Shaped by Its Environment

The influence that a teaching environment has on the development of TPACK was not something I initially set out to investigate. However, during my observations, it became apparent that the TPACK model was designed in a vacuum. In a real setting, like Lakeside, the environment plays a role in how teachers develop and implement their TPACK teaching practices. While this study cannot speak for all environments, it can offer insights into how Ms. Goodman's, Ms. Monroe's, and Mr. Hamilton's TPACK were affected by their teaching environment.

Availability of technology and tech support. Ms. Goodman, Ms. Monroe, and Mr. Hamilton never expressed any concerns about acquiring the right technology for their lessons or having the necessary support to use that technology. Furthermore, all three expressed satisfaction with the support they received and their students received from the tech support department. Research indicates that having an onsite dedicated support staff to maintain the technology infrastructure is a key feature in successful 1:1 technology environments (Schrum & Levin, 2012; Tusch, 2012). This onsite technical support provided Ms. Goodman, Ms. Monroe, and Mr. Hamilton the support they needed to enact their TPACK practices. For example, on the day of Ms. Monroe's *Skype*

conversation with India, the main web camera that she planned on using had technical difficulties. Ms. Monroe became aware of this roughly 35 minutes before the *Skype* session. Despite this crisis, Ms. Monroe was able to notify tech support who had a new, albeit lesser quality, web camera in her room and configured within 15 minutes. Ms. Monroe was able to make accommodations in her room for this new camera and the *Skype* session went off without a hitch. In this example, the availability of tech support directly impacted Ms. Monroe's ability to engage in TPACK practices.

Ms. Goodman, Ms. Monroe, and Mr. Hamilton all confirmed in our conversations that they had met with the director of instructional technology (IT) for Lakeside on numerous occasions to find out about the availability of different software or technologies. Many times these meetings were fact finding in nature, as they would share an idea they had for their class, and the director of IT would suggest technologies or software that could help accomplish their ideas. Any suggestions they received from the IT support staff was followed up with material support in the form of the actual technology or training on how to use it. As a result, many of the TPACK-based practices they engaged in during this study were products of conversations they had started with Lakeside's technical support team. Ms. Monroe's use of *Evernote* and Ms. Goodman's use of *Microsoft Publisher*, for example, came directly from their conversations with the IT support staff about their classroom needs. The data collected suggests that having a supportive IT staff can both facilitate the resolution of technical issues while also providing assistance in finding technical solutions for classroom ideas. While this type of

support does not create TPACK directly, I would argue that it is necessary for TPACK to flourish.

1:1 digital environments. Ms. Goodman, Ms. Monroe, and Mr. Hamilton all agreed that teaching within a 1:1 environment forced them to think about ways they could integrate the students' laptops and applications (e.g., *Internet, Word, Excel, and Google Earth*) into their curriculum. This had the effect of changing the type of practices they used in their classroom, including the way they created classroom management procedures and the delivery of their curriculum (Storz & Hoffman, 2013). In some cases, like with Ms. Goodman, she expressed that teaching within a 1:1 environment helped her become more comfortable teaching with technology. While Ms. Monroe and Mr. Hamilton were already technology enthusiasts prior to teaching, they too expressed that they became better at teaching with technology because of the 1:1 environment. Much like tech support and the availability of technology, teaching in a 1:1 environment seems to foster the type of environment conducive to TPACK teaching. Just from a logistical standpoint, a 1:1 environment provides teachers with technology that is ready to be used on a daily basis and not something that has to be reserved. Additionally, students who are part of a 1:1 environment are better situated to begin TPACK type activities, as the logistics of logging in, familiarity of the device, and packing up are no longer a concern that requires a procedure to accomplish. For students, these activities are part of their normal schooling routines.

Administrative and school system attitudes towards technology. A supportive administrative team and policies that promote technology rich environments, like 1:1 environments, are essential in helping teachers grow their technology practices (Dunleavy, Dexter, & Heinecke, 2007). While none of the teachers directly referenced this level of support during our conversations or my observations, it became apparent that Lakeside's disposition towards creating an atmosphere supportive of technology's use in instruction was a factor in TPACK development. Ms. Goodman, Ms. Monroe, and Mr. Hamilton all cited the need for teachers to be fearless in using technology. I would suggest that their comfort with being fearless in their approach to technology was in part due to the supportive approach of the school's administration. In speaking to the school's headmaster, he confided in me that he wanted his teachers to feel empowered to use the technology provided to them and their students in the best ways they saw fit. As mentioned in Chapter III, Lakeside's mission statement had an entire section that was dedicated to its commitment to using technology in the classroom. Thus, while not directly related to the formation of TPACK in teachers, I believe that an administration can create the type of environment where TPACK can flourish.

Characteristics of TPACK

While Ms. Goodman, Ms. Monroe, and Mr. Hamilton enacted their TPACK differently, some common characteristics were shared across all three of their teaching practices. These characteristics are helpful in understanding what TPACK looks like in practice.

