Professional Development Using Twitter

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Dedication Page

This work is dedicated to the teachers in my life.

Acknowledgement Page

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Abstract

Teacher professional development has the power to affect day-to-day educational practice. Every school district wrestles with planning strategically for the expenditure of funds to improve student learning through curriculum, methodology, and personnel. With the largest portion of the budget being spent on personnel, developing teachers and staff professionally will always be a priority. Taking into consideration the nature of adult learners, changes in educational and technological resources, and new literacies, professional development has already become an area ripe for change. The purpose of this case study was to explore whether a Twitter users group, created as a teacher-to-teacher network for the purpose of real-time, asynchronous communication, facilitated professional development by a group of fourteen teachers in various school districts who participated in an independent Twitter forum. Through analysis of tweeted commentary and interviews, this dissertation investigates: teacher's attitudes about Twitter for professional development; the uses of Twitter to share experiences, give advice, share lessons, and recommend apps; collaboration related to the use of Twitter; and the idea that reflection is an important part of the professional development process. It was the conclusion of the researcher that collaborative, immediate, and interactive methods more clearly aligned with a school district's goal of providing professional learning opportunities for teachers as adult learners in the most efficient and meaningful ways. Findings indicated that future professional development program designs should include learner directed, virtual formats through the use of social media platforms.

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CHAPTER I: INTRODUCTION

Purpose of the Study

The purpose of this case study was to explore whether a Twitter users group, created as a teacher-to-teacher network for the purpose of real-time, asynchronous communication, facilitated professional development by a group of fourteen teachers in various school districts who participated in an independent Twitter forum. Through the investigation of a digital Twitter network and how participants viewed and used the medium for professional collaboration, knowledge about new opportunities for professional growth was acquired.

The teachers involved ranged in experience from beginning teachers in the first years of a teaching career to veteran teachers with over 25 years of classroom experience. The districts included schools with grades pre- kindergarten through 8 as well as secondary schools with grades 9-12. Individual school enrollment ranged from 1,700 to less than 100. Data was collected through a demographic online survey, tweeted exchanges while participants completed instructional modules, and interviews via Google Hangouts or face-to-face after using a twitter group for four weeks as a method of collaborative professional development.

The review of literature indicated that traditional methods of delivery for professional development offered limited engagement, did not result in sustained or lasting change. Additionally, many professional development programs addressed a narrow scope of pedagogical, content, or knowledge questions without taking into account the needs of individual teachers with context specific concerns.

Background and Rationale

In a rapidly changing field such as education, professional development has the power to change a teacher's practice and, in turn, impact the achievement of students. Further, the inclusion of technology as a method of enhancing and often driving curriculum and instruction requires a new model of pedagogical practice. According to Darling-Hammond and McLaughlin (1995), "Beginning with preservice education and continuing throughout a teacher's career, teacher development must focus on deepening teachers' understanding of the processes of teaching and learning and of the students they teach" (p. 82). Under these circumstances teachers, as adult learners, must be open to rethinking what and how they teach in order to best reach students in their classrooms. There must also be some degree of adaptability to changing student populations and their use of digital technologies, which teachers must understand and facilitate, in order to teach these students. Furthermore, because student needs vary and change from subject to subject, or from day-to-day, thought must be given to the fluid nature of teaching. In a 1998 article on pedagogy, Shulman believed "since there are no single most powerful forms of representation, the teacher must have at hand a veritable armamentarium of alternative forms of representation, some of which derive from research whereas others originate in the wisdom of practice" (p. 9). Opportunities for collaboration are not always readily available or teachers have found themselves working in an isolated environment where limited resources dictated that professional development was restricted to large group, expert led workshops. The large group delivery method often fell short of meeting the needs of all participants or had limited results in creating lasting change to benefit students. To illustrate, Timperley (2008) noted that "Professional learning opportunities that have little impact on student outcomes

typically focus on mastery of specific teaching skills without checking whether the use of those skills has the desired effect on students" (pg. 8).

Professional development programs have often addressed curricular changes or implementation of new programs, but seldom revisit the effects of teacher training on students. Many times school districts spend limited dollars allocated to professional development on the types of opportunities that reach large groups of teachers all at once and address clearly defined methodologies or a single, narrowly defined and scripted topic. At the same time, many research based professional development programs address methodologies or teaching strategies which have been shown to be effective in specific circumstances or, in context specific situations. When the context differs or participants find no similarities to personal context, the program fails to produce optimal results for positive student learning (Timperley, 2008). In essence, professional development programs must be applicable to the participating teacher's practice. While the context is important, so is the ability to integrate prior practice with changes in the way students learn or in available materials and technologies currently being used in classrooms. Given these points, the TPACK (Technology, Pedagogy, Content, and Knowledge) model of technology integration (Mishra and Koehler, 2006) should also be explored as a means of addressing changes in pedagogy, content, and knowledge with regard to technology usage.

