1-1-2012

Examining the factors of a technology professional development intervention

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EXAMINING THE FACTORS OF A TECHNOLOGY PROFESSIONAL DEVELOPMENT INTERVENTION

by

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DISSERTATION

Submitted to the Graduate School

of Wayne State University,

Detroit, Michigan

in partial fulfillment of the requirements

for the degree of

DOCTOR OF PHILOSOPHY

2012

MAJOR: INSTRUCTIONAL TECHNOLOGY

Approved by:

Advisor	Date

DEDICATION

To my Mom, Debra Hughes,

your love, support, sacrifices, and unwavering belief in my abilities to succeed,

have made me the person that I am proud to be today.

I love you Mom.

ACKNOWLEDGEMENTS

This dissertation study would not have come to fruition without the intellectual guidance and emotional caring and support from the wonderful people that I have encountered along my journey. Words will never fully capture my true gratitude, but I hope that by acknowledging the commitments of these special people, they have a sense of knowing that they have made a difference on this work, and more importantly my life.

- Darius Harrison for sacrificing time, life experiences, and handling extra errands to help keep me focused through the finish line. Your patience, encouragement, and comfort demonstrated your love and kept me grounded every step of the way.
- Many thanks to my Step Father, Donald Hughes, for his unwavering support of me and my Mom during my transition to Detroit. I am grateful for your love and support of us both throughout the years.
- Monica Tracey for being much more than an advisor and instructor. The pushing, coaching, listening, and advising in many areas of my life beyond academics, is something I will cherish forever. Thank you for being my mentor and life coach.
- I thank my committee members James Moseley, Timothy Spannaus, and Nicole Trujillo-Pagan, for their timely and informative feedback when deadlines drew near.
- To my fellow GRA, colleague, and most importantly, my friend, Sacip Toker. Your knowledge, guidance, and willingness to assist me whenever in need have helped me reach this achievement. Thank you my friend.
- The SMEs, Karen Carmody, James Gates, Kara Kerstetter, and Penny Lenig-Zerby for their time and valuable feedback in increasing the validity of the TPDI.

- The five teachers, and their director, for allowing me to enter their world through my passion for teaching. The time you committed and the insights you shared made this dissertation study possible. Thank you for being open, honest, and supportive throughout our eight weeks together.
- To my forever friends, Tatum, Kara, and Denise, and the ones that I've met along this journey, Anne, Sara, Kecia, and Christina for listening when I had doubts, and for being happy for each and every one of my successes.
- To James Gates, I say thank you for believing, mentoring, and encouraging me, not only throughout my entire doctoral process, but throughout my entire professional career.
- Thank you to the Harrison Family for opening their hearts, homes, love, and support.
- Professors Michael Barbour and Karen Tonso for their academic guidance.
- The professional organizations AECT & MCWT for providing financial support and career and leadership opportunities that have expanded my professional network.
- Michele Norris for helping to keep me and the process moving along.
- Last, but definitely not least, Wayne State University, for providing the learning opportunities and financial support in helping me develop my professional career. I could not have reached this milestone without the Graduate Research Assistant position, and other scholarships and fellowships provided throughout the years. I am forever grateful.

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CHAPTER 1

PROBLEM STATEMENT

Introduction

In response to the ever increasing demand to compete in a global economy, the United States needs to prepare its students with the appropriate technical knowledge and communication skills to be competitive in the 21st century (Watson, 2007). Students must begin utilizing current technology tools during their K-12 educational experience and online learning can assist students with developing these skills. Online learning fosters a self-directed learning environment, increases personal responsibility with technology and time management skills, and increases literacy and problem solving (Duncan & Barnett, 2009; Watson, 2007). Teachers with online technology skills and equipped with effective pedagogical strategies for teaching in an online environment are the keys to achieving this goal. To ensure teachers are keeping pace with changing teaching and learning environments, and effectively utilizing new technologies, teacher technology professional development is a major initiative throughout K-12 education (Lawless & Pellegrino, 2007). Professional development (PD) is an intentional, ongoing, and systemic process aimed at increasing the knowledge base of teachers about a topic that will in turn increase the knowledge and achievement of their students (Guskey, 2000).

Teachers must effectively model the appropriate use of emerging technological tools and concepts to students, our nation's future leaders. In turn, it is the responsibility of school districts to prepare our nation's teachers to model and teach the use of these tools. Therefore, school districts must remove the various barriers that inhibit technology integration (Ertmer, 1999; Goktas, Yildirim, & Yildirim, 2009; Rogers, 2000), and

provide quality technology professional development for teachers. Funding initiatives and federal and state programs have been put in place to assist school districts with preparing their teachers to teach with new technologies. The Enhancing Education Through Technology Program (EETT) provides funds for improving teaching and student achievement through integrated use of educational technology throughout the K-12 curriculum in all subject areas (U.S. Department of Education, 2004a).

The United States Department of Education's Office of Educational Technology released the National Educational Technology Plan for 2010, and many of its goals center on incorporating the internet in daily educational tasks (US Department of Education, 2010). The premise of the plan is to foster an environment that supports online learning and collaboration among students and teachers in order to assist in preparing future leaders to engage in a global economy. Michigan, where this study took place, added two standards to the Entry-Level Standards for Michigan teachers in 2008. These standards impact all teacher candidates and require them to:

> 1. Successfully complete and reflect upon collaborative online learning experiences;
>
> 2. Demonstrate an understanding of and the ability to create an online learning experience and demonstrate continued growth in technology operations and concepts, including strategies for teaching and learning in an online environment (Michigan State Board of Education, 2008, p.3).

While there are government mandates requiring teachers to become knowledgeable in online teaching, many teachers and school districts are not meeting these mandates. Greenhow, Robelia, and Hughes (2009) report that studies conducted

between 2005 and 2008 demonstrate that 90% of adolescents between the ages of 12 and 17 were the largest and fastest growing group of users of the Internet. Most of these users go online daily or several times a day, mostly from home. Roughly 55% of students are using Web 2.0 tools that provide an opportunity to contribute and share content with friends on the Internet on a regular basis, some devoting nine hours per week to social networking (as cited in Greenhow, Robelia, & Hughes, 2009). While students are using and mastering these tools outside of formal education programs (U.S. Department of Education, 2004b), teachers have not yet shifted their lessons to incorporate these new forms of online collaboration and communication (Levin, Arafeh, Lenhart, & Rainie, 2002; Sewlyn, 2006). The U.S. Department of Education (2004b) claims that, "Today's students, of almost any age, are far ahead of their teachers in computer literacy" (p. 10). Students believe that integrating Web 2.0 tools into education would increase their engagement and preparedness (Greenhow, Robelia, & Hughes, 2009) for success in education. The National Council of Teachers of English (NCTE) recommends that teachers, "explore technologies students are using outside of class and [find] ways to incorporate them into teaching" (National Council of Teachers for English, 2007, p.5).

Statement of the Problem

Preparing teachers to incorporate technologies that students embrace, including Web 2.0 collaboration tools such as Google Applications, may give teachers an opportunity to see how emerging technologies integrated into their lessons can benefit both teacher practice and student learning. In order to equip teachers with these skills quality PD experiences must be provided. Studies on PD, however, indicate that PD experiences lack a connection for teachers (Ashdown, 2002; Ball & Cohen, 2000; Cobb,

McClain, Lamberg, & Dean, 2003; McLaughlin, 2002; Tyler, 1971). Many times the lack of connection can be attributed to the typically implemented one day workshop that is ineffective (Hixon & Buckenmeyer, 2009; Lawless & Pellegrino, 2007; Parsad, Lewis, & Farris, 2001; Schrum, 1999). School districts across the United States typically resort to this method because of barriers, such as lack of funding, time, and accessibility to experts locally. These barriers impact the quality of PD provided (Reeves & Pedulla, 2011).

One way to gain more knowledge for providing quality PD is to examine the factors of a technology professional development intervention (TPDI) to establish best practices for designing quality technology PD for teachers. The quality of PD can be influenced by a variety of factors, but Guskey and Sparks (1996) suggest that the factors with the most direct influence can be grouped into content, processes, and contextual factors. Studying teachers' perceptions of these factors during the TPDI provided insight into which factors teachers believed were most beneficial to their learning. Comparing teachers' perceptions of the same factors after they begin applying the knowledge and skills from the TPDI with their students, provided insight about which factors were most beneficial for teacher practice.

Purpose and Research Questions

This qualitative multi-case research study exposed secondary education teachers to concepts of online teaching and Google Applications through a TPDI. The instructional goal of the TPDI was to assist the teachers in meeting two Entry-Level Standards for Michigan teachers related to designing and facilitating learning in the online environment. I worked collaboratively with the teachers throughout the entire study, as both instructor and researcher, to examine the factors of the TPDI the teachers

found to be most beneficial for transferring the knowledge and skills taught during the TPDI to practice.

A learning technology by design approach (Koehler & Mishra, 2005; Mishra & Koehler, 2003) was the basis for the TPDI. This hands on approach exposed teachers to Google Applications while designing instruction and instructional materials to use in their teaching practice. The instructional design of the TPDI was evaluated by a panel of subject matter experts to increase content validity, and was modified based on feedback. The TPDI was implemented in an online learning environment. The data from this qualitative research study was analyzed using a content analysis methodology to examine the factors of the TPDI that the teachers perceived to be most beneficial for transferring the knowledge and skills taught during the TPDI to teaching practice.

The set of research questions that guided this study were:

1. While participating in a technology professional development intervention, what do secondary education teachers perceive as beneficial factors that impact the quality of a technology professional development intervention?
2. After transferring the knowledge and skills taught during the technology professional development intervention to teaching practice, what do secondary education teachers perceive as beneficial factors that impact the quality of a technology professional development intervention?

Theoretical Constructs

TPACK (Technological Pedagogical Content Knowledge), a framework for understanding the complexity of integrating technology into specific subject matter (Mishra & Koehler, 2006), was used as the theoretical framework for designing,

developing, and implementing the TPDI for this study. To investigate the complex relationship between PD factors and teacher practice I used the Guskey and Sparks (1996) Model of the Relationship between Professional Development and Improvements on Student Learning as a conceptual framework for collecting and analyzing data to address the research questions. This study used the first piece of the model to examine the factors of the TPDI. These are discussed in the remainder of this section.

Technological Pedagogical Content Knowledge (TPACK)

TPACK is a framework for understanding the complexity of integrating technology into subject-specific instruction (Mishra & Koehler, 2006). It extends Shulman's (1986) thinking that teachers' content knowledge of their subject and the strategies they employ to deliver that content to their students should not be thought of as isolated domains. Instead, he argued for pedagogical content knowledge (PCK), "the ways of representing and formulating the subject that make it comprehensible to others" (p. 9). PCK is the intersection of pedagogy and content. Mishra and Koehler (2006) added to Shulman's PCK by introducing technology to include teachers' understanding of teaching specific content with appropriate pedagogical methods and technologies. Just as Shulman argued that content and pedagogy should not be viewed as separate domains, Mishra and Koehler (2006) argue the same for the inclusion of the technology domain. They argue that each domain should not be looked at in isolation, but instead grouped into seven different components (Figure 1): content knowledge (CK), pedagogical knowledge (PK), pedagogical content knowledge (PCK), technology knowledge (TK), technological content knowledge (TCK), technological pedagogical knowledge (TPK), and technological pedagogical content knowledge (TPACK).

Figure 1: The Components of the TPACK Framework

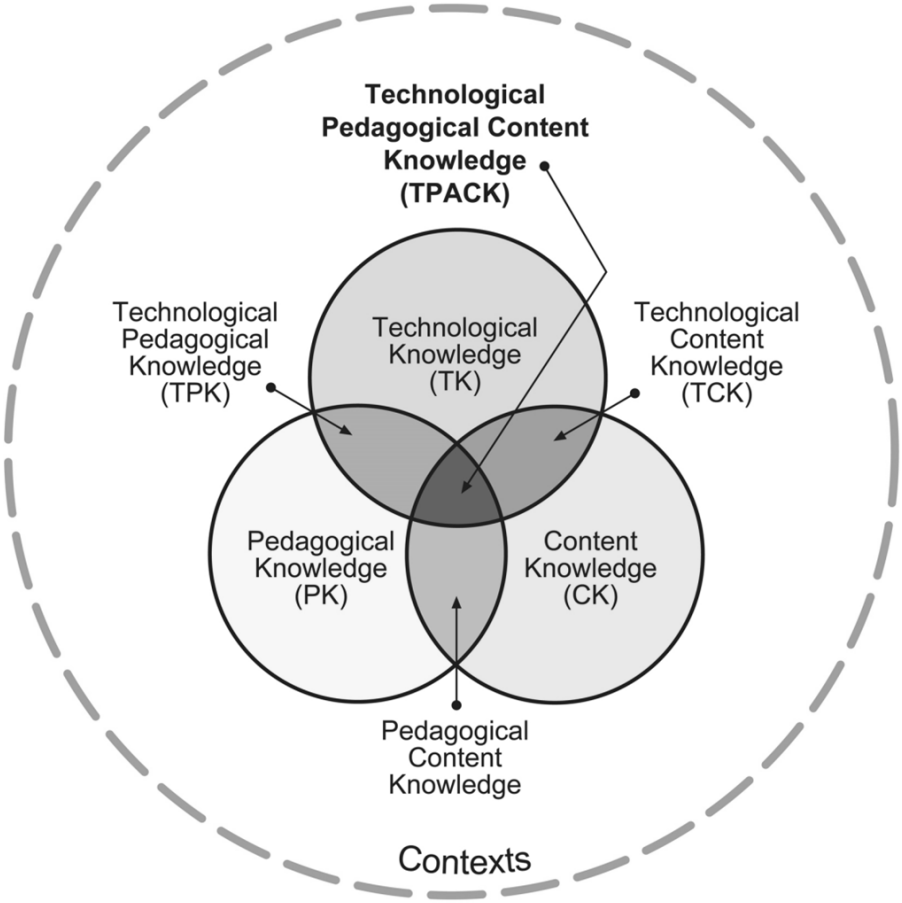


Figure 1. Visual representation of the complex relationships and interplay of the three main forms of knowledge: Content Knowledge (CK), Pedagogical Knowledge (PK), and Technological Knowledge (TK) needed by teachers to effectively integrate technology into their teaching practice. Graphic obtained with permission from http://tpack.org/.

Content knowledge (CK) "is knowledge about the actual subject matter that is to be learned or taught" (Mishra & Koehler, 2006, p. 1026). Each teacher must be knowledgeable about the subject, or content, they teach, and how that knowledge is different across various subjects. Pedagogical knowledge (PK) is the knowledge of methods, processes, and techniques to be used in the classroom, including classroom management, implementing and evaluating student learning and assessment, and lesson

plan development. Consistent with Shulman (1986), pedagogical content knowledge (PCK) is knowing which methods, processes, and techniques are applicable for teaching specific content and must align with the learning situation and students. Technology knowledge (TK) is knowledge about technologies such as books, pens, overhead projectors, the Internet, and computer hardware and software, coupled with the skills necessary to operate those technologies. Technological content knowledge (TCK) refers to the ability to know how specific subject matter, or content, can be altered by the use of technology. Technological pedagogical knowledge (TPK) is the understanding that various technologies will result in changes to the methods, processes, and techniques used for teaching. Technological pedagogical content knowledge (TPACK) "refers to the knowledge required by teachers for integrating technology into their teaching," with an "understanding of the complex interplay between the three basic components of knowledge (CK, PK, TK) by teaching content using appropriate pedagogical methods and technologies" (Schmidt et al., 2009, p.125). The premise of the TPACK framework suggests that if teachers have appropriate knowledge in all of these areas, it can promote student learning. For this reason, the TPACK framework was used to design the TPDI for secondary education teachers in this study. The purpose was to ensure that the TPDI was implemented in a way that integrated technology, pedagogy, and content knowledge based activities in order to increase the chances of success of the teachers participating in the TPDI.

Model of the Relationship between Professional Development and Improvements on Student Learning

The Guskey and Sparks (1996) conceptual model (Figure 2) illustrates the relationships between professional development (PD) and student learning. They argue that the end goal of all PD should be to impact student learning or behaviors in some manner. While PD should ultimately improve student learning in order to gauge the success of the PD (Guskey, 2000), and as such student learning should be evaluated, it is outside the scope of this study. The relevance of this model for this study served as a guide to examine the participants' perceptions of the factors used in the TPDI.

Figure 2: Model of the Relationship between Professional Development and Improvements on Student Learning

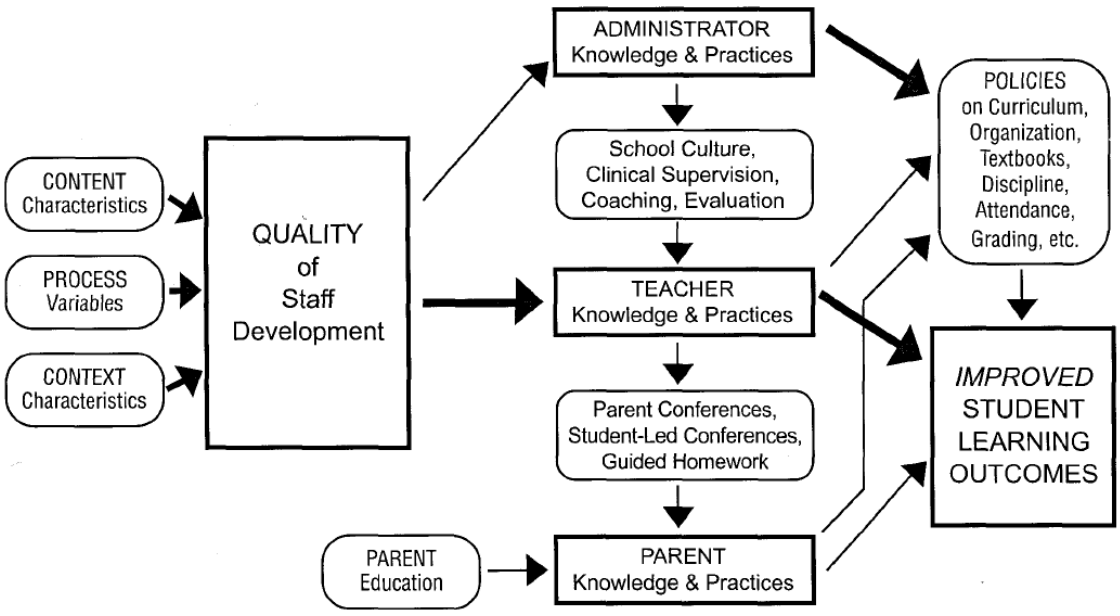


Figure 2. Guskey and Sparks (1996) visual representation of the components that impact student learning. The arrows represent the strongest and most direct effect that each component has on the others. Graphic obtain and used with permission from the authors.

The quality of staff development is the central component of the model, and is impacted by three elements: content characteristics, process variables, and context characteristics (Guskey & Sparks, 1996). These three elements form the conceptual framework of the Standards for Staff Development created by the National Staff Development Council (Guskey & Sparks, 1996). Content characteristics refer to the *what* of the PD; the knowledge and skills to be learned and taught. In this study the content of the TPDI instructed participants on online teaching concepts and Google Applications for online teaching. Process variables are the *how* the PD is delivered, including the planning and organization of the activities and how they are implemented. Processes included in this TPDI are: learning by design, modeling, demonstrations, online discussion posts, individual reflection about the PD, presenting, and collaborative activities. Context characteristics are the *who, when, where, and why* of the PD, including the teacher, school, educational system, culture, and location. For this study, the contextual characteristics include the secondary education teachers, the instructor/researcher, and instruction which occurred during the summer months in the online learning environment with an aim of increasing teachers' knowledge of online teaching and Google Applications. The combination of the content, processes, and contextual elements impacts the quality of the TPDI, which in turn impacts teachers' knowledge and practice.

Assumptions

Based on my experience and conversation with school administrators of the five teachers that participated in the TPDI, this study operated under three assumptions. First, I worked under the assumption that teachers never received formal PD on Google Applications or online teaching. Second, I assumed that teachers' knowledge and practice

of Google Applications for online teaching would increase throughout the TPDI. Given a document of guided questions, I assumed teachers would be able to accurately describe the factors of the TPDI that they perceived as the most beneficial to their teaching practice of the knowledge and skills taught during the TPDI.

Rationale and Significance of Study

Today's students cannot learn with the technology tools of the past. Schools must prepare teachers with online teaching concepts and tools so that they may prepare their students to excel in a global economy, and become successful online learners. In order to properly prepare students to learn and use 21st century technology tools, teachers must be prepared through quality technology PD. The rationale for this study comes from my desire to find the best methods for designing, developing, implementing, and evaluating quality technology PD for teachers that positively impacts teachers' knowledge and practice. A gap exists between PD and the transfer of the knowledge and skills of the PD to teacher practice. The significance of this study was to examine which factors of TPDI teachers perceived as most beneficial for transferring knowledge and skills from PD to teaching practice. This information could help to narrow the transfer gap between technology PD and practice by providing insight to educators about which factors teachers perceive to be beneficial factors of technology PD. The study provides insight for other PD providers about beneficial factors to use when designing, developing, implementing, and evaluating TPDIs.

Definitions of Key Terminology used in the Study

Secondary Education Teacher. Secondary education teachers work in middle, junior-high, and high schools. The participants in this study work in a high school,

teaching math, science, language arts, and social studies to students in grades 9-12. The participants are considered to be professionals and have proven to be experts in their fields. At a minimum, they have earned a four-year college degree and have passed state exams in order to teach.

Technology Integration. Technology integration is the seamless infusion of technology tools and "practices into the daily routines, work, and management of schools" in order to support school goals and purposes (U.S. Department of Education National Center for Education Statistics, 2002, p.75). This study will focus on PD factors that are perceived to assist teachers with the technology integration of Google Applications for online teaching by secondary education teachers.

Professional Development. Professional development (PD) is the organized planning and instruction designed to deepen the knowledge and skills of professionals (U.S. Department of Education, 1999). For the purpose of this study, the target audience for PD is secondary education teachers. PD is noted to contain three characteristics: "(a) intentional, (b) ongoing, and (c) systemic" (Guskey, 2000, p.16). PD for teachers is provided for a variety of reasons, including increasing knowledge and practice of new methods and content because of shifts in the school environment, new technologies, and changes in student population. This study will focus on a TPDI for increasing the use Google Applications for online teaching by secondary education teachers.

Web 2.0 Tools. The term Web 2.0 found popularity among when used by Tim O'Reilly at the first Web 2.0 conference in October, 2004 (O'Reilly, 2005). These technologies are distinguishable from their static and non-interactive predecessors, Web 1.0 tools. Web 2.0 tools allow users to interact with the web without having any computer

programming knowledge or experience. Average or novice users can participate by creating and sharing their thoughts and ideas directly on the web and with others. The TPDI for this study instructed secondary education teachers' about how to use the Web 2.0 collaboration tools, Google Applications, for increasing knowledge for online teaching.

Google Applications. Google Applications are free and customizable tools that provide a web-based platform for teachers and students to communicate and collaborate to learn more effectively and provide students with the necessary skills for learning in the 21st century (Google, 2010). Google Applications were selected for this study because they are free to K-12 school districts that operate on restricted budgets. Exposing teachers and students to Google Applications also provides them with knowledge of tools that are also used in higher education environments. The Google Applications used throughout the TPDI included: Google Calendar, Documents, Forms, Groups, and Sites.

Google Calendar. Google Calendar is a free calendar integrated into Gmail. Gmail is Google's free Internet-based email service. Teachers were instructed on how to use and share the Google Calendar for posting assignments, exams, homework dates, and other relevant dates for the class.

Google Documents. Google Documents is an online location for creating and sharing documents, spreadsheets, presentations, drawings, and forms. Users can create, access, and edit the documents from any computer or smart phone with Internet access. It is an online collaboration tool so users can edit documents simultaneously to save time. In this study teachers were instructed on how to use Google Documents in their classroom teaching.

Google Forms. Google Forms can be used for collecting questionnaire and survey data. Users can create forms on the web, and then share the website address that is generated with others so they can respond to the questions on the form. Teachers were instructed how to create a Google Form for assessing their students through an online platform.

Google Groups. Google Groups is an online user-created discussion board. The user can invite people to join the group or have it opened publicly for anyone to join. Google Groups are formed for people with a common interest to stay connected and share information. Members of the group can add pages and start and reply to discussions, with other members of the group. In this study teachers were instructed using Google Groups in their classroom teaching.

Google Sites. Google Sites is a platform where users can create web-pages for posting information. In this study, teachers were instructed how to create and modify a Google Site for their classroom. Teachers were taught how to create pages, embed video files, and upload documents to the Google Site. The Google Site served as the hub for class information.

TPACK. Technological pedagogical content knowledge (TPACK) is a framework used to discuss the complex and interwoven relationships of the three main components of knowledge (content knowledge, pedagogical knowledge, and technological knowledge) needed for teachers to integrate technology (Mishra & Koehler, 2006). The TPACK framework guided the design, development, and implementation of the TPDI for this study.

Summary

This study intended to address two overarching questions: (1) which factors do teachers perceive as beneficial for a quality TPDI, and (2) do those perceived factors change when teachers apply what they learned during the TPDI to teaching practice? I drew from the TPACK theoretical framework, and utilized the Model of the Relationship between Professional Development and Improvements on Student Learning as a conceptual framework for guiding the study. The research questions, based on the existing body of literature related to professional development and technology integration guided the qualitative multiple-case research study. Definitions of key terminology used in this study were discussed. A review of this study's relevant literature follows in the next chapter of this dissertation.

CHAPTER 2

LITERATURE REVIEW

Introduction

The review of the literature related to this study includes two general areas. The first section addresses how technology has evolved in the U.S. educational system. This evolution directly impacts the factors that influence technology professional development (PD) for teachers, which is the second section of the review.

Evolution of Technology in U.S. Educational System

The U.S. educational system continuously evolves with the creation and emergence of new technologies including: textbooks, pictures, radio, television, motion pictures, computers, the Internet, and mobile devices. Technology use tends to evolve within the home. Then through increased use, research, and curiosity, it infiltrates and establishes worth in the educational setting. Dr. Alvin C. Eurich, executive director for the Ford Foundation from 1958-1964, claimed that:

> The phonograph, radio and motion pictures have long been familiar to most American households; but they remain relative strangers in the field of education where their potentialities are vast. In television, we now have available an almost perfect educational instrument (as cited in Finn, 1957, p.464).

The presence and excitement of a new technology, as shown in this example, tends to provide a sense of security for educators that it will increase student achievement and make the job of the classroom teacher easier. Unfortunately, it's not that simple. The unsuccessful long-term implementation and acceptance of the Midwest Airborne Television Instruction program of the mid-1960s, demonstrates that television, as an

educational technology, was far from perfect. The Airborne Television Instruction was designed to transmit, from an airplane, televised lessons through satellite to schools in six Midwest states. Airborne and other educational television programs during that time failed mostly because of poor instructional quality; many times presenting nothing more than a teacher lecturing (Reiser, 2001). While there are examples of traditional ground-based televised programs that were successful, such as the Children's Television Workshop, it is clear that the excitement of a new technology does not necessarily result in increased learning.

In 1983, under President Reagan, the National Commission on Excellence in Education (NCEE) released *A Nation at Risk: The Imperative for Educational Reform*, which reported that the American education system is not keeping pace with other nations. The NCEE claimed that by the turn of the century technology would be involved in millions of jobs across a plethora of fields, changing the demands for new skills among students (1983). This report states that K-12 students need to possess the knowledge and skills of technology today (1983) for the jobs of tomorrow.

In 1994 President Clinton signed into law the Goals 2000: Educate America Act. Similar to *A Nation at Risk*, it reflected on the evolving global market. The goals were not reached by 2000, so it was not reauthorized.

In 2001, the Federal Government, under the leadership of President George W. Bush, Jr., enacted the No Child Left Behind (NCLB) Act, centering on improving student learning (U.S. Department of Education, 2002). The Act requires all students to be proficient, or show growth in reading and mathematics, as determined by standardized tests, by 2014. It holds school districts and schools accountable for increasing student

performance on achievement exams. NCLB particularly focuses on improving the academic achievement of disadvantaged children to, “ensure that all children have a fair, equal, and significant opportunity to obtain a high-quality education and reach, at a minimum, proficiency on challenging State academic achievement standards and state academic assessments” (U.S. Department of Education, 2002, p. 15). Under this section, similar to the two previous federal government reforms discussed, NCLB mandates the integration of technology by providing funds to:

1. Acquire up-to-date school library media resources, including books;
2. Acquire and use advanced technology, incorporated into the curricula of the school, to develop and enhance the information literacy, information retrieval, and critical thinking skills of students;
3. Facilitate Internet links and other resource-sharing networks among schools and school library media centers, and public and academic libraries, where possible;
4. Provide professional development described in section 1222(d)(2) for school library media specialists, and activities that foster increased collaboration between school library media specialists, teachers, and administrators; and
5. Provide students with access to school libraries during nonschool hours, including the hours before and after school, during weekends, and during summer vacation periods (U.S. Department of Education, 2002, p. 146).

The funds for acquiring the technology and providing students Internet access have proved to be effective. In 2005, nearly 100% of US public schools had Internet access, up

from 77% in 2000 (U.S. Department of Education National Center for Education Statistics, 2006).

One of the components of NCLB was to establish a national educational technology plan. In 2004 the plan was released by the U.S. Department of Education. The plan, similar to its predecessors, stresses the need to be able to compete in a global economy (U.S. Department of Education, 2004b). Comparable to Eurich's (in Finn, 1957) enthusiasm about the integration of television in education, the 2004 plan views digital and virtual technologies as the innovations that will bring about educational change; specifically, the Internet. The plan highlights seven major steps that states and schools can adopt, and provides recommendations to achieve those steps, in order to increase the success of American school children to be competitive in a global economy. These steps are:

- Strengthen Leadership
- Consider Innovative Budgeting
- Improve Teacher Training
- Support E-Learning and Virtual Schools
- Encourage Broadband Access
- Move Toward Digital Content
- Integrate Data Systems (U.S. Department of Education, 2004b).

Recently, the Obama administration has released educational goals of its own. By 2020 the Obama administration wants to raise the proportion of the U.S. population that holds a two or four year degree from 39% to 60%, and ensure that all high school graduates, regardless of race or income, are ready to succeed in college and careers (U.S.

Department of Education, 2010). On March 5, 2010 the Office of Educational Technology released a revised National Educational Technology Plan that claims to guide the U.S. in achieving those two goals. The plan includes five goals addressing learning, assessment, teaching, infrastructure, and productivity (U.S. Department of Education, 2010). The plan's central focus is on online and virtual learning, and encouraging schools to embrace new technologies. The plan includes technology related recommendations to assist educators in achieving each goal. The plan stresses:

> Just as technology is at the core of virtually every aspect of our daily lives and work, we must leverage it to provide engaging and powerful learning experiences, content, and resources and assessments that measure student achievement in more complete, authentic, and meaningful ways (U.S. Department of Education, 2010, p. v).

Title II of NCLB, *Preparing, Training, and Recruiting High Quality Teachers and Principals,* claims to hold schools accountable for improving teacher and principal quality (U.S. Department of Education, 2002, p. 196). One mandate for improving teacher quality is to:

> provide training for teachers and principals in the use of technology so that technology and technology applications are effectively used in the classroom to improve teaching and learning in the curricula and core academic subjects in which the teachers teach (U.S. Department of Education, 2002, p. 540).

Two years later, in 2004, the U.S. Department of Education realized that the appropriate technology, Internet connectivity, and adequate funds were in place to ensure that all schools had access to tools for learning in the 21st century. However, they claimed that

there is “lack of adequate training and lack of understanding of how computers can be used to enrich the learning experience” (U.S. Department of Education, 2004b). In 2002 the U.S. government mandated that in order to improve teacher quality, teachers needed to receive professional development on integrating technology into teaching and learning; two years later, in 2004, an effective instructional intervention for technology professional development was still not in place. Then, in 2010, the U.S. government claimed that it is the responsibility of state and local governments to assist schools with these technological transformations. The Department of Education can assist by “identifying effective strategies and implementation practices; encouraging, promoting, and actively supporting innovation in states and districts; and nurturing collaborations that help states and districts leverage resources so the best ideas can be scaled up” (2010, p. xi).

All government plans and mandates discussed here require technology to be integrated throughout the curriculum in order to prepare students for employment in a global economy. These plans and mandates, however, only describe “*what* teachers need to know, they often do not tell us how they are suppose to learn it” (Koehler & Mishra, 2005, p.94).

Factors Impacting Technology Integration

Educators and researchers have analyzed various components that promote technology integration. The three components relevant to this study include (1) assessing teachers’ levels of technology integration, (Hixon & Buckenmeyer, 2009; Holland, 2001; Moersch, 1995; Rieber & Welliver, 1989), (2) barriers and enablers (Ertmer, 1999; Ertmer, Ottenbreit-Leftwich, & York, 2007; Goktas, Yildirim, & Yildirim, 2009; Rogers,

2000), and (3) technology professional development factors (Di Benedetto, 2005; Ehman, Bonk, & Yamagata-Lynch, 2005; Levin & Wadmany, 2008; Wells, 2007). Each of these components describes the complex nature of technology integration and suggests ways of addressing its complexity. All of the studies point to PD as playing an influential role, and suggest factors to be included in technology PD that are the most effective for successful technology integration by teachers.

Teachers' Levels of Technology Integration. Assessing teachers' levels of technology integration is one method that educators and professional development providers use when developing technology training. Moersch (1995) describes seven levels of technology integration (LoTi) and labeled them sequentially:

- Nonuse;
- Awareness;
- Exploration;
- Infusion;
- Integration;
- Expansion;
- and refinement.

The LoTi Questionnaire (LoTiQ) was designed to gather needs assessment data from teachers to assist in "designing future interventions that support the expanded use of technology as well as the concept/process-based instruction and qualitative assessment practices" (Moersch, 2002, p. 41). Moersch (2002) argues that this framework focuses more on instruction rather than the technology being used. The use of the LoTiQ instrument is wide spread. There are different versions for in-service teachers,

instructional specialists, media specialists, administrators, pre-service teachers, and higher education faculty. Moersch (2001) presents evidence of reliability when used with in-service teachers, however, Julius (2004) states there is no documentation that it has ever been validated.

Rieber and Welliver (1989) also propose that teachers have varying levels of technology integration, and recommend using a five level systematic hierarchical approach for successful technology integration in schools:

- familiarization,
- utilization,
- integration,
- reorientation,
- and evolution.

In their view teachers at each of these levels possess different skills and require different resources. If schools recognize these five levels they will be able to better equip their staff with the resources necessary to assist them in their technology integration growth. This model also implies that technology skills should not be the focus of the PD. Instead, the focus should be on the way the teacher uses the technology for instruction.

In a case study exploring technology PD, Holland (2001) also claims that teachers have varying levels of technology integration. Similar to Moersch (1995) and Rieber and Welliver (1989) these levels are developmental and require varying approaches to PD. Holland builds on Madinach and Cline's (1992) four levels of applying knowledge and skill of technology: survival, mastery, impact, and innovation, by adding a fifth level at the beginning called nonreadiness.

No matter what these levels are labeled, they all share the same underlying general characteristics, including

- teacher's view of technology;
- types of activities conducted by teachers;
- types of thinking supported;
- role of the teacher;
- control of the learning;
- teacher innovativeness/willingness to change; and
- problem-solving skills required (Hixon & Buckenmeyer, 2009).

The critical information common among the levels of technology integration literature is that at each level, teachers demonstrate different attitudes, practices, and skill sets. They also demonstrate "that there is much more involved in technology integration beyond acquiring technical skills" (Hixon & Buckenmeyer, 2009, p. 140). For example, teachers new to the profession may have more technical skills and be more comfortable with the technology tools, but "may lack an appreciation for the value of technology as an instructional tool" (Ertmer et al., 2007, p. 55), and lack the organizational and management skills to use it effectively.

Impact on technology professional development strategies. Teachers' level of technology integration impacts the design and development of technology PD programs. This section discusses PD factors and strategies that can be used depending on the teachers' level of technology integration.

Holland (2001) recommends various instructional strategies, or types of PD activities, that should be used for each of the five levels of technology integration. Table

1 summarizes these suggestions by providing the level, description of the teacher at the level, and strategies for technology PD at that level.

Table 1:
Holland's (2001) Levels of Technology Integration and Professional Development for Each Level

Level	Description	Strategies
Nonreadiness	• Resistant and have little if any knowledge	• Administrative enthusiasm, commitment, and support • Formal training on how to use in classroom
Survival	• Focused on own personal learning and use of technology • Acquired proficiency in one or more computer applications • Don't see it yet as a tool • Limited knowledge and skill leading to problems when using in the classroom • Lack of knowledge how technology enhances instructional content	• Support needed in the classroom • Models of good use • Formal in-service hands on training • Introduce ideas and examples of how technology can be used in the classroom
Mastery	• Doesn't develop mastery in all technologies simultaneously • Demonstrate competence in technologies that are most successful in their content area • Need differentiate PD according to needs and interests • Still see technology as the main instructional focus – ends instead of means	• Collaborative interactions • Provide support for planning • Technology and peer support
Impact	• Working on integrating technology into curriculum and teaching	• Provide management strategies for

	• Recognize technology as instructional tool • Still experimenting how to use it • Shifted attention from personal use to instructional use • Familiar with several technology applications and require students to use them one or more times a week • Interested in how technology can support or enhance student learning • More variety in instructional methods	monitoring student work • Self- and peer reflection on current learning and technology use • Collaboration o Mentor o Observations
Innovate	• Using a variety of applications in teaching • Integrate with content • Maximize student learning through discovery • Change the way the teach • Sophisticated in use of technology for their own research, planning, management, and work collaboratively with others • Go beyond the walls of their classroom • Use technology to gain access to a larger professional community	• Curriculum integration writing with others • Conduct and participate in formal studies using technology • Visibility for their work • Opportunities to share their work and to teach others

When comparing high school teachers' level of technology integration with the PD they received, Mierzejewski (2009) used Moersch's (1995) LoTi scale and found a trend in level of technology integration with the type of PD that teachers received. Teachers with low levels of technology integration did not show dominance in a specific type of PD. As teachers' levels of technology integration began to increase the dominance in self-taught, collaborative, and coaching PD strategies emerged. During interviews, teachers and principals in Mierzejewski's (2009) study described hands-on

training, collaborative activities, or a combination of both as the most effective types of PD.

Teachers' possess different attitudes, abilities, and experiences at each of the different levels of technology integration. Therefore they need different resources and varying technology PD experiences based upon their level. These levels of technology integration occur along a continuum, so as teachers' levels of technology change and improve; the types of PD provided will also need to change. These models assume that for technology PD to be successful, educators and PD providers "must take into account the level of knowledge and commitment that teachers bring to staff development; and address the differing personal learning needs, satisfactions, frustrations, concerns, motivations, and perceptions that teachers have at different states of their professional development" (Holland, 2001, p. 247).

In summary from the literature indicated above, there is a need for teachers with low levels of technology integration to experience hands-on training, administrative support, on site technology support in the classroom when needed, and be exposed to other experts and teachers who model the use of the technology. As teachers' levels of technology integration increase, the literature confirms that there is a need for technology PD to include peer collaboration strategies, curriculum writing, planning, and student management activities, and times for them to present and share their knowledge to their peers through demonstration and formal studies.

Barriers and enablers. Other researched areas of technology integration support that PD to teachers is important, but there may be other factors besides instruction that

impact teachers' technology integration. This section discusses barriers and enablers to technology integration and the impact they have on technology PD strategies.