Characteristics of the teacher. As mentioned before, despite the fact that all three of the teachers in this study enacted TPACK differently, they all shared common characteristics that help us understand what TPACK looks like in practice. Based upon the findings in this study, teachers who enact TPACK practices are:

- Patient with technology
- Willing to fail with technology
- Value technology's potential to shape instruction
- Recognize technology's limitations for teaching

In all three case studies, the teachers never became frustrated with technology despite the numerous opportunities that arose during their uses of technology. For example, Ms. Monroe demonstrated calm and patience when her primary web camera failed the day of their first *Skype* video conference with India. Her patience and planning allowed her to just move on to her "Plan B" without sacrificing the activity or displaying negative attitudes about technology around her students and peers. When Mr. Hamilton could not download a picture from the Internet because of the website blocking it, he remained patient and turned it into a learning opportunity by having his students try and find the picture via an alternative website. When, Ms. Goodman's students became frustrated with the mechanics of the virtual museum *PowerPoint*, Ms. Goodman stayed patient and helped solve their problems while reassuring her students that it wasn't a big deal. It became apparent that in practice, teachers who practice TPACK also practice patience with technology.

All three teachers expressed that in order to be successful with technology, a teacher has to be willing to fail with technology. They made a clear distinction between failings because of a lack of preparation in using the technology with failings because the technology ended up not meeting the learning goals they had in mind. Ms. Goodman, Ms. Monroe, and Mr. Hamilton all agreed that failing with technology because of insufficient prepping and understanding of the technology was inexcusable as an educator. However, all three teachers felt that effective teaching with technology is strengthened by reflecting on instances where technology's inclusion failed, assuming the proper preparation had been done. Each of the teachers was able to identify instances in their own professional development where their use of technology had failed in the lesson they were teaching, yet their understanding of how to teach effectively with technology grew. For example, early in the year, prior to starting this study, Ms. Monroe shared that initial attempts to use technology to help her students' organizational skills had failed because of the methods she chose to implement the technology. However, by the time of this study, the findings reflect that Ms. Monroe was able to use technology effectively to help provide organizational strategies to her students. Thus, in practice, teachers who use TPACK knowledge, are willing to fail with technology in order to achieve the types of experiences that TPACK-based teaching can provide.

Ms. Goodman, Ms. Monroe, and Mr. Hamilton all valued the potential technology has to shape the experiences in the classroom. Ms. Monroe indicated that

without using technology, the learning experiences that her students achieved during her unit on India would not have been possible. Mr. Hamilton expressed on several occasions that the affordances technology provided helped him deliver more content to his students through a greater variety of mediums. Ms. Goodman was able to create more engaging and exciting variations of traditional assignments because of her willingness to use technology in her instruction. In all three cases, the teachers recognized that technology offered them an opportunity to shape the instruction that their students experienced in a positive way. However, while Ms. Goodman, Ms. Monroe, and Mr. Hamilton valued the contributions that technology could make to their teaching practices, they were keenly aware of the limitations technology creates in the classroom. This awareness of technological limitations went beyond just simply understanding the features of a particular technology, but also incorporated an awareness of how the use of technology might limit their students' learning opportunities. For example, Ms. Goodman chose to have her students make papyrus paper by hand, rather than showing them a computer simulation model because of the authentic experience the activity offered the students. Likewise, Mr. Hamilton recognized that some of his students were not particularly proficient with computers nor were they creative with technology. For these students, assignments that required them to produce something with their computers often induced stress about the assignment that detracted from the learning goals Mr. Hamilton had envisioned. In order to preserve the learning outcomes for his assignments, Mr. Hamilton allowed

students the choice of completing the assessment via more traditional means, like a research paper. Ms. Monroe also pointed out that the use of technology can often result in her students feeling stressed about learning something new to complete the assignment. All three of the teachers expressed that the use of technology can often consume an exorbitant amount of both the teachers' and students' time. This means that in practice, teachers who practice TPACK understand both the value and limitations that technology brings to their teaching practices.

Characteristics of TPACK-based instruction. While every technology brings something different to the table and teachers will ultimately choose to implement their TPACK strategies differently, based upon the findings in this study there are some defining characteristics to TPACK-based instruction.

- The technology is never positioned as the focus of the instruction
- Students are given opportunities to practice with technology before expecting to use it for learning.
- Students' familiarity with technology is embraced and utilized by the teacher

Ms. Goodman, Ms. Monroe, and Mr. Hamilton all used TPACK-based instruction during this study. However, when describing their own TPACK practices all three of them insisted that although technology was part of their thinking when developing and implementing the lesson, they were conscious of making sure that the technology did not become the focus of the lesson. For example, when Ms. Goodman introduced her travel brochure project which utilized *Publisher*, she spent a majority of the time

reviewing what type of information should be included and how students should think about organizing their research. Mr. Hamilton practiced for weeks during the summer to ensure that he could not only operate the wireless mouse he used in class, but that he could also use it to effectively replace the need for him to stand beside his laptop. Thus, despite the fact that he could highlight content, open new webpages, and transverse files remotely while teaching and walking around his room, none of the students focused on his use of the wireless mouse. Ms. Monroe often times took the focus off the technology by allowing students to choose the technology they felt best met their needs for a particular assignment. By indicating to her students that success with the assignment was not dependent upon the type of technology the students used, Ms. Monroe was able to take the focus off of the technology. Based upon the practices of Ms. Goodman, Ms. Monroe, and Mr. Hamilton, the need to position learning—and not the technology being used—as the focus of the classroom experience became an essential characteristic to TPACK-based instruction.