By way of explanation, in a 2010 study of embedded learning, Camburn postulated that "teachers' work experiences support the development of their practice; it is useful to look beyond their participation in traditional staff development and consider a broader array of experiences" (p. 464). As a result, more meaningful development of knowledge and pedagogy, by integrating technology, could lead to enhanced student learning. Equally important would be the use of a

more immediate, specifically focused method of professional development allowing teachers to use formative assessments to gauge the impact on student learning.

While development of pedagogical skills in general is important, professional development on the topic of new literacies, which includes the use of digital technologies to create, collaborate, reflect, and think critically, is still a relatively new topic for many districts. Teachers must understand and embrace digital delivery of instruction, allowing students to create rather than consume, and cultivate a collaborative environment in contemporary classrooms. Professional development which broadens teacher understanding is needed. Studies such as Gao, Luo, and Zhang in 2006 show how "micro blogging has become an increasingly popular phenomenon since Twitter was launched" (p. 783). The use of a platform using real-time communication and a finite number of characters has allowed users to interact by creating a "virtual learning environment" (Gao et al., 2006, p. 783). Unless teachers understand the effective use of technological tools and concepts, true technology integration will remain an afterthought or added component to lessons in contemporary classrooms.

The use of social media in an educational setting has been examined by researchers as a way to streamline professional learning, facilitate communication with students, open channels between practitioners as a means of collaboration, and build community within an organization. Web 2.0 interfaces, such as Wikis, Blogs, Email, and Twitter, offer opportunities to bring adult learners, specifically teachers, together in collaborative groups without scheduling problems, time constraints, or the expense of more traditional forms of professional development. In fact, Mishra et al., (2006) stated that "technology is changing so fast that any method that attempts to keep teachers up-to-date on the latest software, hardware, and terminology is doomed to create knowledge that is out of date every couple of years" (p. 1032). Twitter allows participants to

share up to the minute information in real time, synchronously or asynchronously. Because of the immediacy, teachers can share ideas, and self-direct professional development using current technology, which also minimizes the worry that information is out of date.

The most compelling reason to investigate alternative delivery is the way teachers are changing. Teaching professionals who grew up using technology find electronics comfortable and convenient. On the other hand, veterans, or teachers with many years of teaching experience, may or may not feel at ease with using technology for instructional purposes. Regardless of experience level, technology is becoming more prevalent in schools and teachers are expected to take advantage of all resources provided. Offering an opportunity to work with the TPACK model through the delivery of a Twitter based professional development workshop, and studying teacher attitudes, will add to what is already known about the power of social networking and its ability to bring people together virtually. The synergy created by bringing new practitioners and highly experienced practitioners together in a Twitter network could be a powerful tool to improve student learning.

To clarify, technology based learning has pushed teachers to become innovators and the use of Web 2.0 tools can facilitate powerful practices in today's classrooms. With the advent of new literacies, educators must address the need for students to learn creativity, collaboration, and innovation. Educating students in these skills is forcing an evolution of professional development design and delivery. A study of the merging of technology and professional development may help to answer the question of how teachers feel about using Twitter specifically, to collaborate and develop lessons or teaching strategies. According to Ferriter and Provenzano (2013) "Instead of sitting in staff development sessions designed to deliver one message to entire faculties, practitioners learning in new social spaces are setting their own professional boundaries" (p. 19).

In this way, teachers are practicing and modeling the skills they want their students to develop. A social networking methodology such as Twitter can be used as a new component of a comprehensive professional development plan.

This study explored the use of social media and implications for the use of Twitter as a method of professional development to deliver a TPACK workshop. Attitudes of teachers toward a more immediate and collaborative type of professional development using a twitter group was examined. It was the premise of the investigation that collaborative, immediate, and interactive methods more clearly align with a school district's goal of providing professional learning opportunities for teachers as adult learners in the most efficient and meaningful ways. The implications were that teachers had a method of collaboration in real time, synchronously or asynchronously, to connect professionally and personally to their colleagues while they used a quick, simple, convenient format. Previous studies explored digital professional development in higher education using quantitative or mixed methodology, but a study using a qualitative research design and micro blogging in elementary education was not found in current literature.

Traditional models of professional development, such as single topic workshops and expert driven sessions, were seen as ways to expose teaching initiates to continued adult learning after the acquisition of an initial teaching degree. Veteran educators, too, were often required to attend a certain number of hours of professional development per year. Beaudoin, Johnston, Jones, and Waggett (2013) suggested more effort be put into designing professional development that met the specific needs of teachers being served, especially in the areas of pedagogy and content (p. 330). The ability to merge pedagogy and content did not guarantee effective teacher practices, even after teachers attended professional development targeted at improving instruction. Techniques and strategies for engaging teachers as adult learners was explored.