Barriers. Barriers are the external and internal factors (Ertmer, 1999) that impact a teacher's ability to integrate technology into classroom practice. External, or first order, barriers are factors outside of the teacher's control and can include lack of access to hardware and software, lack of time for instructional planning, and lack of technical and administrative support. Internal, or second order barriers, are factors that are intrinsic to the teacher, and can include their beliefs about teaching and computers, and their willingness to change already established classroom practices. Both types of barriers can occur independently or simultaneously throughout the technology integration process, and both play a crucial role in technology integration. Hew and Brush (2007) found 123 barriers that were listed in past empirical studies, and classified them into six categories based upon their relative frequency:

- resources;
- knowledge and skills;
- institution;
- attitudes and beliefs;
- assessment; and
- subject culture.

Impact on technology professional development strategies. Ertmer (1999) discusses five areas that teacher educators and PD providers must address in technology PD for assisting teachers in overcoming barriers. For each of the five areas, she also suggests specific ways for addressing each area, and they are compiled in Table 2.

Table 2:
Ertmer's (1999) Strategies and Activities for Overcoming Barriers to Technology Integration

Areas	Strategies	Activities
Developing a Vision	Modeling	• Observing other master teachers, instructors, or administrators • Mentoring • Staff Development Workshops
	Reflection	• Allows teachers to evaluate their practice and redesign their instruction • Interaction with others to share ideas
	Collaboration	• On-site support
Identifying Curricular Opportunities	Utilize	• Grade level, or content area meetings • Develop plan for addressing potential problems (team teaching, parent volunteers, student helpers) • Incorporate technology in small increments • Develop district-wide competencies and guidelines for technology
Obtaining Resources	Access	• Access to needed equipment and software
	Time	• Instructional planning time provided for creating instructional materials
	Training	• Multiple types of training (on site, weekend retreats, afterschool, summer courses) • Addresses pedagogical needs • Addresses technological needs • Follow-up training
	Support	• Professional • Technical • Instructional
Managing Resources and Classroom Activities	Utilize Resources	• Student computer centers • Modeling for students • Troubleshoot aloud for teaching students

		troubleshooting process • Posters and job aids • Technology rules
	Teacher Management	• Expert guidance • Instruction on management issues
Assessing Student Learning	Assess Technology	• Teacher evaluation of the tool • Student evaluation of the tool
	Assess Student Learning	• Rubrics • Portfolios • Performance tasks

Teachers with less experience integrating technology were more likely to report external barriers (Rogers, 2000). Instructional factors for teachers at this level of technology integration should focus on activities addressing technology availability and support. These activities could include providing specific procedures indicating where teachers can acquire technology resources, communication and assistance from administrators supporting the use of technology, and PD on the technical aspects of the equipment. Providing this support for first-order barriers are key factors to changing the internal, or second-order barriers, such as teacher attitudes and beliefs (Rogers, 2000). Researchers have found that addressing the intrinsic barriers is more important to the success of technology integration than addressing extrinsic barriers (Donovan, Hartley, & Strudler, 2007; Ertmer et al., 2007). This means that even if teachers have access to the appropriate resources and external support from administrators (extrinsic), they still may not integrate technology into their teaching because of a perceived lack of value as an instructional tool.

Along with identifying the most mentioned barriers discussed in the literature, Hew and Brush (2007) reported five categories of strategies that could be used to overcome barriers:

- creating a shared vision and technology plan;
- ensuring access to necessary resources;
- changing attitudes and beliefs;
- providing professional development; and
- revisiting evaluation and assessments.

They suggest that effective PD for assisting teachers in overcoming barriers contains three features. First, the content of the PD must cover technical, pedagogical, and management skills. While consideration of the content, or subject matter, that a teacher teaches is important in designing PD activities, "reports on issues, concerns, and barriers appear to be common to all teachers" (Rogers, 2000, p. 462). Second, the learning should be active and provide hands on learning activities which also include observing experts and sharing in a collaborative environment. The third feature they find effective for PD is that it is based on teacher's needs.

Enablers. Enablers are also considered to be internal and external factors (Ertmer et al., 2007) that assist teachers in overcoming barriers. Enablers and barriers have an inverse relationship, so as one increases the other decreases. In this study for example, lack of administrator support for online teaching in the school, is an example of an extrinsic barrier. But if administrators in the school supported the online teaching initiative it would be an extrinsic enabler.

When studying teachers who had successfully integrated technology into their classroom, Ertmer et al. (2007) found that when provided a list of 19 intrinsic and extrinsic factors, teachers perceived intrinsic factors as the most influential for technology integration. They rated (a) inner drive, (b) personal beliefs, (c) commitment, (d) confidence, and (e) previous success, as the most influential factors. Professional development was ranked 8th out of the 19 provided factors. Hsu and Sharma (2008) examined the technology integration change process, and found three enabling factors, which included: (1) an established leadership team where key stakeholders across varying departments and levels are represented, and share leadership responsibilities, (2) a learning community where teachers can reflect on their personal experiences, and (3) positive influences from all levels within the educational system as a whole. Goktas et al. (2009) found factors that enabled technology integration included: (1) having an established technology plan, (2) established budgetary funds for technology, (3) peer support, and (4) in-service training. All of these studies point to factors that support teachers' efforts and build their internal feelings and confidence toward technology integration through the use of self-reflection and peer support.

Impact on technology professional development strategies. Research on barriers and enablers demonstrates the need for teacher educators and PD providers to include attitudinal instructional factors into teacher learning activities. Attitudes, or affective knowledge, is one of Gagne's (1985) five learning domains, and requires learning activities that result in a change in behavior. Learning activities designed to affect attitudinal change need to have the teacher personally and emotionally involved with the instruction, demonstrations from role models, and real-world practice experiences. It also

demonstrates the need for PD that is learner-centered where teachers have a voice in the process and are well informed of the decisions regarding the technology, and are actively engaged in the learning. (Donovan et al., 2007). A learner-centered approach, as well as involvement with the decision process provides a personal and emotional connection, which helps to provide a better environment for attitudinal change.

The literature on barriers and enablers, as discussed above, suggests that technology PD that is supported by the administration and peers, and includes instruction on pedagogy, technology, and management through reflective and collaborative activities would be beneficial for addressing technology integration barriers. An established district technology plan should be in place to ensure access to necessary resources such as hardware, software, and human support. A teachers' job is to see that children are successful with the content area they are teaching and teachers need to be able to evaluate and manage the technology they are integrating into the content. PD activities related to the evaluation of the technology and to student achievement with the technology should be considered when designing instruction for addressing technology integration barriers.

Technology professional development factors. Wells (2007), when studying a technology integration PD initiative answered an instructional design question: What key design factors led to the successful PD? Wells (2007) conducted an analysis of technology PD research and found ten consistent design factors present in effective PD models. The factors are listed in Table 3.

Table 3:
Key Design Factors of Effective Professional Development

Key Design Factor	Description
Evaluation Driven	Designed around stated outcomes, employing short/long-term assessment plans focusing on individual progress and PD process over time
Contextual	Individual practice made relevant with the larger reform effort
Learner-Centered	Designed around participant concerns, needs, and interests
Duration of Process	Participants' instructional content contact time, in addition to the overall time span of the PD process
Engagement	Learner is actively experiencing the innovation during the PD process
Inquiry Based	Promote spirit of inquiry into content, teaching and learning as evidenced through knowledge products developed for immediate implementation
Theory/Research Based	Grounded in pedagogy that is logical to all participants
Collaborative	Establish communities of practice based on collective reflection
Support	Long-term, continuous pedagogical, technical, social assistance
Sustainability	Purposefully iterative PD process to ensure durability of change

Wells (2007) then investigated to what extent the technology PD model used in his study utilized those 10 key design factors, and found the following five to have the greatest influence on teachers' technology integration: (1) duration of the process, (2) learner-centered, (3) engagement, (4) collaborative, and (5) support. These technology PD factors are consistent with other studies (Di Benedetto, 2005; Ehman et al., 2005; Levin &

Wadmany, 2008) that highlight (a) learner-centered experiences, (b) follow-up training and support, (c) collaborative learning environments (Ertmer et al., 2007; Kopcha, 2010; Macdonald, 2008), and (d) engaging learning and evaluation activities. Kopcha's (2010) study of collaborative environment included the use of a mentor to assist teachers: (a) moving through the levels of technology integration, (b) overcoming barriers, and (c) establishing a culture of technology integration.

Technological, pedagogical, content knowledge (TPACK) is a framework for technology PD (Mishra & Koehler, 2006). TPACK aligns with the literature suggesting that preparing teachers solely on the technical skills will not be an effective means to technology integration (Ertmer, 1999; Ertmer et al., 2007; Hew & Brush, 2007; Holland, 2001; Moersch, 1995; Rieber & Welliver, 1989). The TPACK framework suggests that PD initiatives need to recognize the relationships among the content, or subject matter being taught, the pedagogy, or the methods being used to teach, and the imperatives that come along with each technology (Mishra & Koehler, 2006). A method for applying TPACK in technology PD interventions include, "learning technology by design" (Koehler & Mishra, 2005; Mishra & Koehler, 2003).

Hands-on learning (Ertmer et al., 2007; Hew & Brush, 2007; Holland, 2001; Wells, 2007) and authentic and practical experiences (Ertmer et al., 2007; Holland, 2001; Hsu & Sharma, 2008; Wells, 2007) have been found to be effective factors in technology PD. Similar to those factors is the "learning technology by design" approach (Koehler & Mishra, 2005; Mishra & Koehler, 2003). This approach considers that technologies will constantly evolve, so it is imperative to provide teachers technology instruction beyond the "how-to" concepts and skills. Instead this approach centers on providing real-world

authentic educational problems faced by the teachers, and shows them how to learn and think about technology. “Hence, teachers go beyond thinking of themselves as passive users of technological tools and begin thinking of themselves as active designers of technology” (Mishra & Koehler, 2003, p. 103). Teachers design instruction and instructional materials that they can actually use in the classroom or can be used by others.

Impact on technology professional development strategies. Research on technology PD factors suggest that hands-on, learner-centered, and collaborative technology training activities that focus on technology, pedagogy, content, and management concepts and skills, and incorporates time for planning are key to successful technology PD. TPACK is a framework that incorporates all of those factors, and has been widely used in the preparation of pre- and in-service teachers for technology integration.

Conclusions and Research Implications

The U.S. government mandates that technology is integrated into classrooms, in order to prepare students to be competitive in the global economy of the 21st century. However, they do not provide any plan for preparing teachers to appropriately use and sustain the use of technology in classroom practice. It is the responsibility of school districts, teacher educators, and PD providers to design quality TPDIs which prepare teachers to teach with innovative technology-based curriculum and tools.

Tools that assess teachers’ level of technology integration can provide data to both the government and teacher educators for planning TPDIs. No matter which model or tool is used for assessing the levels, each of the levels requires different PD

opportunities based on individual needs. Research on barriers and enablers, and technology PD provide evidence of factors that should be incorporated for increasing the quality of TPDIs. When analyzing the literature across these three areas, the following emerge as important factors to be incorporated into a TPDI to increase its quality and effectiveness:

- technology plan that ensures appropriate resources (hardware, software, instruction, support, planning time) are available;
- administrator, peer, and technical support;
- teacher (learner)-centered training;
- training on technical, pedagogical, content, and management concepts and skills;
- hands-on practical/authentic training activities;
- collaborative learning environment activities including: modeling, reflection (journal and discussions), presenting, mentoring, observation; and
- engaging activities to assist in attitudinal change.

It is our responsibility as educational researchers, teacher educators, and technology professional development providers to examine which of these factors teacher perceive as the most beneficial with assisting them to integrate technology into their teaching practice.

CHAPTER 3

METHODOLOGY

The purpose of this qualitative multiple-case research study was to examine secondary education teachers' perceptions of a technology professional development intervention (TPDI). This study was designed to provide a deeper understanding of which factors teachers' perceived to be beneficial to the quality of technology professional development (PD) they received. This study examined two research questions:

1. While participating in a technology professional development intervention, what do secondary education teachers perceive to be beneficial factors that impact the quality of a technology professional development intervention?
2. After transferring the knowledge and skills taught during the technology professional development intervention to teaching practice, what do secondary education teachers perceive to be beneficial factors that impact the quality of a technology professional development intervention?

This chapter describes the study's research methodology and includes details on: (a) rationale for a qualitative multiple-case research design, (b) an overview of the research design, (c) the research participants, (d) the research environment, (e) data collection, (f) data analysis, (g) ethical considerations, and (h) issues of trustworthiness. The section concludes with a brief summary of the study's research methodology. Before conducting this study I obtained permission from the university's Internal Review Board (see Appendix A for approval of the study).

Rationale for Qualitative Multiple-Case Research Design

Simple *yes* and *no* responses would not be sufficient for answering the research questions for this study, because the questions are not dichotomous. Instead, participants' perceptions and contextual factors needed to be examined in-depth, in order to provide insight into *how* and *why* participants' held these perceptions. For this reason a qualitative multiple-case design was used for this study.

This section explains the purpose and rationale for using qualitative methods. It includes a detailed description of *how* and *why* multiple-cases were selected as the units of analysis for addressing the study's research questions.

Purpose for Qualitative Methods

Too often educational researchers argue for links between the factors of an instructional intervention and the impact that it had on learners' knowledge, skill, and practice. A problem with this thinking is that it assumes that all learning happens immediately and is observable (Lincoln, 2005). When examining learner perceptions of an instructional intervention, we must consider that each of the learners bring their own previous learning and social experiences, attitudes, motivations, values, skills, and worries to the learning environment (Lincoln, 2005). These previous experiences and beliefs impact the theories they use to shape their view and descriptions of the relationships between objects, concepts, and events around them, so their meanings and interpretations are constantly evolving (Ezzy, 2002).

Qualitative research methods provide researchers with an in-depth view of particular environments or settings to draw conclusions regarding various contextual factors that affect the interpretations of the participants. Exploring other contextual

factors about both learners and the instructional intervention, through qualitative research methods, is a good approach for examining theories that deal with meanings and interpretations (Ezzy, 2002).

Qualitative research is a relevant method for this study, because it examines secondary education teachers' perceptions of a specific technology professional development intervention, TPDI. More specifically I was interested in how the teachers perceived the various factors of the TPDI at two different times: (a) while participating in the intervention and (b) after transferring the knowledge and skills to teaching practice. Qualitative research methods provided a way to see if the teachers' perceptions of the TPDI factors changed after transferring the knowledge and skills from the learning environment to the teaching environment with their students. Access to contextual information about the learners and the TPDI allowed me to draw conclusions to why certain factors were perceived to be beneficial and others negatively perceived.

Purpose for multiple-cases. Qualitative case study designs are typically used when a researcher wants to examine "how" and "why" research questions regarding a specific phenomenon, in-depth, in its natural contextual conditions (Gall, Gall, & Borg, 2003; Yin, 2009). Often "phenomenon and context are not always distinguishable in real-life situations," (Yin, 2009, p.18), so exploring a particular instance, or case, of the phenomenon is beneficial for addressing the research questions of the study (Gall, Gall, & Borg, 2003).

In this study the phenomenon of interest was a specific TPDI, and the way it was perceived by secondary education teachers at two different phases throughout the study:

- Phase 1: while participating in the TPDI and,

- Phase 2: after transferring the knowledge and skills taught in the TPDI to teaching practice.

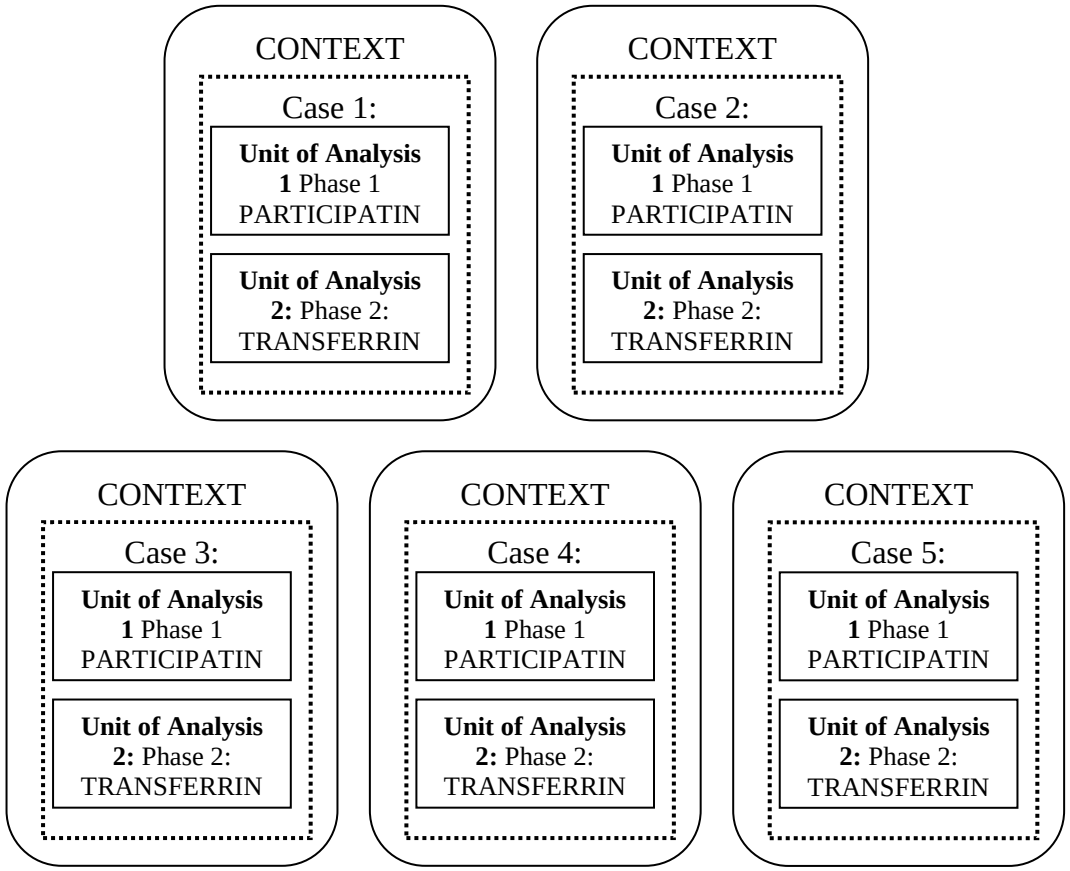
The overall purpose was to explore *how* and *why* teachers' perceptions of the TPDI factors may have changed between the two phases.

Each teacher's perceptions were likely to vary because of the differing professional and social experiences encountered prior to participating in the TPDI. Differences can be found in the subject area and number of years they have taught, the pedagogical methods they currently use in their teaching practice, processes and methods they apply in their own learning, and in their technological abilities in and out of the classroom. These are real-world contextual differences that can influence the way teachers perceive the TPDI factors, making it difficult to separate the phenomenon from the context (Yin, 2009). Examining multiple contexts of the same phenomenon can provide a more in-depth perspective of the phenomenon. In this study, I examined the perceptions of multiple teachers of the same TPDI at two different times.

A multiple-case embedded design was applied in this study. It examined multiple units of data from each teacher participant, in order to discuss *how* and *why* perceptions changed between the two phases (Yin, 2009). As mentioned, the phenomenon of interest was the TPDI, and each participating teacher represented an individual instance of the phenomenon. Gall, Gall, and Borg, (2003) state "that it is possible to break down the aspect of the phenomenon on which the case study focuses into units" (p.436). The aspect of the TPDI that was broken down into units was each teacher's perceptions of the TPDI factors while participating in the TPDI (*unit of analysis 1*) and after transferring

knowledge and skills to teaching practice (*unit of analysis 2*). This provided two *units of analysis* embedded within each participant case (See Figure 3).

Figure 3: Adapted visual representation of the multiple-case study research design for this study



In-depth examination of the two *units of analysis* within each participant *case* individually, later assisted with analyzing themes and patterns that were common among the cases (Gall, Gall, & Borg, 2003) to gain a better insight into which factors of the TPDI teachers' perceived as beneficial to their teaching practice. Knowledge and understanding of contextual factors surrounding the participants' perceptions helps to address *why* certain factors were perceived to be more beneficial than others. For clarity

and understandability, from this point forward I will refer to these two specific units of analysis within each case as:

- Phase 1: Participating and,
- Phase 2: Transferring.

Selecting *cases* for multiple-case study research depends on what it is the researcher wants, or hopes, to be able to discuss at the end of the study (Gall, Gall, & Borg, 2003). The next section explains the process for selecting the teacher participants for this multiple-case study.

Multiple-case selection process. LeCompte and Preiselle (1993) suggest that certain studies in which results will not be generalized to an entire population, establish a set of criteria, or attributes that participants for the study must possess. These criteria are then "used to identify the population; as the research study unfolds, it also is used to establish new sets of phenomena to examine" (LeCompte & Preiselle, 1993, p.69). Before designing this research study, I knew I wanted to discuss which factors of technology PD teachers' perceived as beneficial for integrating technology into their teaching practice. In order to design the TPDI to be examined, I first needed to decide what I would be teaching and to whom. Case selection process began during the design of the TPDI. It was through the design where the criteria, or attributes, of the participants emerged. The following section describes the TPDI.

TPDI. My professional experience has been in teaching adult learners how to utilize various technologies in their work environment. Most of the learners have been K-12 teachers. Budget cuts throughout the U.S. Educational System, and my interest in providing technology instruction, lead me to free Web 2.0 tools that could be used in

teaching practice. As previously noted, I had designed, developed, and implemented an online course for graduate students using Google Applications, and found these tools to be beneficial for online instruction. As noted extensively throughout the literature, teachers tend to adapt technology tools more easily into their teaching practice when technology skills are integrated with relevant content in the PD.

This study was conducted in Michigan, which was the first state to implement an online learning graduation requirement, that requires all high school graduates "to have an online course or learning experience" (Michigan State Board of Education, 2008, p. 2). Even though this requirement was passed in 2006, I discovered through both professional and casual conversations that many teachers throughout Michigan were unaware of this requirement, so I found it to be relevant content for the TPDI. This requirement impacts secondary education teachers, so I decided to design a TPDI that introduces them to online teaching by designing and developing instructional materials using Google Applications (see Appendix B for the complete instructional design document of the TPDI).

Participant selection. Once the topics for the TPDI were selected I established the following set of criteria that teachers must possess to participate in the study (LeCompte & Preiselle, 1993). These included:

- Teach in the same Michigan school district selected to participate in the TPDI and study
- Employed as a secondary education teacher teaching students in any grades 9-12th

- Teach one of the core subject areas: Language Arts, Science, Math, or Social Studies
- Expected to return to the same Michigan school district teaching the same courses and grade levels at the start of the school year (September 2011)
- Agreed to implement the online teaching instructional materials that were designed and developed throughout the five week summer TPDI with at least one of their classes during the first three weeks of the school year (September 2011)
- Agreed to document perceptions of the TPDI factors during and after the TPDI on a weekly basis totaling eight weeks.

Specifying criteria for participant cases is similar to "a laboratory investigator select[ing] the topic of a new experiment" (Yin, 2009, p.38). Because of the specificity of the participant criteria and the phenomenon under examination (LeCompte & Preiselle, 1993), the results from each individual case cannot be generalized to an entire population, but instead analytically compared to preexisting theory (Ezzy, 2002; Yin ,2009).

Once the criteria had been defined, the cases could then be selected. Replication logic is preferred over sampling logic when selecting cases for case study research (Yin, 2009). Replication logic selects cases based upon predictions that the case will either replicate (a) similar (*literal replication*), or (b) contrasting results (*theoretical replication*) of a preexisting theory. Literal replication was used for this study because I anticipated that the cases would generate similar results found in the technology integration literature. For this study, the purpose was to analytically expand upon the

theoretical TPACK framework which was used to design the TPDI that was examined (See Chapter One).

The number of cases selected when using replication logic is dependent upon how many replications are needed or desired to support or refute the theory (Yin, 2009). Even though I anticipated that the cases would demonstrate similar results to the preexisting TPACK framework, I thought selecting teachers who taught varying subject areas may demonstrate contrasting results. This variety of participant could potentially add breadth and depth to the study, since the subject area would be a differing contextual factor examined. My committee supported and approved the selection of four cases to represent each of the four core content areas: Math, Language Arts, Science, and Social Studies.

Since the criteria were set and the number of cases selected, the next step was to gain access to potential cases. Although selecting random cases from the population of participants that meet the set criteria is most desirable, it is better to do a study with cases that are convenient instead of not conducting the study at all (Gall, Gall, & Borg, 2003). As a member and presenter of the Michigan Association of Computer Users in Learning (MACUL), I utilized the online community forum to find secondary education teachers to participate in the TPDI and this study. A K-12 Educational Technology Coordinator, from a school district that had recently adopted Google Applications as their online suite of collaboration tools for teachers and students, contacted me and expressed interest in having some of the teachers from his district participate in the TPDI and the study.

I worked closely with the K-12 Educational Technology Coordinator to identify the four core subject secondary education teachers to participate, and received approval

from the school district to conduct the study at the school (See Appendix C). There are approximately 50 teachers in the high school (English/Language Arts n=16; Science n=11; Math n=11; Social Studies n=12), and 100% of the teachers, according to the Federal No Child Left Behind Act, are classified as highly qualified. Highly qualified teachers hold a minimum of a bachelor's degree, have obtained a state teacher certification or license to teach in the state, and have demonstrated competence in each of the subject areas which they teach (Twin Falls School District, 2011). There are 65 highly qualified teachers at the high school, including full and part-time teachers and counselors. Of these, 33 are men and 32 are women. Forty-four of the staff holds master's degrees and one teacher has a PhD. The average years of experience at the high school is 13.5 (C. Ripmaster, personal communication, May 12, 2011).

The school district was awarded a grant for technology PD for teachers. Thirty teachers district-wide applied to receive the PD, but the grant only provided funding for 16 teachers. Of the 30 applicants, eight were from the high school, but only four were selected to participate in technology PD funded through the grant, *not* the TPDI designed for this study. The K-12 Educational Technology Coordinator suggested that the participants for this study could be the remaining four not selected for the grant funded technology PD. The four teachers available specialized in each of the core subject areas, English/Language Arts, Science, Social Studies, and Math, which fit the criteria selected for the study.

Prior to beginning the study, the school district encountered budget cuts, and the original four teachers were unable to participate in the TPDI due to teacher layoffs. Since the study was taking place during the summer months and the school district was not

100% certain on which teachers would be returning, my dissertation committee advised me to invite more teachers to participate in the TPDI to increase the likelihood of having at least one teacher from each of the four core subject areas.

Three additional teachers responded to an email sent by the K-12 Educational Technology Coordinator expressing interest in participating in the TPDI, bringing the total of participants to five. Unfortunately, I no longer had a participant from each of the core subject areas enrolled in the TPDI, but because of the time constraints of completing the TPDI before the school year started, and the possibilities of not completing the study at all (Gall, Gall, & Borg, 2003), I moved forward with the participants that were available.

Participants were informed of the study through the approved research information sheet (Appendix D), and volunteered to participate in both the TPDI and the study. I had originally planned to use data from only four of the participants, because two taught the same content, social studies, but after working with them for 10 weeks, I found that all five provided information valuable to the study, and so all five were included.

Research Study Environment

The TPDI for this study was implemented in an online environment, using Google Applications for online communication and collaboration. Teachers participated in the five week TPDI during the summer months from July through August. The instructor and participants did not interact at any time throughout the study in the face-to-face environment (see Appendix E for the complete course guide of the TPDI).

The participants for this study teach at a rural consolidated high school located in Michigan. Michigan is a Midwest state with a population of approximately 10,000,000

people (U.S. Census Bureau, 2010). Of that population, 24% are under the age of 18. Approximately, 22% of people 25 years and older in Michigan have obtained a Bachelor's degree. This consolidated school is located on the west side of the state just west of Kalamazoo, and is about halfway between Chicago, IL and Detroit, MI. A consolidated school is a public school which educates students from several adjacent districts, which are largely rural. The town in which the school is located approximately 52 square miles, with a population of 2,690 residents, and has seen a population growth of about 6% since 2000. The entire consolidated area which the district serves is about 71 square miles. The local economy is supported by plastic products, pharmaceutical research and development, and higher education institutions. It has a 12.90% unemployment rate which is almost 3% higher than the national average. The median home costs approximately $56,000, with a cost of living 25% below the national average, and the average household income is $49,000. Approximately 56% of the population is married with the median age of approximately 34 years old. About 15% of the population has received a four year college education or higher. The majority of the population is white (93.23%) and 53% of the population is registered as a Democrat. On a scale of 1 (lowest) to 10 (highest), the town has a violent crime score of 1. The district conducted a survey of their teachers approximately three years ago and report 94% of students had computers at home, and 85-90% of homes had internet access. There is one township the district serves where there is no high speed internet (C. Ripmaster, personal communication, May 12, 2011).

Currently the entire school district's campus is wireless, and any community member, student, or parent, are able to access the wireless internet using a "guest"

username and password when they are on campus. All buildings on campus remain open until 4pm so that students have access to computers and the internet as needed. The three local libraries have internet access as well. There have been conversations between the school district and the town about collaborating to make the entire town wireless in approximately three years. Again, this is currently in the discussion stage and no decisions have been made.

The entire school district educates approximately 4,000 students in four schools. This study took place within the high school which has 1,200 students enrolled in grades 9-12. Under the Federal No Child Left Behind Act, the high school met Adequate Yearly Progress, and earned an "A" on the Michigan Department of Education Report Card. In 2010, 91% of graduates moved onto post-secondary education (as cited on the school's website).

Current PD in Place. All teachers were given laptops at the beginning of the 2010-2011 school year. The school district has 10 PD days built into the schedule for the high school teachers. Four days used before the start of the school year for preparation and two at the end of the school year for finalizing grades and cleaning. Technology PD is typically provided by the administrators and teachers within a 5 to 10 minute timeframe during the monthly faculty meetings. Sometimes these are hands-on learning opportunities that occur face-to-face in the computer lab or with the teachers using their laptops. Other times the technology PD may instead include the sharing of a technology integration article that they read and discuss.

Research Design

Common characteristics in case study research include: (a) the study of specific cases of a phenomenon in its natural state, (b) an in-depth study of each case from the viewpoint of the participant (Gall, Gall, & Borg, 2003), (c) research questions that ask "how" and "why", (d) propositions that assist in finding the information needed to answer the questions, (e) units of analysis, (f) linking data to propositions, and (g) criteria for interpreting the findings (Yin, 2009). This section describes how these characteristics guided the research design for this qualitative multiple-case study.

My desire to implement effective technology PD initiated the development of this study. A first step in providing effective technology PD is to gather teachers' perceptions of which effective technology PD factors are effective. As I reviewed the literature beneficial factors for assisting teachers with integrating technology into practice emerged. These factors, discussed and listed (Table 3) in Chapter Two, served as the framework to design the TPDI. After evaluation, these factors served as the phenomenon examined for this study. Continued review of the literature and iterative cycles of modifying the TPDI enabled me to develop and refine the research questions that guided this study.

The social and professional experiences of each teacher case were important contextual factors for understanding their perceptions, so an in-depth viewpoint of the participants was needed. Simply gathering teachers' perceptions through a survey or questionnaire that had them select various factors from a checklist, would not have provided enough information as to *why* they perceived certain factors to be more

beneficial to their learning than other factors. An in-depth description would also provide insight into *if* and *how* teachers' perceptions of the factors changed over time.

As the multiple-case research design approach emerged as an appropriate method for this study, it was important to avoid collecting data without any propositions in mind to minimize the possibility of gathering data that did not point to my area of interest (Yin, 2009). The key propositions for this study came from the Guskey and Sparks' model (1996), which provides a comprehensive demonstration of the relationships between teacher PD and student learning. The premise of the model suggests that the quality of PD is directly influenced by:

- content characteristics,
- process variables, and
- contextual characteristics.

I used these three elements as the propositions, or categories, to assist in collecting, finding, and reporting the information needed for establishing meaning of the participant data to answer the research questions for this study.

Data Collection

Qualitative data collection methods were used in this multiple-case study to gather data at two different times throughout the study (a) while participating in the intervention and (b) after transferring the knowledge and skills to teaching practice. As noted earlier, these two different times of data collection are referred to as:

- Phase 1: Participating and
- Phase 2: Transferring.

Guided teacher reflection journals were the main data source, during both phases, and were aligned with the research questions as displayed in Table 4.

Table 4:
Research Questions, Data Source, and Collection Method

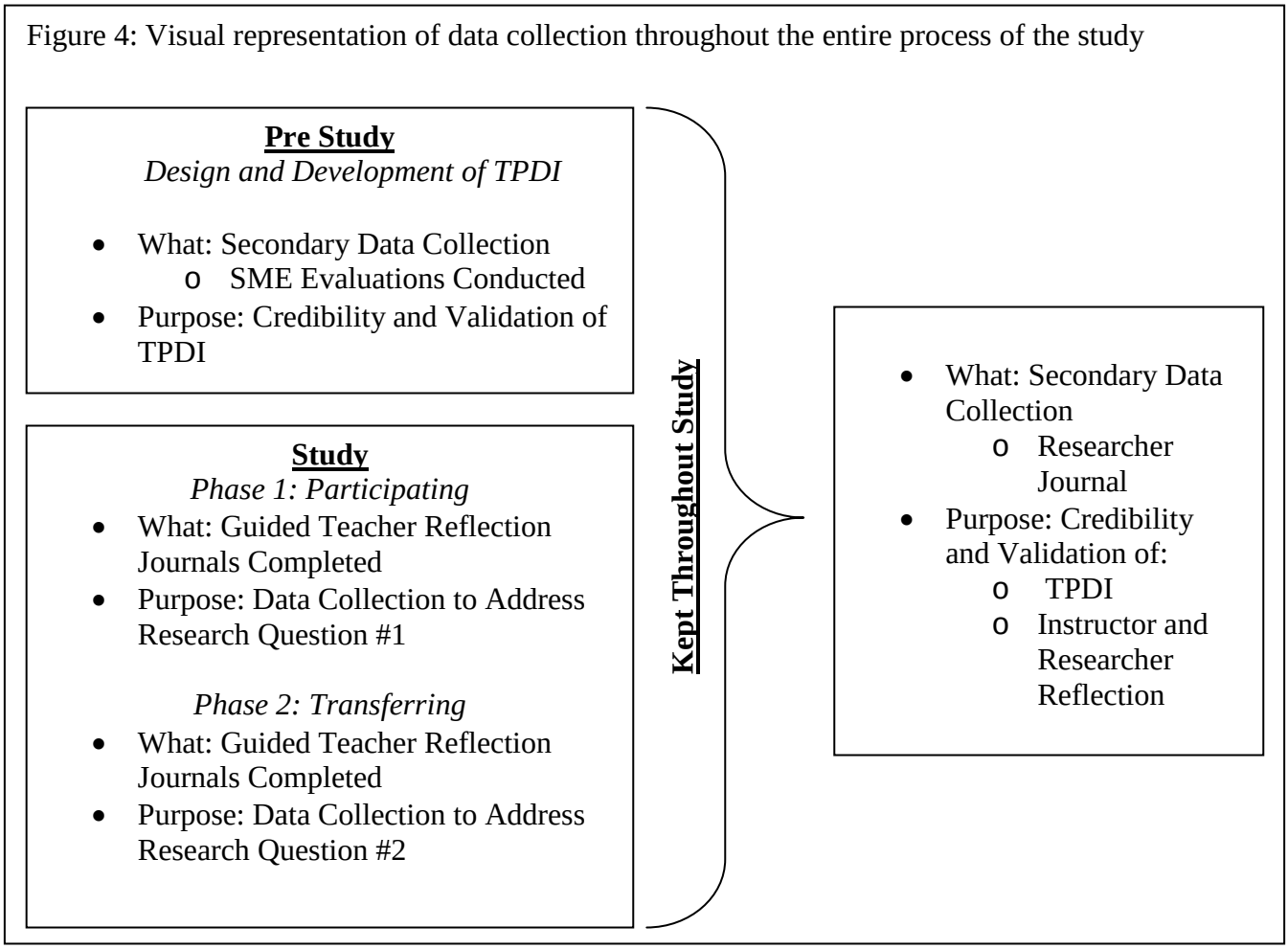
	Research Questions	Data Source	Collection Method
Phase 1: Participating	1. While participating in a technology professional development intervention, what do secondary education teachers perceive as beneficial factors that impact the quality of a technology professional development intervention?	Teachers who received the TPDI	Guided teacher reflection journals
Phase 2: Transferring	2. After transferring the knowledge and skills taught during the technology professional development intervention to teaching practice, what do secondary education teachers perceive as beneficial factors that impact the quality of a technology professional development intervention?	Teachers who received the TPDI	Guided teacher reflection journals

Subject matter expert (SME) evaluations and a researcher journal were secondary data sources used for strengthening the credibility, consistency, and transferability of the findings, but were not used for addressing either of the researcher questions. The SME evaluations of the TPDI were conducted prior to Phase 1. The researcher journal was kept throughout the entire design and development of the TPDI through completed data analysis. See Figure 4 for visual representation of the entire data collection methods.

The remainder of this section explains the TPDI implemented for this study, and the two secondary instruments used to increase the study's credibility and validity, and

the rationale behind each. It concludes with discussing the primary data collection instrument used for both phases of the study, the rationale behind it, and how it was used to address the research questions.

Figure 4: Visual representation of data collection throughout the entire process of the study



Pre-Study

Prior to collecting data used for addressing the research questions, I needed to design and develop the TPDI.

TPDI.

The relevant empirical factors discussed in the literature review were incorporated into the design of this study's TPDI for increasing the knowledge and skills of secondary

education teachers for online teaching using Google Applications. Teachers received instruction in the online environment using the same Google Applications they would later use in their teaching practice with students, providing an authentic learning environment. They experienced the Google Applications first-hand as learners, before designing online instructional materials as teachers for their students. The five teacher participants were exposed to case studies, scenarios, and readings from exemplary online secondary education teachers and experts, which provided demonstrations of pedagogical approaches to online teaching. Participants completed a variety of instructional activities including a guided teacher reflection journal about the TPDI, discussion board postings, collaborative activities, and instructor and peer online text and video communication. The majority of activities centered on designing online instruction and materials to implement into their teaching practice at the start of the school year. Before implementing the instruction they designed with their students, the teachers received feedback from the instructor and others about the instruction and materials they designed (see Appendices D and E for the final versions of the TPDI course guide and design document).

SME Evaluation of the TPDI. I did not pilot the TPDI prior to implementation; however, the initial draft was evaluated by a panel of subject matter experts (SMEs) to assist in modification and validation of the TPDI. Expert review is one of five approaches used in validating instructional design models and products (Richey, 2005; Richey & Klein, 2007). The panel received the design document for the TPDI for expert review of the content, methods, activities, strategies, and evaluation items.

SME population. The SMEs consisted of a secondary education teacher, curriculum administrator, instructional designer, and technology integration specialist. I

had previous professional relationships with some of the SMEs, and others were recommended by another professional. The SMEs had evaluated a previous instructional design model for me. I contacted the SMEs via email to explain the study and to see if they would be interested in serving on the expert panel. Upon their informal agreement, I contacted the SME's by a written request sent through email, explaining the study in detail.

Secondary education teacher. The secondary education teacher is the end user and learner of the TPDI. Kara Kerstetter is a high school social studies teacher, and has been teaching for eight years. Kara has a low level of experience with integrating technology into classroom practice, and no experience with online teaching tools, or Google Applications. Her input provided feedback that assisted in ensuring the technology PD was designed for teachers who are novices to integrating technology, online teaching tools, and methods into classroom practice.