Part of the reason why all three of these teachers were able to keep technology from becoming the focus of their lessons was because they scheduled opportunities for students to gain experience with the technology outside of the scope of an assignment. In this way, when it came time to teach with the technology students were already familiar with the technology and its capabilities. For example, Ms. Monroe gave her students an entire day to work with the software *Evernote*. She modeled the software for them, gave them a simple activity to do using *Evernote*, and then allocated the rest

of the class for them to explore and use *Evernote* on their own. Mr. Hamilton embraced this concept differently. He often encouraged his students to come to him and suggest new ways to complete assignments using technologies with which they were already familiar. All three teachers spent at least three days and up to five days teaching their students how to use their classroom *Haiku* website at the beginning of the year. During this time, the teachers modeled for them where information would be stored on their website and how to use their website for classroom communication. Ms. Goodman, Ms. Monroe, and Mr. Hamilton also gave their students opportunities to interact with this website and complete some tutorial activities so that by the time my study took place, students' use of *Haiku* for their classroom needs had become routine. This conscious effort to ensure students had time to practice and become familiar with technology prior to them using it as part of a lesson or activity emerged as a characteristic of TPACK-based instruction.

Finally, Ms. Goodman, Ms. Monroe, and Mr. Hamilton were all aware of the role technology plays in the culture and lives of their students. In formal and informal conversations with all three teachers, they stressed how for them effective teaching with technology meant they needed to understand how technology was viewed from their students' perspective prior to using it in their instruction. For example, Ms. Monroe used *Instagram* as a means of sharing pictures of both the activities and accomplishments of her classes to her students and their parents. However, before she enabled this with her students, she suggested that they create a school *Instagram*

account separate from their personal accounts in order for them to retain a sense of privacy. In speaking to Ms. Monroe, she commented that she approached using *Instagram* this way because she understood how social media was a personal part of her students' lives, and she did not want to invade that personal space of theirs with her school account. Ms. Goodman on the other hand, used discussions about technology as a means of hooking her students' interest in her lessons. She would often times incorporate discussions about their cell phone use, video game playing habits, and social media routines to engage them in discussions about a topic she wanted to introduce to them. Much like the vignette shared in Chapter IV, Ms. Goodman seized upon their natural familiarity and knowledge with these different technologies to help make connections to the topics she was teaching. In speaking to Ms. Goodman, she was keenly aware of the fact that her students were part of a digital generation, and that while she was not of that generation, she understood that tapping into this digital space was an important part of her pedagogical practices. For all three teachers, understanding their students' attitudes and digital practices was an essential characteristic to TPACK-based instruction.

Implications of the Research

Implications for Teachers

This study captures what TPACK looks like in practice. Based upon the data collected and the discussions about how each of the teacher's TPACK influenced the decisions they made within their classrooms, some important implications for teachers

can be reached. First, a case can be made for why TPACK in practice matters for classroom teachers. Secondly, the results from this study have implications for the process of developing TPACK for practicing teachers. Finally, based upon these two implications, a list of recommendations to help develop TPACK in practice for practicing teachers can be made.

Why TPACK matters in their instruction. As Ms. Goodman, Ms. Monroe, and Mr. Hamilton noted, students today are a product of the digital age. Laptop computers, tablets, and Internet use are a common part of their lives. Due to the increased capabilities of smartphones, many students today are carrying around mini computers in their pockets. Furthermore, there is little evidence to suggest that our lives will become less digital in the future. Our schools are mirroring this phenomenon, albeit at a much slower pace. Schools like Lakeside embrace this digitized curriculum by implementing 1:1 programs and creating an environment supportive of technology. However, even schools without this level of commitment to a digitized curriculum still find a student population well entrenched in the digital culture of today. Given the importance that pedagogical knowledge places on knowing your students and the increased importance technology has in their lives, it stands to reason that teachers must begin or continue to build their technological knowledge, in order to create a curriculum that meets the needs of their students. Developing TPACK practices is one such way in which teachers can meet the demands of this new generation of digital learners.

This study's research into TPACK in practice has shown that for at least these three teachers, TPACK can manifest itself in many different ways. Additionally, as discussed before, TPACK in practice has a depth of knowledge to go along with the breadth of knowledge implied in the TPACK model. This is important to note, because while all three teachers demonstrated TPACK in practice, only Ms. Monroe, and to a lesser degree Mr. Hamilton, demonstrated depth with TPACK. When thinking about why TPACK matters, we should not only be satisfied that a teacher is able to combine their three knowledge to produce TPACK, but rather we should be striving for these teachers to create the type of TPACK knowledge that provides their student with an opportunity to learn effectively with technology.

Another reason why TPACK matters for teachers is because of the changing environment in which they teach. With the increased number of virtual schools, massive online open courses (MOOC), blended learning environments, and the introduction of flipped classrooms, teachers now occupy a learning space that is becoming more digitalized in nature. In order to succeed and take advantage of these new environments, teachers are going to have to develop their TPACK practices. These findings suggest that, like Ms. Goodman, teachers who care about their profession will learn how to adapt to these new environments and develop a sense of TPACK over time. This also speaks to the importance of creating a support system to help nurture the development of TPACK within teachers.