Teachers involved in professional development in the years since 1995, when Darling-Hammond began to look at teacher development, have changed in attitude toward delivery methods. Technology has changed pedagogy, course content, and expectations for teachers.

One such change has been the use of instructional teams to enhance pedagogy, which in turn was expected to improve student learning. Harwood and Clarke (2006) explained that "a team philosophy also encourages exchange of knowledge between the members, facilitates problem- solving and innovations as well as facilitating student learning" (p. 30). Research in how technology-based resources can encourage and foster collegial interactions for the benefit of students is limited, although more user groups and networks are being created daily. Using TPACK allowed teachers without the technological expertise to be exposed to an important change in instructional methodology. The next logical step was to study the ways teachers use such networks to improve professional practice and, therefore impact student learning.

Problem Statement

Student learning is dependent, in part, on the expertise, knowledge, and skill of teachers. Professional development is a way to ensure that teachers participate in opportunities to gain knowledge, become more expert, and develop or refine teaching skills. According to Beaudoin et al. (2013), the "need for professional development has been exacerbated because of the number of teachers who are being trained in nontraditional ways" (p. 331). Many new teachers come from fields other than education and are unprepared for the pedagogy and content required by state or district standards which, many times, define successful teaching. With this in mind, technology must be included in any initiatives designed to keep teachers current.

Further, decisions about professional learning are sometimes driven by a new initiative or adoption of curricular materials. Teachers are required to attend whole group professional development designed specifically to address these situations. Michalec (2013) stated that this type of professional development was "rarely for the direct benefit of the teacher and that collaboration in small communities reaches to the inner core allowing teachers to reflect and examine their professional practice" (p. 33). The problem lies in creating a professional development program participants find useful, engaging, and timely.

When assisting teachers to grow professionally, collaboration, professional learning communities, and social networking of teachers yield more lasting results. For example, Harwood and Clarke (2006) argued that "the purpose of establishing a team approach is to enhance the student experience" (p. 30). With student learning and improving instruction through relevant professional development in mind, programs should contain a variety of experiences which are tailored to meet the needs of a wide range of participants. Forming Twitter networks as one part of a comprehensive professional development plan is already in use informally by teachers. In the digital age, using technology to enhance teacher learning is necessary. Teachers should be versed in the use of social media to fully understand how students connect knowledge to experience. Improving pedagogical practice is dynamic, meaning that each experience forces a shift in perception or change in practice. (Mishra & Koehler, 2006) Changes may range from a slight adjustment, to revamping an entire lesson, and the way a teacher makes decisions or adjusts instruction happens so quickly that a casual observer is often unaware of the process. Since teaching requires constant adjustment to tailor instruction to individual, small group, and large group needs, practical professional development should include a variety of methods including the use of collaboration through social media and, specifically, Twitter networks.

Exploring a teacher driven network to improve student learning has merit and was to be addressed in the study. In this case, teachers were defined as those teachers working directly in the classroom instructing students. Administrators and support staff were not included in this study. Additionally, the study explored new literacies teachers used to improve student experiences in a 21st century environment. Using technology to enhance or facilitate professional development, and the attitudes of teachers toward this method, was a subject worth investigating.

Research Questions

Through the use of qualitative methodology, the study sought answers to the following research questions:

Does a Twitter list created as a teacher-to-teacher network for the purpose of real-time, synchronous communication or asynchronous communication, facilitate professional development within a Twitter forum across various school districts?

- What are teachers' attitudes and beliefs toward social media, specifically Twitter, as a form of professional development in a small Twitter forum across various school districts?
- How do teachers use social media, specifically Twitter, as a method of professional development in a Twitter forum across various school districts?
- Do teachers form collaborative groups through the use of the Twitter exchanges?

Definitions of Terms

Asynchronous communication. Asynchronous communication is an exchange of messages by reading and responding as schedules permit. (http://www.linfo.org/asynchronous.html, 2005)

Collaboration. A deep partnership between educators in which curriculum is studied and understood by teams of teachers across curriculum is called collaboration (Schulz, 2009).

Digital literacies. A person's ability to perform tasks effectively in a digital environment is said to be his/her digital literacy (Jones & Flannigan, 2006).

GoogleHangout. A GoogleHangout is a unified communications service that allows members to initiate and participate in text, voice or video chats, either one-on-one or in a group. (Tech Target, 1999-2015).

Social network. A social network is a web-based service that allows individuals to: (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system (Ellison, 2007).