Curriculum administrator. A curriculum administrator is an expert on the content that teachers must teach to students. The curriculum administrator expert provided feedback to ensure that the intervention included correct content and activities, and that curriculum and technology standards were addressed. Penny Lenig-Zerby Ed.D., was asked to participate as the curriculum administrator expert because of her 23 years of experience in education. Her experience includes: 10 years of teaching, seven years serving as a principal, three years as assistant superintendent in the office of curriculum and instruction, and three months as superintendent.

Instructional designer. An instructional designer is a professional who analyzes the knowledge and skills needed to be acquired by the learners and systematically applies

instructional theory and empirical findings to design, develop, implement, and evaluate an instructional process or product (Dick, 1987). The instructional designer in this study evaluated the objectives and tasks for the learners to ensure that they were appropriately aligned with the instructional delivery, materials, strategies, and assessment items. Karen Carmody was asked to participate on the panel because of her expertise in instructional design. Karen has been designing instruction for all mediums (self-study, information and learning, computer-based, and web-based technologies) and in many industries, including health care, automotive, retail, construction / home building, and insurance. In addition to her 11 years as an instructional designer, she has five years experience as a classroom teacher.

Technology integration specialist. The technology integration specialist has many years of experience with integrating technology across curriculum areas and into classroom practice and use. Jim Gates was selected because of his professional commitment to technology integration in the K-12 sector. Jim was a teacher for 26 years, then a technology professional development provider for eight. He is now retired and doing consultant work for the Pennsylvania Department of Education.

SME Evaluation Instrument. The instrument the SMEs completed was a modified version of McAlpine and Weston's (1994) instrument (Appendix F) for assessing attributes of instructional materials. I received permission from both authors to modify and use this instrument for the proposed study (Appendix F). The SMEs had experience using this instrument since they used it for evaluating a previous instructional design for me.

Instrument procedures. Each SME was emailed a packet of files containing: (a) the course guide/syllabus (Appendix E), (b) the design document (Appendix E), and (c) the instrument for evaluating the TPDI (Appendix H). The SMEs had one week to complete the instrument digitally and return it as an attachment to me via email. After I received all of the evaluation responses from the SMEs, I made changes to the design document (Appendix B) based on their recommendations. I documented all changes made, and also noted any changes that I did not make based on their recommendations in the researcher journal (Appendix G).

Researcher Journal. In qualitative research, the data that researchers study is influenced by "our interpretive lens" (Ruona, 2005, p.235), providing possibilities of misinterpreting the meanings generated by the participants. Keeping a record of thoughts, decisions, events, and speculations, throughout the study, especially during data analysis, allows the researcher to reflect on what's happening not only within the data but also within the researcher. Researcher journals provide another reference point to deepen the qualitative analysis of the study by providing documented insight into contextual factors surrounding the instructor, intervention, researcher, and research methodology. This increases the validity of the study.

Qualitative research is about interpreting participants' meanings, so journaling throughout the study allowed me to reflect on my thoughts and other contextual factors in order to keep focus on the teachers and the intervention. The researcher journal (See Appendix G) was not a direct data collection method that addressed any of the research questions, but instead served as a vehicle for increasing trustworthiness of the study (Ruona, 2005). Since I served as the designer, instructor, and researcher for this study, I

made entries throughout the entire study, from design of the intervention to completed data analysis and reporting. This journal was stored in a Google Document and downloaded on a weekly basis and saved to my computer for backup.

Throughout the design and development of the intervention I made entries regarding the various tools and processes used in the intervention, along with instructions for using the tools. It also served as a way to provide information about the modification decisions made based on the feedback provided by the SMEs.

During implementation, most instructors formatively assess through interactions with the learners, whether or not to modify the intervention based on the needs and contextual factors of the learners and instructional environment. All changes that I made throughout the implementation of the intervention in this study were noted in the researcher journal.

Study

Guided Teacher Reflection Journal Questions. For this study, I was primarily interested in how participants perceived the factors of a TPDI to gain better insight into which factors they found beneficial for their learning. Perceptions are associated with Kirkpatrick's (1979) first level of evaluation, reaction. Reflective journaling is a popular format for collecting data about participants' reactions (Guskey, 2000). Since, participants bring their own previous learning, beliefs, and social experiences to all learning environments, reflective journals were good instruments for this study. Guided teacher reflection journals were the key data collection method for gathering information to answer the research questions. I was able to collect detailed contextual information about the teachers instead of just calculating checkmarks through the use of a survey. The

journals provided rich information on *how* and *why* learners may have perceived certain factors to be better than others for their learning and transferring the TPDI to teaching practice.

The guided teacher reflection journal was a Google Document that teachers created and used for documenting their perceptions of the factors used throughout the TPDI. Each participant shared this document with me, so only the participant and I had access to it throughout the study. The teachers were provided with guided questions (see Appendix H for guided questions) to assist them with focusing their journal entries specifically about the content, processes, and contextual factors of the TPDI throughout both phases of the study. The guided questions also assisted by providing a framework of propositions for organizing and synthesizing the data during analysis (Guskey, 2000; Yin, 2009).

Instrument Validation. The guided questions were created following the suggestions of Guskey (2000), and were also dependent upon the content, processes, and contextual factors of the TPDI for each week. *Content* guided questions were composed to stimulate participant's perceptions about the *content* taught in the intervention. Questions centered on the content's relevance and credibility, newness of knowledge and skills, and practicality of using the knowledge in teaching practice. *Process* guided questions related to how the content was presented by the instructor and various instructional activities and assignments. *Contextual* questions were designed to collect data about the environment and setting of the TPDI, participants' previous online learning and teaching experiences, personal backgrounds, and other information that impact their perceptions.

Prior to implementation of the TPDI, I provided a set of sample guided questions (Appendix H) to five teachers within the same high school where this study took place. The exact instrument could not be provided prior to implementation due to the possible modifications of the instruction based on instructor-learner interactions, and weekly review of the guided teacher reflection journal entries, as discussed in the previous section. All five non-participant teachers expressed that the instrument was clear and understandable.

Instrument Procedures. The entire TPDI was implemented and facilitated in the online environment through various Google Applications. I collected teacher perceptions of the TPDI factors during both phases of the study, which provided two units of analysis.

Phase 1: Participating. Three days prior to start of the online TPDI, I contacted the participants via email notifying them that the TPDI website was available for viewing, and informed them of a synchronous online meeting to discuss the course guide and requirements. I instructed them to review the materials for Week One of the TPDI, which included the sample guided questions (Appendix H), prior to the meeting. Three days later, during the synchronous meeting and the first official day of the intervention, I informed participants of all expectations for completing the guided teacher reflection journal. Participants were instructed to open the sample guided questions document (Appendix H) from the TPDI website. We discussed the sample instrument (Appendix H) and participants had time to ask any questions for clarification. As part of their Week One objectives, participants were provided instruction about how to create and share a Google Document with one person. The first assignment of the TPDI was to create their online

guided teacher reflection journal, share it with me, and type responses to the following: (1) Describe the purpose of the Teacher Reflection Journal, and (2) What are the requirements of the Journal? This instructional activity served a dual purpose. As the instructor, I was able to assess if the participants understood the content (*creating and sharing Google Documents*). As the researcher, I was able to assess if participants were clear about the purpose and requirements of the guided teacher reflection journal; the key data collection source for this study.

I composed the guided questions prior to implementing each week of instruction, and posted them on the TPDI's website and on the assignment checklist for the week. The guided questions for each week changed depending on the content, processes, and contextual factors used at that time of the TPDI. Participants were reminded through email to complete a guided reflective journal entry while completing the instructional activities, or within three days of completing the assignments for the week. Delaying the reflection a few days gives participants time to think and process, and carefully explain their answers, but if too much time elapses the relevance behind their responses can cause important information to be lost (Guskey, 2000). As an additional reminder, I added an automatic footer to each posted message on the Google Group discussion board reminding them to complete their guided teacher journal entries.

Shared access to each guided teacher reflection journal throughout implementation of the TPDI, allowed me to review each journal and make any modifications to the upcoming weekly intervention activities. Ruona (2005) advises that data analysis, at least informally, should not wait until the end of data collection, but instead begin with the first pieces of data collected. The simultaneous process of

reviewing data and reflecting are beneficial for conducting better research (Ruona, 2005). Reviewing the data as the study progressed allowed for altering the data collection processes if needed. I was able to assess if the data generated by the participants was sufficient for addressing the purpose and research questions of the study (Ruona, 2005). Modifications to the TPDI during implementation, whether from interactions with participants or journal review, were noted in the researcher journal. At the end of each week of the 5 week TPDI, I downloaded copies of the guided teacher reflection journals to my computer in order to secure a backup copy of the data.

Phase 2: Transferring. When the five week TPDI concluded, I merged all five weekly guided question instruments into one instrument and removed any duplicated questions. I organized the document into three specific categories of content, processes, and contextual factors the same way the guided questions for each individual week were organized (See Appendix H). This document was then provided to each of the participants via email for three weeks, at the start of the school year, as they implemented the instruction and instructional materials that they designed during the TPDI, with their students.

Data Collection Schedule

Pre-Study: Design and Development of TPDI: May – June 2011. Two instruments were used for data collection during this phase: (1) subject matter evaluation instrument, and (2) researcher journal. Both were secondary data sources used for strengthening the credibility, consistency, and transferability of the findings (Ruona, 2005), but were not used for addressing either of the research questions.

The initial design of the TPDI was completed and then evaluated by the SMEs as previously described. Modifications to the intervention were made based on their feedback, and changes were noted in the researcher journal. I received approval from my dissertation and university human investigative committees to conduct the study.

Phase 1: Participating: July 17 – August 31, 2011. Two instruments were used for data collection during this phase: (1) researcher journal, and (2) guided teacher reflection journal.

I distributed, via email, the approved research information sheet and link to the TPDI website to the teachers selected to participate in the study as previously described. The TPDI was implemented with the participants in an online environment through various Google Applications. As participants proceeded through the five week online instruction, they composed guided entries in their teacher reflection journals regarding their perceptions about the content, processes, and contextual factors of the intervention. Guided teacher reflection journals completed and collected during this phase were the primary data source for answering research question #1 for this study. I conducted weekly reviews of the guided teacher reflection journals, and based on their entries and my interactions with the participants, modified future intervention activities and began informal analysis of the data. Any changes made to the TPDI based on their entries or interactions were documented in the researcher journal.

Phase 2: Transferring: September 5-October 31, 2011. The second phase of data collection occurred when teachers returned to school and began implementing the instruction and instructional materials they designed during the TPDI with their students.

During this phase two instruments were used for collecting data: (1) guided teacher reflection journal, and (2) researcher journal. Both were previously discussed.

The guided teacher reflection journal in this phase was used to collect data on teachers' perceptions of the content, processes, and contextual factors of the TPDI after transferring the knowledge and skills to teaching practice with their students. This data was collected to provide an insight into any changes in teachers' perceptions of the content, processes, and contextual factors of the TPDI now that they transferred the knowledge and skills taught during the intervention to practice.

During this phase I emailed the participants the merged guided questions document (Appendix H) to assist them with completing their reflective journal entries. Teachers completed their journal entries regarding their perceptions of the content, processes, and contextual factors of the TPDI now that they were transferring the knowledge and skills from the TPDI to teaching practice, throughout the first three weeks of school. Data collection, however, needed to extend into October. One participant had to postpone using her instruction and materials by three weeks, because of a drastic schedule change to accommodate student numbers in the school. I conducted weekly reviews of the guided teacher reflection journals, to ensure their journal reflections centered on the content, processes, and contextual factors of the PD intervention.

Data Analysis Methods

Qualitative data, usually in the form of words, are meanings which represent the social realities of a study's participants (Ruona, 2005). The goal then, of the qualitative researcher "is to conduct a rigorous analysis of the data" (Ruona, 2005, p. 234), to convey the participants' meanings. Data analysis in case study research should begin, at

least informally, with the first pieces of data collected and continue throughout the data collection process (Gall, Gall, & Borg, 2003; Ruona, 2005). This simultaneous relationship of data collection and analysis could potentially lead to a study that never ends. Reflecting back on the study's purpose and research questions, and utilizing conceptual frameworks, assists with reminding researchers when to stop data collection and analysis (Guskey, 2000; Yin, 2009; Miles & Huberman, 1994). Lincoln and Guba (1985) also identify four criteria for ending qualitative data collection and analysis: (1) exhaustion of sources, where further engagement with the data sources or data would provide no further relevant information; (2) saturation of coded categories, where further data collection only produces minimal pieces of information to the already collected and analyzed data sets; (3) emergence of regularities, or consistencies in the data that show phenomena occur regularly or occasionally; and (4) overextension, where the data coming in no longer contribute to the focus of the case study.

Qualitative data for this study was collected in two different phases:

- Phase 1: Participating and
- Phase 2: Transferring.

Even though there was only one main data source for analysis, guided teacher reflection journals, organizing and managing the data was important. Data were collected from five participant cases for both phases of the study, totaling eight weeks of journal entries for each case. Organization and management of the two secondary sources, SME evaluations of the TPDI and the researcher journal, required minimal effort as those documents were not analyzed to address either of the research questions,

Ruona (2005) states that "Qualitative data analysis is a process that entails (1) sensing themes, (2) constant comparison, (3) recursiveness, (4) inductive and deductive thinking, and (5) interpretation to generate meaning" (p. 236). To complete these steps, I employed a content analysis (Ezzy, 2002) methodology, for analyzing the data for this study. The data analysis process I used for analyzing the guided teacher reflection journals followed Ruona's (2005) four stages for analyzing qualitative data: (1) data preparation, (2) familiarization, (3) coding, and (4) generating meaning.

Data Preparation

Participants created their guided teacher reflection journals in Google Documents and digitally shared it with me throughout the study. Data preparation involved gathering the data into a manageable form. Data organization, management, and informal analysis began at the conclusion of the first week of the TPDI, when I downloaded the guided teacher reflection journals to my computer. I created a digital folder structure for organizing and managing the data. I cleaned the data by removing all identifiable information, and applied pseudonyms for each teacher and the school district to protect the identities of the participants. Informal weekly reviews of the journals assisted in modifying upcoming activities of the TPDI. Any changes were then noted in the researcher journal. The simultaneous and recursive process of reviewing and reflecting upon the data are beneficial for conducting better research (Ruona, 2005). The process of downloading and reviewing occurred weekly throughout the five week TPDI.

At the conclusion of the five week TPDI, and prior to Phase 2 of data collection, I compiled all participant data for Phase 1 into the word processing software Microsoft Word 2007. Computer software packages cannot conduct analysis, but can assist

qualitative researchers in organizing, managing, displaying, and interpreting data, by allowing interaction and multiple views of the data (Ruona, 2005).

As I transitioned into familiarization with the Phase 1 data, I simultaneously started preparation for Phase 2 data collection. I used the same processes for downloading and reviewing the guided teacher reflection journals, and implemented the same digital folder structure as I did for Phase 1 data.

Informal weekly reviews of the Phase 2 journals assisted me with providing feedback to the teachers regarding questions or difficulties they encountered when transferring the TPDI knowledge and skills to teaching practice. It also allowed me to ensure participants were reflecting in their guided teacher journals specifically about the factors of the TPDI, which was necessary for collecting appropriate data to address the purpose and research questions of this study. During my review of the journals, I noted thoughts or reflections in the researcher journal. The process of downloading, reviewing, and reflecting upon data from Phase 2 occurred weekly until all teachers transferred their knowledge and skills from the TPDI to teaching practice for three weeks. At that time data collection for the study ended, and I compiled all participant data from Phase 2 into the word processing software Microsoft Word 2007, and organized it into tables as described by Ruona (2005).

Familiarization

By preparing the data the process of familiarization begins (Ruona, 2005). During this stage the researcher really immerses into the data by reading and rereading, and taking notes about what the data is saying, and also what the researcher is thinking. These

notes are typically items of interest and “potentially important data that you will use as you progress in your analysis” (Ruona, 2005, p. 241).

After Phase 1 data was organized into Microsoft Word, an inductive content analysis approach was used for segmenting the data into three factors to identify themes and concepts within the data (Ezzy, 2002). I began reading and noting certain content, processes, and contextual factors that were mentioned throughout the journals. As noted in detail in the data collection methods section, the content, processes, and contextual factors of the Guskey & Sparks (1996) model served as the key propositions for organizing and dividing the data into three categories. While reading I was able to note and label parts of the text that were related to each of these three factors, because I had already grouped the specific TPDI factors into these categories when I created the guided questions for the teacher reflection journals (See Appendix H). This cyclical immersion into the data provided me the opportunity to sense patterns and themes from the guided teacher reflection journals (Ruona, 2005).

Methods of data analysis for one qualitative study may not be applicable in other studies. As qualitative researchers move throughout the data analysis process, they employ a variety of strategies. The creative process of assembling these strategies assists them in fully understanding the data, and in the end creating a process that is uniquely their own (Ruona, 2005). Quality qualitative research is trustworthy “when the researcher demonstrates that he or she has worked to understand the situated nature of participants’ interpretations and meanings” (Ezzy, 2002, p. 81).

Ruona (2005) suggests using a word processor for “formatting data into tables, which allows you to organize your data, segment the data into meaningful ‘chunks’,

merge data across participants, and sort in a variety of ways" (p. 251). For this study, I followed Ruona's (2005) approach for organizing the participant data in a table within Microsoft Word 2007 (See Appendix I), but developed my own iterative process to "actively engage with the data, begin [my] analysis, and record [my] insights about what [I saw] in the data" (Ruona, 2005, p. 254). Modifying Ruona's (2005) approach was needed to employ a process that was more conducive to my study, and more applicable for my understanding of the data, because this "is the most important part of the [analysis] process" (Ruona, 2005, p. 254). The following section discusses the three iterative steps I used for familiarizing and segmenting the data.

Step 1: Chunk Data by Participant. Using the raw data table (See Appendix I); I first chunked the data by individual participants by creating individual documents in Microsoft Word 2007 for each participant's data. Within each participant's document, I used a table to separate the data by weeks. Now that the data was chunked by individuals, I began reading one of the participant's Week 1 data. As I read the data for Week 1, I then furthered separated the data into content, processes, and contextual factors. As discussed in the Methodology section at the beginning of this chapter, these factors were the three categories used for creating the questions for the guided teacher reflection questions journal, so it was relevant to use these three factors for organizing and dividing the data into smaller chunks. I added a row, labeled Feelings/Background, in the table above each of the five weeks for a place to segment data outside of the content, processes, and contextual factors, because it could potentially be important data for understanding the participant's meaning. It is the responsibility of the researcher to generate meaning from participant data, so understanding various items discussed in the

data is very important (Ruona, 2005). Figure 5 demonstrates the table template I created for each individual participant document.

Figure 5: Table used for chunking individual participant data by weeks and into content, process, and contextual factors.

Participant			
Demo			
Feelings/Background	•		
During Week 1:	**Content** •	**Processes** •	**Contextual** •
Feelings/Background	•		
During Week 2:	**Content** •	**Processes** •	**Contextual** •
Feelings/Background	•		
During Week 3:	**Content** •	**Processes** •	**Contextual** •
Feelings/Background	•		
During Week 4:	**Content** •	**Processes** •	**Contextual** •
Feelings/Background	•		
During Week 5:	**Content** •	**Processes** •	**Contextual** •

As I read the original data for the participant, I copied any data that could potentially fit into either one of the three factor categories, or the feelings/background row (See Appendix J for a sample page of a completed table for a participant). The table I created which outlined the content, processes, and contextual factors of the TPDI, and the questions for the guided teacher reflection journals, assisted me in knowing where to place the data. This process was repeated for the reaming four weeks of the Phase 1: Participating data for Participant 1, and when finished, the entire process was repeated for

each participant, resulting in five individual documents. These documents served as the first formal step in segmenting the data. Segmenting into categories is the first step in coding, which is discussed in more detail later in this section. Table 5 provides a representation of the sequential approach for chunking the data by participant.

Table 5:
Sequential approach for Step 1: Chunking Data by Participant

	Sequential Approach Completed for Each Participant
Step 1: Chunk Data by Participant	1. Separate data by participant into individual files 2. Separate individual participant data by weeks 3. Read data by week and separate into Content, Processes, Context, and/or Feelings/Backgrounds

Step 2: Chunk Data by Weeks. The next step included viewing the data from a different angle. In this step I started reading the original data file created during data preparation, by weeks instead of participants. Instead of working digitally during this step, I used a printed copy of the original data file and ink for separating the data into the three categories. As I read Week 1 data for the first participant listed in the table, I looked specifically for data related to the category *content*, and underlined it with blue ink, as a way of segmenting the data, see Appendix K, (Ruona, 2005). I continued reading and underlining the *content* factors in blue ink for all of the data collected from Phase 1 of the study. When finished segmenting all five weeks of Phase 1 data for *content* factors with blue ink, I returned to the beginning of the printed document and read it again. This time through the data I took notes in the margins about data related to *content* factors. I reread the same section of data again for a third time, and compared what was underlined in blue

ink with the notes I took in the margins. This helped to ensure I had a clear understanding of the participant's perceptions of the *content* factors for that week. As I compared the two, I hand wrote the perceptions of content factors the participant expressed for that week on a second document. Constant comparison of the data is a central method for identifying themes appearing in the data (Ezzy, 2002).

I repeated this note taking and comparison process, looking specifically for *content* factors, for Week 1 data generated by the remaining four participants. Upon completion of this entire step for Phase 1 Week 1 data, I repeated the sequential approach for the remaining weeks (Weeks 2-5) of data generated during Phase 1: Participating. The handwritten document that was generated from comparing the underlines and margin notes about *content* factors contained a combined list of all five participants' perceptions of *content* factors of the TPDI during Phase 1: Participating, grouped by weeks (See Appendix L for a sample of documents generated from the constant comparisons completed during Step 2: Chunk the Data by Weeks). Table 6 provides a representation of the sequential approach for chunking the data for each week of the TPDI.

It is important to note, that *before* repeating this entire Step 2 again, specifically looking for *process* or *contextual* factors within the data, I first completed Step 3.

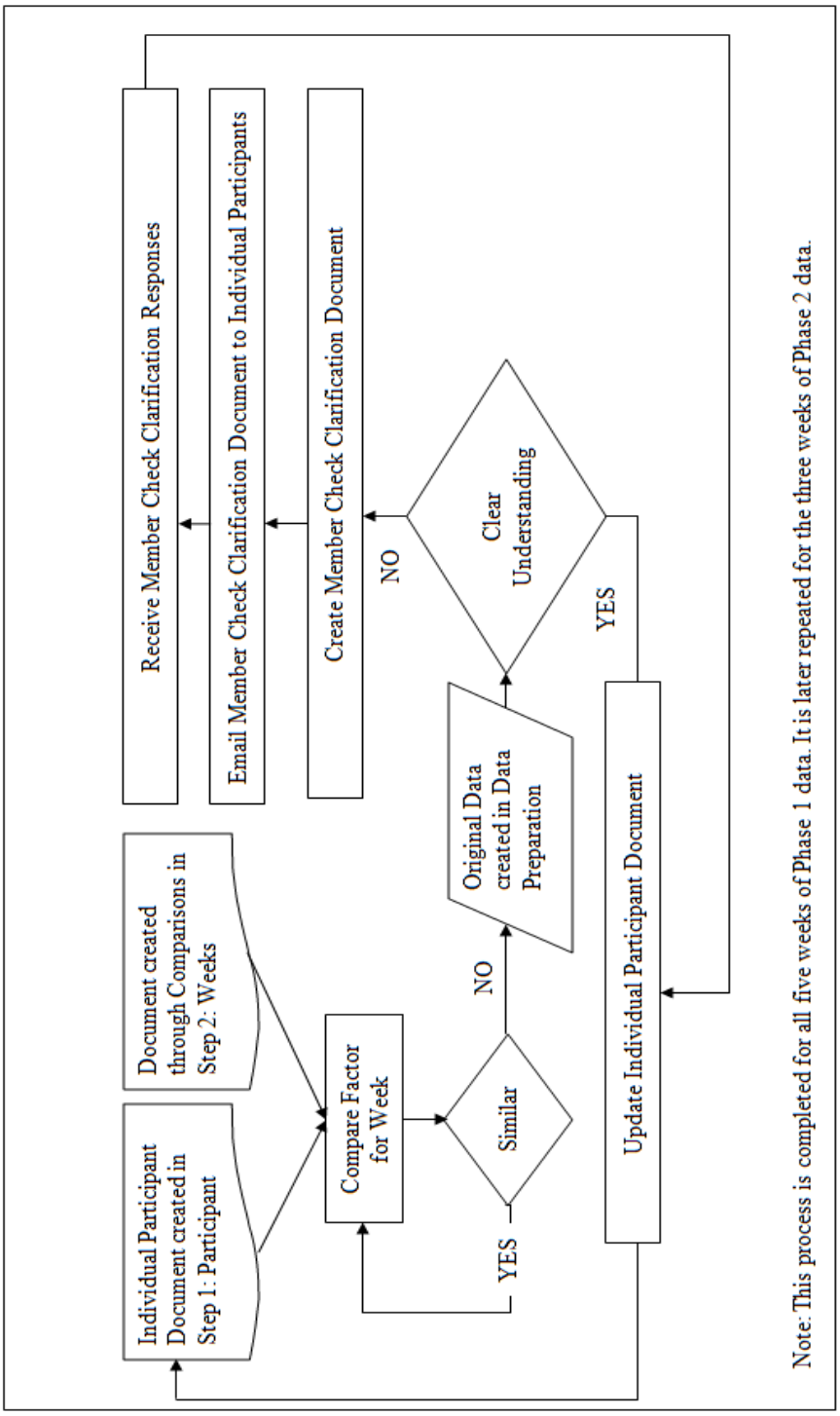
Table 6:
Sequential approach for Step 2: Chunking Data by Weeks

	Sequential Approach Completed for Each Week of the TPDI
Step 2: Chunk Data by Weeks	1. Print original data file created during data preparation 2. Read data by weeks searching for comments related to one of the specific factors, and segmenting that data by underlining in a selected color ink 3. Reread data by weeks searching for comments related to one of the specific factors, and take notes regarding that data in

	the margins of the document 4. Compare the data underlined with the margin notes 5. Document interpretations from the comparisons into a separate document

Step 3: Compare Documents. The third step encompassed another round of comparison. I compared the hand written document generated during Step 2 (Appendix L) with the individual document created in Step 1 (Appendix J). I compared these two documents by week for each participant individually for all five weeks of Phase 1. The purpose for comparison was to see if there were any similarities or differences between the two documents (Ezzy, 2002). My decision process during this comparison is represented visually in Figure 6, and then described in detail in the following paragraph.

Figure 6: Visual representation of the decision process used during step 3 of familiarization stage in data analysis



If everything listed under Week 1 *content* in the individual document created during Step 1 (Appendix O), was the same as what was listed in the hand written document for Week 1 *content* factors for that participant, then I moved onto comparing the two documents for Week 2 for that same participant. If there were differences, I would go to the raw data table file created during data preparation (See Appendix I), and reread the section of data where the differences appeared regarding my interpretations. Pulling from my experience with the data and my direct connection with the participant throughout the TPDI, if I was able to make an informed decision about the participants' meaning, I updated the individual participant document created during Step 1. I decided to use this document as the main data file for each individual participant as I moved throughout the rest of the analysis. When the file was updated the previous version of the document was saved as well. If I was unable to determine the participant's meaning, because I felt the data could be interpreted in a few possible ways, instead of selecting one of the possible interpretations I created a separate clarification document (See Appendix M). The clarification document served as member check strategy for enhancing the trustworthiness of the data analysis. Member checks are used in qualitative data analysis to ensure the participant's meaning has been interpreted by the researcher in the way it was intended (Ruona, 2005). I emailed the participants individually with any items that needed clarification (See Appendix M for a sample of clarifying member checks). After receiving their responses I updated the individual participant document that was created during Step 1. The sequential approach used for completing Step 3 is represented in Table 7.

Table 7:
Sequential approach for Step 3: Compare Documents

	Sequential Approach Completed for Comparing Documents Created during Steps 1 and 2
Step 3: Compare Documents	1. Compare documents generated from Steps 1 and 2 and follow the process in Figure 6

Upon completion of Step 3 for *content* factors, I circled back to Step 2 underlining and note taking in black ink, *process* factors, within the data. I then repeated Step 3 for *processes*. I returned to the original data for a final time specifically searching for *contextual* factors, using red ink this time and repeated Steps 2 and 3.

While working through Step 3, I started noticing pieces of data that overlapped into more than one of three factor categories, and I found myself questioning 'which category (content, processes, or contextual) should this piece of data be placed?' When questions similar to this would arise, I made note of them in the researcher journal. I would later return to these notes during the coding stage. This served as another strategy for increasing the trustworthiness of the data. The researcher journal provided a location for reflecting on any of my *questions, assumptions or biases* that emerged during analysis. I later returned to the journal for help to "reconstruct and understand the research process, which can enhance [the] reporting of the process and findings" (Ruona, 2005, p. 249).

Coding

The coding of the data initially began during Step 2 of the familiarization stage when I segmented the data with different color ink for the three key factors used for collecting and organizing participant data: content, processes, and contextual (See

Appendix N). At this point of the analysis I had the data segmented by these three factors, by weeks, and by participant. The three factors served as the overarching categories and starting point for me to begin thematic analysis of the data.

I merged the data in the individual participant documents to have a more linear flow and grouped all weeks together by factor category, i.e., all content factors identified for each of the weeks were grouped together, then all processes, and finally all contextual factors. Using the constant comparative method I started with content factors for one of the participants, and compared all of the content factors identified for all five weeks throughout Phase 1: Participating. I constantly compared the items until similar themes emerged. I began grouping the themes into categories using paper and pen (See Appendix N for a sample of this document). I grouped and consolidated the categories using a tallying approach until I could no longer consolidate the categories. When finished, I then transferred the themes and numbers to spreadsheet software Microsoft Excel 2007 (See Appendix N for a visual example of the spreadsheet). I completed this same process for the *processes* and *contextual* factors for this same participant. I repeated this for the remaining four participants. By placing the data into the spreadsheet I could sort and filter for the various words among all three factors for each participant, and later across all five participants.

Coding the data allowed me to conceptualize large amounts of qualitative data, in this case the guided teacher reflection journals, into smaller categories to assist in generating the participants' meaning. The initial overarching codes of content, processes, and contextual factors were easy to label and define because they were used to create the guided questions for the teacher reflection journals. Through within-case analysis, sub-

categories emerged within the three overarching categories, and were continually refined to develop a consensus of meaning for each individual teacher's case. As suggested by Yin (2009), it was important to examine each teachers' case because the "conclusions are then considered to be the information needing replication by other individual cases" (p. 56). With each immersion back into the data for the individual participants, my coding system evolved, and I was able to collapse the categories and associated codes into smaller and more consistent categories in order "to deeply understand the meaning that participants ascribe to their experience" (Ruona, 2005, p.243).

Upon completion of within-case analysis, I conducted a cross-case analysis to generate a synthesis of the themes and sub-themes which emerged from across all three context, process, and context factors from Phase 1: Participating data. This cross factor analysis of the themes and sub-themes provided a way to synthesize and condense the coded categories even further to better portray the factors teachers found to be beneficial while participating in the TPDI.I repeated this process for Phase 2: Transferring data. Finally, after comparing all of the themes that emerged across each of the three content, process, and contextual factor categories, I conducted more rounds of constantly comparing the categories from both phases of the study, until the same themes reoccurred regularly (Lincoln & Guba, 1985) with each round of comparison.

Ethical Considerations

Qualitative researchers in the social sciences who study phenomena in real-life contexts are obligated to protect the participants of the study (Yin, 2009). Participants for this study were notified through a research information sheet (Appendix D) that was approved by the university's Human Information Committee (HIC). The research

information sheet informed participants about the study's purpose, any possible risks or benefits, data collection, storage, and reporting methods, and how confidentiality would be ensured for all volunteer participants. The participants were not put under any perceived threat or harm throughout the study. Throughout this study I took all necessary steps to protect the exposure of the five participants. As the instructor and researcher I was the only one who viewed the teacher reflection journals and communicated with the participants about their perceptions regarding the TPDI. Upon downloading the data from the teacher reflection journals, any identifiable information was cleaned, or removed (Ruona, 2005). Pseudonyms were used to replace the participants' names and school district. When I finished downloading, organizing, and analyzing all data from their journals I notified the participants that all data had been downloaded and they could now delete the journal or restrict my access to it by removing my permission rights to the Google Document. The downloaded data was stored on my computer and a back up stored on my external hard drive.

Issues of Trustworthiness

Researchers strive to conduct and produce research that benefits the knowledge base and populations they impact. Findings need to convince the audience that the study has value and worth (Lincoln & Guba, 1985). Qualitative researchers face the challenge of proving credibility, consistency, and transferability of the findings (Lincoln & Guba, 1985; Ruona, 2005). Following recommendation in the literature, I used multiple techniques to establish trustworthiness of the methods and findings throughout the study.

The credibility, or internal validity, of the research addresses to what extent the study makes sense to the readers, participants, and the researcher (Ruona, 2005). It seeks

to identify a causal relationship, “whereby certain conditions are believed to lead to other conditions” (Yin, 2009, p.40). Credibility was established by conducting various activities, including: iterative engagement with the participants, pattern matching (Yin, 2009), journaling, and member checks (Ruona, 2005).

The dependability, or reliability, of a qualitative research study must demonstrate results that other researchers agree that the study, depending on the purpose, methods, analysis, and information, is consistent and dependable (Ruona, 2005). The dependability of a study can be hindered by any careless act in measurement or assessment (Lincoln & Guba, 1985). To address the issue of dependability I documented all of the following in a researcher’s journal: (1) processes in designing the TPDI, (2) rationale for changes to the TPDI made from the SMEs feedback, (3) implementation processes of the TPDI, (4) methods for data collection, and (5) procedures implemented for data analysis.

Transferability, or external validity, pertains to the generalizability of study to be transferred to similar cases (Gall, Gall, & Borg, 2003; Yin, 2009). In other words, if the study was transferred to another setting that included the same problems, another researcher should be able to apply the methods of the study in the other situation. Lincoln and Guba (1985) state that the transferability of one study to another setting relies heavily on the reader, and not the researcher, because the researcher does not have control over where others may implement a similar study, but it is up to the researcher to provide enough descriptive details to make the transferability possible. To make transferability possible from this study I thoroughly described each of the five participants, the TPDI, research design, and data collection and analysis methods.

Summary

This chapter provided a detailed description of the study's research methodology. A qualitative multiple-case study aimed at gathering information from secondary education teachers at a high school in western Michigan, regarding their perceptions of factors of a TPDI, during the intervention and after transferring the knowledge and skills to actual practice. The data collection instruments and analysis methods have been described, along with the procedures for addressing issues of trustworthiness and ethical considerations.

The following chapter describes the findings of the data collected throughout this study.

CHAPTER 4

FINDINGS

This chapter includes the findings generated from a multiple case comparative data analysis of the guided teacher reflection journals. Analysis was conducted to address the following two research questions:

1. While participating in a technology professional development intervention, what do secondary education teachers perceive as beneficial factors that impact the quality of a technology professional development intervention?
2. After transferring the knowledge and skills taught during the technology professional development intervention to teaching practice, what do secondary education teachers perceive as beneficial factors that impact the quality of a technology professional development intervention?

Analysis of the data from both, Phase 1: Participating and Phase 2: Transferring of the study generated various themes within each of the three factors used to organize the data. In Chapter 3, it was discussed in detail that the teachers were provided guided questions to assist them in reflecting specifically on the content, processes, and contextual elements of the TPDI. The guided questions followed the recommendations suggested by Guskey (2000). The themes emerged from extensive immersion in the data as discussed in the Methods Chapter.

This chapter is divided into three sections that discuss the results from Phase 1: Participating, Phase 2: Transferring, and comparison of both phases. The comparisons of results between each phase are not discussed individually by teacher case, because it was determined that discussion of the teachers' perceptions collectively would sufficiently

address the research questions. The next section explains the results of Phase1: Participating.

Phase 1: Participating

Throughout this section, I provide the themes that emerged from the Phase 1 data by separating it into three sub-sections. First, I provide vignettes reflecting the results from each teacher's case. Next, are the results from an interpretational analysis of themes or patterns within the content, process, and contextual categories found among all five cases. The section concludes with a synthesized description of the themes across the three categories.

Teacher Vignettes. During Phase 1: Participating, the unit of analysis was the participating teachers in the TPDI. The five teachers completed guided teacher reflection journal entries for five weeks throughout the TPDI. Themes emerged using within-case analysis to generate initial categories, which were continually refined to develop a consensus of meaning from the guided teacher reflection journals. The categories were refined through further analysis and each category was assigned a code. The codes were applied to the data as described in Chapter 3 for each of the three factors: content, processes, and context. Since the coded data was in table format in Microsoft Word, I was able to categorize and manipulate the coded data for better understanding of the teachers' meanings (Ruona, 2000). This section represents the content, processes, and contextual factors discussed by each of the teachers individually, which is presented through summarized vignettes. Table 8 provides a visual representation of the demographics for the teacher participants.

Table 8:
Visual Representation of Research Participants

Participant	Age	Degrees	# of Years Teaching	Years Teaching at this School	Teaching Courses	Grade Level	Previous Online Learning Experiences
Brenda	52	BA English/Journalism; MAInstructional Design and Technology	15	11	Video Projects; Broadcasting; Tech Communications and Web Design	Mixed Classes of 9-12	2
Jason	50	BS History; MBA	27	26	United States History/Geography; AP United States History	9th; AP 11-12	0
Julie	50	BA Chemistry; PhD Biochemistry; Teacher Certification	6	6	Chemistry; Honors Chemistry; AP Chemistry	10-12	1
Kristy	26	BA English Education, minor Spanish Education; Enrolled in MA English Teaching Program	3	3	British Literature; Writing Center	11-12	0
Nancy	34	BA History, minor in Social Studies and Communications; MATeaching and Learning	12	12	Civics and Law	10-12	Entire MA Progam was online; Taught 1yr Part-time

Brenda. Brenda is a 52 year old Technology teacher with an earned Bachelor of Arts degree in English and Journalism, and Masters in Instructional Design and Technology. Her classes contain a mix of students from 9^{th}-12^{th} grades. She has taught at

the school for 11 of her 15 years as a teacher. Prior to participating in this TPDI, she had participated in two online courses.

Content. As a teacher who teaches technology based courses, Brenda found most of the content relevant to her teaching practices, because it benefitted her students' learning. She also found it relevant for future technology planning and decision making at the school level.

Processes. Throughout Brenda's journal she made references to how the activities stimulated thoughts of previous experiences she had with similar activities or content. She also mentioned some of the activities were refreshers that also expanded her knowledge through engagement with and immersion in the materials from a different perspective. She referenced her feelings and thoughts often throughout the journal. Brenda indicated she learned best when a task was demonstrated, or modeled, and then she was given the opportunity to perform the task on her own. She indicated interest in incorporating the processes that were implemented by the instructor that she enjoyed or benefitted from as a learner into her own teaching practice,. Brenda liked being able to communicate directly with the instructor, and appreciated and benefitted from synchronous communication.

Context. Brenda benefitted from instructional settings where there are ample opportunities for synchronous and one-on-one discussions with the instructor. She felt the class should have more opportunities for synchronous meetings. This could be to better assist her in feeling confident and capable of completing the instructional activities with success. She was comfortable experimenting and learning with a variety of technology tools, and learned the tools best when provided independent learn by doing activities.