The process of developing TPACK knowledge. Professional development must be offered to our inservice practicing teachers in order to help facilitate their growth with TPACK teaching practices. This professional development should occur in three stages. First, professional development sessions should be designed to increase the breadth of knowledge teachers have about technology. These sessions should be provided on an ongoing basis as a means of staying current with trends in technology. Each of these sessions should address different trends in technology and provide opportunities for teachers to learn about and have hands-on experience with these technologies. For example, a professional development session on social media could begin with an information session about current trends in social media and student involvement in social media. Then teachers could rotate between different stations setup with different social media platforms like *Twitter*, *Instagram*, and *Facebook*. Under the supervision of an instructional technology facilitator, these teachers could then have time to practice with and become more familiar with these technologies.

Professional development sessions should also develop the depth of teachers' TPACK knowledge. In order to develop depth with TPACK practices, teachers should be given an opportunity to learn in detail about a narrow range of technologies. Then, follow up sessions should provide these teachers opportunities to increase their skills with these technologies until they have enough practice with them to recreate them in their own classrooms. Finally, these sessions should then focus on sharing techniques and best practices between educators to improve the overall quality, thus building

depth of knowledge with TPACK practices. For example, a professional development session could be offered on a learning management system like Haiku. In the first session, teachers could be shown how to login Haiku, navigate its menus, and basic functionality like adding, editing, and deleting a webpage. Then, in following sessions, these teachers could learn more advanced features of Haiku, like how to use the calendar feature, the student drop box, or blogging platforms. Finally, as teachers begin to use Haiku in their own classrooms, professional development sessions could be offered for them to share success stories and important reflections they learned during their use of Haiku. This entire process would help develop the depth of their TPACK practices with Haiku.

Lastly, teachers should continue to attend professional development sessions aimed at improving both their content knowledge and their pedagogical knowledge. Specifically, professional development sessions should allow for teachers to practice combining content and technological knowledge in order to create technological content knowledge. These professional development sessions should emphasize how content and technological knowledge can offer both affordances and limitations to instruction when they are combined. For example, a professional development sessioncould be offered on using *Instagram* for instruction. Teachers could then practice making pro and con list for the use of Instagram for various standards in their curriculum. This process of picking a technology and then evaluating its contribution to the standard would give teachers practice in combining their content and technological

knowledge to create technological content knowledge. In instances where there is a significant amount of synergy for using the chosen technology with a particular standard, teachers could then practice adding pedagogical knowledge to create a TPACK-based lesson.

Recommendations for teachers. TPACK is not something that can be acquired from a book. Each of the different components of TPACK must first be present (even if technological knowledge is inside of pedagogical knowledge like Mr. Hamilton) before it can be created. Each teacher's version of TPACK will be different, accounting for both the depth and breadth of each type of knowledge they possess and how they choose to combine their different knowledge. Based upon the discussion of the findings of this study, the following recommendations are made for inservice teachers.

- Teachers should seek out professional development opportunities to help build both the breadth and depth of knowledge they possess. These professional development opportunities should not be limited to activities that promote technological knowledge. Content and pedagogical knowledge should be developed in order to build a strong foundation for creating TPACK.
- As a means of developing technological knowledge, teachers should embrace the expertise and experiences that their students bring to the classroom. This means that teachers should encourage students to suggest alternative ways to complete project and assignments using technology. This allows

teachers to include a more diverse set of technologies in their classroom, without first having to become expert users of those technologies. It also allows teachers to grow their technological knowledge by learning from their students how these technologies can be applied in educational settings.

- TPACK-based instruction does not have to be developed from scratch. A teacher can begin to develop their TPACK practices by simply replacing components of their traditional activity with complementary pieces of technology. With practice and experience, teachers will begin to develop TPACK knowledge by using these technologies to provide experiences for their students that were not available in the traditional activity.

Implications for Teacher Educators

The findings from this study have important implications about how teacher education programs prepare future teachers to teach with TPACK knowledge. First, to produce the type of teachers who can implement TPACK practices into their curriculum, teacher education programs must adapt their own curriculum to value TPACK knowledge in its graduates. Next, teacher education programs must adopt new programs that give students the opportunity to practice combining their different knowledge bases in order to create TPACK. As this study has shown, TPACK can manifest itself in many different ways, with varying degrees of breadth and depth. Thus, there is no “one” way to teach a preservice teacher how to develop their TPACK. This means that teacher education programs should adapt their programs to provide

students with the foundation necessary for students to create their own personalized TPACK practices. To do this, teacher education programs must first inform their students about the complexities in creating TPACK knowledge. This study demonstrated these complexities by highlighting the different ways in which Ms. Goodman, Ms. Monroe, and Mr. Hamilton developed their TPACK knowledge. Teacher education programs must teach students that when they are teaching with technology, they must view it through a technological, pedagogical, and content knowledge lens. However, teacher education programs must also make explicit the difference between teaching with each of these knowledges and TPACK, the process of combining these knowledges to create a new type of knowledge for teaching effectively with technology. This difference is vital in helping students understand what effective teaching with technology looks like in practice. Until teacher education programs commit to informing their students about how TPACK is created and the necessary knowledge components to build TPACK knowledge, their students will be left on their own to try and piece together TPACK knowledge. To adapt their teacher education program to account for TPACK knowledge, new courses will have to be added to address the topic of teaching with technology along with a commitment to infuse the concept of TPACK into other teacher education classes as part of a unifying curriculum.