Synchronous communication. Synchronous communication, or real time communication, is the ability of participants to be present in the conversation at the same time. (http://www.linfo.org/asynchronous.html, 2005)

Teacher professional development. The Term 'professional development' means a comprehensive, sustained and intensive approach to improving teachers' and principals' effectiveness in raising student achievement (National Staff Development Council, n.d.).

Teacher to teacher network. A social network is a web-based service that allows teachers to: (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system (Ellison, 2007).

Tweet. A tweet is a short 140-character message sent by a Twitter user. (Tech Target, 1999-2015).

TweetDeck. A TweetDeck is a social media dashboard application for management of Twitter accounts. Like other Twitter applications it interfaces with the Twitter API to allow users to send and receive tweets and view profiles. (Tech Target, 1999-2015).

Twitter. Twitter is one of the Web 2.0 based technologies, for example blogs, podcasts, and wikis utilized on the world-wide web as a means of digital communication (Tambouris, 2011).

Twitter List. A twitter list is a curated group of Twitter users (Twitter, 2014).

Web 2.0. Web 2.0 technologies are a range of technologies, for example: blogs, podcasts, and wikis, utilized on the world-wide web as a means of digital communication (Tambouris, 2011).

Assumption, Limitation, Delimitation

The effects of professional development using social media and Twitter, specifically, was evident through the analysis of qualitative data. However, the researcher was unable to measure the effect of teacher learning on students. As such, a limitation of the study was that the results of the intervention on student achievement and applicability of the data to student outcomes was not measured or evaluated.

With this in mind, although teachers may master pedagogical skills, positive learning experiences by students are not always guaranteed. A longitudinal study, with Twitter as professional development and student learning considered, could provide evidence that digitally

competent teachers affect digital learners. The proposed study took place over the course of four weeks with no specified requirement for amount of participation. An outline of the workshop and anticipated amount of time participants invested is included in Appendix A. After being informed of the time needed for the study, participants may or may not have engaged in all study modules. Further, the study was limited to brief periods over the course of four weeks rather than a longer period of time or as a course repeated every year.

Equally important, in a study that relies heavily on familiarity with digital social media, was that an inability to maneuver within the confines of a tweeted conversation hampered understanding or added frustration as a barrier to a positive attitude toward the method of professional development. As a result, teachers who found the process stressful or frustrating were more likely to discontinue participation in the study. It was the assumption of the researcher that all participants in the study had knowledge of Twitter and social media in general.

It was important to realize that participation in a conversational thread was not always guaranteed. Teachers generally seek out colleagues with whom they feel comfortable and who are in close proximity. Some educators prefer face-to-face conversations with colleagues not participating in the study. As such, the information gathered from the actual Twitter interactions provided the most meaningful insight into the effectiveness of the delivery method.

Conclusion

Technology based professional development networks can facilitate a positive shift and strengthen powerful practices in classrooms at all levels. (Harwood & Clarke, 2006; Mishra & Koehler, 2006). Designing the research study, recruiting participants, and gathering data through the use of a qualitative, case study methodology after examining the previous research as well as

selecting an appropriate time frame, sample size, and data analysis allowed further understanding of technology based professional development. In addition, the idea that professional development is a means to an end must be kept at the forefront. (Timperley, 2008). The reason for professional development is for students to ultimately benefit from improved professional practice. Support of educators who know how to create, collaborate, think critically, and reflect on experiences should be at the core of any professional development effort. A study of technology based professional development added to current knowledge about improving professional practice through professional collaboration.

CHAPTER II: REVIEW OF THE LITERATURE

Historical Perspective

Professional development on new literacies, which includes the use of digital technologies to create, collaborate, reflect, and think critically, is evolving. Recent literature, from 2004 to the present, shows a slow progression toward using Web 2.0 technologies for collaboration and networking to enhance professional practice. The first decade of the 21st century saw a shift in focus to electronic forms of professional development such as email, which depends on asynchronous electronic communication, and to Twitter, which utilizes both synchronous and asynchronous communication. Email and Twitter constitute only two examples of electronic professional development. Other forms included Skype, online learning management platforms, and web-based systems such as Moodle. Professional development should be convenient for the user and take into account time constraints or availability. Conversations through digital platforms allow users to self-direct professional learning.

A key point is the additional pressure teachers face to keep current with technology and digital communications in the classroom. Ultimately, teachers must understand and embrace digital delivery of instruction, allowing students to create rather than consume digital content. The cultivation of a collaborative environment in contemporary classrooms is becoming more expected due to changes in how students learn in a digital culture. Opportunities to practice this type of instruction and the formation of a more collaborative culture within institutions are ways to strengthen instructional practices and create meaningful learning experiences. Professional development which broadens teacher understanding is needed. Previous studies have explored professional development with technology based delivery as a convenient format. In current literature, there was no evidence of a case study which explored professional development

through the use of Twitter to present a TPACK workshop and explore subsequent teacher perceptions.