Brenda benefited from extended due dates for assignments, but felt rushed and indicated if the class was longer she would have had more time to integrate the content information.

Jason. Jason, a 50 year old Social Studies teacher, teaches ninth grade US History and Geography, and an Advanced Placement US History course for eleventh and twelfth grade students. He earned a Bachelor of Arts in History, and Masters in Business Administration. Of the 27 years Jason has been teaching, all but one was not with this school. Prior to participating in this TPDI, Jason had never experienced learning in an online environment.

Jason was excited to take the TPDI because he felt that it would be applicable to his job, since schools are incorporating online teaching. He was interested in acquiring the knowledge and skills because teaching online might be something that he considers doing part time after he retires. Jason was interested in learning new technology tools and how they could be integrated into his teaching practice.

Content. When reflecting in his journal each week while participating in the TPDI, Jason found most of the content relevant to his teaching practices, which then impacts his students, colleagues, and his students' parents. Most of the content was new to him. He had previous experience with Documents and Skype, but had never used either of the technologies in his teaching practice. He admitted being nervous and anxious to learning and applying the technology tools and concepts in his teaching practice, but was surprised at how easy and user friendly the technology tools were to use.

Processes. Part of the course provided basic information, concepts, and practices for online teaching, and Jason benefitted from watching how the instructor modeled, or

implemented, the TPDI and activities. He appreciated how the course and its assignments were thoroughly planned and organized in a clear and concise manner, which increased his learning of the content.

Context. Participation in the TPDI was a beneficial learning environment for Jason, because he never participated in an online instructional setting. He found it beneficial working and experimenting with the tools from a student's perspective. He perceived that this would assist him later when he implemented the materials with his own students.

Julie. Julie is 50 years old and has taught her entire 6 year teaching career at this school. She has a bachelor's degree in Chemistry, a PhD in Biochemistry, and teaching certification in chemistry and math. She teaches Chemistry, Honors Chemistry, and AP Chemistry for grades 10, 11, and 12.

Content. Julie found the content relevant to her teaching practice, which supports her students' learning. For her the content was most relevant because it helped her organize information for both her and her students. The Google Applications provided her a better and more efficient way to assess and communicate with her students. Whether the content was new or a refresher, or positively or negatively appealing, the content successfully impacted Julie's learning.

Processes. Throughout Julie's journal she mentioned a few processes that worked best for helping her learn, including, learning by doing, the book, and the modeling of the instructor. Learning by doing was not only important to Julie's learning, but it gave her the opportunity to create items that she could use in her teaching practice. The readings and scenarios were beneficial, because they provided her information that allowed her to

develop her own thoughts and opinions. She then expressed them through her discussion question responses. Developing answers to the instructor discussion questions were beneficial to her, but she hoped for more interaction with the other students, instead of solely with the instructor. The book was a great resource for Julie because it was clear, concise, and easy for her to use when she worked on her assignments. She found it easier than alternating back and forth between windows while watching video tutorials. Julie also learned that the instructor was a crucial factor in her learning about how to teach in an online environment. Participating first-hand in an online learning environment gave her the opportunity to watch the instructor model and facilitate online teaching and learning activities. Through observation she found that clear, efficient, and thought provoking feedback from the instructor was crucial for her learning, and believed it would also be useful for her students.

Context. The online learning environment was beneficial to Julie because it occurred during the summer months and she had a busy schedule. The technology tools enabled her to complete the work from home when she had the available time to do so. She doesn't mind working on projects independently, but did miss the direct interaction of the face-to-face environment. She benefited and appreciated the collaborative assignments, but felt they lacked interaction from the others in the course.

Kristy. Kristy, a 26 year old, has taught tenth and eleventh grade English/Language Arts at the school for three years. She also facilitates a writing center which is comprised of both eleventh and twelfth grade students. She has a bachelor's degree in English Education, with a minor in Spanish Education, and is currently enrolled in a master's program in English with an emphasis on teaching.

Content. Most of the content related to Google Applications was not new for Kristy. She already had previous experience with using the tools, so a lot of the content was a review. The tool she least appreciated was Google Sites. Last school year she explored the possibilities of using Sites for her main class website, but decided that another technology tool, Word Press, worked better for her. She found most of the online teaching content, and some of the features of the Google Applications were relevant to her teaching practices. The content was also relevant to Kristy because of another technology initiative that was implemented throughout the school.

Processes. Kristy learned best by doing activities, because it gave her the chance to explore the tool and make it relevant to her needs. She liked the collaborative activities, because she could see how others planned to use the Google Applications in their teaching practice. The initial Skype meeting, which occurred to kick off the TPDI, was frustrating to Kristy, because she had to wait for others to learn how to use it.

Context. Kristy found the online technology tools used throughout the TPDI were acceptable for her learning. She appreciated the flexibility of being able to move at her own pace, and to work independently. Summer was a difficult time for her to participate in the TPDI because of having to prepare for the beginning of the school year and other commitments, such as attending to her master's degree course work.

Nancy. Nancy is a 34 year old high school civics and law teacher, who has taught at the school throughout her entire 12 year career. She teaches students in grades 10th thru 12th. Nancy has earned a Bachelor's of Art History degree with minors in Social Studies and Communications. She also completed a fully-online Master's program in Teaching and Learning.

Content. Nancy benefitted the most from content that was relevant to her teaching practices, including the communication mediums that assisted in the delivery, facilitation, and interaction of her course content and materials with her students to promote their learning.

Processes. Nancy learned best through processes that allowed her to view and digest clear and concise information that was presented in an organized manner, and then permitted practice with the knowledge and skills just presented. Information presented in this manner allowed her to utilize her time efficiently, which was important to her. She benefitted from activities that were authentic and relevant to her teaching practices, because creating products that increase her learning and that can also be applied in her teaching, utilized her time efficiently. The collaboration activities, such as the initial Skype meeting to begin the TPDI, and the collaborative reading and summarizing of the National Educational Technology Plan, were not that beneficial to Nancy. The Skype meeting was frustrating because others in the class had to become acquainted with the tool, and on best practices for conversing synchronously in an online environment. She liked the idea of assigning each teacher a specific section of the National Educational Technology Plan for reading, but it was difficult to learn and retain the information because each teacher summarized the reading in a different way. In the end, neither activity was an effective use of her time.

Context. The technology tools used to facilitate the TPDI supported Nancy's learning, since she believes people learn technology best by doing, through demonstration and practice. She enjoyed working independently on activities with assistance from the instructor in an asynchronous delivery method because she liked to

complete her work when she had time. Completing the course throughout the summer was important for Nancy since it gave her time to digest the information and think of how she could apply it to her teaching practice. It also gave her plenty of time to create the materials so the materials were ready to go for the start of the school year.

Cross-case analysis themes. The following section discusses the themes that emerged from cross case analysis of themes within the individual cases. The themes are discussed as they appeared within each of the three categories used to guide the teachers' reflections: content, processes, and context.

Content Characteristics. The data collected from the five teacher participants generated four themes related to content characteristics. Content characteristics describe the *what* of the PD, such as, new knowledge, skills, and understandings (Guskey, 2000). The first theme was how relevant teachers perceived the content of the TPDI. The second theme centered on perceptions of how the content impacted their own learning and understanding. Teachers' overall reactions to the TPDI content emerged as the third theme. The fourth theme regarded how clear and easy the teachers' perceived the content.

Relevant. The most dominant theme regarding content characteristics was how relevant teachers perceived the content. Their perceptions of relevant content were specifically described within two sub-themes, including their teaching responsibilities and previous personal experience. Statements regarding teaching responsibilities appeared more often throughout this coded set of data (approximately 80%) than statements on previous personal experience (approximately 20%).

Teaching responsibilities. Teachers discussed how the content was relevant to their teaching responsibilities. This sub-theme was further explained within two specific areas: communication with stakeholders and teaching practice.

Communication with stakeholders. Teachers discussed how the content of the TPDI would impact their communication with various stakeholders, including: students, other teachers within the school, and parents of their students. An example was provided by Nancy who stated, "One of my major responsibilities as a teacher is getting students and parents information about daily activities in the classroom" (personal communication, August, 2011). Jason also found it relevant for "how we communicate with each other as teachers" within the school (personal communication, July, 2011).

Of the three groups of stakeholders mentioned, teachers were most interested if the content was relevant to their students. Nancy revealed this when she said:

> This week's content directly related to my professional responsibilities because it focused on students not being able to graduate with a Michigan diploma without an online learning experience. The ultimate goal of primary and secondary education is for the students to obtain that diploma, so my role as a teacher is directly affected by this new requirement (personal communication, July, 2011).

The content of the TPDI centered on technology, so most teachers described it as relevant since it was their responsibility to prepare students to use these tools. Brenda, the technology teacher, demonstrated this by a feeling of "responsibility to introduce the students to Google Apps so that they can use them throughout their high school career" (personal communication, July, 2011). Teachers also discussed that the content was

relevant for gaining the interest and understanding of more students, and to prepare them for the work force. This was demonstrated best by Julie, who stated:

> This past week I have read about several technology standards for teachers, all of which were new to me. Reading about them made me aware that teachers are expected to be using technology in their classrooms and to keep learning and implementing new techniques…The content is relevant since I want to prepare my students for their futures in a technology-based work force. In addition, I see how it can help to reach more learners and keep their interests (personal communication, August, 2011).

The other two groups of stakeholders mentioned throughout the data were other teachers within the school and parents of their students. The content was perceived relevant for these two groups, because the school "promoted the use of Google Docs during the past year" (Brenda, personal communication, July, 2011). It is also related to the one-to-one learning initiative taking place within the school, which focuses on students use of technology. This was best captured by Kristy when she described:

> The two parts that made a lot of sense to me would be the Google Docs and Myths information. I've been using Google Docs extensively for the past few years–last year, I implemented a writing workshop using Google Docs as our online writing/responding environment. The Myths article rang true, especially since a lot of those sentiments are ones that we've been dealing with among some staff and parents as the school has tried to move forward with one-to-one learning (personal communication, July, 2011).

Along with administrator and peer support of the TPDI content, teachers also reported it relevant for "teacher professional development" (Brenda, personal communication, August, 2011), and as "a much more flexible…communication tool" for parents (Jason, personal communication, August, 2011).

Teaching practice. Teachers perceived the content was beneficial if it was relevant to their teaching practice. They demonstrated how the content was relevant and would help them "organize all [student] work," (Julie, personal communication, August, 2011), "be a productive teacher" (Jason, personal communication, July, 2011), and better meet "the expectations of those creating [classroom technology] standards" for teachers and students (Kristy, personal communication, August, 2011). Julie best demonstrated how the relevant content can impact teaching practice when she stated:

> One of the biggest things I have discovered is that by using what I have learned, I will be better able to determine the extent that my students are grasping the concepts. Since my class sizes are larger and I will have less time to grade, this is huge for me. I have set up surveys that will make it easier to quickly find gaps, discussion boards to not only help them with literacy but also give me access to how they are applying concepts, and spreadsheets to make it easier for me to grade labs (personal communication, August, 2011).

Previous experience. A second reason the teachers found the content relevant was because all five had previous experience, on some level, with the topics covered in the TPDI. Since the school introduced Google Applications to the teachers during the previous school year, they all had experience with using Google Documents. For Nancy, who already had online teaching experience, she "knew most of what was said in the

[online learning scenario] videos, if not more," (personal communication, August, 2011) and was familiar with the "soft skills" students needed for successful online learning (personal communication, July, 2011).

Kristy also had previous experience with some aspects of the TPDI content, but her experience was one she perceived as negative. Specifically, she did not find the tools practical for teaching. This was best presented in her following comment:

> I did find that I was frustrated with Google Sites, mainly because I chose not to use them when we first made the switch to Google because I could do more with a site like Word press. The site I already use is extremely detailed and fairly complex (combining blogs, wikis, and other website functions), so creating a second one was redundant (personal communication, August, 2011).

The comment above was made by Kristy during the third week of the TPDI, and her comments remained fairly similar throughout remaining weeks, which resulted in "previous experience" emerging as a dominant sub-theme within the relevant theme.

Learning. The second overarching theme related to the TPDI content, emerged from teachers' perceptions of its impact on their learning. All teachers, except for Kristy, described the content in a positive manner, and found it effective for contributing to their learning and understanding of Google Applications and online teaching. Most positive learning comments centered on skills or topics that were "new" to the teachers. Jason, "had not been aware of any technology standards before," (personal communication, August, 2011) and Julie "learned that [her] role as a teacher/facilitator in the online process is the key factor in the success of the [online] class" she teaches (personal communication, July, 2011).

Reactions. Teachers' reactions to the content emerged as the third theme from Phase 1: Participating data. All five teachers expressed positive comments regarding the TPDI content. The comments revolved mostly on how "excited" they were about certain Google Applications, and how "good" or "beneficial" they perceived the information regarding online teaching.

The only negative reactions came from Kristy. Kristy's negative reactions to the content were best revealed during the final week of the TPDI when she said:

> At this point, I'm not sure that this was the most relevant thing for me. When setting up my websites last year, I had already spent a lot of time using Google Apps and decided the Google Sites was not the program that I wanted to use. I decided to go with Word press since I have more control over how the site looks, layout of the information, and what/where I can include multimedia tools. Google Sites was too basic and the templates were too constrictive for my needs. This has not changed- I'd rather use my Word press site than the one I created [throughout this TPDI]. While Google Sites may not be difficult to understand, it is limiting in what you can do. Another problem is that I now have multiple sites to take care of rather than one. This is hard to deal with, since I already have limited time. Instead of making life easier by creating a site, I've doubled my monitoring and site maintenance time (personal communication, August, 2011).

Clear and Easy. The final content related theme from Phase 1: Participating was teachers' perceptions of the content's level of difficulty, and how well it was organized and explained. Teachers described the content as "easy and straight forward," (Brenda, personal communication, August, 2011) "clear and concise," (Nancy, personal

communication, August, 2011) and “easy to understand” (Julie, personal communication, July, 2011), which assisted in making it beneficial to their learning.

The four overarching content characteristic themes generated from Phase 1: Participating data are displayed in Table 9. The table displays which of the four themes and sub-themes appeared in the guided teacher reflection journals of each participant. The following section is presented in the same manner, but discusses the factors that emerged from Phase 1: Participating data related to process variables.

Table 9:
Content Characteristic Factors Generated from Phase 1:Participating Data Displayed by Participant

	Theme	Sub-Theme	Sub-Theme	Brenda	Jason	Julie	Kristy	Nancy
1	Relevant							
		Teaching Responsibilities		X	X	X	X	X
		Previous Experience						
			Review	X	X	X	X	X
			Not Practical				X	
2	Learning							
		Positive		X	X	X		X
3	Reactions							
		Positive		X	X	X	X	X
		Negative					X	
4	Clear and Easy			X	X	X	X	X

X = Theme claimed by teacher

Process Variables. The data collected from the five teacher participants, generated two overarching themes related to process variables of the TPDI. Process variables refer to *how* the content was communicated and implemented to support or enhance the teachers' learning (Guskey, 2000). The most dominant theme, which represented approximately 60% of the process variable related data, centered on how teachers perceived the instructional activities used throughout the TPDI. Instructional delivery methods (approximately 40%) emerged as the second dominant theme in this category. Each of the themes and any related sub-themes are described in the following sections.

Instructional activities. Teachers discussed their perceptions of the instructional processes the most. Throughout the guided teacher reflection journals the teachers' referred to these activities as "assignments." For the purpose of this study the two words are used interchangeably. The majority (approximately 72%) of perceptions generated around this theme were specifically described within two sub-themes including, *learning by doing* assignments, and assignments which teachers found relevant. Representing approximately 10% each, the remaining instructional activities data was categorized into two minor themes: clear and easy, and collaborative.

Learning by doing. Activities that permitted teachers to actively engage with the content, also known as "learning by doing" (Mishra & Koehler, 2005), were discussed as being the most influential to their learning of the TPDI content. While all five teachers described these types of activities as the "most beneficial" for them, it was demonstrated by Julie when she reflected that, "The processes used over the last 2 weeks in which I had

to create or set up things were most useful, [such as,] setting up a group, [and] making a presentation" (personal communication, July, 2011).

The teachers typically used the following verbs when they described the *learning by doing* activities: exploring, doing, creating, setting-up, using, adding, and embedding (personal communication, July-August, 2011), which demonstrated their active engagement with the content and assignments. This was reflected by Jason when he discussed how a *learning by doing* activity modeled exactly what he was looking to do in his own teaching:

> Using the highlight feature and then commenting on that specific portion of the article was very beneficial for helping me to see how this could crossover into my teaching and I am planning on using it in my online unit, as one of my activities was to submit a paper online. Now I know I can use Google Docs to accomplish my goal (personal communication, August, 2011).

Kristy also reflected how learning by doing was a beneficial process for her, when she said:

> I liked the learning by doing activity most so far. I think this is one of my strongest methods of learning, since I get to explore and make the tool work for me…I'd prefer to do as much learn by doing as possible (personal communication, July, 2011).

The learning by doing theme ties closely to that of the second dominant theme, relevant. These themes were separated because there were other activities that were implemented throughout the TPDI that did not provide teachers the opportunity to

actively engage by doing. Those activities were categorized under the sub-theme relevant and are addressed in the next section.

Relevant. The second dominant theme that emerged regarding the process variable data were comments on how relevant the activities were to the teachers. Some teachers described the activities as relevant to their learning. Nancy provided an example of this when she stated that, "All of the assignments and the learning opportunities directly related to the learning this week" (personal communication, July, 2011). Jason shared how an assignment was relevant to his learning as well when he shared:

> The discussion questions this week were very helpful, especially in helping me to understand the three different methods that a school can deliver online instruction to qualify for graduation requirements…Your questions are relative to the class, my teaching, and very thought provoking (personal communication, July, 2011)!

While it was not an activity specifically designed and implemented for the TPDI, and its sole purpose was for collecting teacher participant data related to the research questions of this study, Julie found that reflecting in the teacher reflection journal was relevant to both her learning and teaching practice. This was shown when she reflected:

> I am using many types of Google docs, the groups for discussion boards, embedded documents, links, and am having my kids reflect in a journal…I like the ways in which I learned all this information and hope to transfer many of these processes to my students…In addition, reflecting and discussing is often lost in today's classroom and it is now part of the newly released Common Core [teaching standards] (Julie, personal communication, August, 2011).

Clear and easy. When discussing activities, teachers mentioned how assignments were clear, organized, well planned, and preferred if the level of difficulty in completing it was easy. Brenda provided an example of this theme when she reflected that, "…working with calendars and forms was very easy. I think that the instructional activities were thoughtful and well planned (personal communication, August, 2011).

Collaborative. There were two assignments that were implemented to incorporate collaboration amongst the teachers. The major of the two collaborative assignments were the weekly online discussion board questions, where each teacher was responsible for responding to all of the questions I posted throughout the five week course. Each teacher was then required to respond to at least one other teacher's posting each week. The second collaborative activity used the carousel method where each teacher was assigned a section of a larger reading. Teachers were then required to summarize the section, and then respond to at least one of the other teachers' summaries. All of the teachers, except for Nancy, mentioned in their journals, at least once, about how they benefitted from one or both of the collaboration activities.

The collaboration activity that appeared to be most beneficial for the teachers, although occurring only once, was the carousel method activity. Julie felt she "was able to review the technology plan quickly in order to see a large overview of how technology can be used and assessed" (personal communication, August, 2011). This was also revealed by Kristy when she commented that she "did enjoy viewing comments on the Google Doc- it's like witnessing the thought process of those sharing the documents" (personal communication, August, 2011). It is important to note that Nancy did mention the carousel method activity, but did not benefit from the collaboration, because "people

take different styles of notes…It made it difficult to transition from the [different] style[s] of information" (personal communication, August, 2011).

The benefit from the online discussion board questions was shown in Brenda's comment when she said, "Julie's post and Kristy's post brought some 'reality' to the content area articles" (personal communication, August, 2011). It was also demonstrated by Jason when he claimed:

> I also love the discussion board and the free exchange of ideas that it brings – I think as colleagues we tend to encourage each other where your role is more to provoke thought regarding our posts and I especially appreciated your comment doing that with my post regarding online learning myths (personal communication, July, 2011)!

Even though the teachers, except for Nancy, described benefits from the discussion boards, they also reflected negative perceptions as well. This was reflected by Kristy who stated "I also enjoyed the questions for discussion, though some of them proved difficult, since once one person posted, part or most of the question was [already] answered" (personal communication, July, 2011). A remark by Brenda was similar when she said that "While I think the discussion activities were beneficial, I must admit to skimming over some responses as reading through them all can become time-consuming" (personal communication, August, 2011). Julie reiterates this theme when she revealed:

> Discussion boards are useful for me in reflecting and discussing, but I find it cumbersome at times in that it is choppy to me. I must go back to the boards, figure out what has been stated and if what I have to say is any different or has a

> new twist, find which strand to post it to, and then wait for a response back…if any (personal communication, July, 2011).

Instructional delivery methods. Instructional delivery methods appeared as the second major theme throughout the teacher reflection journals within the process variable data set. The first theme, instructional activities, which was previously discussed, referred to how the teachers engaged with the content of the TPDI. The instructional delivery method theme related to which media was used to deliver the content to the teachers.

The theme is divided into eight categories which address eight different instructional delivery methods that the teachers found to be beneficial during Phase 1: Participating. The medium that appeared the most beneficial were the technology *how-to* video tutorials created by the instructor. The instructor emerged as the second category, followed by assigned readings. The online synchronous collaboration tool Skype emerged as the fourth medium beneficial to teachers, followed next by the required book for the TPDI. The final two categories combined represented approximately 10% of the instructional delivery methods data, included instructional scenarios and telephone calls.

Video tutorials. Each week throughout the five week TPDI, technology *how-to* video tutorials were created and provided a step-by-step audio visual guide for the teachers on how to complete tasks with the Google Applications; it was a demonstration on how to complete a specific task that was related to the TPDI content for the week. The video tutorials emerged (approximately 29%) as the most beneficial instructional delivery method in Phase 1: Participating. Three themes emerged as to why the video tutorials were beneficial, including: increased learning, relevant to teaching practice, and clear and easy to understand.

Learning. Approximately 7 out of 10 (68%) responses from the data related to the video tutorials were described as “helpful” to teachers’ learning. It appeared that the teachers would watch the video tutorials, and then complete the task that the video was demonstrating. An example was provided when Julie mentioned, “after viewing the videos [I] then began working, [and] I was doing what I had watched” (personal communication, August, 2011). Kristy also referenced that the videos were helpful in “illustrating things,” since she “learn[s] best by doing alongside the information” (personal communication, July, 2011). Jason benefited from the videos because he is a “visual learner” and will use the videos as his “standard to understand how to do tasks” (personal communication, July, 2011). An example was provided when he discussed: “I watched your Google Groups tutorial once and went through the process without a problem at all” (personal communication, July, 2011).

The last two sub-themes related to the video tutorials emerged equally within this category. One was not discussed more than the other. The clear and easy theme is discussed first because it was discussed by more teachers than the relevant theme which was only discussed by Brenda and Jason.

Clear and easy. Another theme which appeared in the video tutorial data centered on the ease of using the videos. The videos were described as being “clear and to the point” (Nancy, personal communication, July, 2011). Another example was when Julie reflected that “short video clips have been focused and easy to use,” and that she “appreciate[d] that the clips are not lengthy” (personal communication, July, 2011).

Relevant. Even though the relevant theme emerged from the data related to video tutorials just as much as clear and easy, it did so because it was referenced many times by

Brenda, and once by Jason. Both teachers, not only described the video tutorials as helpful to their own learning, but they also discussed them as being relevant to use within their own teaching practice. This was demonstrated when Jason explained, “I have learned that these instructional videos will be quite important when I try to conduct my own online teaching” (personal communication, August, 2011). Brenda, a technology teacher, also referenced how she “appreciated them so much so that [she is] incorporating them into [her] own instruction” (personal communication, August, 2011). Most of her other statements, however, posed questions or discussed the technology tool that was used to create the video tutorials. She made references similar to the following throughout all five weeks of the TPDI:

> The videos you made were helpful. I am wondering what screen capture and audio software you used. I also wonder if it is available for the Mac. Also, how did you link to the videos and did you run into size requirements as videos can be large (personal communication, July, 2011)?

Instructor Feedback and Modeling. The second most discussed category throughout the teacher reflection journals during the Phase 1 instructional delivery methods data set was the instructor’s feedback and modeling. The instructor created video tutorials, discussed in the previous section, and the instructions in this instance were categorized separately because the videos were created to be used by all teachers in an asynchronous format. Responses throughout the journals related to instructor’s feedback and modeling tended to focus more on individualized instructional information that was delivered through a variety of methods. These two topics were grouped together because the majority of teachers’ remarked on how the instructor’s methods of feedback

served as a model example of how they hoped to respond and interact with their own students in the online environment. A demonstration of this was best shown when Nancy reflected:

> I did enjoy the email from the instructor that stated that my progress for the week. It helps me make sure that the instructor is getting what I am putting out there instead of wondering what is going on or what they are thinking of my work. I think this is vital [for] younger students (personal communication, July, 2011).

Kristy also mentioned the email feedback and that she "want[ed] to add in reminder emails" as an online classroom strategy as well (personal communication, July, 2011).

Individualized feedback and modeling appeared in other forms of instructor behaviors outside of feedback emails. Teachers also reflected that they liked receiving feedback or prodding questions on their discussion board posts from the instructor. Julie provided an example when she reflected, "I have used a discussion board before and sometimes I would ask questions and nobody ever responded. Again, the instructor is crucial in keeping the processes flowing smoothly" (personal communication, July, 2011).

Clear and easy. A sub-theme which emerged within this category was that the instructor was clear and easy to understand. While they found the instructor feedback crucial for their learning they appreciated feedback that was straightforward. Jason best explained this when he said:

> …all of your feedback is outstanding. Direct and to the point - very easy to understand what you wanted me to do. Most all of the feedback I followed with my Google Site I changed simply because I trust that you have been through this

many times and it was going to save me time" (personal communication, August, 2011).

Readings. Throughout the TPDI teachers were assigned various articles or documents to read related to online teaching. Similar to the instructional video tutorials, the teachers found the readings to be effective for their learning. The readings were often described as effective for learning because it enhanced their previous knowledge and provided an avenue for them to reflect and build upon that knowledge with the new material. This was best shown by Brenda when she commented, "It was also good to have some reading materials as a professional 'refresher.' The article on cheating brought out additional concerns that I had not thought of previously" (personal communication, August, 2011).

Skype. On the first day of the TPDI, I organized a synchronous Skype meeting for all five teachers and myself. Skype is an online collaboration tool that teachers can use to communicate in real-time. Two sub-themes emerged within this category, including effective for learning and negative reactions to the meeting.

Learning. Three of the five teachers, who had never used Skype before, Brenda, Jason, and Julie, described the synchronous meeting as beneficial and effective for their learning. During the first week of the TPDI, Jason stated that he "enjoyed the Skype meeting that we had to open up our class - I felt like it demonstrated the power of collaborating and actually hearing all of the voices" (personal communication, July, 2011). At the conclusion of the five weeks, he expanded and recommended:

If I were you I would stick with the first group meeting with students even though there were some snags it really introduces the power of that tool, and I felt I

> learned from that meeting. I would not do any after that though. One of those once and done activities that I thought was helpful the first time and engaging, but could get old very quickly (personal communication, August, 2011).

Brenda also appreciated the Skype meeting for the experience. She stated that, "I think it gave me more confidence to approach you when I struggled with log in issues" (personal communication, July, 2011). Unlike Jason, however, who recommended keeping the Skype session to a once and done activity, Brenda would have included more synchronous Skype sessions. This was demonstrated during Week 4 when she said, "I think it might have been beneficial to have more Skype activities....maybe even once a week. I would have felt more confident about the assignments and maybe gained more from the discussions" (personal communication, August, 2011).

Negative. The Skype session was perceived as an ineffective or negative experience by Kristy and Nancy, who had previous experience with using it. They both described the experience as "frustrating." Unlike the other three teachers who benefitted from the experience and mentioned it in multiple weeks, both Kristy and Nancy referred to the session only once in their Week 1 guided teacher reflection journal. Their negative experience with this synchronous session was displayed by Nancy when she stated:

> The real time meeting using Skype provide[d] me some frustration. We have to wait for everyone to get on correctly, etc. I don't have a lot of time to do extra work; therefore, I want to be as productive as possible when I have the time to work (personal communication, July, 2011).

Book. The required book for the class, which was purchased for the teachers by the instructor, included descriptions of the Google Applications that were discussed

throughout the course. It provided instructions for completing the tasks within Google and also gave examples of how other teachers have used the applications in their teaching practice. Similar to the Skype category, the same three teachers, Brenda, Jason, and Julie, found the book a beneficial resource because it was “easy to use” and modeled “just what we needed to know and do” with the various Google Applications they were learning (Julie, personal communication, July and August, 2011). Nancy did not mention the book in any of her guided journal entries, and Kristy did only once during Week 1, because she was having trouble finding the assigned pages for the week since, she selected to use the Kindle version of the book that did not contain page numbers.

Scenarios and phone calls. The remaining instructional delivery method data (approximately 10%) were related to online teaching instructional scenario videos and phone calls to the instructor. While these represented approximately 5% each of all of the instructional delivery methods data set, it is important to note that only one teacher for each method referenced it as being beneficial to their learning. Julie remarked that the instructional scenarios were “effective in having [her] learn the information,” because “the cheating assignments were not as exciting” (personal communication, August, 2011). Brenda found benefits from having frequent telephone calls with the instructor. This was demonstrated in numerous weekly reflections, but an example was provided when she said:

> The call is time-consuming I know, but I think it made the revision process more efficient for me. In a previous on-line class, I also had one phone call with the instructor and it helped me rearrange and re-think the entire structure of my Broadcast Journalism class … priceless (personal communication, August, 2011).

The two overarching process variable factors generated from Phase 1: Participating data are displayed in Table 10. The table displays the themes that appeared from the guided teacher reflection journals for each participant. The following section is presented in the same manner, but discusses the factors that emerged related to context characteristics.

Table 10:
Process Variable Factors Generated from Phase 1: Participating Data Displayed by Participant

				Brenda	Jason	Julie	Kristy	Nancy
	Theme	Sub-Theme	Sub-Theme					
1	Instructional Activities							
		Learning by doing		X	X	X	X	X
		Relevant		X	X	X	X	X
		Clear and Easy		X	X	X	X	X
		Collaborative		X	X	X	X	
2	Instructional Delivery Methods							
		Video Tutorials						
			Learning	X	X	X	X	X
			Clear	X	X	X	X	X
			Relevant	X	X			
		Instructor						
			Feedback/Model	X	X	X	X	X
			Clear	X	X	X	X	X
		Readings						
			Learning	X	X	X	X	X
		Skype						
			Learning	X	X	X		

Negative				X	X
Book Model	X	X	X		
Instructional Scenario			X		
Phone Calls	X				

X = Theme claimed by teacher

Contextual Characteristics. Contextual characteristics refer to the *who, when, where, and why* of the TPDI (Guskey, 2000), leading to an endless list of possible items that could fall under this group. To keep aligned with the research questions and purpose of this study, the data collected from the five teacher participants were grouped into three overarching themes related to contextual characteristics of the TPDI including: instructional setting (approximately 76%), non-instructional setting (approximately 17%), and access (approximately 7%).

Instructional Setting. The TPDI was delivered in the online environment using the Google Applications and other collaboration tools, such as Skype, that the teachers were instructed on how to use. Within this instructional setting theme, emerged four sub-themes teachers discussed that impacted their experience: technology tools, interaction, time, and instructor.

Technology tools. The technology tools that were used to implement the TPDI were viewed in a positive manner by the teachers as "helpful and appropriate" (Brenda, personal communication, August, 2011) and "fine" (Kristy, personal communication, August, 2011) for supporting their learning. This was best demonstrated by Julie when she reflected on her personal experience with learning in the online environment: "Keeping up with this class has been harder than I anticipated. I am quickly learning that

family distractions can get in my way and I have directly experienced how the soft skill of time management is important" (personal communication, July, 2011)!

The majority of comments related to the technology tools for the instructional setting, were viewed in a positive manner (approximately 82%) by teachers, there were a few negative reactions that emerged as well. Brenda reflected that "Listening and sharing in a classroom environment is just so much more efficient" (Brenda, personal communication, August, 2011), and that those missing aspects are drawbacks of online learning. Jason was the only teacher who did not remark about the technology tools in a negative manner as related to the instructional setting.

Interaction. The second sub-theme to emerge within the instructional setting theme was teachers' desired level of interaction with other learners in the TPDI. Within the theme teachers reflected that the independent environment was most beneficial to their learning. During Week 1 Jason demonstrated this when he stated, "I don't mind independent learning on my own so I really liked the modules and lessons that you had planned and found them very effective" (personal communication, July, 2011). During Week 5 he reiterated that "overall I liked just working on this stuff on my own and figuring it out" (personal communication, August, 2011). All teachers described the independent environment throughout all five weeks.

All teachers discussed independent work as beneficial, and there were two, Brenda and Julie, who wished for more collaborative activities. Julie demonstrated this best when she reflected:

> Most of the time I don't mind working independently, but at times I wish I was in direct contact with others to help me out. I sometimes struggle making little

> decisions like what to have my background on my site look like! I am finding that I get more feedback from others in this course than in my previous course this summer, but I still miss the instant group feedback and discussion that comes in a classroom (personal communication, August, 2011).

Jason and Kristy also mentioned that some of the collaboration was important for the class, but Nancy did not mention any benefits to her learning through a collaborative environment.

Time. The third most discussed theme within the context of the instructional setting during Phase 1: Participating emerged around *time*. Within this theme, *time* was referred to as the flexibility and pace of assignments, and it also represented the *time* of the year the TPDI was implemented.

As the course progressed, I could tell the teachers were having a bit of difficulty digesting the information in a way that would be beneficial to their learning. Each week throughout the TPDI operated on a Monday – Sunday schedule, where Monday was the first day of the instructional week and Sunday was the last. Monday mornings, I would compile a weekly individual reflection email for each teacher providing feedback on their assignments, and if they were up-to-date on their assignment completions. These weekly feedback emails and guided teacher reflection journals were key tools that allowed me to see if teachers were completing assignments and digested the information. Through these I observations, I made adjustments to the due dates of some of the assignments. This freedom of flexibility and working at their own pace during the TPDI was a direct correlation to the previous theme of how teachers preferred to work independently,

instead of collaboratively. Kristy provided an example of this when she described the instructional setting:

> I preferred the environment in which I could move at my own pace, explore what interested me, and work independently. This allowed me to keep a different pace than I'm allowed when watching a video or moving through a module (personal communication, July, 2011).

Brenda also benefitted from the flexible due dates and the freedom to work at her own pace, but she still felt that the course should have been longer. This was demonstrated when she said:

> I used the extended dates. I think they were necessary to a thorough treatment of the subject…I have taken another online course over a semester and I think there was more time to digest the material. Even with the extended time, I still felt a bit rushed (personal communication, August, 2011).

Four of the five teachers described that completing the TPDI during the summer months and prior to the start of school was beneficial for them. Nancy demonstrated this theme when she stated, "It is a crazy time when teachers go back to work for professional development and having the time to figure my site out on my own time as helpful" (personal communication, August, 2011). Kristy was the only teacher who did not view the timing of the course as beneficial to her. This was evident when she mentioned:

> I would have preferred to be done with the course weeks before school started, since my focus began to switch as I got closer to the start of school. The information wasn't really new to me for the most part, so it wasn't difficult, but timing was an issue. Again, the learning environment was fine, but due to time, I

> might consider what time of year will be the best for teaching this type of course in the future; though it may be different for everyone (personal communication, August, 2011).

Instructor. The fourth and final theme regarding the instructional setting was the perceived beneficial presence of the instructor. This theme correlates with the interaction theme, but was separated because the teachers discussed the instructor on various levels outside of interaction. Julie demonstrated that observing the instructor was beneficial when she explained:

> I am thankful for this experience and Kelly's modeling of how an online experience should be for students. Seeing all of her methods and ways of prodding, questioning, using different forms of technology to meet the objectives has been most helpful (Julie, personal communication, July, 2011).

The only teacher that did not reference the instructor in the guided teacher reflection journal was Kristy.

Non Instructional Setting. Within any instructional environment there are always contextual factors which are not directly related to the instruction, but still impact learners' perceptions. These non-instructional setting factors are items that impact the learner outside of the instructional environment. In this study, non-instructional setting contextual factors were discussed significantly less (approximately 17%) when compared with those of the instructional setting (approximately 76%). Of these reflections teachers discussed factors regarding their personal lives and professional responsibilities as teachers.

Through thorough analysis of the guided teacher reflection journals, different personal characteristics of each of the learners emerged. These personality traits and beliefs impact the way learners perceive their world and environments. One teacher often demonstrated insecurity with abilities, while others were motivated and confident. The impact of the teachers' perception of self was best demonstrated by Nancy when she said, "I am a very intrinsically academically motivated person" (personal communication, August, 2011). This statement shows the self-confidence Nancy has in her abilities to complete academic work.

Personal responsibilities outside of the TPDI were also mentioned, including being "a full time mother, [and] things come up like broken arms, etc.," (Nancy, personal communication, August, 2011), and "finishing up [a] summer class" (Kristy, personal communication, August, 2011).

Julie was able to make a connection with a content specific PD conference that she attended in parallel with the TPDI. Her statement, "While being at a ChemEd conference all week, my mind was reeling with ideas for using Google Apps!" demonstrated that another external learning initiative provided opportunity for synthesizing the two learning events to make the experiences more relevant to her teaching practice (personal communication, July, 2011).

Access. The third and least mentioned theme of the contextual characteristic data (approximately 7%), related to teachers having access to appropriate resources. Statements within this theme emerged from three of the teachers regarding login issues with the technology (Brenda and Kristy) or not having access to particular instructional resources (Brenda and Nancy), which spawned feelings of frustration. Brenda's

experience led to feelings of uncertainty which was revealed when she reflected, "Although I had some initial access issues this week, I am now through that, I hope" (personal communication, July, 2011). Nancy expressed frustration when she "had to research how to set things up specifically the way that [she] wanted," (personal communication, September, 2011) because the content information was not provided to her.

The three overarching context characteristic factors generated from Phase 1: Participating data are displayed in Table 11. The table displays the themes that appeared from the guided teacher reflection journals of each participant. The next section discusses a synthesis of the themes and sub-themes which emerged from across all three context, process, and context factors from Phase 1: Participating data.

Table 11:
Context Characteristic Factors Generated from Phase 1: Participating Data Displayed by Participant

				Brenda	Jason	Julie	Kristy	Nancy
	Theme	Sub-Theme	Sub-Theme					
1	Instructional Setting							
		Technology Tools						
			Positive	X	X	X	X	X
			Negative	X		X	X	X
		Interaction						
			Independent	X	X	X	X	X
			Collaboration	X	X	X	X	
		Time						
			Flexible/Pace	X	X	X	X	X
			Summer	X	X	X		X
		Instructor		X	X	X		X

2	Non-Instructional Setting	Relevant	X	X	X	X	X
		Personal	X	X	X	X	X
3	Access		X			X	X

X = Theme claimed by teacher

Common Factors from Phase 1: Participating. Further analysis of the content, processes, and contextual factors demonstrated themes and sub-themes that appeared common amongst all three categories of factors. This cross factor analysis of the themes and sub-themes provided a way to synthesize and condense the coded categories to better portray the factors teachers found to be beneficial while participating in the TPDI. The cross factor analysis of the themes and sub-themes demonstrated seven factors that teachers found to be beneficial for impacting the quality of the TPDI. Throughout this phase, teachers described that TPDI factors that were relevant to them as the most beneficial, and factors related to the access to appropriate resources as the least important to the quality of the TPDI. Table 12 displays the complete list of the seven beneficial factors and the frequency of how often they appeared throughout all of Phase 1: Participating data. The beneficial factors are numbered 1 thru 7, with 1 meaning it was the factor most frequently mentioned as beneficial and 7 meaning it was the least frequently mentioned factor. Again, all of these factors were found to be beneficial for impacting the quality of the TPDI during Phase 1: Participating of the study.