How to prepare teachers to teach effectively with technology. In order to prepare students to teach from a TPACK knowledge base, teacher education programs must provide their students with ample opportunities to practice this type of teaching

as part of their program. However, as mentioned above, courses that expose students to a basic set of technologies is not preparing them to teach effectively with technology. Students must be given opportunities to practice combining content, pedagogical, and technological knowledge together, in order to get a sense of how their personal TPACK knowledge develops.

One means by which to achieve this is by creating a dedicated instructional technology course. As implied by the title, this course is not just about technology, but rather how technology can be used for instruction. Much like a Social Studies methods course, this course would be grounded in theory, but also provide students with practical instructional technology practices they could use to begin to build their TPACK practices. Assignments could be created that scaffolds the process of combining the different knowledge bases found in TPACK, consummating in a final project that demonstrates their ability to design and execute a TPACK-based lesson. One consideration that must be taken into account is that often times, because of the way technology has integrated itself with our society, we come to see technology as something we can check off once we learn it. Just like a single Social Studies methods course only provides one with the base upon which to build their social studies teaching practices, this instructional technology course only provides students the base upon which to build their own TPACK knowledge. Students should not be expected to emerge from this course with the ability to execute TPACK in practice with any more consistency then a Social Studies teacher would have in teaching history after a Social Studies

methods course. Rather, these students would have the knowledge in theory about TPACK and some practice in creating their own TPACK. As this study shows, their TPACK will then grow once they have more opportunities to use this new knowledge in practice.

The creation of an instructional technology course like this is an essential first step. However, in order to make TPACK knowledge a standard practice, it will have to be included as part of a teacher education program's entire curriculum. For example, diversity and educational psychology classes are not the only place where students are taught about these topics. Rather, issues of diversity and educational psychology are integrated into methodology courses, pedagogy courses, and classroom internships. This is done because of the importance of these two topics and because both of these topics play a key role throughout the curriculum. In much the same way, TPACK must be integrated throughout the curriculum so that students can see how TPACK is applied within the context of pedagogy classes, methods classes, diversity classes, educational psychology classes, and classroom internships. This will help students continue to develop their TPACK practices as they emerge from their teacher education program.

Recommendations for teacher educators and teacher education programs. Teacher education programs must insure that they are positioned correctly in order to help their students graduate with the ability to teach effectively with technology. Based upon the discussion of the findings of this study, the following recommendations are made for teacher education programs.

- Teacher education programs should develop an instructional technology methods course that does more than expose their students to a variety of technologies, but rather gives them both the theory of how to teach effectively with technology and the practical methods needed to begin creating their own TPACK practices.
- Teacher education courses should integrate effective teaching with technology practices and theory into the entire curriculum. Students need to see how teaching with technology fits in with their other methods course, along with other important concepts in education like diversity and educational psychology.
- The internship and student teaching portion of a student's teacher education program should have a requirement for students to demonstrate their ability to teach effectively with technology, at a level that is to be expected of a new teacher.

Implications for Schools and Policy Makers

The findings from this study suggest that both schools and policy makers have a role in the development of TPACK knowledge within their teachers. Schools and policy makers establish the environment in which teachers work. The right environment can facilitate the growth of TPACK knowledge in teachers. This study suggests that there are characteristics of what an environment that facilitates TPACK looks like in practice.

Creating the right environment. When placed in the right environment, this study indicates that a teacher can gain initial TPACK knowledge or grow their existing TPACK knowledge. Ms. Goodman had little if any TPACK knowledge prior to coming to Lakeside. However, because of the support she received from her school and the 1:1 laptop imitative that she taught in, she was able to create a sense of TPACK knowledge. Ms. Monroe, who already had TPACK knowledge prior to coming to Lakeside was able to take advantage of the environment to grow her TPACK knowledge by incorporating new technologies and ideas into her teaching practices. All three teachers' TPACK knowledge benefited from teaching at Lakeside.

Lakeside enacted several practices that facilitated Ms. Goodman's, Ms. Monroe's, and Mr. Hamilton's TPACK knowledge. First, the administrators at Lakeside ensured that the staff was supported and encouraged to try new ways to integrate technologies into their curriculum. This includes creating a mission statement that included technology as a central component to learning at Lakeside. Second, policy makers at Lakeside ensured that the right type of technical support was available to the school, including a technical support helpdesk and a director of IT. This director of IT worked with teachers to understand their TPACK ideas and help them find the right technical knowledge solution to meet their need. Finally, a 1:1 laptop environment was created and the necessary infrastructure was put in place to guarantee that the teachers had access to both technical support and the equipment necessary to implement their

TPACK practices. This equipment includes accessories like web cameras, wireless mice, scanners, software, and access to high speed Internet connections.

Recommendations for schools and policy makers. Based on the evidence in this study, a list of recommendations to help schools and policy makers facilitate TPACK knowledge growth is offered.

- Policy makers should adopt a 1:1 initiative or a Bring Your Own Device (BYOD) initiative. Ensuring that each student has access to a digital device not only increases the digital fluency of students, but it provides teachers a technology rich environment from which they can grow their TPACK practices.
- However, 1:1 or BYOD initiatives should be implemented carefully, to insure that the necessary support structure is in place and that teachers have been given an opportunity to become familiar with teaching in a 1:1 or BYOD environment through professional development and training.
- Schools should offer professional development programs that focus more on helping teachers practice combining the knowledge found within TPACK.
- Schools should provide support staff that can assist teachers with the technological knowledge component of TPACK. Including providing technical support for classroom technology and providing teachers with a resource to help them match technologies to their pedagogical and content needs.