This literature review began with a description of Malcolm Knowles' Theory of Adult Learning (2011), and the ways in which a comprehensive professional development program can be supported with the incorporation of the principles it espouses. The idea of professional development design based on andragogy has the potential to increase engagement, and better meet the needs of teaching professionals in a technology rich environment. Through an examination of previous research with Knowles' principles in mind, the Twitter study had the potential to gather evidence which could be useful in designing future professional development opportunities.

At the same time, attention was given to Mishra and Koehler's TPACK Framework for technological, pedagogical, content, knowledge (2006). This framework showed the synthesis of each of the four areas to enhance the quality of teaching (Mishra & Koehler, 2006, p. 23). With knowledge of how technology integration fits into daily practice, teachers can become adept at selecting the best pedagogical practice to deliver the content knowledge and create meaningful connections for students. With this in mind, the TPACK framework can be used with andragogy to design relevant professional development programs.

Malcolm Knowles' Theory of Adult Learning with TPACK

Malcolm Knowles' theory of andragogy, or Adult Learning Theory, was the framework for this literature review. The theory addresses the needs of adult learners and has a direct bearing on design and implementation of effective professional development with regard to teacher attitude. Teachers, as adult learners, are impacted by each of the six principles of the

theory, leading to engagement and success in a professional growth program. Too often, the needs of the participants are neglected in the interest of serving a district or school initiative, new program, or governmental standards. The theory clearly identifies needs and characteristics of adult learners. When coupled with the idea of changing teacher mindsets toward the integration of technology, adult learning theory may be an avenue for moving the teaching profession forward through continuous improvement and professional learning. Inclusion of the TPACK framework (Mishra & Koehler, 2006) as part of the professional development presented in the research study, gave insight into how the adult learning and technology integration were combined.

Based on the work begun by Shulman (1986) on pedagogy, content, and knowledge; TPACK adds technology to what teachers should know as they move through preparation programs or in teaching careers. Teachers participating in a technology integration workshop should already have basic skills in using technology. The integration workshop intended to help participants develop skills leading to understanding that "technology integration in teaching needs to consider all three issues not in isolation, but rather within the complex relationships in the system defined by the three key elements" (Mishra & Koehler, 2006, p. 1029).

Exemplary teachers balance these elements in a seemingly effortless way. Preparing teachers to become expert at integrating technology requires the development of teaching skills within the TPACK framework. Researchers, specifically Mishra and Koehler (2006), ground the teaching of educational technology with a framework called Technological Pedagogical Content Knowledge, or TPACK. Coupled with Adult Learning Theory, the TPACK framework adds technology integration

Knowles, Holton and Swanson stated that Malcolm Knowles' theory is widely accepted as a preferred standard when discussing andragogy. (2011). The principles of the theory have been revised in 1980, 1984, 1989, 1990, and 1998 to the current six principles: the learner's need to know, a self-directed self-concept, learning related to experiences, a readiness to learn, problem-centeredness of learning, and internal motivation to learn (p. 139). After careful consideration of the applicability to professional development, it is clear that although Knowles proposed the principles as theory, there is room for adaptation to adult learning as professional development.

In adult learning, the need to learn is often related to professional growth or a need to strengthen job skills. Adult learning theory should not be confused with adult education (Knowles et al. 2011, p. 143). Examples of adult education include: taking a continuing education class, post-secondary education, human resources training (HRT), and professional development (PD). Each is a learning venue with adult learners at the core. The intent of this review is to apply adult learning theory to professional growth programs only.

In spite of the support for andragogy as a theory, critics take the view that Knowles does not account for the social aspect of adult learning (p. 140). In a purely andragogical model of learning, the adult learner is fully formed and self-directing. In any group of adult learners, there may be multiple levels of self-directedness and members who are at incompatible levels may have difficulty forming social bonds. Professional development is a social concept to deal with social ideologies, such as education and social betterment through an educated public. Merriam (2001) contended that adult learning theory could be seen as a model for designing learning opportunities for adults, rather than a theory. Compatibility of the group members would be a variable to consider when designing professional learning opportunities, especially with regard to

an andragogical model. Knowles et al. (2011) described andragogy as an emergent theory (p. 229). When unpacking the principles espoused by Knowles, each in isolation has the potential for critical scrutiny. For example, Merriam (2001) remarked that some of the principles could apply to both children and adults (p. 5). A need to learn or being ready to learn certainly impacts children and adults with regard to attaining learning goals or objectives; however, when seen as a cohesive whole used to explain how adults learn, the criticism seems misplaced. Learning at all levels will have similar characteristics as will the learners. For the purposes of this study, adult learning was a means to make a lasting, individual change, whether as a theory, concept, or model for design.