Table 12:
Frequency of beneficial factors as they appeared throughout Phase 1: Participating

1	Relevant
2	Learning
3	Reactions
4	Instructor
5	Interaction
6	Clear/Easy
7	Access

All seven factors have been explained throughout this section, and more details will be provided in the Chapter 5 Discussion. The next section describes the results from Phase 2: Transferring in the same format that was used to present the results from Phase 1: Participating data.

Phase 2: Transferring

Throughout this section, the themes that emerged from the Phase 2: Transferring data are discussed and segmented into three sub-sections. First, vignettes are provided to reflect the results from each teacher's case. Then the results from an interpretational analysis of themes or patterns within the content, process, and contextual categories found among all five cases are provided. Finally the section concludes with the synthesized results describing the themes across the three categories.

Teacher Vignettes. During Phase 2: Transferring, the unit of analysis was the TPDI participating teachers. The five teachers completed guided teacher reflection journal entries throughout the first three weeks of the school year. During those three weeks they implemented the instructional materials they created throughout the TPDI.

The guided teacher reflection journal entries were guided by the same questions used during Phase 1. In this phase the questions guided teachers to reflect back to the TPDI, and discuss which content, process, and contextual factors they found to be beneficial now that they were transferring the knowledge and skills to practice. Within-case analysis was used to generate initial categories that were continually refined to develop a consensus of meaning from the guided teacher reflection journals. The categories were refined throughout further analysis and each category was assigned a code. The codes were applied to the data as described in Chapter 3 for each of the three factors: content, processes, and context. Since the coded data was in table format within Microsoft Word, I was able to categorize and manipulate the coded data for better understanding of teachers' meanings. This section represents the content, processes, and contextual factors discussed during Phase 2: Transferring by each of the teachers individually, which is presented through summarized vignettes.

Brenda.

Content. Brenda teaches technology based courses, and described the content of the TPDI as beneficial if it was relevant to her teaching practices, learning, and confidence. By participating in the TPDI, she feels she will impact student learning by teaching them valuable skills that she otherwise would have not learned.

Processes. Brenda described that she learned best by watching the instructor demonstrate or model a task, and then performed the task on her own. This was shown in her repeated discussion on how the video tutorials assisted her with learning and teaching the content to her students. She incorporated the videos into her own teaching practice. Brenda liked being able to communicate directly with the instructor, and appreciated and

benefited from synchronous communication via Skype or telephone. She recommended that the TPDI include more synchronous interaction activities.

Context. Brenda benefitted most when she had access to information and others, such as the instructor and other teachers. She felt the class should have had more opportunities for synchronous meetings. As she implemented the instructional materials with her students, she frequently mentioned items that she wished would have been included in the TPDI. However, a few of these items she mentioned, such as managing student documents and a naming mechanism for the student documents, was modeled throughout the TPDI.

Jason.

Content. When reflecting during each of the three weeks in Phase 2: Transferring, Jason found content that was relevant to his teaching practices were beneficial. He implemented most of the content with his students and felt pretty good about his ability to do so. He admitted being nervous and anxious to apply the technology tools and concepts in his teaching practice, but felt that the TPDI successfully prepared him.

Processes. Jason benefitted by watching how the instructor modeled, or implemented, the TPDI and activities. The modeling helped him transfer the processes to his own teaching practice with his own students.

Context. Jason discussed the technology issues he encountered, and believed his instructional plans would have gone better if these issues had not occurred, but benefitted from the experience in two ways. First, the technology access constraints allowed Jason to trouble shoot some of the students' issues, which helped reinforce his own learning by having to apply it to help others. He also used the opportunity as a teaching moment to

model and demonstrate to his students that there will sometimes be technology barriers that can't be overcome right at an exact moment. To ease the students' frustrations he complimented them on their mature way of handling the situation. Jason wanted his students to feel comfortable with learning and using the Google Applications. To reduce their anxiety he informed them that he was learning the applications right along with them. He wanted his students to know that when it comes to technology that they should view him as a peer, instead of a director, so that they can all feel more comfortable in this new learning environment.

Julie.

Content. Julie found the content beneficial to her learning if it was relevant to her teaching practices, because it then also supported the learning of her students. She was able to help students with any questions they had and troubleshoot some of their technology issues when they happened, which reinforced her learning of the content.

Processes. Throughout Julie's journal entries during Phase 2, she mentioned three processes that worked best for helping her to learn, which included learning by doing, and the book and video tutorials. Learning by doing was important to Julie's learning, because it gave her the opportunity to create instructional materials that she could use in her teaching practice. The book and video tutorials were beneficial resources for Julie because she liked learning, and learns best, by having multiple resources that demonstrated the content.

Context. Learning in an online environment was beneficial for Julie because she experienced firsthand some of the pitfalls that her own students may encounter. She liked that she knew where to find and access resources as she transferred the knowledge and

skills from the TPDI to teaching practice, just in case she needed to reference something she may have forgotten.

Kristy.

Content. Kristy felt that most of the content covered throughout the TPDI was not relevant to her job, and did not find it beneficial, because she had previous experience using Google Applications, and decided then she did not want to use them. She already had a tool in place and was frustrated because she had to maintain the tools she was using, and also maintain these Google Applications as well. Even though the content related to Google Applications was not relevant to Kristy, she did benefit from the online learning content, and transferred it during Phase 2 of the study.

Processes. Learning by doing was the best way for Kristy to learn the content because she was able to move at her own pace and it allowed her to play around with the tools until she figured them out. She benefited from the flexibility in completing assignments, and felt the TPDI activities were well planned and organized.

Context. The technology tools used to implement the TPDI instructional environment were conducive to Kristy's learning, but she struggled because she had other personal commitments. Because she had too many other things to prepare for her classroom, she would not participate in another PD intervention that took place too close to the start of school. Kristy benefitted from the collaborative assignments because she heard multiple perspectives from the other teachers, and learned how they planned to use the content in their teaching practice, but still preferred to learn independently.

Nancy.

Content. Nancy found that content that was relevant to her teaching practices and that allowed her to communicate with her students and their parents, was beneficial because she perceived that it would make her more efficient and effective in her teaching.

Processes. Nancy learned best through processes that allowed her to view and digest clear and concise information that was presented in an organized manner, and allowed her to practice with the knowledge and skills that were presented. Information presented in this way allowed her to utilize her time efficiently, which was important and beneficial to her.

Context. The technology tools used to facilitate the TPDI supported Nancy's learning. She enjoyed working independently on activities with assistance from the instructor in an asynchronous delivery method because she likes to complete her work when she had the time. Completing the TPDI throughout the summer was an important factor for Nancy, since it provided her time to digest the information and think of how it could apply to her teaching practice. It provided plenty of time to create the materials so they are ready to go for the start of the school year, because that time of year is extremely busy. During Phase 2, Nancy found that having access to the instructor was a beneficial resource to her when she was unable to complete specific technology tasks that she wanted to incorporate into her teaching.

Cross-case analysis themes. The following section discusses themes that emerged from comparing the individual cases. The themes are discussed as they appeared within each of the three categories used to guide the teachers' reflections, including: content, processes, and context.

Content Characteristics. The data collected from the five teacher participants generated two themes related to the content characteristics category. Content characteristics related to the *what* of the PD, such as, new knowledge, skills, and understandings (Guskey, 2000) from the TPDI, which now helped teachers since they were transferring the skills to practice. The main theme, representing about 91% of the content characteristic comments, focused on the content teachers perceived as relevant. They also discussed that content that was perceived as easy was beneficial as well

Relevant. When discussing how relevant the content of the TPDI was to the teachers, two sub-themes, including teaching responsibilities and previous experience with the content appeared the most throughout the journals. The most dominant theme, representing approximately 75% of the comments, regarded how relevant teachers perceived the content towards their teaching responsibilities. The second theme, previous personal experience with the content, was only generated by one teacher, Kristy.

Teaching responsibilities. As teacher's transferred the knowledge and skills from the TPDI environment to practice, they reflected on how the content was relevant to their teaching responsibilities. Specifically, it helped their students because they were now implementing it with them. All five teachers mentioned at least one way in which the content was relevant to their teaching practice and students, but it was best represented when Jason reflected:

> I have been teaching for 28 years now and this activity has been the single best discussion activity that I have had in a classroom – [the] only difference is that the discussion is occurring online. The amount of depth that students have put into their own posts and then the interaction between postings that they have done

> with each other have frankly blown me away. THESE ARE NINTH GRADERS - they are not supposed to be able to do this stuff! At least that is what most people have told me, but there were just some excellent examples of tremendous maturity in these posts. I am over 200 posts on the board at this point and have had to delete just one (personal communication, September, 2011)!

Previous experience. The second sub-theme that emerged regarded one teacher's previous experience with the content of the TPDI. Within the Phase 2 content data set, Kristy described her distaste for the Google Applications. She tried using the tools prior to the TPDI and found that the tools she was already using worked best for her. Kristy demonstrated this frustration throughout all three weeks of her journal entries during this phase, and was shown when she said:

> The content was not relevant to my professional responsibilities. I ended up having to push back my use of the site because it didn't fit with the curriculum at that time. Since I already created and use Word press, my Google Site was redundant and lacked the flexibility I crafted within my Word press site. I showed students where it was, but do not have use for it (personal communication, October, 2011).

Even though Kristy did not find use for the Google Applications content that was covered in the TPDI, she did find the online teaching content was relevant to her classroom practice. This was best displayed when she said:

> Since I didn't use the apps we learned about in the course, I would say no [that the content was not relevant]. But the skills I learned helped me set up a blog and the materials I made, [such as,] the soft skills and guidelines, helped me implement a

> different app…I was able to apply what I learned about digital learning to prep students for the blog (personal communication, October, 2011).

Clear and Easy. Clear and easy was not a dominant theme within the Phase 2 content data, but it represented approximately 9% of the comments from the journals. Brenda, described that the content was "direct, clear and gave [her] the skills and confidence to teach Google Docs" to her students (personal communication, September, 2011). This demonstrated that having content that is communicated in a clear and concise manner was important to the teachers as they transferred their knowledge and skills from the TPDI to classroom practice.

Teachers also discussed that having the knowledge and skills of using Google Applications that were easy to use within their teaching practice made them more effective in their jobs. Nancy demonstrated this when she reflected the following about Google Calendar:

> I LOVE this feature and that you can embed this calendar on multiple websites. It is quick and easy to upload events and it is in the same program as my primary email. Therefore, it is quick and easy and very effective. Students and parents can access this at any time to find out what we are doing and what is coming up. My goal next week is to get students to subscribe to my calendar through their Gmail account, so everything I post will come up when they check their calendar (personal communication, October, 2011).

The two overarching content characteristic themes generated from Phase 2: Transferring data are displayed in Table 13. The table displays which themes appeared from the guided teacher reflection journals of each participant. The next section is

presented in the same manner, but discusses the themes that emerged from Phase 2: Transferring data related to process variables.

Table 13:
Content Characteristic Themes Generated from Phase 2: Transferring Data Displayed by Participant

	Theme	Sub-Theme	Sub-Theme	Brenda	Jason	Julie	Kristy	Nancy
1	Relevant	Teaching Responsibilities		X	X	X	X	X
		Previous Experience					X	
2	Clear and Easy			X	X	X	X	X

X = Theme claimed by teacher

Process Variables. The data collected from the five teacher participants generated two overarching themes related to process variables of the TPDI during Phase2: Transferring. Process variables refer to *how* the content of the TPDI was communicated to teachers, and more specifically, the activities that were implemented to support or enhance their learning (Guskey, 2000). Teachers discussed the instructional activities used throughout the TPDI more frequently (approximately 61%) than the second theme, instructional delivery methods (approximately 39%). Each of the two themes and related sub-themes are described in the following sections.

Instructional Activities. The most discussed process variable theme was how teachers perceived the instructional activities. The majority (approximately 92%) of

perceptions generated around this theme were specifically described within one sub-theme, *learning by doing*.

Learning by doing. Teachers discussed that the instructional activities that permitted them to actively engage with the content, also known as learning by doing (Mishra & Koehler, 2005), were the most influential to their learning of the TPDI content as they transferred it to their classroom practice. This theme was dominant, but Brenda was the only teacher not to reference "learn by doing" activities, or any instructional activities as being beneficial to her learning. She did not negatively mention the activities that were included in the TPDI; she simply did not discuss them during this phase.

The teachers typically used the following verbs when they described the learning by doing activities: making, preparing, actually setting-up, participating, and embedding (personal communication, September-October, 2011). This demonstrated that their active engagement with the assignments throughout the TPDI helped them to transfer the knowledge and skills to their teaching practice. Consistently throughout the journals, except for Brenda, teachers discussed learning by doing as their "preferred" process (Kristy, personal communication, October, 2011), or as their "top way in learning about this material" (Jason, personal communication, September, 2011). There were numerous examples, but the *learning by doing* theme was best demonstrated by Julie who said:

> By actually setting up and sharing documents in the course, I understood first-hand some of the pitfalls and was able to help students. In addition, by having to use many of the documents during assignments, I was better able to decide on which ones might fit the needs of my students better. Also, by making the presentation on soft skills, I had it ready for my students to use. And by actually

participating in a discussion board, I could easily direct my students to do it (personal communication, September, 2011).

Instructional delivery methods. Instructional delivery methods appeared as the second major theme throughout the teacher reflection journals within the process variable data set. This theme related to the delivery of the content. Within this theme, teachers found two instructional delivery methods as beneficial for transferring the TPDI knowledge and skills to teaching practice. The delivery method that appeared the most throughout the journals was the technology how-to video tutorials created by the instructor. The other instructional delivery method discussed during this phase was the instructor.

Video tutorials. The technology how-to video tutorials provided a step-by-step audio visual guide for the teachers on how to complete tasks with the Google Applications. The video tutorials represented approximately 75% of the reflections around the instructional delivery methods as the most beneficial instructional delivery method in Phase 2: Transferring. While this theme emerged dominantly within the cross-case analysis, neither Kristy nor Nancy mentioned the video tutorials in their guided teacher reflection journals during this phase. The three other teachers discussed that the video tutorials were effective in helping them learn the material as they transferred it to their teaching practice. Brenda and Julie found them relevant and implemented them in their own instruction.

Learning. The three teachers, Brenda, Jason, and Julie, described the video tutorials as beneficial because they provided detailed information on using the Google Applications. During Phase 2, teachers had access to all of the TPDI resources available

to them on the course website, so that they could go and view if they needed a reminder, or further demonstration, as they taught their own students how to use the applications. Julie best described this theme when she reflected:

> The other process that I found most useful was the tutorial videos in which Kelly walked us through the process. I have gone back to use the videos numerous times when I have forgotten how to do something. I found this to be much more helpful than the textbook readings since they often did not give as much detail (personal communication, September, 2011).

As previously mentioned, Brenda did not reference that learning by doing was beneficial to her during this phase. However, she repeatedly mentioned, throughout all three weeks of Phase 2, that "it was the videos created using Jing that helped the most," and were "the most valuable" and "preferred approach" for learning the material and transferring it to her teaching practice (Brenda, personal communication, September, 2011).

Relevant. The video tutorials were transferred to the teaching practices of Brenda and Julie. Julie had students watch "a video about creating and sharing Google Docs" (personal communication, September, 2011). She then had them practice using Google Documents by creating and sharing their reflection journals with her, just as she did as a student in the TPDI. Brenda discussed the video tutorials as relevant throughout each of her journal reflections during this phase. She found the videos "so valuable that [she] recreated some of them and used some of [the instructor's] as well," in her teaching practice (personal communication, September, 2011).

Instructor. The other process variable factor that emerged as beneficial to the teachers' in transferring the TPDI to teaching practice was the instructor. Teachers

reflected that the "delivery of instruction was straight forward and easy to understand" (Brenda, personal communication, September, 2011), as well as "planned out and well organized" (Kristy, personal communication, October, 2011). Jason provided an example of how the instructor modeled an online teaching strategy that he then decided to use in his teaching practice as well. This was shown when he said:

> I really liked what you shared when we were using our discussion board this summer to use someone's name at the top of the post that you are responding too. I implemented that with responses to my students and am going to teach them that strategy when they respond to another post (Jason, personal communication, September, 2011).

The two overarching process variable themes generated from Phase 2: Transferring data are displayed in Table 14. The table displays the themes that appeared from the guided teacher reflection journals for each participant. The following section is presented in the same manner, but discusses the themes that emerged from Phase 2: Transferring data related to context characteristics.

Table 14:
Process Variable Themes Generated from Phase 2:Participating Data Displayed by Participant

				Brenda	Jason	Julie	Kristy	Nancy
	Theme	Sub-Theme	Sub-Theme					
1	Instructional Activities							
		Learning by doing			X	X	X	X
2	Instructional Delivery Methods							

Video Tutorials						
	Learning	X	X	X		
	Relevant	X		X		
Instructor						
	Feedback/Model	X	X	X	X	X
	Clear	X	X	X	X	X

X = Theme claimed by teacher

Contextual Characteristics. Contextual characteristics refer to the *who, when, where, and why* of the TPDI (Guskey, 2000), so there could be unlimited amounts of information that could fall into this group. To keep aligned with the research questions and purpose of this study, the data collected from the five teacher participants were grouped into three overarching themes related to contextual characteristics of the TPDI, which included: access, instructional setting, and non-instructional setting. The three themes were typically discussed with the same frequency, but access represented approximately 38% of the contextual characteristics followed closely by instructional setting (approximately 36%), and non-instructional setting comments rounded out the theme representing approximately 27% of this data set.

Access. Access to appropriate resources, during this phase emerged as a theme in the guided teacher reflection journals. The statements related to access statements could be associated to the other two contextual characteristic themes, instructional and non-instructional setting, but were categorized separately because the statements emerged independently more than the other two themes. In relation to the instructional setting theme, teachers discussed not having access to particular instructional resources during the TPDI that could have helped them now that they were teaching. This theme was

discussed the most by Brenda and Nancy. Brenda reflected about not being able to assist her students with some of the tasks because the skills were not covered in the TPDI:

> We did not spend much time in your class exploring how to work with Google Spreadsheets. So an additional lesson here would have been very helpful. When students added pictures to the Google Spreadsheet they had a hard time controlling their placement. Drag and drop did not always work and they became frustrated. Additional instruction on pictures and Google Spreadsheets would have also been helpful (personal communication, September, 2011).

In each of the three weeks during this phase, Nancy mentioned at least one topic that she wished would have been covered in the TPDI now that she was teaching. She explained this when she said:

> I would have liked more focus in the course about different permissions which is hard to do in the summer with no students to practice on, so when we set up our site we had no one that was looking at it from the student perspective. Typically, when I try something new, I have one student log into a laptop so I can play around under their username to make sure everything works. However, that was not the case when creating a summer course in professional development in technology (personal communication, September, 2011).

Teachers also mentioned technology access constraints that occurred while implementing their instructional materials with their students. These comments would have fallen into the non-instructional setting theme. Jason described the technology access issues the best when he said:

> Throughout the week our network here at School was the primary stumbling block to getting my unit off of the ground. We are going through some major network changes this summer and I just don't think they were as prepared for the mass usage of Gmail accounts by students that we as teachers wanted to accomplish (personal communication, September, 2011).

Teachers also discussed the benefit of having appropriate access to resources during this phase as they needed it. Julie described that having the book and video tutorials helped her "not only learn the information, but also what resources [she] had for [the] future," when she was teaching Google Applications to her students (personal communication, September, 2011). Brenda also demonstrated the benefit of having access to the instructor, since the "phone calls and emails that were sent received a very quick response" (personal communication, September, 2011). Similar to Julie, she also liked "having the ability to return to the class web site and review the videos to make the task of teaching Google Presentations easy" (personal communication, September, 2011).

Instructional Setting. During Phase 2: Transferring, teachers were no longer participating in the TPDI, but as guided, reflected back on the instructional setting as they implemented the materials they created in their teaching practice at the beginning of the school year. In their journals, teachers referenced three sub-themes that impacted their experience: time, interaction, and technology tools.

Time. The theme discussed the most within the context of the instructional setting during Phase 2 was *time*. Within this theme, *time* was referred to as the flexibility and pace of assignments, and also *time* of the year the TPDI was implemented. Fifty eight percent of the reflections about the instructional setting focused on this theme. Teachers

reflections found that the flexibility of completing the TPDI assignments were beneficial to their learning. Throughout all three weeks of Phase 2, Nancy stated that she "enjoyed the flexibility of creating [her] course when [she] had time to do it" (personal communication, September, 2011). The flexibility in instructional setting worked two-fold for Julie. The flexibility "made it easy for [her] to work when [she] had time," so she didn't have to "hurry through assignments, but could think and reflect more" (personal communication, September, 2011). The flexible due dates in the instructional environment also made Julie "aware of how [her] students might appreciate some flexibility in due dates" as well (personal communication, September, 2011).

For Jason, flexibility meant more than just the time allotted for completing the assignments; it meant from where and when the flexible due dates came into place. As previously mentioned, Jason had never experienced online learning prior to the TPDI, and was eager to learn about the content of the course. Jason's reflection discussed how the flexibility of completing the course coupled with a time in his life where he was ready to learn the content has beneficial to his learning when he said:

> I guess with context and contextual processes the thing I appreciated the most was the flexibility in completing assignments. Being highly motivated to complete the course and implement the tools in my classroom was a big factor. Without the motivation I don't think that flexibility would have meant as much, in fact I would have probably just blown it off. It was really helpful at that point in the class though. I liked that the most about the context during the whole online learning was the environment that I worked in - my home! The flexibility in general was something I had never experienced because this was my first online

> learning experience and it was wonderful. I guess it does drive home the notion that online learning can really reach a certain type of audience and be a really effective experience (personal communication, September, 2011).

As noted in the content section during this phase, prior to the start of the school year, Kristy's teaching responsibilities changed. These changes came about during the last few weeks of the TPDI. While she found benefit in being "able to choose [her] pace" throughout the TPDI, the timing of the course was not conducive for her learning (Kristy, personal communication, October, 2011). This was best demonstrated when she stated:

> I believe that timing has to be changed. It was difficult to try to maintain the expectations of this course when class layout, curriculum, numbers, and requirements changed within my own classroom. I also think that it was done too close to school starting. Instead of focusing only on my classroom set, curriculum, and students, I was trying to divide my time. After having experienced this course, I would not volunteer to take part in something that would extend from the end of July into the beginning of the school year (personal communication, October, 2011).

Overall, all five teachers found that the flexibility in assignment due dates that permitted them to progress and complete the materials when convenient for them were found to be beneficial factors of the contextual environment.

Interaction. The second sub-theme to emerge within the instructional setting theme was teachers' desired level of interaction with other learners in the TPDI. Within this theme teachers discussed both independent and collaborative environments, but reflected that the independent work was most beneficial to their learning. The

independence that the teachers discussed came from the fact that they were creating materials that were authentic to the courses they teach independently as teachers. As seen in the previous theme, teachers benefited from “all independent work” (Nancy, personal communication, September, 2011), because it allowed them the flexibility to work at their own pace, and when it was convenient for them.

Only two of the teachers, Brenda and Kristy, discussed collaborative interaction within the instructional setting as beneficial. Kristy stated that she “was able to get multiple perspectives and approaches by working with others,” and that “it was also beneficial to see how they were using various tools and how they were fitting them into their curriculum” (personal communication, October, 2011). Brenda did not mention how the collaborative activities throughout the TPDI were beneficial to her, but she did suggest that more collaborative interaction be included throughout the course. This was demonstrated when she reflected:

> I think more synchronous meetings with class members and the instructor this summer would have been helpful. Or maybe a meeting after the first week of school would have helped me see the amount of data coming my way. In all honestly, I think a couple of class meetings along with the online instruction would have made this a richer learning experience and a more efficient one (personal communication, September, 2011).

Technology tools. The technology tools used in the instructional setting of the TPDI were viewed in a positive manner by the teachers as “fine” (Kristy, personal communication, October, 2011) for supporting their learning. This was best demonstrated by Julie when she reflected that “The context used for learning the content was part of the

reason it was so useful" (personal communication, September, 2011) to her learning. This shows how the learning in the same instructional setting, and using the same tools they were learning, and were now using in their teaching practice was a beneficial contextual characteristic of the TPDI.

Non Instructional Setting. Within any instructional environment there are always contextual factors which are not directly related to the instruction, but still impact learners' perceptions. These non-instructional setting factors are items that impact the learner outside of the instructional environment. Since they were already discussed, any technology access related issues outside of the TPDI, were not grouped within this theme. The teacher reflections discussed factors regarding their relevant professional responsibilities as teachers and their personal lives.

Teachers discussed how they were learning from their teaching practice about topics that were not specifically covered within the instructional setting. These items were categorized as non-instructional setting contextual factors that were beneficial, but were not related directly to the TPDI. Julie learned that her students "liked the idea of a living document and that for [an] assignment, [and] they will have an opportunity to take my comments and further perfect their report," before having to turn it in for a grade (personal communication, September, 2011). Brenda's learning also expanded outside of the TPDI. This was explained when she said:

> I am finding that students who need to make up class work are reluctant to go to my web site for the material. Their expectation is that I will teach them whatever they missed. I have told them that I would help them only after they reviewed my web site materials first (personal communication, September, 2011).

Through thorough analysis of the guided teacher reflection journals, different personal characteristics from each of the teachers emerged. These personality traits and beliefs impact the way they perceive their world and environments. Some of these personal characteristics included teachers' personal experiences with other online courses, and previous use of the Google Applications. This was best demonstrated by Kristy when she reflected:

> I just found myself struggling to stay engaged because of timing, academic commitments, and the fact that I had already learned a lot of the information. In the past, I've used those tools myself and found success in them. In many of my graduate courses, professors have set up these types of learning environments (groups, discussion boards, and blogs) that we've had to use in tandem with the class. This was more guided than many of those, since you were training us on how to use them (personal communication, October, 2011).

The three overarching context characteristic themes generated from Phase 2: Transferring data are displayed in Table 15. The table displays the themes that appeared from the guided teacher reflection journals of each participant.

Table 15:
Context Characteristic Themes Generated from Phase 2: Transferring Data Displayed by Participant

				Brenda	Jason	Julie	Kristy	Nancy
	Theme	Sub-Theme	Sub-Theme					
1	Access			X	X	X	X	X
2	Instructional Setting							
		Time						
			Flexible/Pace	X	X	X	X	X

		Summer	X	X	X		X
	Interaction						
		Independent	X	X	X	X	X
		Collaboration	X			X	
	Technology Tools						
		Positive	X	X	X	X	X
3	Non-Instructional Setting						
		Relevant	X	X	X	X	X
	Personal		X	X	X	X	

X = Theme claimed by teacher

Common Factors from Phase 2: Transferring. Further analysis of the content, processes, and contextual factors demonstrated themes and sub-themes that appeared common amongst all three categories of factors. This cross factor analysis of the themes and sub-themes provided a way to synthesize and condense the coded categories to better portray the factors teachers found to be beneficial while participating in the TPDI. The cross factor analysis of the themes and sub-themes demonstrated seven factors that teachers found to be beneficial for impacting the quality of the TPDI. Throughout this phase, teachers described that TPDI factors that were relevant to them as the most beneficial, and factors related to the instructor were the least important to the quality of the TPDI. Table 16 displays all seven beneficial factors and the frequency of how often they appeared throughout all of Phase 2: Transferring data. The beneficial factors are numbered 1 thru 7, with 1 meaning it was the factor most frequently mentioned as beneficial and 7 meaning it was the least frequently mentioned factor. Again, all of these

factors were found to be beneficial for impacting the quality of the TPDI during Phase 2: Transferring of the study.

Table 16:
Frequency of beneficial factors as they appeared throughout Phase 2: Transferring

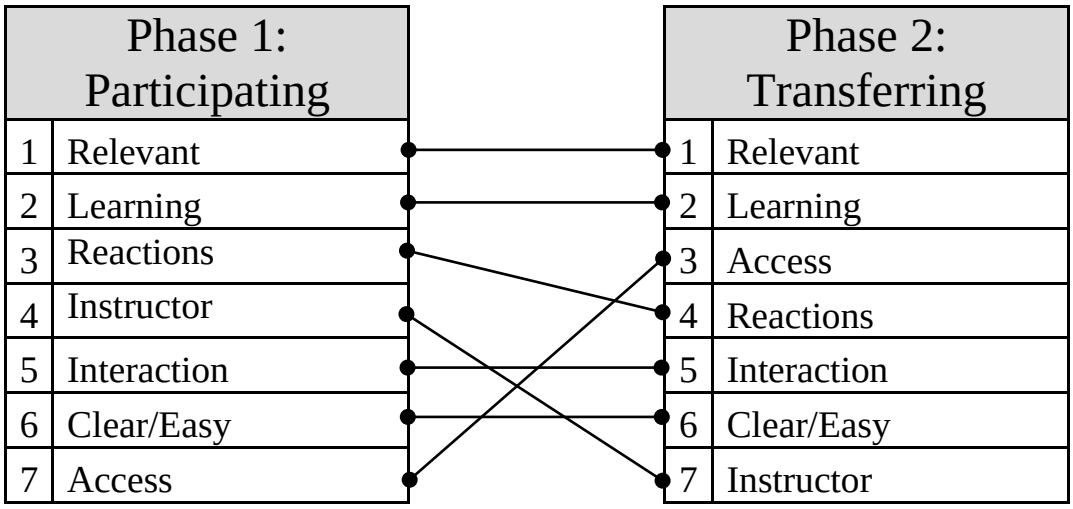
1	Relevant
2	Learning
3	Access
4	Reactions
5	Interaction
6	Clear/Easy
7	Instructor

All seven factors have been explained throughout this section, and more details will be provided in the Chapter 5 Discussion. The next, and last, section of this chapter describes the comparison of themes and sub-themes of Phase 1 and Phase 2.

Compared and Synthesized Both Phases

After comparing all of the themes that emerged across each of the three content, process, and contextual factor categories, I conducted one final comparative analysis of the factors from both phases of the study. This section describes the changes that occurred within each of the three categories, and Figure Y displays a visual representation of the changes between the factors of the two phases.

Figure 7: Changes in Content Characteristic Factors between Phase 1 and Phase 2.



The content factor found to be most beneficial, by all five teachers, during both phases was if it was relevant to the teachers' teaching responsibilities. In Phase 1 all five teachers discussed at least once, that some of the content was a review and benefitted from it, because they could build upon that knowledge and skill from their previous experience. Kristy was the only teacher who viewed a portion of the content during Phase 1 as not practical for use in her teaching practices. During Phase 2, the only teacher to mention their previous experience with any of the TPDI content was Kristy, and she referenced repeatedly how her experience was negative. The only other theme from Phase 1 that appeared again during Phase 2 was that all five teachers discussed that content that was clear and easy to understand was beneficial for their learning.

Changes in Process Variable Factors between Phase 1 and Phase 2. The process variable found to be the most beneficial during both phases were instructional activities that included a *learning by doing* component. All five teachers referenced it as

the most beneficial during Phase 1, but Brenda was the only one not to mention it during Phase 2. The second most beneficial process variable during both phases included instructional delivery methods. Only two of the seven instructional delivery method categories that were mentioned during Phase 1, appeared as beneficial themes again in Phase 2, which included: video tutorials and instructor. In both Phases, video tutorials and instructor appeared the most, respectively, in the instructional delivery methods theme. In Phase 1 all five teachers describe that the video tutorials were beneficial to their learning, and clear and easy to follow, which was also beneficial. Brenda and Jason, however, were the only two teachers who found the video tutorials to be relevant to their teaching. In Phase 2, only Brenda, Jason, and Julie mentioned that the video tutorials were beneficial to their learning, and none of the teachers mentioned that the videos were clear and easy to use. Consistent with Phase 1, Brenda, the technology teacher, found that the videos were relevant to her teaching practice. Even though Jason described the video tutorials as relevant to his teaching practice in Phase 1, he did not mention the tutorials as relevant during Phase 2. This was opposite for Julie who mentioned the video tutorials were relevant for teaching practice in Phase 2, but did not in Phase 1. Neither Kristy nor Nancy mentioned that the video tutorials were relevant to be used in their teaching practice in either of the two phases. All five teachers, in both phases, described the instructor as a beneficial factor because of the clear feedback and messages provided throughout the TPDI, and the modeling of certain instructional practices.

Changes in Context Characteristic Factors between Phase 1 and Phase 2. During both phases the teachers found the same three overarching contextual characteristics to be beneficial, although the frequency in which they discussed them as

beneficial was different. In Phase 1, teachers discussed that the instructional setting was the most beneficial contextual characteristic of the TPDI. Access to resources was important, but it only represented approximately 7% of the contextual characteristic data, and neither Jason nor Julie referenced the theme. In Phase 2, however, having access to resources was the most discussed contextual characteristic, and all five teachers referenced it as beneficial during this phase. During Phase 2, there was also a change within the instructional settings sub-themes. In Phase 1, teachers discussed the technology tools the most. All five teachers made references to the technology tools used in the instructional setting with both positive and negative perceptions, except for Jason who made no negative comments regarding the tools. During Phase 2, however teachers found that having the ability to work on assignments at their own pace accompanied by flexible due dates appeared as the most beneficial factor of the instructional setting. This theme of time was also related to the timing of the year that the course was held, which was the summer, and the teachers, except for Kristy, found this to be a beneficial time of year for the TPDI. The second sub-theme in both phases was the interaction that occurred in the instructional setting. All five teachers found that working independently was more beneficial to them than working collaboratively on assignments. During Phase 1, all teachers, except for Nancy, mentioned at least once that a collaborative activity was beneficial in some way. This changed, however in Phase 2, when only Brenda and Kristy discussed collaborative environments as beneficial. The sub-theme instructor, which was discussed as beneficial by teachers in Phase 1, except for Kristy, did not appear as a sub-theme during Phase 2. The other theme to appear in the contextual characteristic data during both phases, were factors that related to non-instructional setting items. In both

phases teachers discussed contextual characteristics that were not directly related to the TPDI environment, but still had an impact on the teachers. The two sub-themes that emerged within this theme were factors that were relevant to the teachers' teaching responsibilities and well as personal factors. All five teachers mentioned these sub-themes in both phases, except for Nancy who did not mention any personal related items during Phase 2 of the study.

CHAPTER 5

DISCUSSION

The purpose of this qualitative multiple-case research study was to examine secondary education teachers' perceptions of a technology professional development intervention (TPDI). This study was designed to provide a deeper understanding of which factors teachers' perceived to be beneficial to the quality of technology professional development (PD) they received. This study examined two research questions:

1. While participating in a technology professional development intervention, what do secondary education teachers perceive to be beneficial factors that impact the quality of a technology professional development intervention?
2. After transferring the knowledge and skills taught during the technology professional development intervention to teaching practice, what do secondary education teachers perceive to be beneficial factors that impact the quality of a technology professional development intervention?

The purpose of this final chapter is to provide a discussion of the findings of this qualitative multiple-case research study. The chapter is organized into the following sections: (a) important technology professional development factors found in empirical literature, (b) teachers perceptions of beneficial factors that impact the quality of technology professional development (PD) they received, (c) implications of the findings for instructional technology, (d) limitations of the study, and (e) recommendations for future research and redesigning the TPDI used in this study.

Technology Professional Development Factors

Before discussing the seven factors that teachers perceived as the most beneficial for impacting the quality of the TPDI in this study, it is imperative to revisit the factors that were included in the TPDI design, and why they were included.

The Guskey and Sparks (1996) conceptual model illustrates the relationships between professional development (PD) and student learning. This study did not utilize the model in its entirety to verify the TPDI's impact on student learning, but it did serve as a guide to examine the teacher's perceptions of the TPDI's content, processes, and contextual factors. The factors included throughout the TPDI were found throughout the literature to increase the quality and effectiveness of technology professional development. The factors were explained in detail in Chapter Two and included:

- technology plan that ensures appropriate resources (hardware, software, instruction, support, planning time) are available;
- administrator, peer, and technical support;
- teacher (learner)-centered training;
- training on technical, pedagogical, content, and management concepts and skills; relevant;
- hands-on practical/authentic training activities;
- collaborative learning environment activities including: modeling, reflection (journal and discussions), presenting, mentoring, observation, and
- engaging activities to assist in attitudinal change.

The technological pedagogical content knowledge (TPACK) framework was used to design the TPDI used in this study, because it encapsulated the factors identified above

into one theoretical perspective. TPACK suggests that if teachers have appropriate technological, pedagogical, content knowledge, and recognize the interplay of the three, that they are able to promote student learning (Schmidt et al., 2009).

TPDI. The purpose of the TPDI used in this study was to provide teachers with an introduction to designing and facilitating effective online instruction. It introduced online teaching, current teacher technology standards, and application of planning effective online instruction and materials for preparing students for learning and working in the global economy of the 21st Century. Along with online teaching content, teachers learned various Google Applications to assist in the implementation of online instruction with their students.

Teachers participated in the five week TPDI during the summer months from July through August. The instructor and participants did not interact at any time throughout the study in the face-to-face environment. Teachers received instruction in the online environment using the same Google Applications they later used in their teaching practice with students. They experienced the Google Applications first-hand as learners, and designed online instructional materials to use as teachers with their students. The five teacher participants were exposed to case studies, scenarios, and readings from exemplary online secondary education teachers and experts, which provided demonstrations of pedagogical approaches to online teaching. Participants completed a variety of instructional activities including a guided teacher reflection journal about the TPDI, discussion board postings, collaborative activities, and instructor and peer online text and video communication. The majority of activities centered on designing online instruction and materials to implement into their teaching practice at the start of the

school year. Before implementing the online instructional materials with their students, the teachers received feedback from the instructor and others about the instruction and materials they designed. This was an introductory course to online teaching and Google Applications, so the materials the teachers designed were implemented in both the classroom and online environments. Similar to previous years, teachers met with their students face-to-face at the beginning of the year, but now had a course website that hosted the online instructional materials and activities that they designed throughout the summer.

The purpose of this study was to examine which of the factors identified as important in the literature, and included in the TPDI, were perceived as the most beneficial for impacting the quality of technology professional development.

Beneficial Factors

As demonstrated in Chapter 4, teachers perceived seven beneficial factors that impact the quality of the TPDI. Those factors, included: relevant, learning, access, reactions, interaction, clear and easy, and instructor. In this section I discuss each of the seven factors, and provide my thoughts for why each factor was determined as beneficial by the teachers. I also outline connections between the seven factors identified by the teachers in this study and the important empirical factors used to design the TPDI. The factors, because of their overlapping nature, were discussed in a way that demonstrates their interdependence, and therefore are not discussed in a specific order.

Seven Factors. In both phases of the study teachers perceived that the most beneficial factors of technology professional development are *relevant* to their teaching responsibilities, and most importantly, impact student learning. The second factor

included items that teachers perceived as beneficial to their own *learning.* Similar to *relevant, it* remained consistent in frequency between the two phases. Their perceptions directly align with both of the models (Guskey & Sparks, 1996; Mishra & Koehler, 2006) that were used to guide this study; in that student learning should be the end goal to any professional development. Teachers need to *learn* in order to impact student learning, which was discussed as their most relevant professional responsibility. Because of the overlapping qualities of these two factors, they are examined together.