- Schools and policy makers should incorporate the goal of learning with technology into their school's mission statement. Then this goal should be supported through the actions of the school and policy makers. This means that teachers should be encouraged to take calculated risk with technology and be supported when they attempt new ways to use technology as part of their instruction.

Implications for Future Research

The findings for this study suggest implications for future research including: (a) additional research efforts to draw a better TPACK framework that accounts for potential missing elements and the transforming nature of TPACK knowledge; (b) studies in new environments including public school settings with and without 1:1 initiatives; and (c) studies that examine how teachers' TPACK knowledge changes over time when teaching in a 1:1 environment. I expand upon each of these ideas below.

TPACK 2.0

The findings of this study indicate that TPACK in practice is much more complicated than the model provided by the TPACK framework. In this study, TPACK in practice, students' placement in the model, the nature of technological knowledge, and how the environment affects TPACK all became issues that the TPACK model failed to account for with Ms. Goodman, Ms. Monroe, and Mr. Hamilton. New research studies should be undertaken to investigate what components might be missing from the TPACK model. By collecting a larger sample size, additional insights could be made about what

a new TPACK 2.0 framework might look like. Additionally, collecting and analyzing inservice teachers' self-described TPACK models could yield important insights into how teachers combine their different components of TPACK knowledge. The process of combining knowledge to create TPACK is currently missing from the TPACK framework and should be included in the new TPACK 2.0 framework.

TPACK in Public School Settings

This study examines TPACK knowledge in a setting that is not representative of most middle schools. This study should be replicated in public schools in order to have a clearer picture of what TPACK looks like in practice. Additionally, schools that do not have a 1:1 initiative should be investigated to understand the differences in TPACK knowledge that teachers have within each setting. Each of these research efforts would contribute to what was started with this study and provide a better picture of what TPACK looks like in practice.

Longitudinal Effects of 1:1 Environments on TPACK Knowledge

A question that emerged from this study was how teaching in a 1:1 environment helped foster and grow TPACK knowledge. Future investigations should be undertaken that look into how the TPACK knowledge of teachers changes over time when teaching in a 1:1 environment. A longitudinal study that follows teachers for several years could help answer questions about how TPACK develops in teachers. This could be especially insightful if the data is then compared to longitudinal studies of teachers teaching in non 1:1 environments. Understanding how the availability of a technology rich

environment helps or hinders TPACK development could prove useful for both teacher education programs and policy makers.

Conclusion

The TPACK framework provides us with a blueprint of the knowledge needed to effectively teach with technology. However, theory can look much different when it is viewed in practice. This study uses the TPACK framework in order to understand what TPACK looks like in practice. Three different case studies demonstrate that teachers create and combine their TPACK knowledge differently. This has an impact on the depth and breadth of TPACK practices each of the teachers implement in their classrooms. Understanding what TPACK looks like in practice has implications for how teachers should teach with technology, how teacher education programs should prepare new teachers to teach with technology, and how schools and policy makers should proceed in creating the type of environment conducive to learning with technology. This study concludes that for each of the three case studies, TPACK in practice, looks very different than TPACK in theory. Despite this, the TPACK framework provides a good starting point from which to understand TPACK practices. With this study, and other research efforts, a new TPACK 2.0 can be proposed that better captures what happens in the classroom, when teachers are teaching effectively with technology.

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APPENDIX A

OBSERVATION PROTOCOL

The TPACK classroom observation protocol is a means by which to document and evaluate the use of TPACK teaching practices within the classroom.

Header Info:

Teacher name:

Date & time of lesson:

Which class is being observed (1st core, 2nd core, etc.):

Number of students in the class:

Title or topic of lesson being taught:

General Observation:

What materials were used in the lesson?

What instructional strategies were used during the lesson?

Describe the events that took place during the class:

If technology was used during the lesson, describe its role and application:

Technology Knowledge:

Does the teacher have the essential technology tools required for the lesson?

Explain your answer:

Does the teacher demonstrate familiarity, ability, and confidence with technology during the lesson?

Explain your answer:

Does the teacher use technology tools without any technical difficulties?

Explain your answer:

Additional comments about the teacher's technology knowledge:

Content Knowledge:

Does the teacher exhibits a good mastery of content knowledge?

Explain your answer:

Does the teacher present relevant and accurate facts in relation to the topic?

Explain your answer:

Does the teacher provide a variety of references for the students to gain relevant content knowledge?

Explain your answer:

Additional comments about the teacher's content knowledge:

Pedagogical Knowledge:

Does the teacher know essential pedagogical approaches for the lesson preparation and presentation (direct instruction, collaborative learning, problem-based learning etc.)?

Explain your answer:

Does the teacher demonstrate an understanding of different styles of student learning?

Explain your answer:

Does the teacher structure the lesson to promote student learning?

Explain your answer:

Additional comments about the teacher's pedagogical knowledge:

Pedagogical Content Knowledge:

How does the use of pedagogy shape the content being taught?

How does the content of the lesson shape the use of pedagogy during the lesson?

How does the teacher use pedagogy to help students investigate and construct meaning of the complex ideas they are learning?

Explain your answer:

How does the teacher demonstrate PCK thinking and **NOT** just the use of PK & CK in the same setting?