Adult learners and the need to know.

The first of Knowles' principles is the learner's need to know. For learning experiences to be meaningful, adult learners need to see the reasons for learning. The need is for what is being learned, how it will be learned, and why the learning is necessary (Knowles et al., 2011, p. 147). According to a study by Kindle (2013), "teachers benefit from professional development that has depth and breadth, and when they are included in the planning process" (p. 178). As adult learners, the teachers studied were more likely to benefit from learning when the planning included an understanding of the why, what, and how. Knowles et al. (2011) suggested using an analysis of learner knowledge before planning a course of study (p. 156). In order to plan and develop professional learning courses, the planner assesses the impact of the need to know principle on the success of the course. Having assessed the learners' need to know, the likelihood for successful adult learning would be increased. With regard to the TPACK framework, technology is a part of daily life and can touch personal and professional interactions. Few adult learners have not been exposed to the use of technology based instruction or the use of electronic

devices in their course of study. It makes sense to incorporate knowledge of technology as an element of what an adult learner needs to know.

The "how" of learning could include the length of the course, location, methodology, or investment by the participant. Adult learners see value in learning that is clearly explained, but want to be a part of defining "how." In addition to how learning will occur, an even larger part of the need to know includes the reasons for learning. The proposed study will incorporate each of these principles by assisting participants in seeing the value of the learning by allowing teachers to be in control of possible directions the professional development would take. Participation in the study and the use of technology was clearly explained in the recruitment process. Teachers involved had control over how and when the workshop was accessed and whether or not they continued. In particular, each week a new module was available and the decision to seek out the information and activities rested solely with participants.

Defining why learning needs to be accomplished gives the instructor the ability to influence engagement of adult learners. Validating worth to the participants is a valuable tool to engage adults in the learning process. The perception by the adult learner that learning has a valid purpose may improve active participation and help promote positive outcomes. Andragogy, and especially application of the principle of the learner's need to know, is closely tied to creating an adult learning program to help teachers develop new skills and refine current skills. TPACK offers a way to combine content, knowledge, and pedagogy with technology to "help us consider how to achieve them via technological/pedagogical solutions" (Mishra et al., p. 24). A professional growth opportunity which has immediacy, relevancy, and expediency could eventually yield positive results for student learners. To illustrate, Harwood and Clark (2006), postulated that a team approach could develop commitment to student achievement and motivate

teachers to improve both pedagogy and content (p. 31). The challenge in the team approach was to provide professional development that addressed what the team needed to know to improve teaching and increase student learning which ultimately built collegiality.

A large part of the current study included the premise that teachers used twitter to discuss teaching strategies in a needs-based virtual environment to improve student learning. For this reason, the learners need to know potentially influenced the direction a strand of conversation took. As such, participants as the adult learners in this case, had to self- assess and be able to direct learning in a meaningful way. Familiarity with TPACK allowed teachers to skillfully integrate technology into daily teaching and learning situations.

Self-directed learning.

Self-direction is a part of adult learning that requires some degree of familiarity with the concept being presented to the learner. Learners with no experience or without a basic understanding of a concept may easily become disinterested or frustrated with the material under study. In teacher development, the assumption would be that background knowledge or having completed a pre-service program would prevent disinterest or frustration. If a learner has had success in the past, self-directedness is more likely. By way of illustration, Burke (2013) studied the concept through the use of an experiential professional development course offered to teachers after evaluating the prior experience and level of familiarity with the basic principles of communicating in a world language, as opposed to simply learning about the world language. Teachers were found to be more apt to be successful if there was a higher level of self-directedness involved. Teacher participants returned to classrooms and implemented the methods from the course because there was a high degree of self-directness. If the learners had little background, the course was less effective due to the inability to self-direct the learning. Burke

(2013) also discovered that the teachers felt the learning experiences were successful because participants were able to connect classroom experience to the professional development (p. 259). The reflective nature of the course, coupled with experiential application enhanced the self-directed growth of the participants.

Similarly, the current study allowed teachers to reflect on previous experience to share both successes and revisit challenges in teaching practice. Twitter conversations were reviewed and re-tweeted as a method of reflection. Conversational strands added to the understanding of a topic or posted question. Responsibility for the way conversations flowed was shared with group members and participants proposed discussion topics as the need arose. Greater knowledge of how to leverage knowledge of pedagogy, content, and technology was a potential benefit from the use of the TPACK framework for the adult learners in the study.