A key reason the teachers discussed the factors of the TPDI as relevant was because the school district, during the previous school year, adopted the Google Applications for Education platform. The school district planned to launch the platform as their main digital online communication system for all educational stakeholders, including administrators, teachers, students, and parents at the start of the 2011-2012 school year. The presence of Google Applications within the school environment demonstrated that the district administration had some technology plan in place. It was not determined if the technology plan was publicized to the teachers, but it did demonstrate that the administration supported the tools since they made the decision to switch their entire technology platform. Two factors from the literature determined as important to quality professional development, included having (1) a technology plan that ensures appropriate resources (Goktas et al., 2009) and (2) administrator, peer, and technical support (Ertmer, 1999; Rogers, 2000; Holland, 2001; Hew & Brush, 2007; Hsu & Sharma, 2008). The platform switch made the tools relevant to the teachers, because they knew they were going to have to learn to use the tools in order to communicate with their students, other teachers, and parents. The teachers also recognized that their overall

key responsibility as a teacher is to prepare students for their futures. The teachers described their students' futures as, the rest of their high school careers, college, or the work environment. No matter which way they viewed it, they perceived it was their responsibility to be equipped with the appropriate technology tools and skills to support and impact student learning, so students can be successful in their futures. I think the learning module of the TPDI that focused on local and national technology standards impacted the teachers because it illustrated the importance of having these technology skills, especially with the increase of online K-12 teaching and learning environments (iNACOL, 2011). The technology standards module was further demonstration to teachers about the importance of having and integrating these skills from an administration level, from the state and national government.

As noted throughout this dissertation, the majority of the TPDI instructional activities for the teachers, centered on them designing online instructional materials to implement into their teaching practice at the start of the school year. Hands-on learning (Ertmer et al., 2007; Hew & Brush, 2007; Holland, 2001; Wells, 2007) and authentic and practical experiences (Ertmer et al., 2007; Holland, 2001; Hsu & Sharma, 2008; Wells, 2007), such as these, where teachers design instruction and instructional materials that they can use in the classroom have been found to be effective factors in technology PD. Providing teachers with real-world authentic educational problems is also known as the "learning by design" approach (Koehler & Mishra, 2005; Mishra & Koehler, 2003). This approach places teachers in the environment where they "go beyond thinking of themselves as passive users of technological tools and begin thinking of themselves as active designers of technology" (Mishra & Koehler, 2003, p. 103). The instructional

activities where teachers designed their own instruction and instructional materials during Phase 1: Participating, and then implemented them with their students in Phase 2: Transferring, provided the environment for "weaving together components of technology, content, and pedagogy" (Koehler & Mishra, 2005, p.95) in order to solve relevant problems within their teaching practices. These activities where teachers were actively *doing*, were perceived positively by teachers as impacting their *learning*, which was the second most beneficial factor found in both phases of the study. In Phase 1teachers were creating or designing, their instruction and instructional materials, and in Phase 2 teachers discussed various items and practices they learned as they were implementing the materials with their students. This approach allowed them to work in a comfortable and safe learning environment during Phase 1 with the assistance of the instructor, who was able to model and demonstrate best practices, and provide feedback on the instruction and materials that were relevant to them. When they implemented their designed instruction and materials in Phase 2, the teachers found that their learning continued, because they were actually *learning by doing*, or transferring the knowledge, skills, and materials from the TPDI to the environment intended, which was their teaching practice. By learning in the same instructional environment that their students would be learning in, when the teachers began to teach their students, they were able to help with troubleshooting and recognize if they needed to implement another approach. This demonstrates that by allowing the teachers to interact with the knowledge in a changing environment, provides opportunity for better understanding in a situated context. The situated context allowed for teachers to actively use the tools, "rather than just acquire them, by contrast, build an increasingly rich implicit understanding of the world in which they use the tools and of

the tools themselves" (Brown, Collins, & Duguid, 1989). Situation cognition theory is the perspective that "knowledge is situated, being in part a product of the activity content, and culture in which it is developed and used" (Brown, Collins, & Duguid, 1989, p. 32). Mishra & Koehler's (2006) TPACK framework is grounded in situated cognition theory, and they argue that their "learning technology by design" approach helps to design and "create conceptually and epistemologically coherent learning environments" (p.1034). As demonstrated by the teachers in this study, *learning by doing* activities that were relevant to their teaching practices, were beneficial factors both during and after transferring the TPDI knowledge and skills to practice.

Teachers perceived that TPDI factors which they had previous experience using were viewed in both positive and negative manners. If the instructional material was something teachers experimented with prior to participating in the TPDI, and decided then that they didn't like it, their negative perceptions remained intact. Kristy, for example, demonstrated throughout Phase 1 that there were beneficial parts of the course, but for the most part she was frustrated. She tried using Google Sites in the previous school year and didn't like it. She used another similar tool and believed it performed better than Google Sites. Kristy became additionally frustrated the closer she approached the beginning of the school year. She was overwhelmed and irritated for two reasons. First, because of student enrollment numbers, her class schedule was altered and she had to teach other courses. Second, she thought that she *had* to use all of the instructional materials that she created, because of committing to participating in the study, even though she didn't like all of the tools that were covered. She opted to use technology

tools she was comfortable using, and simply provided a link to the instructional materials she created for her students, but didn't really use them.

If teachers had a previous experience with a component of the TPDI content, but never developed a strong negative or positive feeling about the content, then teachers found the content component to be beneficial. Since teachers had not developed a strong reaction from their previous encounter with the content, when they encountered it again, this time, in the TPDI, they found it beneficial. Exposure to the content a second time expanded their awareness and allowed them to build upon their knowledge and skills, in turn creating a positive learning experience. If the teachers encountered factors that were *new* to them, even if the experience was bad, they determined it was beneficial because they were glad to have had the experience. For example, interacting in Skype; even though there were a few access issues at first, it was still determined to be a beneficial learning experience for Brenda, Jason, and Julie because they had never used the tool before. They appreciated the experience, because it enhanced their knowledge of the tool, even if there were a few glitches at first.

The only major difference that emerged between the two phases was factors related to the feedback and modeling of the *instructor,* and the teachers having *access* to technology and instructional resources as needed. During Phase 1, the instructor was the fourth most frequently mentioned beneficial factor. The how-to video tutorials, which were created by the instructor, and the feedback and modeling of the instructor were both found to be beneficial for teachers' learning. Demonstration and modeling of tasks and concepts within the instructional environment assisted teachers, because they knew they would be implementing the tasks and concepts into their own teaching practice. Ertmer

(1999) states “demonstrations by peers, mentors, or seasoned practitioners can illustrate effective ways to use technology to teach existing and expanding content. In addition, members of a learning community…can become models and mentors for each other” (p. 54). In Phase 2, the teachers ended up doing many of the same instructional strategies and activities with their students that they learned and practice throughout the TPDI. The instructor, however, was mentioned the least, during Phase 2, while access factors rose from the bottom of the seven factor list to the top third spot.

Teachers barely discussed access issues to content or technology during Phase 1, because teachers were still in the learning environment. They had not yet transferred the knowledge and skills to teaching practice with students until Phase 2 of the study. When transferring the knowledge and skills to practice, teachers experienced technology issues, and discovered various areas of content they needed or wanted to know now that they were in the situated context of their teaching environment. The teachers handled access issues differently throughout the phases. Jason’s enthusiasm and eagerness for learning the Google Applications and online teaching concepts, for example, allowed him to see through any access experiences of the TPDI, and put a positive spin on how it increased his learning. This attitude carried over into Phase 2 of the study when Jason displayed that technology access issues would not deter him in using the instructional materials he created. Instead, when he and his students’ encountered technology access issues while he was implementing his instruction, Jason embraced the negative experience and utilized it as a teaching moment. He demonstrated to his students that technology doesn’t always work when, or the way we intend, so we have to learn to make adjustments. He then praised his 9th grade students for their maturity in handling the situation.

During Phase 1, Brenda often demonstrated insecurities of not completing her work correctly and preferred higher levels of interaction with the instructor. In Phase 2, Brenda often stated that she was not able to help her students at times, because the skills to do so were not covered in the TPDI. This is most likely because Brenda teaches technology related courses. She wanted more content to be covered, and was frustrated that she was not able to manage the amount of electronic assignments coming in. Her desire for access to additional content is a non-instructional setting issue, surrounded by two contextual factors. First, she teaches technology courses, and is constantly using the Google Application tools, so she has more students who work solely on technology-based projects. Therefore she determined that she needed or wished the TPDI would have included a wider array of instructional topics. However, during Phase 2: Transferring she wanted, or felt that she needed more exposure to other topics; she also said, during Phase 1 that the TPDI was a lot of content to digest. Her insecurities led to not trusting her abilities to complete tasks on her own, which contributed to her increased needs for more interaction through various instructional delivery methods that were familiar to her, i.e., telephone and face-to-face classroom instruction.

Of all of the teachers, Kristy was the youngest and had the least amount of teaching experience years. Even though she was not particularly satisfied with the overall experience of the TPDI, she still demonstrated that she wanted to know more about teaching with technology. Even though “new teachers may be more comfortable with the technology tools, they may lack an appreciation for the value of the technology as an instructional tool…and the organization and management skills needed to use technology effectively” (Ertmer et al., 2007, p.55). This was demonstrated in her descriptions of how

she found the most benefit from the collaborative assignments because she was able to see how others planned on using the various tools and concepts within their teaching practice. This shows that Kristy did not benefit directly from the Google Applications content, but she did want to learn how those within her school planned on using the tools in their teaching practice. She was interested in understanding the way her colleagues viewed the technology tools together with their teaching practice, so she could make adjustments to her teaching practice in order to appropriately adapt to the culture (Brown, Collins, & Duguid, 1989).

Nancy wanted to do more things with the Google Applications as she started using them in practice, and wished she knew how, but didn't have time to research. It can be assumed that Nancy's level of technology integration is high and could have benefitted from more advanced topics (Holland, 2001; Mierzejewski, 2009). Nancy was the only one who did not mention any benefit from the collaboration activities. Even though she mentioned various access issues, Nancy's demonstrated throughout her journal that her "intrinsic factors such as confidence and commitment" (Ertmer et al., 2007, p.57) were not going to keep her from using the technologies with her students. It was evident that she operates in a perfectionist mind set and prefers to make the best use of her time, and does not feel that working collaboratively, when related to technology, is the best for her.

Contextual factors, such as access to instructional resources and technology, were discussed more throughout Phase 2. During this phase teachers were no longer completing or interacting directly with each other, the content, or assignments of the TPDI, so the process variables were no longer a direct influence as they were in Phase 1.

This most likely contributes to why the instructor was mentioned less frequently in Phase 2, and access to resources increased. Teachers started implementing materials and started noticing which resources they didn't have access to in order to help them accomplish what they wanted in their teaching practice. Access also increased because all teachers experienced technology access issues at the beginning of the school year, which were not an issue during Phase 1.

I provided an *extra resources* section on the website and would point them out each week during Phase 1, but none of the teachers used or accessed them throughout the course. My intentions were that teachers would access the extra resources throughout the TPDI if the instructional materials were too easy or not as advanced as they had hoped. After going through Phase 2, I learned that it would be more beneficial for the teachers if those extra resources included items that were specifically related to the Google Application tools, or best practices for using them in teaching practice. This would have been a resource spot for teachers to access when they needed them when transferring to practice.

Even though I was available during Phase 2 by phone, email or Google Chat, it appeared that teachers might have benefitted from a synchronous meeting time throughout the first few weeks of Phase 2 as teachers transferred their resources to classroom practice. I had interactions with Brenda, Jason, and Nancy, during Phase 2, but a scheduled time could have provided an open forum for the teachers to interact with the instructor and each other about their experiences, and potentially receive advice for addressing the issues. I'm not sure if they would have taken advantage of a synchronous

meeting, because of the dominant statements regarding independent time, personal lives, and how hectic the beginning of the school year is with other items.

Time was described frequently throughout both phases of the instruction. Whether discussing content, instructional activities, or available technology tools, teachers benefitted from factors that were clear and easy to understand; factors that that got straight to the point in order to make effective and efficient use of their time. Having clear and easy to understand instructional materials and tools to use was important to the teachers, because with those items in place they could work independently and complete the tasks they needed when they wanted on their own time. The teachers found the instructional video tutorials clear and easy to use during the TPDI, and benefitted from being able to access those resources with ease when transferring knowledge and skills to teaching practice. Brenda, Jason, and Julie, for example, found benefit from the assigned book for the TPDI. The book appeared to be something they perceived as easy and comfortable to use for learning the material, and provided them another easy resource to access during Phase 2 as a reference.

This TPDI didn't have collaborative *learning by doing* assignments where teachers worked together on creating instructional materials, as they did throughout Mishra and Koehler's (2005) work. It appeared, however, that from this group of teachers that they wouldn't have reacted in a positive way to collaborative activities because of time availability, differences in levels of technology integration, and reactions or interest in the Google Application. Empirical literature on technology integration levels demonstrates that teachers at different levels benefit from different types of learning strategies (Hixon & Buckenmeyer, 2009; Holland, 2001; Moersch, 1995; Rieber &

Welliver, 1989). It is possible that if instructional activities were designed to allow teachers to participate in different roles throughout a collaborative project that each teacher could have learned from each other, fostering "the social network within the culture help[ing] them develop its own language and belief systems and promotes the process of enculturation" (Brown, Collins, & Duguid, 1989, p.39). Enculturation is the process a person partakes to fit in with the behaviors of the cultural or community norms (Brown, Collins, & Duguid, 1989). The process usually entails observing and practicing the behaviors of others within the community, and if "given the opportunity to observe and practice [the behaviors], people adopt them with great success" (Brown, Collins, & Duguid, 1989, p.34). Implementing assignments where teachers created instructional materials collaboratively could have helped by having teachers like Nancy model best practices on integrating various online teaching concepts and Google Applications into teaching practice.

Enculturation was demonstrated throughout this study, in numerous ways, but the best example is from the collaborative discussion board questions. Teachers did not really benefit from the discussion boards, except when they were directly responding to the instructor's questions and when they received feedback and thought provoking responses from the instructor. Overall, the teachers' experience with the discussion board wasn't that beneficial for their learning, because they skimmed over other's responses, or it was cumbersome to navigate through the questions, or was hard to respond differently after another teacher had already responded. However, during Phase 2, as they implemented their instruction with their students, they found the discussion board to be a successful approach for their online teaching practice. Even though teachers didn't find the

discussion board activities overall beneficial for their learning, they still implemented it in their own practice. This stems from the process of observing the instructor utilize and have the teachers practicing this activity. It also can be linked to either their own personal experience, or from others who have participated in higher education online learning, that online discussion boards are a standard practice in the higher education online environment (Mason & Rennie, 2008). This demonstrates that "the culture and the use of a tool act together to determine the way practitioners see the world; and the way the world appears to them determines the culture's understanding of the world and of the tools" (Brown, Collins, & Duguid, 1989, p.33). The next section discusses the implications this study has on the field of instructional technology.

Implications for Instructional Technology

The findings of this study suggest that the factors found in previous technology integration and professional development literature were beneficial factors to include for increasing teachers' perceptions of a quality TPDI. The findings from this study impact the instructional technology field by providing another empirical body of research, which identifies beneficial design factors that should be considered when designing technology professional development.

The overarching purpose of this study was to examine if teachers' perceptions of beneficial factors of a TPDI changed as they transferred the knowledge and skills from the instructional environment to their real world teaching practice. The findings from this study demonstrate that teachers' perceptions of the factors remained fairly consistent between the two environments, except for two factors, *access* and *instructor*, which switched in frequency of importance between the two phases.

A beneficial factor for instructional designers to consider when designing technology professional development is to include content, processes, and contextual factors that are *relevant* to the teachers, which aligns with previous research (Ertmer, 1999; Rogers, 2000; Holland, 2001; Mishra & Koehler, 2003; Koehler & Mishra, 2005; Ertmer et al., 2007; Wells, 2007; Hew & Brush, 2007; Hsu & Sharma, 2008; Goktas et al., 2009) Gathering information through an assessment (Di Benedetto, 2005) of the (1) technology tools and best practices embraced by the school culture, (2) global, national, and state technology requirements, standards, and best practices currently used throughout the educational environment, (3) core subject area taught by the teachers, and (4) exemplary use cases of other teachers and school districts that have demonstrated success with similar content, will help the designer incorporate relevant instructional content, activities, and delivery methods.

After gathering *relevant* information about the teachers and the environment, the next implications this study has for the instructional technology field align with Richey, Klein, and Tracey's (2011) three basic constructivist design principles:

- Learning results from a personal interpretation of experience.
- Learning is an active process occurring in realistic and relevant situations.
- Learning results from an exploration of multiple perspectives (p.130).

Designers should incorporate factors that assist in creating an environment that promotes *learning* through *clear, easy,* and appropriately sequenced segments to assist teachers' with constructing their own knowledge from their previous experiences. Presenting this information with *learning by doing* activities that are situated in a relevant contextual environment, typically increases teachers' positive *reactions* to the instruction, in turn,

making it “more likely to be transferred or applied in other settings” (Richey, Klein, & Tracey, 2011, p. 132).

Even though some teachers wanted more face-to-face *interaction*, it was the online learning environment that enabled them to troubleshoot technology issues in teaching practice. Instructional designers must consider providing and creating an instructional environment that allows for real world authentic practice and experience (Brown, Collins, & Duguid, 1989; Holland, 2001; Mishra & Koehler, 2003; Koehler & Mishra, 2005; Hew & Brush, 2007; Wells, 2007; Richey, Klein, & Tracey, 2011). These experiences must first be provided in an environment that is comfortable for the teachers’ to explore, practice, experiment, and make mistakes with the tools and content. The practice environment should include activities, which for the majority are designed to be completed independently, but should also incorporate opportunities for collaboration. These collaboration opportunities should be designed to provide modeling by expert teachers, or instructors, from within the group in order to benefit teachers who may be in a lower level of technology integration (Kopcha, 2008). They should also provide an increased perception of enculturation so that teachers feel comfortable incorporating some of the same activities into their own teaching practice. It also opens various channels for increased *access* to support through others who are available within the school environment. The modeling teacher also benefits from being able to construct their own knowledge expertise through the practice of sharing and teaching others. This implication aligns with Kopcha’s (2008) “systems-based mentoring model for technology integration” (p.175). The model suggests that a mentor can help teachers overcome barriers to technology integration by helping to establish:

> a culture of technology integration, modeling of technology use, and creating teacher leaders [and] culminating the establishment of a teacher-led community of practice that users the resources currently available at the school to support and sustain the implementation of the system (Kopcha, 2008, p.175).

Instructional designers should also consider including opportunities for teachers to extend beyond their comfort zones, by gaining relevant practice with a small group of students. These kinds of experiences allow teachers to assess how students will react to their new approach to teaching, and allow them to adjust and alter any technology, pedagogical, or management issues that may arise (Mishra & Koehler, 2003; Koehler & Mishra, 2005; Hew & Brush, 2007). The instructor, or model teacher, should still be present in this environment as a support to ease comfort issues, and to provide feedback so the teacher can make necessary adjustments, but slowly becomes less involved in order for the teacher to be comfortable on their own. This scaffolding mechanism provides teachers with the support they need to generate their own learning path (Brown, Collins, & Duguid, 1989; Richey, Klein, & Tracey, 2011).

In order to provide effective instructional environments, designers also need to incorporate into the design an *instructor* who is able to provide clear, effective, and timely feedback, model best practices, and ensure teachers are engaged throughout the instruction. The *instructor* is a beneficial factor for technology professional development because he or she provides access to the knowledge and skills the teachers need. The *instructor* needs to be able to model the best practices, because teachers tend to replicate the activities and practices they learned during PD into their own teaching practices. Depending on availability of instructors to implement the instruction, designers may have

to design and develop an instructor guide. This guide would be created to assist the instructor with implementing the intended instruction. Additional training sessions with the instructor may also need to be accounted for depending on the instructor availability. The designer should consider instructor availability at the beginning of the design project, so they can plan accordingly and work within the project budget and timeline for implementation.

As teachers transferred their knowledge and skills to practice, teachers' found that having access to resources when they needed was more beneficial at this point than the instructor. This demonstrates that incorporating awareness and practice of where and how to access resources is an important factor to be included when designing instruction. The implication of this finding also aligns with previous research on incorporating appropriate access to resources for increasing the sustainability and transferring success of knowledge and skills after the instructional environment fades away (Reiber & Welliver, 1989; Ertmer, 1999; Hew & Brush, 2007; Wells, 2007; Goktas et al., 2009). Table *17* identifies seven beneficial factors instructional designers, professional development providers, and teachers educators can use for designing quality technology professional development.

Table 17
Beneficial Design Factors for Quality Technology Professional Development

Beneficial Design Factor	**Description**
Relevant	Content, processes, and contextual factors are designed around technology tools and best practices as demonstrated at the global, national, state, and school level, promoting an instructional environment that impacts teaching practice and student learning.
Learning	Designers build upon teachers' previous knowledge by incorporating instructional content and activities that are situated in their contextual environment of practice.
Access	Engaging and participatory activities are included throughout the design to increase awareness of where to find technology tools, learning resources, and community support when transferring knowledge and skills to practice.
Reactions	Based on prior information gathering, designers incorporate various instructional strategies to address any negative attitudes and beliefs. In case any additional negative perceptions arise throughout the instruction, additional activities are designed and included, so the instructor can select and implement.
Interactions	Majority of design should incorporate independent work, but provides collaborative learning by doing activities as well, for modeling of expert instructor or teachers from the group to benefit teachers in lower levels of technology integration; also provides experts the opportunity to increase knowledge and skills through sharing with others.
Clear and Easy	Instruction, instructional materials, and instructional activities are designed to be easily understood by teachers in order to utilize their time efficiently and to keep negative reactions and attitudes at bay.
Instructor	Design should incorporate an expert instructor who can model and demonstrate best practices because teachers will replicate what they have learned. Designers assess availability of instructor, which guides the design, budget, and timeline. May need to develop instructor guide to ensure instructor is engaged with teachers and provides clear, easy, and timely feedback.

Implications for the field recommend that instructional designers incorporate relevant learning by doing activities that are structured to impact learners' perceptions of how their knowledge can be expanded by creating their own learning path in a situated contextual environment. While this study examined a specific TPDI designed for secondary education teachers at a high school in Michigan, the design of the TPDI incorporated factors that are rooted in constructivist design principles, making the implications of the findings from this study relevant to instructional design. These recommendations could be used to guide instructional designers when designing environments for other technology training and adoption initiatives for employees.

Limitations of the Study

The main limitation of this study is the lack of measurement of how teachers' knowledge and skills learned during the TPDI impacted student learning, which is the overall goal of any teacher professional development (Guskey & Sparks, 1996; Guskey, 2000; Schmidt et al., 2009). Other potential limitations of this study involve the population and sample size. The study was conducted at one school in Michigan with a sample size of five high school teachers making it difficult to generalize the results to a larger population, or classifying the TPDI as a best practice. The teachers who participated in this study volunteered to do so because of interest in learning Google Applications for online teaching.

No needs assessment of the teachers was conducted prior to designing the TPDI to provide detailed information about the learners, so the design was based off my ten years of experience designing, developing, and implementing technology PD in the K-12 environment. It is imperative to acknowledge that these experiences may create a

potential liability through biasing judgment regarding research design and analysis of findings. As discussed in Chapter 3, I aimed to provide safeguards for the study's reliability by keeping a researcher journal throughout the design and implementation of the TPDI, and throughout the data analysis, as well as having the TPDI evaluated by a panel of subject matter experts.

Questionnaires or survey's distributed to learners at the conclusion of an intervention cannot fully demonstrate the impact the instructional intervention had on their knowledge, skill, and practice at that given moment, because learners may return to a thought, concept, or idea shared in the instructional intervention at a later date (Lincoln, 2005). While this study did examine teacher's perception of the TPDI when they transferred it to practice, it was only for a three week time period. Teachers' perceptions could have changed after the three weeks allotted in this study.

At the beginning of Phase 2: Transferring, teachers didn't understand the purpose of the journal after they begin implementing their materials. They thought they were to journal about their experiences with implementing the Google Applications. I had to send various emails, set up meetings, record and demo the explanation that they were to reflect back on the TPDI and use the guided questions that were used in Phase 1, and provided to them each week via email throughout Phase 2. I had a bit of difficulty getting two of the teachers to complete their journal entries during this phase. One teacher wouldn't respond to my communications via email so I was unclear at times if she had planned to complete the journal entries as they were intended. Another teacher couldn't use the materials at the beginning of the school year because of class changes, which set me back 3 weeks in my data collection, until she was ready to implement the materials.

Recommendations

As noted throughout the chapters of this dissertation there are many other possibilities that could be implemented to expand on the findings from this study, as well as the design of the TPDI used throughout the study. Based on this study, I recommend future research in the following three areas, including the impact of: (1) implementing the recommended instructional strategies based on teachers' levels of technology integration and TPACK, (2) incorporating activity types into technology professional development for increasing teachers' level of technology integration and TPACK, and (3) using the entire Guskey and Sparks (1996) model for examining the impact of quality professional development on student learning. Following the recommendations for future research, I provide recommendations for how the design of the TPDI used for this study could be improved based on the findings from the study.

Future Research. As noted, it was determined that a detailed comparison between Phase 1 and Phase 2 for each teacher was not necessary for addressing the research questions for this study. This study could be expanded, and potentially contribute to instructional strategy selection literature based on teachers level of technology integration. First, select one of the levels of technology integration models (Hixon & Buckenmeyer, 2009; Holland, 2001; Moersch, 1995; Rieber & Welliver, 1989). Each model provides specific instructional strategies for each level that are suggested to be used when preparing a teacher at that lever for integrating technology into classroom practice. Next, complete a detailed comparison of the individual teachers' journals from both phases of the study, and examine if their reflections aligned with the descriptions characteristics recommended throughout the levels of technology integration literature.

Then hypothetically suggest which level they would fall into. Finally, interview the teachers with an instrument that addresses the "characteristics of technology integration stages" as outlined by Hixon and Buckenmeyer (2009, p.138) to assess if the teachers' interview responses align with the same level that you placed them in based on their journals. This would help the field to explore if these suggested instructional strategies based on teachers' level of technology integration are valid for transferring technology professional development knowledge and skills to teaching practice.

I believe that the guided teacher reflection journals were the best way to collect the data for this study, but recommend conducting interviews for collecting data during Phase 2. This may ensure that more timely appropriate data is collected, and make it less intrusive on teachers' time at the beginning of the school year when it is busy for them. However, finding time when both researcher and each of the teachers are available for interviews could be difficult to coordinate, again because of the hectic schedules at the start of the school year.

The teachers' learning during Phase 2 was captured, and I think enhanced, through the process of reflecting in the guided teacher reflection journal. The journal also served as a reference point for teachers to refer to in the future if they wanted to track or trace their growth throughout the various levels of technology integration over time. A researcher could use the journal to trace teachers' levels of technology integration or TPACK over time.

I did not use an instrument to assess the teachers' level of TPACK prior to or after the TPDI. Schmidt et al. (2009) suggest a survey that "is a reliable and valid instrument that will help educators design longitudinal studies to assess pre-service teachers'

development of TPACK" (p.123). I recommend researching if their survey instrument can be used to assess in-service teachers' development of TPACK.

Two methods for applying TPACK in technology PD interventions include, "learning technology by design" (Koehler & Mishra, 2005; Mishra & Koehler, 2003) and "activity types" (Harris & Hofer, 2011; Harris, Mishra, & Koehler, 2009). This study implemented various learning by doing activities, but as noted, did not have enough time to provide instruction or incorporate instructional activities utilizing activity types. I suggest implementing this TPDI again with a control and experimental group, and only provide instruction on "activity types" to the experimental group to see if the groups generated different results. Participant selection must strategically and carefully be utilized to ensure the two groups are as similar as possible.

The results from this study found one teacher that did not benefit from having the course during the summer. It would be interesting to identify which types of teachers prefer summer technology professional development and which prefer it throughout the year. Examining this could possibly allow professional development providers and teacher educators to utilize strained budgets by increasing the effectiveness of the technology PD by providing it to teachers when it is best for them. This could address questions such as, would summer PD: only impact those who are taking courses towards another degree? Or new teachers who are not fully prepared or seasoned at the *back to school* process? Or teachers that have to teach a new content area? Grade level? Does it really matter what time of year it is offered? Would the course be more beneficial for some teachers if the course was developed with all of the content available so the teacher could progress at their own pace independently? Could this be an option for the teacher at

the beginning of the TPDI, where teachers could respond to a statement similar to *Please review the course guide. Decide if you will be participating in this TPDI facilitated by an instructor, or if you will proceed through independently.* It might be a better use of some teachers' time, and help extend district budgets by providing instructional environments that teachers' find beneficial for them.

The final area that could impact this area of research is to utilize the Guskey & Sparks (1996) model to measure a TPDI on student learning. A researcher could utilize the findings from this study, since they aligned with other technology integration literature, and explore *if* and *how* the TPDI impacted student learning. For example, if using this TPDI, a pre and post instrument could be used to gather students' perceptions of their knowledge and skills of Google Applications, Michigan online learning graduation requirement, and ability to learn in the online environment.

Redesign of the TPDI. The school district where this study took place had not officially implemented Google Applications as their primary educational technology platform with their student body prior to the TPDI. Students received accounts for the first time at the beginning of the 2011-2012 school year; the same time the teachers from this study implemented their instruction they developed throughout the TPDI. If I were teaching this TPDI course again, I would create video scenarios, use cases, or sample problems that provided examples of when other teachers have encountered technology issues while teaching students. Teachers would complete and reflect on how they would address these issues. In this TPDI, teachers did not find much benefit from the other teachers' discussion responses, so I would have them present their case to the others in one of two ways: (1) in a synchronous environment using a tool like Skype, or (2) give

them the option to use video or audio recording. This activity would benefit the teachers in two ways. First, it would model and demonstrate best practices of how other teachers were able to overcome or handle with technology access issues when teaching. Second, it would give them more experience using the various communication tools and instructional delivery methods. It would be imperative to keep reminding teachers that a major technology network implementation for Google Applications is planned and is new to all teachers and students, so be prepared by having a plan of how they will handle and address these issues. Working closely with district administrators would also help solidify with teachers that they too had a plan in place for handling any technology issues, and could provide the teachers a sense of support as they integrated the new tools and online learning concepts into their teaching practice.

Another way to help increase teachers' preparedness to address technology issues is to have them practice with students. First, I would create a fake student user account for each of the teachers that have the same Google Application permissions that students will have at the beginning of the school year. This allows the teachers to practice accessing the materials from the student perspective to ensure that students have the correct access permissions, or that teachers have permissions on their instructional materials set correctly. I would also have teachers practice implementing their instructional materials before the start of the school year (as I discuss in the next paragraph that similar TPDI should be implemented at the beginning of the summer break) with a small group of students that are on their class rosters for the fall when they return to school. Piloting the instruction gives the teachers practice, and the students can become classroom student coaches who assist others students when technology issues

arise, so they can support and model for other students. Piloting would also provide more learning by doing activities that teachers found to be a beneficial factor for transferring their knowledge and skills to classroom practice. The firsthand experience of managing large quantities of electronic documents could help teachers create a document organizing taxonomy that works best for them.

I would start the TPDI at the beginning of teachers' summer break, two weeks after school dismissed for summer. Teachers benefitted from having their materials in place and ready to go for the school year. I would, however, extend the TPDI throughout the school year with monthly activities, which build upon teachers' knowledge and skills in a manner that is sensitive to their time availability. The teachers in this study repeatedly mentioned that having enough time and relevant content and activities were important factors for them. The activities the teachers would complete would be designed and implemented for their specific needs and could be completed within one month's time frame.

One way to include more relevant content and activities is to include instruction on activity types (Harris & Hofer, 2011; Harris, Mishra, & Koehler, 2009). Another approach to assist in technology integration is to provide teachers with specified "activity types" based on the content area they are teaching (Harris & Hofer, 2011; Harris, Mishra, & Koehler, 2009). "Learning activity types function as conceptual planning tools for teachers; they comprise a methodological shorthand that can be used to both build and describe plans for standards-based learning experiences" (Harris & Hofer, 2009, p. 101). The more activity types a teacher combines together the more engaging and effective the learning will be for students. It has been found that more time for planning (Ertmer,

1999; Goktas et al., 2009; Hew & Brush, 2007; Holland, 2001; McGrail, 2006) should be available to teachers when learning to implement a new technology, and research suggests that activity types can assist with better use of instructional planning time (Harris & Hofer, 2011). Activity types for each of the core learning subjects in the high school environment, social studies (Hofer & Harris, 2011), language arts (Young, Hofer, & Harris, 2011), math (Grandgenett, Harris, & Hofer, 2011), and science (Blanchard, Harris, & Hofer, 2011), have been outlined showing the specific activity type, description, and possible technologies to be used for teaching that activity with students. I had intended on including instruction and instructional activities in the TPDI on activity types, but the pace of the teachers completing the other course content and activities did not permit for it to be included. The information was provided in the *extra resources* area of the TPDI website for teachers to access, but none of them did because of limited time or relevant need at that specific time.

Conclusion

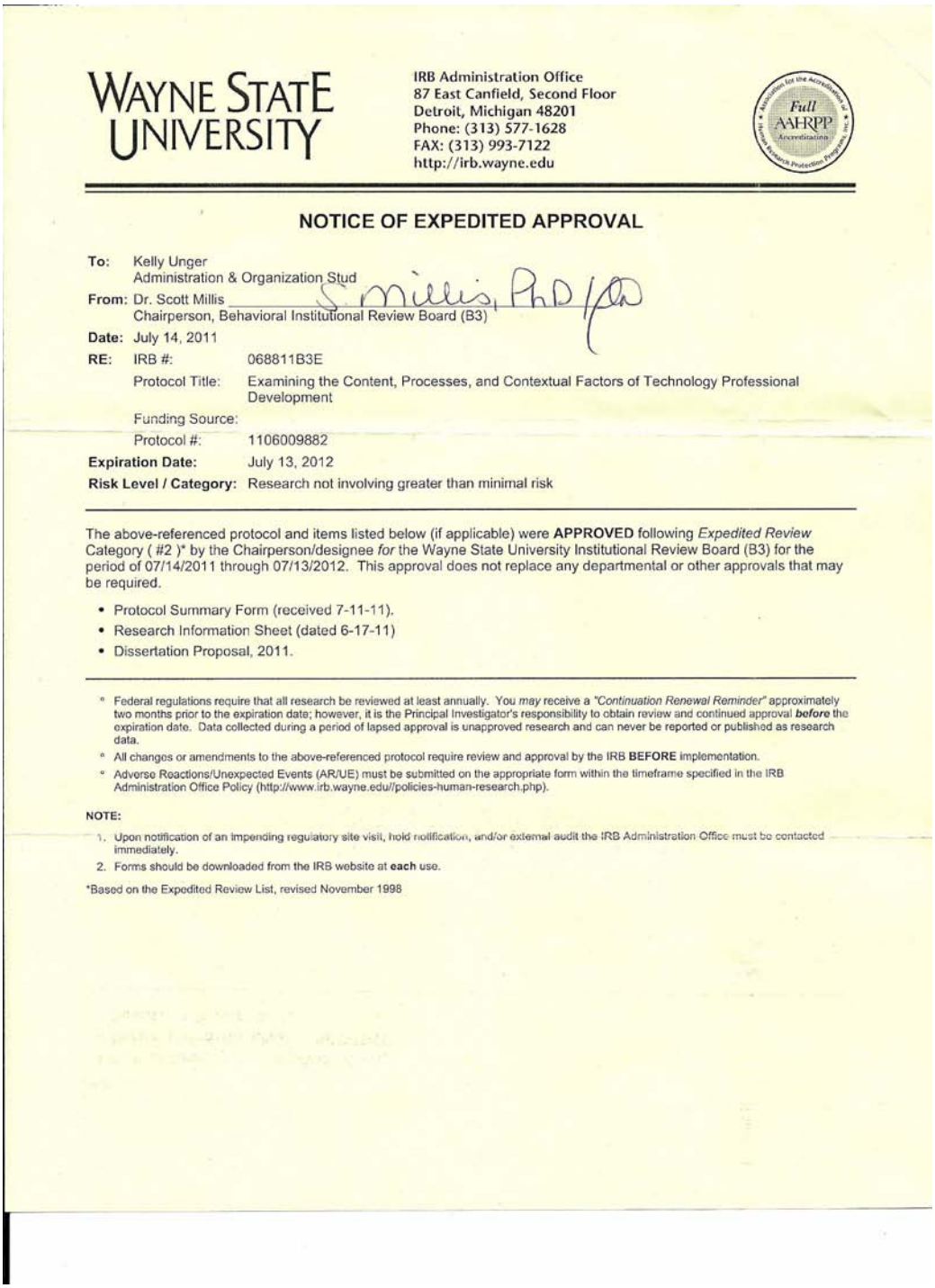
The purpose of this study was to examine which technology professional development factors teachers perceived as the most beneficial for impacting the quality of a TPDI. In summary, the perceptions from the teacher participants in this study determined that beneficial factors that should be included in the design of technology professional development, should:

- be relevant and practical to their teaching practice;
- provide access to resources beyond the conclusion of the TPDI, such as instructional how-to videos that demonstrate the technology tasks, and the instructor and content resource;

- enable flexibility to work in an independent environment that allows for working at their own pace with relaxed due dates for assignments; and
- contains easy, clear, and organized instructional messages for content delivery, instructor feedback, and instructions and requirements for assignments.

It is concluded that the technology integration and professional development literature align with the TPACK framework, which was used to successfully guide the design and implementation of the TPDI, used for this study. The theoretical perspectives of TPACK were beneficial for increasing the secondary education teachers' perspective of factors that impact the quality of technology professional development. It is recommended that further research be conducted to explore the other research areas described in this chapter.

APPENDIX A: WAYNE STATE UNIVERSITY INTERNAL REVIEW BOARD APPROVAL LETTER



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http://irb.wayne.edu

Full AAHRPP Accreditation

NOTICE OF EXPEDITED APPROVAL

To: Kelly Unger
Administration & Organization Stud

From: Dr. Scott Millis
Chairperson, Behavioral Institutional Review Board (B3)

Date: July 14, 2011

RE: IRB #: 068811B3E

Protocol Title: Examining the Content, Processes, and Contextual Factors of Technology Professional Development

Funding Source:

Protocol #: 1106009882

Expiration Date: July 13, 2012

Risk Level / Category: Research not involving greater than minimal risk

The above-referenced protocol and items listed below (if applicable) were **APPROVED** following *Expedited Review* Category (#2)* by the Chairperson/designee *for* the Wayne State University Institutional Review Board (B3) for the period of 07/14/2011 through 07/13/2012. This approval does not replace any departmental or other approvals that may be required.

- Protocol Summary Form (received 7-11-11).
- Research Information Sheet (dated 6-17-11)
- Dissertation Proposal, 2011.

° Federal regulations require that all research be reviewed at least annually. You *may* receive a *"Continuation Renewal Reminder"* approximately two months prior to the expiration date; however, it is the Principal Investigator's responsibility to obtain review and continued approval ***before*** the expiration date. Data collected during a period of lapsed approval is unapproved research and can never be reported or published as research data.

° All changes or amendments to the above-referenced protocol require review and approval by the IRB **BEFORE** implementation.