Additional comments about the teacher's Pedagogical Content Knowledge:

Technological Content Knowledge:

How does the use of technology shape the content being taught?

How does the content of the lesson shape the use of technology during the lesson?

Does the teacher help students to use technology to investigate and construct meaning of the complex ideas they are learning?

Explain your answer:

How does the teacher demonstrate TCK thinking and **NOT** just the use of TK & CK in the same setting?

Additional comments about the teacher's Technological Content Knowledge:

Technological Pedagogical Knowledge:

How does the use of technology shape the pedagogical approaches used by the teacher during the lesson?

How does the pedagogical approach taken by the teacher shape the choice of technology used for the lesson?

How does the teacher demonstrate TPK thinking and **NOT** just the use of TK & PK in the same setting?

Additional comments about the teacher's Technological Pedagogical Knowledge:

Technological Pedagogical and Content Knowledge (TPACK):

Does the teacher teach a lesson that **appropriately** combines content, technology and teaching & learning approaches?

Explain your answer:

How does the teacher demonstrate TPACK thinking and **NOT** just the use of TCK, TPK & PCK in the same setting?

Additional comments about the teacher's Technological Pedagogical and Content Knowledge (TPACK):

Guiding Questions:

- What was the specific benefit of technology to support pedagogy and content in the class you observed? In other words, why did it require the use of technology?

Lesson Plan & Debrief with Teacher

- How has the teacher demonstrated technology use to enhance delivery of content as stated in the lesson plan (TCK)?

- What evidence is there of teacher demonstration of Technological Pedagogical Knowledge (TPK) in the lesson plan?
- Is there evidence of Technological Pedagogical and Content Knowledge (TPACK) in the lesson plan?

APPENDIX B

INTERVIEW PROTOCOL – TEACHER

- RQ: In what ways do the middle school social studies teachers demonstrate TPACK teaching practices in a school wide 1 to 1 technology environment?

Introduction: Thank you so much for agreeing to be interviewed. The purpose of our interview is to discuss your beliefs about the use of technology by schools and by you as a teacher for instruction. There is no right or wrong answer to any of these questions. If you do not understand a question please let me know. I will audio record our conversation so that I do not miss any of the information you are sharing with me. If at any time you need to stop the interview, please just let me know. Do you have any questions before we begin?
NOTE: The numbered questions represent question I specifically want to ask, while the lettered questions represent probing questions that I might ask if the conversation lends itself to them. This only represents a tentative script, this interview is designed to go where the participant leads it, and thus additional questions may be added during the course of the conversation to flesh out emerging themes and concepts.

1) Tell me all the ways you have seen technology used in school.

    A) Why do you think <*insert name of technology mentioned here*> was used this way?
    B) What technologies are missing from school?
    C) Why do you think that <*insert name of technology mentioned here*> should be used in schools?
    D) Explain your opinion on your school's or your preparedness to use technology for educational purposes?

2) What are your opinions about the use of technology in school?

    A) In what ways has technology improved your teaching practices?
    B) In what ways has technology hurt your teaching practices experience?
    C) Why do you think schools use technology in school?
    D) Do you think we need more or less technology in school?
        a. Why?
        b. If we need more technology, what would it look like?
        c. If we need less technology, what do we remove?

3) Describe an effective use of technology for something you taught.

   A) Why was it effective?
   B) How did this technology improve the educational experience?
   C) Give me an example of how you would use technology for learning?
      a. Why is this an effective use of technology for learning?

4) Describe an ineffective use of technology that you were a part of.

   D) Why was it ineffective?
   E) How did this technology hurt your educational experience?
   F) Give me an example of how technology can make learning worse?
      a. Why is technology making things worse for learning?

5) Describe yourself as a technologist.

6) Describe the process of how you integrate technology to teach the content of your course.
   A) When thinking about content, pedagogy, and technology; How do you approach the integration of the three.
      a) Which of the three do you feel is most important?
      b) Which of the three are you most comfortable with?

7) Describe yourself belief about teaching with technology?

APPENDIX C

INTERVIEW PROTOCOL – STUDENT

- RQ: In what ways do the middle school social studies teachers demonstrate TPACK teaching practices in a school wide 1 to 1 technology environment?

Introduction: Thank you so much for agreeing to be interviewed. The purpose of our interview is to discuss your beliefs about the use of technology by schools and teachers for instruction. There is no right or wrong answer to any of these questions. If you do not understand a question please let me know. I will audio record our conversation so that I do not miss any of the information you are sharing with me. If at any time you need to stop the interview, please just let me know. Do you have any questions before we begin?
NOTE: The numbered questions represent question I specifically want to ask, while the lettered questions represent probing questions that I might ask if the conversation lends itself to them. This only represents a tentative script, this interview is designed to go where the particapant leads it, and thus additional questions may be added during the course of the conversation to flesh out emerging themes and concepts.

1) Tell me all the ways you have seen technology used in school.

    E) Why do you think <*insert name of technology mentioned here*> was used this way?
    F) What technologies are missing from school?
    G) Why do you think that <*insert name of technology mentioned here*> should be used in schools?
    H) Explain your opinion on your school's or teacher's preparedness to use technology for educational purposes?

2) What are your opinions about the use of technology in school?

    E) In what ways has technology improved your educational experience?
    F) In what ways has technology hurt your educational experience?
    G) Why do you think schools use technology in school?
    H) Do you think we need more or less technology in school?
        a. Why?
        b. If we need more technology, what would it look like?
        c. If we need less technology, what do we remove?