As a principle of adult learning, self-directedness may also be contingent upon the level of support offered by the directors of the learning activity. Learners who are unfamiliar with the subject matter or lacking background need more support in order to develop the degree of self-directedness necessary for successful adult learning. Support should not slip into pedagogy. Simply put, confidence in the ability of the adult learner to succeed should dictate the level of support necessary by course facilitators. Through the use of a specific workshop on technology integration, adult learners would gain confidence in viewing technology as a natural part of teaching decisions on a consistent basis, leading to a feeling of control and self-directedness.

Equally important is the fact that adult learners expect others to see them as capable of self-direction. In some cases, a professional development instructor directing the learning was viewed as more important than allowing learners to retain control of learning. Although,

professional development workshops without consideration of teacher goals and a course design with substantial rigidity would defeat the adult learner's sense of autonomy. The concept of autonomy was viewed as essential for a positive self-concept which lead to a participant being able to self-direct (Darling-Hammond & McLaughlin, 1995). In other words, teachers should be given the choice about how and when professional development can improve teaching and learning with regard to personal situations and level of confidence.

By the same token, autonomy had a possible downside. Williams (2013) researched professional learning communities (PLCs) and discovered that teachers felt their knowledge increased when collaborative groups were formed and isolation was lessened. Teachers were empowered by the collaboration and the group had high levels of self-directedness and confidence. The students of the participants were reported to be the beneficiaries of this type of adult learning. Collaboration was perceived as an important component of the formation of self-directed adult learners.

Experiential learning.

On Knowles' checklist, "prior experiences of the learner provide a rich resource for learning" (p. 158). Teachers, as adult learners, should have the opportunity to develop and implement their own professional learning based on the relevance to problems and concerns in their practice. In 1995, Darling-Hammond and McLaughlin wrote an article outlining professional development reform. This included allowing teachers to move away from "top down teacher training strategies" (Darling-Hammond & McLaughlin, 1995, p. 81) to move toward collaborative models with student learning as the ultimate goal. Classroom experiences directed the need for development sessions based on data or feedback from student achievement assessments for individual teachers. Graham (2007) studied middle school teachers and how

effectiveness of teaching methods improved student outcomes. At the center of the study was the premise that group goals in PLCs of same-subject teachers led to improvement in pedagogical knowledge and content, which led to student improvement (p. 5). Graham (2007) also identified features that led to "high-quality professional development" (p. 5). Trends or similarities in results have led to experience-based teacher development. Teachers who had convergent needs were grouped together to form shared experience cohorts or learning communities. The school Graham studied departed from earlier models of PLC formation in that the teams were of the same-grade, same-subject rather than interdisciplinary (Graham, 2007, p. 7). Shared experience led to richer discussion and promoted teacher growth through more honest reflection. When teachers saw only one perspective, the self-evaluation was less objective. Challenge to improving teaching methodology could have been blamed on external sources rather than something the teacher did or did not do.

Multiple perspectives illustrated the point in the previously mentioned study by Burke (2013). Spanish language teachers utilized an experiential model of professional development where collaborative communities were created to enhance professional practice in the classroom. The subjects worked collaboratively in discussion groups after reflecting on individual day- to-day experiences in Spanish language classrooms. Participants had the opportunity to share and compare experiences during after school meetings. Findings indicated that the teachers were not used to collaborating and had a period of adjustment but found the collaborative piece valuable in transferring the same principles of collaborative learning to their students. The end result was that the students felt more empowered by having a voice in planning for the classes in which they participated. Because the teachers were able to implement the strategies they had learned in professional development based on past experiences, their students were more successful (Burke,

2013, p. 256). The idea of allowing learners to self-direct, reflect on past experience, and plan future experiences fit well with the andragogical model.

Not only does the andragogical model allow for reflection, but a confident use of TPACK may give teachers a feeling of support through making technology integration more seamless. Shared experiences through activities in a TPACK workshop and communicating through Twitter on a regular basis had the potential add to collegial relationships of the sort adult learners found to be beneficial in previously mentioned studies.

On the other hand, negative experiences can have a less than desirable outcome. Adult learners who experienced negative results in professional learning were less willing to participate in similar types of courses or sessions. A study of online learning communities by Charalambos, Michalinos, and Chamberlain (2004) expressed a concern about challenges based on technology and the exchange of information. Issues in accessing the internet or experience level of participants were mentioned as needing to be addressed before beginning an online learning community (Charalambos et al., 2004, p. 139). Fear of being attacked, or hesitance to share (Charalambos et al., 2004, p. 139) could have been a result of previous experience impacting outcomes in a new methodology for adult learning.