° Adverse Reactions/Unexpected Events (AR/UE) must be submitted on the appropriate form within the timeframe specified in the IRB Administration Office Policy (http://www.irb.wayne.edu//policies-human-research.php).

NOTE:

1. Upon notification of an impending regulatory site visit, hold notification, and/or external audit the IRB Administration Office must be contacted immediately.
2. Forms should be downloaded from the IRB website at **each** use.

*Based on the Expedited Review List, revised November 1998

APPENDIX B: THE COMPLETE INSTRUCTIONAL DESIGN DOCUMENT OF THE TPDI

Using Google Applications for Online Teaching

Instructional Design Document

Prepared by Kelly L. Unger

Design Overview

Course Overview

Throughout this course teachers will be introduced to online teaching in the K-12 environment. Teachers will explore the Michigan Online Learning Graduation Requirement, current teacher technology standards, and pedagogical issues through the use of scenarios, case studies, readings, and discussions. While the course content centers on teaching in the K-12 online environment, another overarching goal of the course is to prepare teachers to teach online using various Google Applications. Assignments throughout the course will be completed using these tools in expectations of preparing the teachers to use Google Applications to create and facilitate an online educational environment for their students.

This is a highly interactive course that introduces teachers to the practice of designing and facilitating effective online instruction. Teachers will create online course materials in Google Applications to be used with their students, while learning best practices for online teaching in the K-12 environment. The online instructional materials they will be creating for their students will be used in a blended learning environment. Students in their classes will be physically present, but the students will be completing some of the online activities in the classroom, in the computer lab, and at home. The course is completely web-based with most of the work being completed asynchronously. There will be some synchronous meetings between the instructor and teachers using text and video chat. Teachers will be provided ample opportunities to practice the information and skills covered in the lectures and readings, while increasing their knowledge and use of Google Applications through designing effective course materials to be used with their students.

Target Audience

The course is aimed at secondary education teachers who are interested in designing, developing, and delivering effective online instruction. This specific course offering is for four secondary education teachers in a high school in Michigan. Each of the four teachers is responsible for teaching one of the core subjects: Language Arts, Math, Science, Social Studies. According to No Child Left Behind (NCLB), all four teachers are highly qualified. All teachers have been teaching for six or less years with all of their teaching experience at the same school where the training is taking place. The teachers have volunteered to participate in course. None of the teachers have received training in online teaching. All teachers have little to no experience with the Google Applications being taught in this course. The K-12 Educational Technology Coordinator will also participate in the instruction in order to provide local administrative support throughout and following the instruction.

Instructional Goal

This course provides teachers with an introduction to designing and facilitating effective online instruction for the K-12 grade environment. It introduces online teaching, current teacher technology standards, and application of planning effective online instruction and materials for preparing their students for learning and working in the global economy of the 21st Century. Along with the online teaching course content, teachers will learn various Google Applications to assist in the implementation of online instruction with their students.

Course Objectives

Upon completion of this course teachers will be able to:

1. Discuss online teaching in the K-12 environment
2. Discuss current teacher technology standards
3. Design effective web-based instruction and materials using Google Applications
4. Facilitate effective online instruction with their students

Using Google Applications for Online Teaching

Week 1

Module 1: Course Introduction

Objective	After completing this module, teachers will be able to: • Explain the overall purpose of the course • Access the course website • Operate Skype for communication
Content	• Welcome Message • Course Guide: *Instructor Information, Course Description, Goals, and Objectives, Materials, Discussions, Course Project, Due Dates, Points, Tentative Schedule* • Skype job aid: *downloading, creating account, adding contact* • Lecture: Discuss Skype features
Materials	• Course Guide • Skype job aid • Fill-in-the-blank worksheet • Weekly Assignment Checklist
Strategy	Instructor will email the students a welcome message to the course on the first day of class; provide a link to the course website, a fill-in-the-blank worksheet, and a job aid for Skype one week prior to the course beginning. Instructor will ask the teachers to review the Course Guide, complete the

	fill-in-the-blank worksheet, and make notes regarding any questions or concerns which can be discussed during the meeting. Instructor will schedule a Skype session that is conducive to all teachers through the use of a Doodle Poll. Online synchronous meeting via Skype to ensure teachers can complete the listed objectives.
Assessment	1. Teachers' ability to download and create a Skype account will occur prior to the scheduled synchronous meeting by assessing if teachers were able to add the instructor to their Skype contact list. If the teacher has not added the instructor to their Skype contact list the instructor will contact the teacher prior to the schedule meeting to see if they need assistance. 2. During the synchronous Skype chat, the instructor will ask the teachers to share in the Skype text feature: • What is the purpose of the course 3. During the synchronous Skype chat, the instructor will review the responses to the fill-in-the-blank sheet including: • Initial discussion due dates are due by: • Responses to teacher responses are due by: • What colors are the course website? • When are assignments for the week due? • What is on pg. 150 in the textbook? • How many points are each weekly discussion worth? • If they have any clarifying questions about the course

Module 2: Creating and Sharing a Google Document

Objective	After completing this module, teachers will be able to: • Create a Google Document • Share a Google Document with one other person • Describe the purpose and requirements of the Teacher Reflection Journal
Content	• Textbook reading (37-55) with job aids on creating and sharing a Google Document • Instructor Video Lecture: o Highlight points from the text o Share previous experiences o Explain Teacher Journal o Explanation of Google Doc uses

Materials	• Textbook, pgs. 37-55 • Instructor video lecture • Teacher Reflection Journal Sample Questions • Google Document video: Google Docs in Plain English • Creating a Google Document Assessment Rubric
Strategy	Teachers will view a video of the instructor, located on the course website, explaining the purpose and requirements of the Teacher Reflection Journal, and discussing various Google Document concepts. A Teacher Reflection Journal Sample will be provided for teachers' review. Teachers will read and follow the instructions in the textbook to create and share a Google Document (their Teacher Reflection Journal) with the instructor. Instructor will provide a writing prompt, and teachers will respond in their Teacher Reflection Journal: • Describe the purpose of the Teacher Reflection Journal. • What are the requirements of the journal? Instructor will provide the assessment rubric.
Assessment	Using a rubric the instructor will: 1. Assess teachers' ability to create and share a Google Document once she has received an email notice that the teacher has shared a document with them. If an email notice does not arrive on or before the due date, the instructor will contact the teacher via email to inquire about their process of completing the task. 2. Assess teachers' understanding about the requirements of the teacher reflection journal by examining their completed journal entry which describes the purpose and requirements of the teacher reflection journal. Instructor will review their description and provide necessary feedback on the document, and will email the teacher from Google Documents notifying them that feedback was provided.

Module 3: Activity Types

Objective	After completing this module, teachers will be able to: • Describe the purpose of Activity Types
Content	• Instructor discussing activity types and the purpose and usefulness

	of them for designing technology integrated instructional activities
Materials	• Science, Language Arts, Math, and Social Studies activity type documents
Strategy	Instructor will share four activity types with the teachers through Google Documents. Teachers will be given five minutes to review the document related to their subject area.
Assessment	In Skype teachers will be asked to type the purpose of using activity types when designing technology integration activities.

Module 4: Google Groups

Objective	After completing this module, teachers will be able to: • Follow directions to access and navigate the course Google Group • Reply to a discussion post on a Google Group • Create a Google Group for the high school class of students they have selected to design effective online instructional materials for • Add members to a Google Group
Content	• Textbook reading (137-141) with job aids on Google Groups • Jing video demonstration of creating and using the Google Group
Materials	• Textbook, pgs. 137-141; 143-146 • Discussion Questions • Jing Demonstration • Creating a Google Group Assessment Rubric • Weekly Assignment Checklist
Strategy	Teachers will be instructed to access the Google Group for the course and respond to the Discussion Questions 1 & 2: 1. Write an entry that describes what you currently know about K-12 online teaching and learning. Here are some questions which can guide you: What does it look like? How is it done? Where is it done? What kinds of students take it? What kinds of courses are offered? 2. Last week we discussed that by the end of the course you will have created instructional materials you can use for teaching your students online. You were asked to think about which unit you would like to use for teaching your students online. Please describe, in as much detail as possible, about the topic you selected. Remember that the topic needs to be taught within the first month of the new school year. Teachers will read and reply to the other teachers' postings to begin

	building an online collaborative learning environment, and demonstrating the features of a discussion board. Teachers will read and follow the instructions in the textbook to create a Google Group for their class, and add the other teachers and instructor to their Group. Instructor will provide the assessment rubric.
Assessment	Using a rubric the instructor will: 1. Assess teachers' ability to access and reply to a discussion post in a Google Group by receiving an email with the teachers' responses to Discussion Questions 1 & 2. If an email notice does not arrive on or before the due date, the instructor will contact the teacher via email to inquire about their process of completing the task. 2. Assess teachers' ability to create and add members to a Google Group of their own. If an email notice does not arrive on or before the due date that the Group has been created, the instructor will contact the teacher via email to inquire about their process of completing the task. 3. Provide feedback on the teachers' postings.

Module 5: Perceptions and Myths of Online Learning

Objective	After completing this module, teachers will be able to: • Describe how their current perceptions about online learning compare and contrast with the truths provided in the article
Content	• Top 10 Myths article by North American Council for Online Learning discussing the top 10 myths and truths about virtual schooling.
Materials	• 10 Myths (article) • Discussion Question
Strategy	Teachers will be instructed to access and read the myths article, and respond to Discussion Question 3: 3. Based upon the 10 Myths reading, what did you learn that surprised you? Were there things you posted in Discussion Question 1 that were false (were any of them listed in the top 10 myths)? Were there things you posted in Question one that were accurate? Teachers will read and reply to the other teachers' postings to begin

	building an online collaborative learning environment, and demonstrating the features of a discussion board.
Assessment	Instructor will read and reply to the teachers' posts.

Week 2

Module 1: Online Learning Graduation Requirement in Michigan

Objective	After completing this module, teachers will be able to: • Indentify the three ways students can meet the online learning graduation requirement in Michigan
Content	• Complete online course • 20 hours in traditional classroom where 1 or 2 units are online • Technology infused online learning activities throughout the district curriculum
Materials	• Scenario 1: http://itlab2.coe.wayne.edu/it6230/michigan/Scenario1/index.html • Discussion Questions • Weekly Assignment Checklist
Strategy	Teachers will be instructed to view Scenario 1, and respond to Discussion Questions 1 & 2: 1. Describe some challenges that students, teachers, and the school might face in meeting each of the State's online learning graduation requirements: a. Complete an online course b. 20 hours in a traditional classroom where 1 or 2 units are online c. Technology infused online learning activities throughout the district curriculum 2. How is your school district currently supporting this requirement for the students? Were you made aware of the online learning requirement? If yes, how? Have you been mandated from your administration to teach any differently in order to assist students in meeting this online learning graduation requirement? Teachers will read and reply to the other teachers' postings to continue fostering a collaborative learning environment.
Assessment	Instructor will read and reply to the teachers' posts.

Module 2: Create Google Group Discussion Guidelines for Instructional Unit

Objective	After completing this module, teachers will be able to: • Create and post discussion/Google Group guidelines for students • Delete a post from the Google Group
Content	
Materials	• Jing video
Strategy	Teachers will create a Google Group post containing student guidelines for discussion posts that they will use with their students as part of the online instructional unit Teachers and instructor will provide feedback on posted guidelines. Teachers will be instructed to remove the feedback from the other teachers and instructor.
Assessment	Instructor will read and respond to the teachers posted guidelines.

Module 3: Soft Skills and Support for Online Learning

Objective	After completing this module, teachers will be able to: • Identify three soft skills students should possess to be successful in online learning • Describe three strategies to prepare students with soft skills for success in online learning • List three ways to support students in the online learning environment • Create a presentation using Google Presentation
Content	• Soft Skills: independent, self-motivated, self-regulated, self-directed, time management, interest in technology • Supports: technology based tutorials, email, telephone, study buddy, orientation for soft and technical skills, Internet searching strategies, school-based tutors • Textbook reading (47-55) with job aids on Google Presentations
Materials	• Scenario 2: http://itlab2.coe.wayne.edu/it6230/michigan/Scenario2/index.html • Scenario 3: http://itlab2.coe.wayne.edu/it6230/michigan/Scenario3/index.html • Text: 47-55 • Jing video • Discussion Questions • Creating a Google Presentation Assessment Rubric

	• Weekly Assignment Checklist
Strategy	Teachers will be instructed to view Scenarios 2 & 3, and respond to Discussion Questions 1 & & 2: 1. Do you feel that your students have these soft skills to be successful in online learning? Have you ever taken on online course? If so, do you agree that these soft skills are required to be successful in an online course? Are there any other skills that you would add? 2. What is the purpose of preparing students to learn in an online environment? Do you feel that it is necessary to do so? Why or why not? If you have taken an online course, please describe any strategies that were used by the instructor or school to prepare you for learning in the online environment. Teachers will read and reply to the other teachers' postings to continue fostering a collaborative learning environment. Teachers will be instructed to read and follow the instructions in the textbook to design a Google Presentation that discusses at least three strategies that students could use to develop independence, self-motivation, self-regulation, self-direction, time management, technology interest, and other soft skills, along with three ways they plan to support their students. They will be required to share the Google Presentation with the other teachers and the instructor in order to receive peer feedback. This Google Presentation will be something they include on their instructional website for their students as a way to prepare them with information about succeeding in an online course. Instructor will provide the assessment rubric.
Assessment	1. Instructor will read and reply to the teachers' posts. 2. Using a rubric the instructor will assess teachers' ability to create and share a Google Presentation once she has received an email notice that the teacher has shared a document with them. If an email notice does not arrive on or before the due date, the instructor will contact the teacher via email to inquire about their process of completing the task. The instructor will review the presentation to ensure that all of the main points were discussed and provide feedback.

Week 3

Module 1: Current Teacher Technology Standards

Objective	After completing this module, teachers will be able to: • List and describe the two new educational technology standards for Michigan teachers • List the five National Educational Technology Standards for Teachers (NETS-T) • Describe one main idea and concept in the 2010 National Educational Technology Plan

Content	• Instructor video will introduce the content for the module.
	• Updated Entry Level Standards for Michigan Teachers:
	  • Successfully complete and reflect upon collaborative online learning experiences;
	  • Demonstrate an understanding of and the ability to create an online learning experience and demonstrate continued growth in technology operations and concepts, including strategies for teaching and learning in an online environment.
	  • University programs providing the Educational Technology (NP) Endorsement needed to teach teachers:
	  o Online Technology Experience and Skills
	  o Online Course Design
	  o Online Course Delivery
	  • NETS-T
	  o Facilitate and Inspire Student Learning and Creativity
	  o Design and Develop Digital-Age Learning Experiences and Assessments
	  o Model Digital-Age Work and Learning
	  o Promote and Model Digital Citizenship and Responsibility
	  o Engage in Professional Growth and Leadership
	  • 2010 Educational Technology Plan
	  o The United States Department of Education's Office of Educational Technology released the National Educational Technology Plan for 2010, and many of its goals center on incorporating the Internet in daily educational tasks (US Department of Education, 2010). The premise of this plan is to foster an environment that supports online learning and collaboration among students and teachers in order to assist in preparing future leaders to engage in a global economy.

Materials	• Standards for the Preparation of Teachers: Educational Technology (1-3; 21-38) • Text: NETS-T, 367-368 • 2010 National Educational Technology Plan • Instructor Video Lecture • Discussion Questions • Weekly Assignment Checklist

Strategy	Teachers will be instructed to read and review Standards for the Preparation of Teachers: Educational Technology (1-3; 21-38) and Text: NETS-T, 367-368, and will respond to Discussion Questions 1 & 2: 1. Describe the two new educational technology standards for Michigan teachers. Were you aware of these two new standards? If so, how were you informed? Describe your current abilities to meet these two standards. Describe how you were prepared (either formally or informally) to meet these two standards. 2. List the five NETS-T. Which of these do you already employ in your teaching? How? Do you feel that these standards are important for teachers? Were you aware that these standards existed before this week? If so, how? Has anyone ever evaluated you on these five standards? Should teachers be evaluated on these standards? If evaluated on these standards, and teachers were unable to demonstrate the associated skills, what should the school district do? Anything? Teachers will be instructed to read various sections of the 2010 Educational Technology Plan; each teacher will be assigned a specific section of the document. The instructor will create and share a Google Document with the teachers and each teacher will be required to summarize their assigned section in the Google Document. The instructor will provide writing prompts and each teacher will have to read and respond to each of the writing prompts for each assigned section.
Assessment	1. Instructor will read and reply to the teachers' posts. 2. The instructor will review each of the teachers' writings in the Google Document to ensure that all of the main points were discussed and provide feedback.

Module 2: Create Google Document for Instructional Unit

Objective	After completing this module, teachers will be able to: • Create and share a Google Document that they will use with their students as part of the online instructional unit. • Use the comment feature in Google Documents
Content	Instructor reminds teachers that this document can be an informational document shared with the students or a document that students will work on collaboratively.
Materials	• Jing video of using the comment feature

Strategy	Teachers will create a Google Document that they will use with their students as part of the online instructional unit and will share it with the rest of the teachers and instructor. Teachers and instructor will provide feedback on this document using the comment feature
Assessment	Instructor will read and respond to the teachers documents using the comment feature

Module 3: Create a Google Site

Objective	After completing this module, teachers will be able to: • Create a website using Google Sites
Content	• Textbook reading (181-192) with job aids on Google Sites • Job aids providing updated steps and information that are slightly different from the textbook publishing; tips from the instructor
Materials	• Text: 181-192 • Google Site Job Aid • http://sites.google.com/site/mflynchsites/home • Creating a Google Site Assessment Rubric • Weekly Assignment Checklist
Strategy	Teachers will read the textbook readings about Google Sites and will use the provided website tutorial and job aids for creating a Google Site for their online instructional unit. They will share the Google Site with the other teachers and the instructor. Instructor will provide the assessment rubric so teachers can ensure that they have included all of the items necessary for success on meeting the objective.
Assessment	Using a rubric the instructor will assess if the teacher was able to complete all of the items listed on the rubric. If the instructor does not receive an email containing the website address of the teacher's site on or before the due date, the instructor will contact the teacher to inquire about the process of completing the task.

Week 4

Module 1: Create and Share a Google Calendar

Objective	After completing this module, teachers will be able to: • Create and share a Google Calendar
Content	• Textbook reading (125-135) with job aids on Google Calendar

Materials	• Text: 125-135 • Creating a Google Calendar Assessment Rubric • Weekly Assignment Checklist
Strategy	Teachers will read the textbook readings about Google Calendar. They will embed the Google Calendar onto their Google Site. Teachers will post important school dates on the calendar. They will also post assignments and due dates on the calendar for the month of September. (Teachers may need to change some of these dates at the end of the course) Instructor will provide the assessment rubric so teachers can ensure that they have included all of the items necessary for success on meeting the objective.
Assessment	Using a rubric the instructor will assess if the teacher was able to complete all of the items listed on the rubric. If the instructor does not receive an email stating that the teacher's calendar was shared on or before the due date, the instructor will contact the teacher to inquire about the process of completing the task.

Module 2: Create a Google Forms

Objective	After completing this module, teachers will be able to: • Create and share a Google Form via email • View the data collected from a Google Form • Indentify three strategies to reduce online cheating
Content	• Textbook reading (71-76) with job aids on Google Forms • Introduction to Google Forms: http://www.youtube.com/watch?v=IzgaUOW6GIs • Sample for assessment purposes: https://sites.google.com/site/technologyinteaching123/tech-assessment#TOC-Google-Forms-Assessment • Scenario of student who cheats in an online course • Article discusses information about cheating and suggests strategies teachers can use to reduce the opportunity for students to cheat
Materials	• Text: 71-76 • Scenario • Cheating in an online assessment • Discussion Questions • Creating a Google Form Assessment Rubric

Strategy	Teachers will be instructed to watch the scenario, read the article, and respond to Discussion Question 1: 1. In the scenario the student feels like his last resort in order to pass the class is to cheat, mainly because he fell behind on his coursework. What can you do as a teacher to keep students on task with their work when they have this much freedom in an independent environment? The article discusses three ways that students cheat online. Are these ways different from how cheating could occur in a face-to-face class? Do you feel that it would be easier to cheat online or in the traditional classroom? Identify three strategies you can use to reduce online cheating. Teachers will read the text on Google Forms, watch the assigned video, and review the sample, in order to create a Google Form that they will use as part of their online instructional unit. Teachers will be required to email their Form to the other teachers and the instructor in order for them to complete it. Instructor will provide the assessment rubric so teachers can ensure that they have included all of the items necessary for success on meeting the objective. Teachers will be instructed to complete Discussion Question 2: 2. Now that you have created and shared a Google Form, and have received responses and were able to view the data, list 5 ways in which you can use Google Forms as a teacher. Teachers will embed the Google Form on their Google Site.
Assessment	1. Instructor will read and reply to the teachers' posts. 2. Using a rubric the instructor will assess if the teacher was able to complete all of the items listed on the rubric. If the instructor does not receive an email stating that the teacher's calendar was shared on or before the due date, the instructor will contact the teacher to inquire about the process of completing the task.

Module 3: Online Teaching Pedagogical Issues

Objective	After completing this module, teachers will be able to: • Describe two strategies for providing substantive individualized feedback to students on writing assignments in the online environment • Describe two ways students can demonstrate computations in an online environment • Describe two strategies for increasing interaction in an online environment • Describe two strategies for improving students writing in an online environment
Content	• The Michigan Online Teaching Case Studies are Michigan-focused case studies using teachers from Michigan Virtual School and pedagogical issues they faced. Each case study provides a rationale for the pedagogical issue, a description of the strategies and/or materials utilized by the teacher to overcome the issue (with links and samples), and finally a discussion of the online pedagogical issue within the literature.
Materials	• Michigan Online Teaching Case Studies • Instructor Video Lecture • Discussion Questions • Weekly Assignment Checklist
Strategy	Teachers will be instructed to read the case studies and respond to Discussion Questions 1-6: 1. Describe at least two strategies for how a teacher can provide substantive feedback in an online environment? 2. Describe at least two ways a mathematics teacher can have their students show computations when submitting their work online? Do you feel that one of these ways is more superior to the others? 3. Describe at least two strategies and/or tools a teacher can use to increase online student-student, student-instructor, and student-to-content interaction? 4. Describe at least two strategies can a virtual school teacher utilize for increasing students' science literacy when teaching in a virtual school environment? 5. Describe at least two possible factors could affect the successfulness of implementing these same strategies in a different subject area? Different age level? Different students?

	6. In your opinion describe how, if at all, do new technology tools for delivering the content interfere with student learning?
Assessment	Instructor will read and reply to the teachers' posts.

Week 5

Module 1: Final Online Unit Creation

Objective	After completing this module, teachers will have used their knowledge and skills from the semester to compile and alter any of the materials they created during the semester for the online instructional unit for their students.
Content	
Materials	• Creating an Online Unit Assessment Rubric • Weekly Assignment Checklist
Strategy	Instructor will provide the assessment rubric so teachers can ensure that they have included all of the items necessary for success on meeting the objective. Teachers will work independently during this week on creating their altering current, or creating any new materials necessary for their online instructional unit. The instructor will be available upon teachers' request, and will also post daily reminders and tips on the Google Group to assist students with completing their projects.
Assessment	Using a rubric the instructor will assess if the teacher was able to complete all of the items listed on the rubric. Feedback will be provided to the teachers in order for them to make any adjustments before presenting to the other teachers, instructor, and administrators at the school.

Module 2: Final Online Unit Presentation

Objective	After receiving feedback from the instructor, the teachers will be giving 30 minutes to present their online instructional unit to the other teachers who took the course, the instructor, and building level administrators. The purpose of this presentation is for the teachers to have their instruction peer-reviewed prior to implementing the unit with their students.
Content	
Materials	• Presenting an Online Unit Assessment Rubric • Peer review feedback form
Strategy	Instructor will provide the assessment rubric so teachers can ensure that they have included all of the items necessary for success on meeting the

	objective. The peer review feedback form will be completed orally by the attendees; however their comments will also be documented in a Google Document and shared with the teacher who presented. The comments will be documented by one of the other teachers.
Assessment	Using a rubric the instructor will assess if the teacher was able to complete all of the items listed on the rubric. Feedback will be provided to the teachers on their presentation. Feedback will also be provided to each teacher through the use of the peer review feedback form.

APPENDIX C: APPROVAL FROM MATTAWAN CONSOLIDATED SCHOOL DISTRICT TO CONDUCT THE STUDY AT THE MATTAWAN CONSOLIDATED SCHOOL

Mattawan Consolidated School
Fifty-Six Seven Twenty Murray Street
Mattawan, Michigan 49071-9543
269-668-3361
Fax: 269-668-2372
www.mattawanschools.org

April 13th, 2011

Kelly L. Unger, Ph.D Candidate
Instructional Technology Department
College of Education
5425 Gullen Hall
Education Bldg-Room 355
Detroit, MI 48202

Dear Ms. Unger,

I am writing to offer the support of Mattawan Consolidated Schools to your research proposal entitled "*Examining the factors of technology professional development and the impact on secondary education teachers' TPCAK for online learning*." We have been working towards more efficient professional development for increasing the use of technology in instruction several years now, and are pleased that you want to work with some of our high school teachers. We are also pleased that your professional development intervention provides a pedagogical approach to integrating technology into the curriculum and assists teachers in meeting the two Entry-Level Standards for Michigan teachers that were implemented in 2008.

We understand that this proposal requires the support and cooperation of Mattawan Consolidated Schools in several ways. This includes: 1) the identification of 4 high school teachers that will participate in the technology professional development intervention; and 2) the collection of data from the teachers at these schools at various points in time throughout the intervention. We are willing to cooperate with this project as long as our policies and rules are followed and our expectations in a number of areas are met. This includes the following:

- That teacher burden is reduced to a minimum
- That the results of the research be shared with us on an on-going basis and in a timely fashion
- That the study design/protocol be reviewed and approved by the IRBs at Wayne State University

We look forward to working with you on the unique and worthwhile project. Best wishes for a successful proposal.

Sincerely yours,

APPENDIX D: RESEARCH INFORMATION SHEET

Title of Study: Examining the content, process, and contextual factors of technology professional development

Principal Investigator (PI): Kelly L. Unger
Administrative and Organizational Studies
717-649-8545

Purpose:
You are being asked to be in a research study of examining professional development factors because you volunteered to participate in an instructional technology intervention on online teaching. This study is being conducted at Wayne State University.

Study Procedures:
If you take part in the study, you will be asked to

- Actively participate in a 5 week online instructional course by completing:
  - Readings
  - Discussions posts
  - Instructional materials to be used in your teaching
- Document weekly in an online journal about your thoughts of the content, processes, and contextual factors used throughout the instruction
- Teach one instructional unit in the online environment in September 2011
- Document weekly in an online journal about your thoughts of the content, processes, and contextual factors after implementing the knowledge and skills learned during the instruction with your students.

Benefits:

- The possible benefits to you for taking part in this research study are increasing your knowledge and skills for online teaching and Google Applications, and the possibility of receiving up to 4 SB-CEUs.

Risks

- There are no known risks at this time to participation in this study.

Costs

- There will be no costs to you for participation in this research study.

Compensation

- You will not be paid for taking part in this study.

Confidentiality:

- You will be identified in the research records by a code name.

Voluntary Participation /Withdrawal:
Taking part in this study is voluntary. You may choose not to take part in this study, or if you decide to take part, you can change your mind later and withdraw from the study. You are free to not answer any questions or withdraw at any time. Your decision will not change any present or future relationships with Wayne State University or its affiliates.

Questions:

If you have any questions about this study now or in the future, you may contact Kelly Unger at the following phone number 717-649-8545. If you have questions or concerns about your rights as a research participant, the Chair of the Human Investigation Committee can be contacted at (313) 577-1628. If you are unable to contact the research staff, or if you want to talk to someone other than the research staff, you may also call (313) 577-1628 to ask questions or voice concerns or complaints.

Participation:
By completing the 5 week instructional course and the instructional activities required throughout you are agreeing to participate in this study.

APPENDIX E: THE COMPLETE COURSE GUIDE/SYLLABUS FOR THE TPDI

Using Google Applications for Online Teaching

Professional Development Intervention for Secondary Education Teachers

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Course Name: Fundamentals of Instructional System Design
Course Location: Web-based: https://sites.google.com/a/mattawanschools.org/pd-onlineteaching/
Instructor Information: Kelly L. Unger
E-mail: kunger@mattawanschools.org; klu728@gmail.com;
Skype Conferencing: patomi08

Course Description:
Throughout this course teachers will be introduced to online teaching in the K-12 environment. Teachers will explore the Michigan Online Learning Graduation Requirement, current teacher technology standards, and pedagogical issues through the use of scenarios, case studies, readings, and discussions. While the course content centers on teaching in the K-12 online environment, another overarching goal of the course is to prepare teachers to teach online using various Google Applications. Assignments throughout the course will be completed using these tools in expectations of preparing the teachers to use Google Applications to create and facilitate an online educational environment for their students.

This is a highly interactive course that introduces teachers to the practice of designing and facilitating effective online instruction. Teachers will create online course materials in Google Applications to be used with their students, while learning best practices for online teaching in the K-12 environment. The online instructional materials created for their students will be used in a blended learning environment. Students in their classes will be physically present, but the students will be completing some of the online activities in the classroom, in the computer lab, and at home. This course is completely web-based with most of the work being completed asynchronously. There will be some synchronous meetings between the instructor and teachers using text and video chat. Teachers will be provided ample opportunities to practice the information and skills

covered in the lectures and readings, while increasing their knowledge and use of Google Applications through designing effective course materials to be used with their students.

Course Goal:
This course provides teachers with an introduction to designing and facilitating effective online instruction for the K-12 grade environment. It introduces online teaching, current teacher technology standards, and application of planning effective online instruction and materials for preparing their students for learning and working in the global economy of the 21st Century. Along with the online teaching course content, teachers will learn various Google Applications to assist in the implementation of online instruction with their students.

Course Objectives:
Upon completion of this course teachers will be able to:

1. Discuss online teaching in the K-12 environment
2. Discuss current teacher technology standards
3. Design web-based instruction and materials using Google Applications
4. Facilitate online instruction with their students

Required Text:
Lerman, J., & Hicks, R. (2010). *Retool your school: The educator's essential guide to Google's free power apps.* USA: International Society for Technology in Education. (ISBN 978-1-56484-267-1)

Online Course Content:

- Supporting K-12 Online Learning in Michigan: http://itlab2.coe.wayne.edu/it6230/michigan/index.html

- Michigan Online Teaching Case Studies: http://itlab2.coe.wayne.edu/it6230/casestudies/index.html

Course Site: https://sites.google.com/a/mattawanschools.org/pd-onlineteaching/
All course instructional and administrative material will be posted on:
Including:

- Course Guide
- Weekly Readings
- Weekly Lectures
- Assignments
- Announcements

Course Group: Class discussions will take place on the Google Group that was established for the course: https://groups.google.com/a/mattawanschools.org/group/pd-onlineteaching-ug/topics

Ustream Channel: http://www.ustream.tv/channel/pd-online-teaching

1. **Attendance**: Weekly participation via the web is required and is crucial for success in this course. If you are unable to participate in the weekly activities, notify the instructor as soon as possible prior to the absence to make arrangements for completing the requirements.

   Discussion Guidelines: The guidelines for every discussion week are the same. You will be required to post one initial posting to each of the questions, and at least one response to one initial posting of another student in the class. Your initial postings must be completed by Friday at 11:59PM. Your response to one other students' initial posting must be completed by Sunday at 5:00pm.

   For example, Week 1 starts Monday, July 11th, your initial responses to each of the questions must be posted by Friday, July 15th at 11:59pm, and your response to at least one other student's initial posting must be posted by Sunday, July 16th at 5:00pm. Instructor responses will follow as responses are posted.

   Meaningful breadth and depth of your response is expected and will only benefit your growth as a teacher, which further impacts your students. Example of acceptable response is available at the end of the document.

2. **Online Unit:** Throughout this course teachers will be designing and developing, from scratch, online instructional materials for teaching an instructional unit at the beginning of the 2011-2012 school year. By the end of week two, teachers will have decided upon the topic and will begin building an online instructional unit throughout the course. Therefore, consider the following when selecting the topic:
   - Best grade level to begin online teaching.
   - A unit taught at the beginning of the school year, and can be completed with your students before October 1.
   - The length of the unit.

3. Assignments: All other assignments besides the discussion questions are due by Sunday at 5pm.

Course Assignments, Due Dates and Point Value

Assignment	Due Date	Points
Create and share teacher reflection journal in Google Documents		10
Create and add members to a Google Group		10
Create and share Google Presentation		30
Create and share Google Site		50
Create and embed Google Calendar		10
Create and embed Google Form		20
Weekly Discussions		60
Final Online Unit		75
Presentation		35

Course Point Ranges and Value

300 – 290	4 SBECU's
289 – 280	3 SBECU's
279 – 270	2 SBECU's
269 – 260	1 SBECU's
259 - 250	.5 SBECU's

Course Schedule

Week	Date	Topics	Required Readings	Assignments
1		• Course Introduction • Google Documents *Synchronous Skype Meeting – to be determined among group*	• Course Guide • Google Docs in Plain English (video) • Text: Google Documents, 37-55	• Teacher Reflection Journal (*share with instructor only*)
		• Google Groups • Current perceptions of online learning • Activity Types	• Text: Groups, 137-141, 143-146 • Ten Myths (article) • Science, Language Arts, Math, and Social Studies activity type documents	• Discussion Questions • Create a Google Group
2		• Online learning graduation requirement in Michigan	• Supporting K-12 Online Learning in Michigan Scenario #1	• Discussion Questions • Create Google Group Discussion Post Guidelines for Students
		• Soft skills for online learning • Supporting the online student • Google Presentation	• Supporting K-12 Online Learning in Michigan Scenario #2 • Supporting K-12 Online Learning in Michigan Scenario #3 • Text: Presentations, 47-55	• Discussion Questions • Soft skills strategy presentation
3		• Teacher Technology Standards	• Standards for the Preparation of Teachers: Educational Technology (1-3; 21-38) • Text: NETS-T, 367-368 • 2010 National Educational Technology Plan, each student will be assigned specific sections	• Discussion Questions • Create Google Document to be used with Students
		• Google Sites	• Text: 181-192	• Create Google Site
4		• Google Calendar	• Text: 125-135	• Create Google Calendar

		• Google Forms	• Text: 71-76 • Cheating Scenario • Cheating in an online assessment	• Create Google Form • Discussion Questions
		• Online Teaching Pedagogical Issues o Providing Substantive Feedback o Showing Computations o Increasing Interaction o Using Reading and Writing	• Michigan Online Teaching Case Studies	• Discussion Questions
5		Final Unit Work Week		
		Online Instructional Unit Presentations		

EXAMPLE OF ACCEPTABLE RESPONSE:

I decided to look at Cloud Computing. Cloud Computing is the use of a number of computers to process and store information. The Cloud's storage and processing resources are distributed to a number of computers. The Cloud can usually be accessed over the Internet, so a stable connection is a must. This type of computing can be preferable for people who need to collaborate on information generation and those who want their content to be accessible from a number of locations.

I have used cloud computing a bit during my college career. In my undergraduate studies, I used Google Groups to form a group to collaborate on a project, I've been using Gmail since they opened it to the public, and I've used Google Apps to compose some papers.

For an example of instructors and learners using this technology, we need look no further than this class. We have made use of Google Groups and Google Apps in this class for collaboration and sharing.

I decided to look at TeacherTube. TeacherTube is a site that hosts videos intended to be used by teachers or homeschoolers. It has a YouTube style structure, where any user can create an account and upload videos to the site.

My project could perhaps make use of Cloud Computing by uploading videos to TeacherTube or YouTube prior to the instruction. The videos could be viewed during the instruction to assist learning. After the instructions, the learners could access the videos

if they feel they need to.

APPENDIX F: SME EVALUATION INSTRUMENT AND APPROVALS FROM AUTHORS

Using Google Applications for Online Teaching

Please evaluate the instructional design of the professional development intervention using the 4 categories below as a guide.

- **Categories A, B, and C are to evaluate the Instructional Design file.**
- **Category D is to provide an overall feedback.**

There are questions in each category. You can respond to each individual question or compose one response that touches on each of the questions for that category. Feel free to use more space in between each response if needed. You can simply type your response on this document, save the file, and return it to me in email as an attachment.

A. Instructional Attributes – Instructional Design

1. Are the ***objectives*** for each section clear?
2. Does the instruction provide ***motivation*** *and* ***context*** *for learning*?
3. Are the ***instructional strategies*** appropriate for this ***target audience***?
4. Is the instruction ***organized***?
5. Are there enough ***examples*** included?
6. Is there enough time for participant ***practice*** included?
7. Is there ample opportunity for participants to provide ***feedback***?
8. If you do not want to respond to the individual questions above, please use this space to provide your overall thoughts related to the **instructional** attributes that are bolded and italicized above.

B. Language Attributes – Instructional Design

1. Is the ***language consistent*** throughout the document?
2. Are the instructions easily ***understandable***?
3. Is the language ***appropriate*** for the participants?
4. If you do not want to respond to the individual questions above, please use this space to provide your overall thoughts related to the **language** attributes that are bolded and italicized above.

C. Subject Matter Attributes – Instructional Design

1. Does the ***content have value*** for the participants?
2. Can the content be ***integrated*** into participants' instruction and student learning?
3. Is the content area ***recent, or up-to-date***?
4. If you do not want to respond to the individual questions above, please use this space to provide your overall thoughts related to the **subject matter** attributes that are bolded and italicized above.

D. Additional Comments

1. Please indicate any ***direct changes*** you feel should be made?
2. Please provide ***additional comments*** that will help support and guide my revisions to the instruction and the manual.

Permission to Modify and Use Instrument

Greetings,

I am a PhD Candidate at Wayne State University and am working on my dissertation for completing my degree in Instructional Technology. I have designed a technology professional development intervention for teachers. In order to increase the validity of my instructional design I am having it evaluated by 5 subject matter experts. I write today to seek your permission to use a modified version of the instrument from:

McAlpine, L., & Weston, C.(1994). The attributes of instructional materials. Performance Improvement Quarterly, 7(1), 19-30.

I will not use the exact instrument, but instead modified slightly and my version is attached. The 5 SMEs will use this modified version to evaluate the instructional design document for my intervention.
Thank you in advance for your consideration.
Kelly L. Unger

Hello Kelly,
I'm pleased to know that the tool we developed some years ago will be of some use in your research. I did not find your version of the instrument attached to your message, and I would like to see it. Could you send a copy?
I am copying this message to Dr. Lynn McAlpine, as I think it is important to get permission of the first author of the article. If she agrees, then you also have my permission to use a modified version of it as long as you include a reference to source from which you have adapted it (our article as cited in your message).
Thank you and I wish you success with your research.
Cynthia Weston
Director, Teaching and Learning Services
Professor, Department of Educational and Counseling Psychology
MS-12 McLennan Library Building
McGill University
3459 McTavish Street
Montreal, Quebec
H3A 1Y1
514-398-6648

Hi, Entering into the discussion at this point! Sorry if I didn't reply sooner but it's because I tend to do my emails in a group at the end of the week rather than on a day-to-day basis. I agree with

Cynthia how nice it is nice to hear that the instrument might be of use to you. Cynthia's suggestion as to how to proceed makes sense to me. All the best with your research, L

APPENDIX G: RESEARCHER'S JOURNAL

Information for Modification to Instruction

May 9, 2011

- Items I need to include in the Instruction:
  - TPACK definition
  - Activity Types
    - Both of these should be included at the beginning of the course, but activity types could be re-emphasized at the end of the course during weeks 9 and 10.
  - Barriers and strategies

May 14, 2011

- When analyzing the teachers' reflection journals I'll want to be sure to look at their perceptions and tie this to first and second order barriers:
  - "Although second-order barriers may not be readily observed, their presence often can be noted in the reasons teachers give for being frustrated by first-order barriers"
  - "thus, by examining teachers' reasons for feeling frustrated, we can begin to understand how their goals for technology use, as well as their beliefs about the role of technology in the curriculum, may shape perceptions of, and responses to, first-order barriers" (Ertmer, 1999, p. 53)

May 18, 2011

- Secondary Education Teacher
  - Recommended that No Changes were necessary
- Curriculum Administrator
  - Comment: What I would like to see as an additional focus is : "How does this relate to the newly adopted core curriculum standards?"
    - The Core Curriculum Standards center on the curriculum being aligned with college and work expectations. This instruction will in turn provide students opportunities for learning in the online environment which are skills needed for college and working experiences in the 21st Century.
    - Michigan teachers will not begin instruction on the Core Curriculum Standards until Fall 2012. Michigan schools will be prepared to integrate the Core Curriculum standards through training from their local ISD.
    - http://www.michigan.gov/mde/0,1607,7-140-37818-238722--,00.html
- Technology Integrator
  - Design Document
    - Made minor grammatical changes
    - Recommended to include more explanation of the teachers creating actual instructional materials throughout the course.