3) Describe an effective use of technology for learning that you were a part of.

    G) Why was it effective?
    H) How did this technology improve your educational experience?
    I) Give me an example of how you would use technology for learning?
        a. Why is this an effective use of technology for learning?

4) Describe an ineffective use of technology that you were a part of.

    J) Why was it ineffective?
    K) How did this technology hurt your educational experience?
    L) Give me an example of how technology can make learning worse?
        a. Why is technology making things worse for learning?

APPENDIX D

FOCUS GROUP DISCUSSION GUIDE

Introduction:

1. Welcome
   Introduce myself.
   Review the following:
   - Who I am and what I'm trying to do
   - What will be done with this information
   - Why I asked you to participate

2. Explanation of the process
   Ask the group if anyone has participated in a focus group before. Explain that focus groups are being used more and more often in qualitative & case study research.

   About focus groups
   - I learn from you (positive and negative).
   - Not trying to achieve consensus, I'm just gathering information.
   - Information is provided more quickly than if people were interviewed separately.

   Logistics
   - Focus group will last about one hour
   - Focus group will be audio recorded.
   - Feel free to move around
   - Where is the bathroom? Exit?
   - Help yourself to refreshments

3. Ground Rules
   The following ground rules will be used to structure our focus group.
   - Everyone should participate.
   - Information provided in the focus group must be kept confidential
   - Stay with the group and please don't have side conversations
   - Turn off cell phones if possible
   - Have fun

4. **Turn on Tape Recorder**

5. Ask the group if there are any questions before we get started, and address those questions.

6. Introductions

    - Go around table: Everyone introduces themselves.

Discussion begins, make sure to give people time to think before answering the questions and don't move too quickly. Use the probes to make sure that all issues are addressed, but move on when you feel you are starting to hear repetitive information.

Questions:

1. Let's start the discussion by talking about what your definition for effective teaching with technology would be.

2. What are some of the qualities that teachers who teach effectively with technology have?

3. Talk about the process you go through when thinking about technology and your Social Studies classrooms? What effect does working in a 1 to 1 laptop environment have on your teaching?

4. What role should technology play in our classrooms?

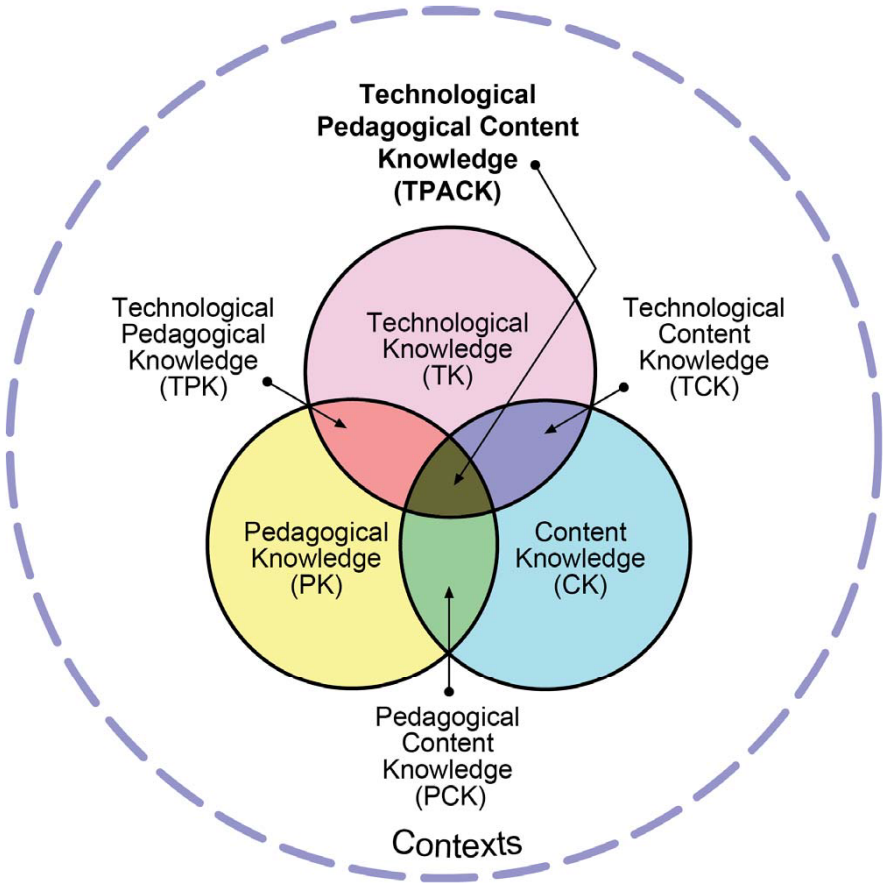
5. Do students affect the way technology is used in your classroom? If so, how do you account for students when planning to teaching with technologies?

6. How would you prepare future teachers to teach effectively with technology? What would you do to help existing teachers better teach with technology?

That concludes our focus group. Thank you so much for coming and sharing your thoughts and opinions with us. We have a short evaluation form that we would like you to fill out if you time. If you have additional information that you did not get to say in the focus group, please feel free to write it on this evaluation form.

APPENDIX E

PERMISSION TO USE THE TPACK IMAGE



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