- While I knew this as the designer that this was included, it was not evident to the reviewer.
    - Changes were made: See May 19th where I addressed this issue.

Instructional Designer

Course Guide

Addressed first-second person language issue

Move discussion example to the end of document in order to avoid flow of document.

Consistent language for purpose of the course: introductory skills not solid foundation

Grammatical changes

Bold, Capped, underlined words were removed because they appear aggressive and can turn off adult learners

Negative words such as “unacceptable” were removed because they may appear demeaning to adult learners

Changed weighted point value because they were not evenly distributed. Increased value of points for online discussion

Removed “tentative” phrasing from the course schedule because in an online learning environment this can become frustrating for adults who have made plans around the activities listed. Can be aggravating for learners if the requirements change.

Design Document

Provided more detail in the course overview about the learning environment

Removed “discuss” from objectives

Moved Materials from in between Obj. and Content to between Content and Strategies to provide a better flow.

Recommended changing the capitalization of the Google Applications, but I decided to keep them capped because they are the names of specific tools.

Week 1 - Module 1

- Create Fill-in-Blank sheet to make first meeting more of dialogue instead of instructor just talking
- Changed the assessment wording
- Changed objective - Discuss to Explain; Use to Operate

Week 1 - Module 2

- Remove word “Please” just give the instruction

Week 2 - Module 1

- Add more detail to Create Google Group objective to explain in detail who the teachers are creating the Google Group for.
- Removed Instructor video lecture as it was not needed; don’t add tasks that they won’t be held accountable for; replaced with Jing recorded demonstration
- Shortened words in the discussion question to make it straight to the point.

Week 2 - Module 2

- Reworded objective to show compare
- Consistency with “Discussion Question X” and be sure to keep it worded that way throughout

Week 3 - Module 1

- Discuss to Identify

Week 4 - Module 1

- Removed “the” and “need” from first objective to make it more acceptable and open instead of a definite statement.
- Reworded objectives to make them more measurable
- Changed Presentation assessment item to better reflect the changes made to the objectives.

Week 5 - Module 1

- Changed Discuss in the objectives to List and describe
- Changed discussion questions because they were confusing. So they were reworded, and shortened to get to the point to measure the objectives and not to ask teachers to make a judgement.

Week 7 - Module 2

- Changed third objective..it was worded incorrectly
- Discussion questions were made more clear and to the point to measure the objectives.

Week 8 - Module 1

- Changed discuss in the objectives to “describe two”
- Changed discussion questions to reflect changes made to the objectives.

Overall

Included the word “effective” instead of just designing and facilitation online instruction, because we want the instruction to be effective.

Needed to be more specific that the online instructional materials that the teachers will be creating will be used in a blended approach. I added this material under the course overview

Need to include more engaging and motivating activities

Need to provide more clear descriptions of the assignments:

- This will be done when the rubrics for each assignment are created.

May 19, 2011

- Two of the reviewers stated that it wasn’t clear enough in the Design Document that they were creating materials to be used in their actual classrooms.
  - I’ve added a 2nd Module to Week 3 where teachers create a Google Group Guidelines for their class.
  - I’ve added a 2nd Module fo Week 5 where teachers create and share a Google Document that they will use with their class.
  - I went back into the other modules and added text to clearly state that the teachers will be creating materials to be used for their class.
- Weeks 9 & 10 were originally combined weeks, but I now split them.
  - Week 9 will give teachers one week to finish altering or creating any new materials to be used in their instructional unit.
  - Week 10 will be when teachers will present their online instructional unit to the others and principal in order to receive feedback. The intent of this is to give teachers another opportunity to alter their materials before they begin using them with students.

- Activity type activity module was added to the Week 1 material
- K-12 Educational Technology Coordinated was invited and accepted to participate in the instruction. The purpose of this was for him to be a local administrator and technical support contact for the teachers during and after the instruction.

APPENDIX H: THE GUIDED QUESTIONS PROVIDED TO TEACHERS IN PARTICIPATING AND TRANSFERRING PHASES OF THE STUDY.

Sample Reflection Journal Questions Used in Participating Phase

Your online teacher reflection journal is a place for you to document and reflect on your thoughts throughout the TPDI. You have free reign to use this journal to document any thoughts, successes, failures, and reactions regarding the intervention and your learning throughout the PD.

As you know **two of the goals** of this study are to:

> (1) Gather data to analyze your perceptions of the ***content, processes, and contextual factors*** that were used throughout the TPDI in order to provide a discussion to other PD providers about which ***content, processes, and contextual factors*** you found beneficial, or that you found hindered your learning of Google Applications for online teaching.

After various instructional activities throughout the TPDI, I will send you an email reminder to reflect in your journal about that recent activity. Here is a sample questions I may send regarding the content, processes, and contextual factors:

- Content
  - Was the content relevant to your professional responsibilities? Please describe.
  - Did the content make sense to you? Please describe.
  - Do you feel you will be able to apply the content in your teaching practice? Please describe.
  - Did the content enhance your understanding of this content? Please describe.
  - Was the content presented difficult to understand? Please describe.
- Processes
  - Was “learning by doing” a helpful strategy for learning the content? Please describe.
  - Were the instructional activities carefully planned and organized? Please describe.
  - Was using various documented “activity types” in your planning of a lesson assist your learning of the content? Please describe.
  - Do you feel that the discussion question activities between you, the instructor, and the other students were beneficial to your learning? Please describe.
- Context
  - Were the instructional settings conducive to learning? Please describe.
  - Were the technology tools that were used for facilitating the instruction conducive to learning? Please describe.
  - Please describe any similar learning experiences that you have had in this same environment. How did this experience compare?

- How could the learning environment for this instructional activity been enhanced? Please describe.

(2) Gather data to analyze your perceptions of perceptions of the ***content, processes, and contextual factors*** of the PD intervention after ***transferring*** the knowledge and skills taught during the TPDI to ***actual practice***?

After the TPDI, when you are applying the knowledge and skills taught in the PD to your teaching practice with your students, I will send you an email reminder to reflect in your journal about that recent activity. The questions I send to assist with your reflection will be similar to the questions above.

Reflection Journal Questions Used in Transferring Phase

Purpose of the Teacher Reflection Journal

• Location for you to reflect on your learning and a reference point to refer back to as you implement your online instructional materials.
• Gather data to analyze your perceptions of the ***content, processes, and contextual factors*** that were used throughout the technology PD intervention that you found most beneficial, or that you found hindered your learning of Google Applications for online teaching, now that you are implementing the materials you created with your students.

Please use the following questions and statements as a guide as you reflect and journal about this week's instruction. Remember, that these questions and statements are simply a guide to help focus your reflection.

Content:

The content covered this week included:

- **Google Documents: Creating and Sharing**
- **Google Groups: Replying; Editing Membership; Creating; Adding Members**
- **Myths about virtual schools**
- **Michigan Online Learning Graduation Requirement**
- **Creating Student Guidelines for Online Discussion Boards**
- **Soft Skills and Support Students Need for Online Learning**
- **Google Presentations**
- **Technology Standards for Michigan Teachers**
- **National Educational Technology Standards for Teachers**
- **2010 National Educational Technology Plan**
- **Comment Feature in Google Documents**
- **Creating a Google Site**
- **Creating Pages for a Google Site**
- **Google Calendar**
- **Google Forms**

- **Online Cheating**
- **Online Assessment**
- **Online Teaching Pedagogical Issues**
- **Extra Resources: Activity Types, Skype in the Classroom**

- Was the content relevant to your professional responsibilities? Please describe.
- Did the content make sense to you? Please describe.
- Do you feel you will be able to apply the content in your teaching practice? Please describe.
- Did the content enhance your understanding and/or knowledge? Please describe.
- Was the content presented difficult to understand? Please describe.

Processes

The processes, or instructional activities and methods used to deliver the content this week included:

- **Online synchronous Skype meeting to discuss questions about the course**
- **Textbook readings**
- **Article readings**
- **Screen capture videos of technology tasks/Video tutorials**
- **Discussion questions – post; replying**
- **Assignments/Activities creating and using the Google Applications you learned about; learning by doing**
- **Video of instructor discussing this upcoming week's activities**
- **Video Scenarios**

- **Email reflection from the instructor about your performance for the week**
- **Collaboration Document**
- **Case Studies from online teachers**
- **Discussion questions – post; replying**

- Was "learning by doing" a helpful strategy for learning the content? Please describe.
- Were the instructional activities carefully planned and organized? Please describe.
- Was there an instructional activity or method that you preferred over the others? Please describe.
- Do you feel that the discussion question activities between you, the instructor, and the other students were beneficial to your learning? Please describe.

Context

This week you participated in:

- **A Synchronous (real-time) meeting with the instructor and other students**
- **Asynchronous learning activities that you completed independently**
- **Flexibility of completing assignments; you had the choice to stick with following the original assignment due dates, or extended dates**
  If applicable, synchronous learning meetings with the instructor
- **Asynchronous video of the instructor discussing this week's activities**
- **Synchronous learning meeting with instructor to discuss the requirements for the week**

- Were the instructional settings conducive to learning? Did you prefer one over the other? Please describe.
- Were the technology tools that were used for facilitating the instruction conducive to learning? Please describe.
- Please describe any similar learning experiences that you have had in this same environment. How did this experience compare?

How could the learning environment for this instructional activity been enhanced? Please describe.

APPENDIX I: A SAMPLE OF RAW DATA TABLE

Code	ID	W#	Turn#	Data	Notes
	KU	1	1	Please use the following questions and statements as a guide as you reflect and journal about this week's instruction. Remember, that these questions and statements are simply a guide to help focus your reflection. Content: The content covered this week included: o Google Documents: Creating and Sharing o Google Groups: Replying; Editing Membership; Creating; Adding Members o Myths about virtual schools o Was the content relevant to your professional responsibilities? Please describe. o Did the content make sense to you? Please describe. o Do you feel you will be able to apply the content in your teaching practice? Please describe. o Did the content enhance your understanding and/or knowledge? Please describe. o Was the content presented difficult to understand? Please describe. Processes The processes, or instructional activities and methods used to deliver the content this week included: o Online synchronous Skype meeting to discuss questions about the course o Textbook readings o Article readings o Screen capture videos of technology tasks o Discussion questions – post; replying o Assignments/Activities creating and using the Google Applications (Documents/Groups) you learned about; learning by doing o Was "learning by doing" a helpful strategy for learning the content? Please describe. o Were the instructional activities carefully planned and organized? Please describe. o Was there an instructional activity or method that you preferred over the others? Please describe. o Do you feel that the discussion question activities between you, the instructor, and the other students were beneficial to your learning? Please describe. Context This week you participated in: o A Synchronous (real-time) meeting with the instructor and other students o Asynchronous learning activities that you completed independently o Were the instructional settings conducive to learning? Did you prefer one over the other? Please describe. o Were the technology tools that were used for facilitating the instruction conducive to learning? Please describe. o Please describe any similar learning experiences that you have had in this same environment. How did this experience compare? o How could the learning environment for this instructional activity been enhanced? Please describe.	

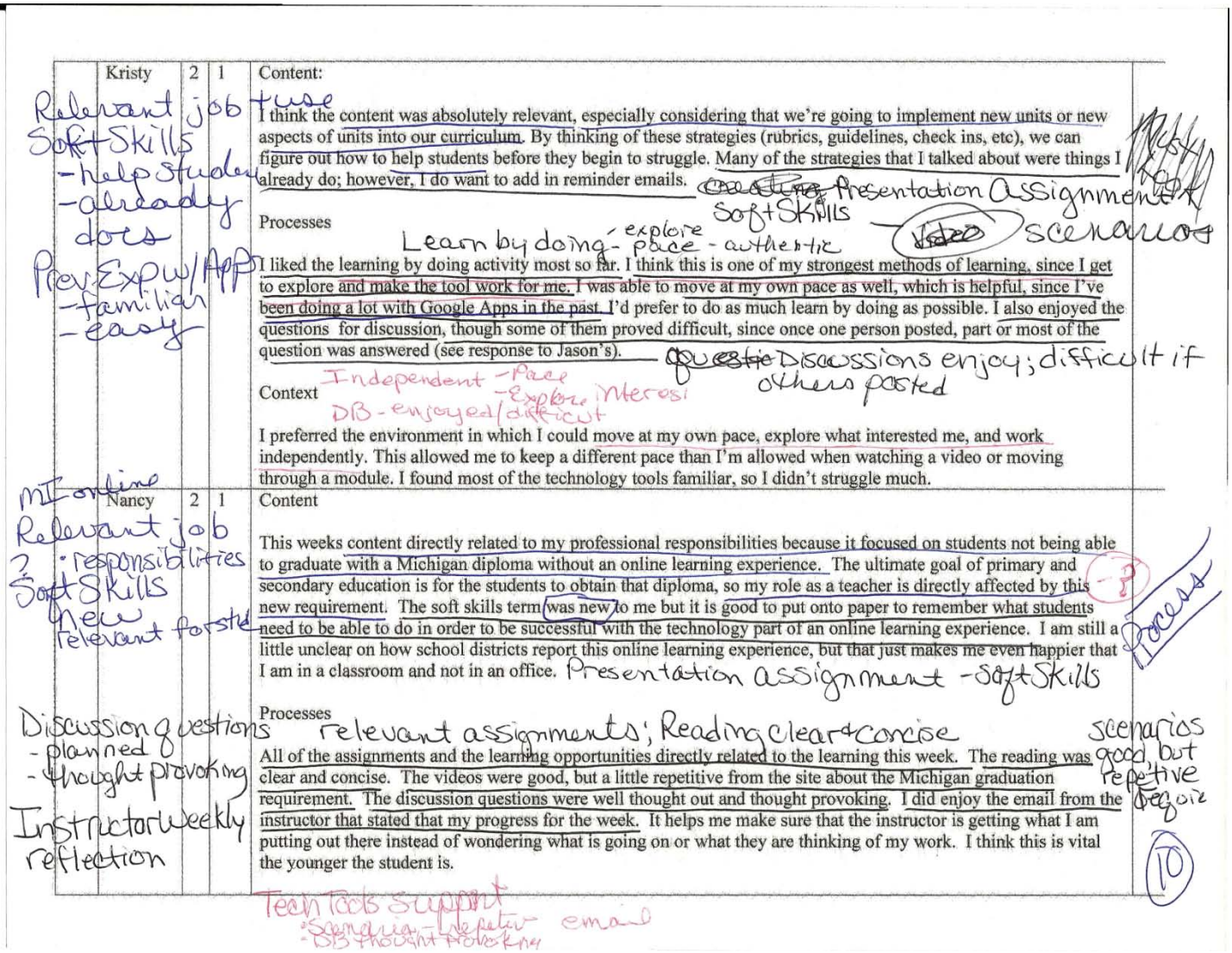
Code	ID	W#	Turn#	Data	Notes
	Brenda	1	1	Was the content relevant to your professional responsibilities? Please describe. Yes. The content was very relevant as MHS promoted the use of Google docs during the past year. I used it briefly, but there were some technical issues with student log ins. I think those have been resolved. I teach a course called Technical Communications. It started out years ago as a Microsoft Applications course, but has gone through a metamorphosis. I feel a responsibility to introduce the students to Google apps so that they can use them throughout their high school career. Although I had some initial access issues this week, I am now through that (I hope) and I am getting more comfortable with docs and groups. So, this week was great and extremely applicable to my job. Did the content make sense to you? Yes. I was not sure however, if I was really supposed to respond to the posts of other class members as that was not on the check list. Also, upon the completion of this journal, I am assuming that I met all of the requirements for this week. If I did not, please let me know. I think this is one of my concerns …. feeling insecure that I am not understanding the requirements of the class. I checked everything on the check list … so hopefully, I'm understanding and grasping expectations. Do you feel you will be able to apply the content in your teaching practice? Please describe. I think that I mostly answered this above. However, I do think that developing on-line units will take time. It requires a higher level of detail than delivering a lesson in a traditional class setting. As a result, developing units will be a systemic process of feedback and revision. Did the content enhance your understanding and/knowledge. Please describe. Yes. Definitely. I think I made the biggest gains in my comfort level with Google docs and Google groups. I am looking forward to the spreadsheets and presentations as I have never accessed or worked in those applications. Was the content presented difficult to understand? No. Of course, I was frustrated with the initial log in issues, but the content itself was easy to comprehend. I also like the book. I read the opening chapter about how Google transformed a low performing school and that was interesting and inspirational as well. The videos you made were helpful. (I am wondering what screen capture and audio software you used. I also wonder if it is available for the Mac. Also, how did you link to the videos and did you run into size requirements as videos can be large?) Processes Thanks for starting this class off with Skype. I really need to experience that. Also, I think it gave me more confidence to approach you when I struggled with log in issues. I like the checklist approach and I think that I will use it with my unit. If I'm honest, I still feel a bit insecure that I have not turned something in. Videos and book - great. Journal Reflection - This assignment was fine but sometimes I felt as if some questions were asking the same thing. Hope this wraps up the week. Thank you.	

Code	ID	W#	Turn#	Data	Notes
	Jason	1	1	Wow this google stuff is pretty amazing. Even for an old guy like me! :-) I watched your google groups tutorial once and went through the process without a problem at all. No wonder Google is making so much money! I say this because this was the one that was giving me the most anxiety as I hadn't ever done anything with google groups so of course I saved it for last. I love google docs and have had much experience with them and the groups were just as easy, easier than I thought. Most definitely the assignments that we worked on this week are very relevant to be a productive teacher. First from a perspective of how we communicate with each other as teachers, but also from a perspective of broadening that and communicating with our students on a new level. I am really looking forward to this as I see my job as developing as many ways as possible to reach my students to help them learn. I know that this will be another effective tool that I put in my "tool box"! Regarding processes I love having the book as a standby hard copy resource that I can access, but for me your tutorials are far more effective - most definitely I am a visual learner and will use those as my standard to understand how to do tasks. I found your tutorial excellent and easy to follow! I also love the discussion board and the free exchange of ideas that it brings - I think as colleagues we tend to encourage each other where your role is more to provoke thought regarding our posts and I especially appreciated your comment doing that with my post regarding online learning myths! I also enjoyed the skype meeting that we had to open up our class - I felt like it demonstrated the power of collaborating and actually hearing all of the voices. I don't mind independent learning learning on my own so I really liked the modules and lessons that you had planned and found them very effective!! By the way Kelly I am just going to use this as a running journal throughout the class so I just have one document that I can review and reflect on at the end! Hope that was your intent! :-)	
	Julie	1	1	Last week I was able to set up a group. It was simple to do, especially after the book and video helps. I had already used google docs to share documents with classes last year, but like the idea of setting up a group better. I am still not sure if it will be any easier to set up, but it seems like it will be easier to keep documents organized. I also like the discussion boards. I am looking forward to setting one up and having my students use it. While being at a ChemEd conference all week, my mind was reeling with ideas for using google apps!	
. . .					

APPENDIX J: A SAMPLE OF INDIVIDUAL PARTICIPANT DATA TABLE

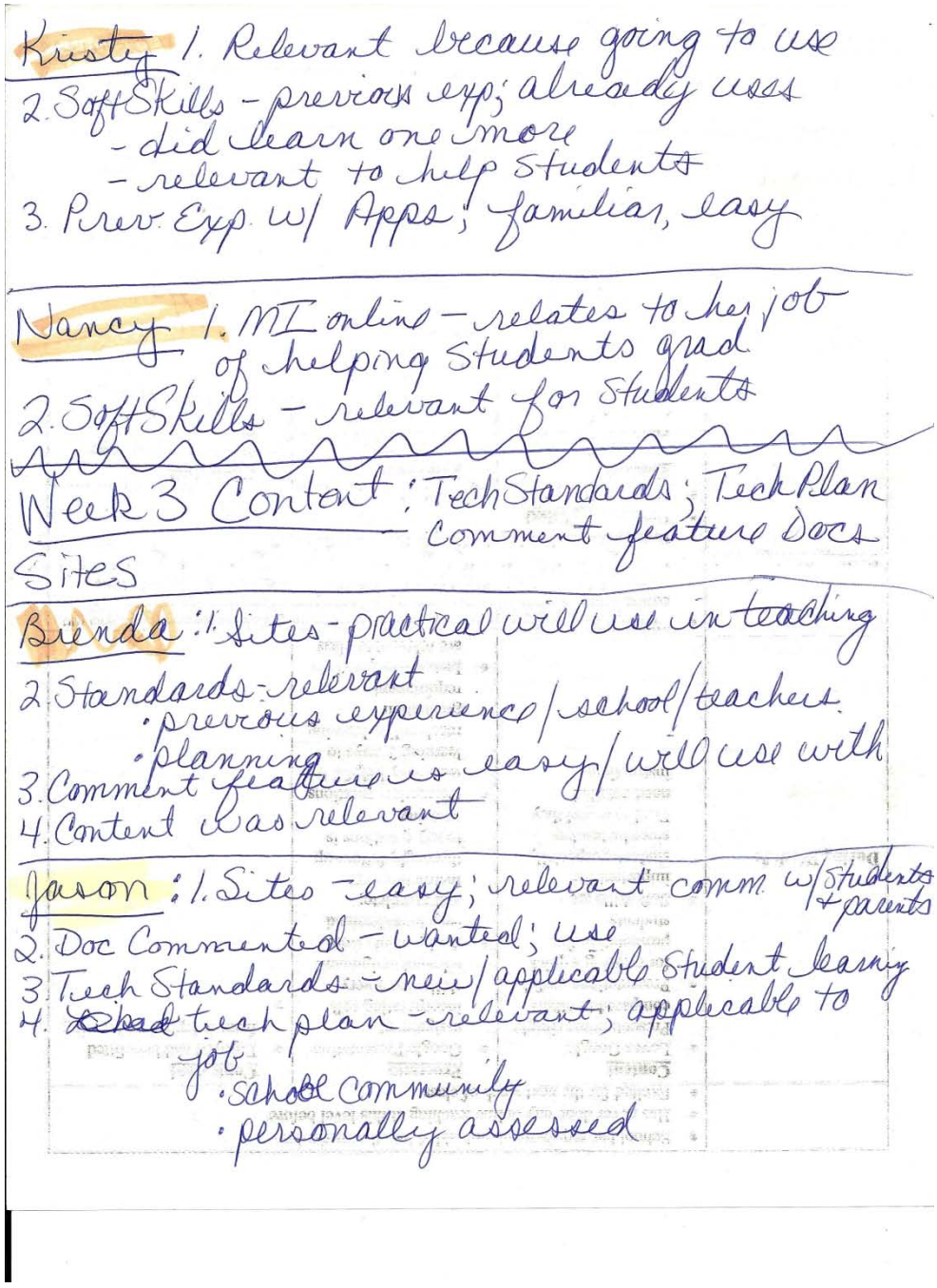
Participant	Nancy		
Demo	1. Teacher for 12 years, all at the school 2. BA in History, minors in social studies and communications. 3. MA in Teaching and Learning 4. Age: 34 5. Teach: Civics and Law 6. Grade Level 10-12		
Feelings/Background	• The more teachers learn about technology and how it can be used in the classroom will help abolish myths. • "teachers have to learn that students, parents, and community members also have to be educated on the advances and techniques that technology can provide." • States that students learn technology by demonstration and then practicing • States that she is academically and intrinsically motivated, and sees many students who are not mature enough to handle responsibility of online learning		
During Week 1:	**Content** • Documents and Groups were relevant because "Students, teachers, parents, and community members can see documents that have been created and worked on by a group of students or collaborators in the school community." • Security settings for Groups was relevant to protect the identity and work of her students • Will use the content in her classroom and student government group • Myth article was relevant • Documents and Groups are relevant for communicating with students she doesn't see on a daily basis	**Processes** • Myths article stimulated thinking which teachers fall victim to the myths • Likes and learns best through learning by doing • Learns technology best by demonstration and practice • Frustrated by Skype meeting because of waiting for everyone to get acquainted	**Contextual** • Prefers working at own pace because her time is limited
Feelings/Background	•		
During Week 2:	**Content** • Michigan online learning content was relevant because it impacts students graduating; and her role as a teacher • Soft Skills content was new and beneficial	**Processes** • Presentation assignment was beneficial for learning the soft skills • All assignments and materials directly impacted the instruction • Readings were clear and concise • MI online learning videos were good, but repetitive • Discussion questions were well thought out and thought provoking • Benefited from the personalized weekly instructor email which provided a sense that the instructor was reviewing her work; feels this is vital for a younger student. • Enjoyed the instructor video reflection from week 1 providing a recap and what to expect upcoming week • Weekly email with due dates was beneficial and handy for easy access	**Contextual** • Asynchronous communication via text and video from the instructor were beneficial

APPENDIX K: A SAMPLE OF SEGMENTED RAW DATA TABLE BY CONTENT, PROCESSES, CONTEXTUAL FACTORS



	Kristy	2	1	Content: I think the content was absolutely relevant, especially considering that we're going to implement new units or new aspects of units into our curriculum. By thinking of these strategies (rubrics, guidelines, check ins, etc), we can figure out how to help students before they begin to struggle. Many of the strategies that I talked about were things I already do; however, I do want to add in reminder emails. Processes I liked the learning by doing activity most so far. I think this is one of my strongest methods of learning, since I get to explore and make the tool work for me. I was able to move at my own pace as well, which is helpful, since I've been doing a lot with Google Apps in the past. I'd prefer to do as much learn by doing as possible. I also enjoyed the questions for discussion, though some of them proved difficult, since once one person posted, part or most of the question was answered (see response to Jason's). Context I preferred the environment in which I could move at my own pace, explore what interested me, and work independently. This allowed me to keep a different pace than I'm allowed when watching a video or moving through a module. I found most of the technology tools familiar, so I didn't struggle much.
	Nancy	2	1	Content This weeks content directly related to my professional responsibilities because it focused on students not being able to graduate with a Michigan diploma without an online learning experience. The ultimate goal of primary and secondary education is for the students to obtain that diploma, so my role as a teacher is directly affected by this new requirement. The soft skills term was new to me but it is good to put onto paper to remember what students need to be able to do in order to be successful with the technology part of an online learning experience. I am still a little unclear on how school districts report this online learning experience, but that just makes me even happier that I am in a classroom and not in an office. Processes All of the assignments and the learning opportunities directly related to the learning this week. The reading was clear and concise. The videos were good, but a little repetitive from the site about the Michigan graduation requirement. The discussion questions were well thought out and thought provoking. I did enjoy the email from the instructor that stated that my progress for the week. It helps me make sure that the instructor is getting what I am putting out there instead of wondering what is going on or what they are thinking of my work. I think this is vital the younger the student is.

APPENDIX L: A SAMPLE DOCUMENT GENERATED FROM THE CONSTANT COMPARISONS COMPLETED DURING STEP 2: CHUNKING THE RAW DATA



Kristy 1. Relevant because going to use
2. SoftSkills - previous exp; already uses
- did learn one more
- relevant to help Students
3. Prev. Exp. w/ Apps; familiar, easy

Nancy 1. MI online - relates to her job of helping Students grad
2. SoftSkills - relevant for Students

Week 3 Content: TechStandards; TechPlan
Comment feature Docs
Sites

Brenda: 1. Sites - practical will use in teaching
2. Standards - relevant
• previous experience / school / teacher
• planning
3. Comment feature is easy / will use with
4. Content was relevant

Jason: 1. Sites - easy; relevant comm w/ Students + parents
2. Doc Commented - wanted; use
3. Tech Standards - new / applicable Student learning
4. ~~Sched~~ tech plan - relevant; applicable to job
• School community
• personally assessed

APPENDIX M: A SAMPLE CLARIFICATION DOCUMENT

As I qualitative researcher I want to make sure I don't interpret your journal entries inappropriately. Can you please take a few minutes to clarify what you mean by the following? You can place your responses below each in a different color font. Thank you!

- **You entered this statement during week 1.**
  - "Most definitely the assignments that we worked on this week are very relevant to be a productive teacher. First from a perspective of how we communicate with each other as teachers, but also from a perspective of broadening that and communicating with our students on a new level. I am really looking forward to this as I see my job as developing as many ways as possible to reach my students to help them learn. I know that this will be another effective tool that I put in my "tool box"!
  - **The content covered during week 1 included:**
    - **Google Documents: Creating and Sharing**
    - **Google Groups: Replying; Editing Membership; Creating; Adding Members**
    - **Myths about virtual schools**
  - **Can you please clarify:** In this entry where you discuss this being another effective tool in your tool box, were you speaking of ALL of the content listed above? Or were there specific ones? Or were you referencing Google Applications in general? Or were you referencing online teaching? Or all of these things? Or none of them?
    I was referring to Google Aps as singular rather than plural. As in "I know that Google Aps will be another effective tool that I put in my tool box". So to answer your question I was referring to all of the topics we covered in that week!

- **You entered this statement during week 3.**
  - "I really had not been aware of any technology standards before this unit and the activities really helped me understand each of their importance to student learning. Also I enjoyed the reading that I was assigned on the National Standards article. Confirming in some respects and challenging in others.

    - **Can you please clarify:** "Confirming and challenging" what?
      Confirming in respect to what we do as a **school** already that are in those standards and challenging for me **personally** as to how far I have to go with my technology learning to be up to snuff with those standards. I think our school and many of our instructors were so far ahead of me in the use of technology, which is why I

used the word challenging. (As I read through them now I am so much more confident that I can be a tech leader in my school, not a tech follower!) I know you can't use that, but wanted you to know how much better I feel as a result of your class. :-)

APPENDIX N: EMERGING THEMES FROM INDIVIDUAL PARTICIPANTS DATA

TABLE BY FACTORS

ELECTRONIC VERSION OF MERGED THEME FILE

During Week 1:	**Content**
	• Documents and Myths
	  o Relevant to job
	  o Previous Experience
	  ▪ used it in teaching last year (Docs)
	  ▪ Sees it amongst staff and parents because the school supports one-to-one (Myths)
	• Excited about Groups, but doesn't see the difference from Blogs which is what she already uses- Not Practical

During Week 2:	**Content**
	• Relevant to job
	  o implementing into their curriculum
	  o student learning
	  o Soft skills, MI Online Learning Requirement, Guidelines
	  o Presentation content least relevant
	• Previous Experience with Apps
	  o Familiar
	• Easy

During Week 3:	**Content**
	• Technology standards relevant to job
	  o Expectations
	  o student technology fluency
	• Frustrated with Sites
	  o Not Practical - experience with Word press (another tool) that did the same things as Sites; feels that it is redundant to learn/use another tool
	• Comment feature in Docs is relevant and she will use it with students

During Week 4:	**Content**
	• Google Apps: Previous experience; not new; review
	• Extra Resources
	  o Has tried Skype before in the classroom, but is going to give it another try this year
	• Online cheating and assessment
	  o Relevant/good topics to cover
	  o Not New
	  o Not Practical/Won't use
	• Sites is frustrating because she already uses a tool that does the same thing/Not Practical
	• Previously denounced the tool

During Week 5:	**Content**
	• Doesn't like;
	  o Spent previous time last year with Google Apps and decided Sites was not the program she wanted to use
	  o limiting in its features/not flexible
	  o Not Practical
	  o Too Easy/Basic
	• Sites has also made her life harder because of double site monitoring and maintenance

Kristy
5

During Week 1:	**Content**
	• Documents and Myths
	  ○ Relevant to job
	  ○ Previous Experience
	  ▪ used it in teaching last year (Docs)
	  ▪ Sees it amongst staff and parents because the school supports one-to-one (Myths)
	• Excited about Groups, but doesn't see the difference from Blogs which is what she already uses- Not Practical

During Week 2:	**Content**
	• Relevant to job
	  ○ implementing into their curriculum
	  ○ student learning
	  ○ Soft skills, MI Online Learning Requirement, Guidelines
	  ○ Presentation content least relevant
	• Previous Experience with Apps
	  ○ Familiar
	• Easy

During Week 3:	**Content**
	• Technology standards relevant to job
	  ○ Expectations
	  ○ student technology fluency
	• Frustrated with Sites
	  ○ Not Practical - experience with Wordpress (another tool) that did the same things as Sites; feels that it is redundant to learn/use another tool
	• Comment feature in Docs is relevant and she will use it with students

During Week 4:	**Content**
	• Google Apps: Previous experience; not new; review
	• Extra Resources
	  ○ Has tried Skype before in the classroom, but is going to give it another try this year
	• Online cheating and assessment
	  ○ Relevant/good topics to cover
	  ○ Not New
	  ○ Not Practical/Won't use
	• Sites is frustrating because she already uses a tool that does the same thing/Not Practical
	• Previously denounced the tool

During Week 5:	**Content**
	• Doesn't like;
	  ○ Spent previous time last year with Google Apps and decided Sites was not the program she wanted to use
	  ○ limiting in its features/not flexible
	  ○ Not Practical
	  ○ Too Easy/Basic
	• Sites has also made her life harder because of double site monitoring and maintenance

Relevant - 𝍸 I

PE - 𝍸 III

Dislike 𝍸

Not Practical - 𝍸

Review/NotNew - 𝍸 I

New - II

Retread

TP - III
S - III
T - II
P - I

(1)

Rel - 𝍸 I

PE - 𝍸 II

Dis - 𝍸

NP - 𝍸

Rev - IIII

N - II

TP - III
S - III
T - II
P - I

(2) Final

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ABSTRACT

EXAMINING THE FACTORS OF A TECHNOLOGY PROFESSIONAL DEVELOPMENT INTERVENTION

by

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May 2012

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Major: Instructional Technology

Degree: Doctor of Philosophy

In response to the ever increasing demand to compete in a global economy, the United States needs to prepare its students with the appropriate technical knowledge and communication skills to be competitive in the 21st century (Watson, 2007). Students must begin utilizing current technology tools during their K-12 educational experience and online learning can assist students with developing these skills. Teachers with online technology skills and equipped with effective pedagogical strategies for teaching in an online environment are the keys to achieving this goal. To ensure teachers are keeping pace with changing teaching and learning environments, and effectively utilizing new technologies, teacher technology professional development (PD) is a major initiative throughout K-12 education (Lawless & Pellegrino, 2007). In turn, it is the responsibility of school districts to prepare our nation's teachers to model and teach the use of these tools. Funding initiatives and federal and state programs have been put in place to assist school districts with preparing their teachers to teach with new technologies. While there are government mandates requiring teachers to become knowledgeable in online teaching, many teachers and school districts are not meeting these mandates, and often barriers, such as lack of funding, time, and accessibility to experts, impact the quality of PD provided (Reeves & Pedulla,

2011). One way to gain more knowledge for providing quality PD is to examine the factors of a technology professional development intervention (TPDI) to establish best practices for designing quality technology PD for teachers.

The purpose of this qualitative multiple-case research study was to examine secondary education teachers' perceptions of a technology professional development intervention (TPDI). This study was designed to provide a deeper understanding of which factors teachers' perceived to be beneficial to the quality of technology professional development (PD) they received. An extensive review of literature surrounding technology integration within K-12 educational settings, demonstrated important factors to be incorporated into a TPDI to increase its quality and effectiveness. These factors aligned with the TPACK (Technological Pedagogical Content Knowledge) theoretical framework, so it was used to for designing, developing, and implementing the TPDI for this study. The instructional goal of the TPDI was to assist teachers in meeting two Entry-Level Standards for Michigan teachers related to designing and facilitating learning in the online environment. A learning technology by design approach (Koehler & Mishra, 2005; Mishra & Koehler, 2003) was the basis for the TPDI. This hands on approach exposed teachers to Google Applications while designing instruction and instructional materials to use in their teaching practice. The instructional design of the TPDI was evaluated by a panel of subject matter experts to increase content validity, and was modified based on feedback. The TPDI was implemented in an online learning environment.

The quality of PD can be influenced by a variety of factors, but Guskey and Sparks (1996) suggest that the factors with the most direct influence can be grouped into content, processes, and contextual factors. To investigate the complex relationship between the TPDI factors and teacher practice, I used the first piece of the Guskey and Sparks (1996) Model of the

Relationship between Professional Development and Improvements on Student Learning, as a conceptual framework for collecting and analyzing data to address the research questions. The data was analyzed using a content analysis methodology to examine the factors of the TPDI that the teachers perceived to be most beneficial for transferring the knowledge and skills taught during the TPDI to teaching practice. Studying teachers' perceptions of these factors during the TPDI provided insight into which factors teachers believed were most beneficial to their learning. Comparing teachers' perceptions of the same factors after they began applying the knowledge and skills from the TPDI with their students, provided insight about which factors were most beneficial for teacher practice.

The results of this study demonstrated seven beneficial factors to narrow the transfer gap between technology PD and practice. These factors include: *relevant, learning, access, reactions, interactions, clear and easy, and instructor.* This suggest that instructional designers should incorporate relevant learning by doing activities that are structured to impact learners' perceptions of how their knowledge can be expanded by creating their own learning path in a situated contextual environment. While this study examined a specific TPDI designed for secondary education teachers at a high school in Michigan, the design of the TPDI incorporated factors that are rooted in constructivist design principles, making the implications of the findings from this study relevant to instructional design. These recommendations could be used to guide instructional designers when designing environments for other technology training and adoption initiatives for employees.

AUTOBIGRAPHICAL STATEMENT

Kelly Unger has been a professional in instructional technology for 10 years, working extensively with K-12 school districts and other adult learners, providing instruction on various technologies and concepts. To date she has published three co-authored book chapters and three refereed journal articles, presented over 20 refereed presentations, and received six different honors and awards. An activist for community service, Kelly was co-founder of MIAECT (Michigan Association for Educational Communications and Technology), the first state-wide chapter of the international organization, AECT. She is actively involved in the Michigan Council of Women in Technology, where she assists with summer technology camp for K-12 female students, university committee, and e-learning initiative.

Kelly currently works as an End-User Change Management and Engagement Specialist on a global Information Technology team at Ford Motor Company. Her responsibilities include gathering and reporting information from 80,000 salaried global employees' on their current and desired uses of information and communication technologies throughout the company. As she settles into her new position at Ford, Kelly is really beginning to see the interdisciplinary connections throughout the instructional technology field, and is eager to continue learning how previous experience, and this research, can expand and open many new opportunities throughout the corporate sector. She enjoys teaching and will continue to seek opportunities to teach as an adjunct faculty member in higher education, and as a technology professional development provider for K-12 schools.