With this in mind, adult learners' previous experiences impacted future learning experiences. Knowles et al. (2011) agreed that previous learning could "create biases that can inhibit or shape new learning" (p. 188). Turvey (2012) completed a two-pronged study which investigated how participants' personal practice with social networking influenced "their beliefs about effective pedagogies" (p. 744). Basically, the personal practice shaped and created a pedagogical keystone that dictated the teacher's professional development (Turvey, 2012, p.

744). As the case studies were reviewed further, it became apparent that some of the practices in the personal arena crossed over or converged in professional practice. Given these points, it would be reasonable to conclude that prior experience can affect subsequent attitudes and beliefs. Consideration was given to the prior experience of participants in the current study. If participants found technology overwhelming, TPACK strategies may have been more stressful than rewarding.

Readiness to learn.

Not only did the previous andragogical principles influence adult learning, the readiness to learn also influenced learning as evidenced by Masuda, Ebersole, and Barrett (2012) who commented in their introduction to a study on teacher attitudes toward professional development that sessions that lead to "significant impact on teaching practice and student learning must be …able to engage teachers in active learning of the content" (p. 7). In other words, a readiness to learn yielded better results when adult learners were involved. Several factors either impeded or enhanced a learner's readiness to learn, including the situation, distance from the learning opportunity, or resources available.

Situational learning, such as the type involved in professional development, can drive a learner's readiness to learn. Readiness is directly related to the situation in which the learner is involved. Other factors come into play with the need for support some learners encounter with new material or unfamiliar concepts. Dependence on the instructor or other learners for information can reduce readiness. The situation, familiarity with material, and dependence on others may influence a learner's confidence and readiness. Hustad and Arntzen (2013) sought information on integration of learning management systems (LMSs) and social networking technologies (SNTs) to facilitate learning in a post-secondary institution. The participants had

prior knowledge and had used LMs and SNTs in previous experiences. Had the students and instructors been unfamiliar with either platform, the readiness to learn would have made the projected research difficult. Even so, the researchers approached the planned study in two phases. The first involved the LMS and how it was used by students and teachers. The second was the exploration of the enhanced opportunities available by the use of SNTs. (Hustad & Arntzen, 2013, p. 18). All in all, the readiness, skills, and previous experiences of the learners and facilitators impacted the success of learning in this particular situation. To put it another way, the readiness to learn was influenced by the personal characteristics of the learners.

For the purpose of this case study, readiness to learn involved a careful introduction to the TPACK framework and the use of technology integration for enhancing classroom experiences. Participants were more likely to be ready to learn if a clear understanding of the process was achieved through the initial presentation of material.

Problem-centeredness of learning.

The previous study by Hustad and Arntzen (2013) could also be used to illustrate how problem-centeredness related to adult learning. Learners saw value in learning that solved problems or allowed manipulation of the learning environment to offer an acceptable solution. Creativity, critical thinking, evaluation, and application fit into the category of higher level thinking skills related to problem solving capabilities necessary for success in planning and developing adult learning opportunities. The combination of LMSs and SNTs provided benefits to the learners. Although the study specifically investigated post-secondary education, the themes Hustad and Arntzen (2013) identified spoke to the problem-centeredness of online classes. Participants had the opportunity to collaborate and problem solve in a community-based online venue (Hustad & Arntzen, 2013, p. 29).

Similarly, adult learning, with regard to professional development, became more sustainable, or lasting, with application to a real life problem. Many professionals attended sessions with no application to a current problem or situation and did not retain information presented. Participants who viewed the development sessions as irrelevant seldom fully engaged. Masuda et al. (2012) found, "teachers were adamant that anything learned from professional development needed an application component" (p. 10). In fact, the study measured intent and further found a difference in willingness to engage or participate was influenced by stage of career (p. 10). Analysis of the data showed all teachers valued content related professional development which had application to professional practice regardless of career stage. Since technology integration was introduced, teachers have been expected to incorporate digital content. Methodology changed as technological devices became available for use in classrooms. The accepted pedagogy made way for technology integration through research led by Mishra et al. beginning in 2006. The use of TPACK for improving instructional quality has gained momentum as a current problem. Although in the preliminary stages since 2006, Mishra et al. suggested "technology is fundamentally changing how we interact with information and each other" (p. 23). Educators are challenged to find solution in teaching for a changing world. As adult learners, technology integration has relevance and should be a subject found worthy of professional development opportunities.

As a result, problem-centeredness led to outcome-based learning. Adult learners were engaged in a process which allowed success to be measured in regard to a desired outcome. When learning experiences were related to current professional or situational practice, learners were more likely to actively learn. Additionally, problem-centered learning allowed the learner to take responsibility for a successful outcome. To further explain, desired outcomes in 21st

century classrooms involved successful production of technology based projects and activities. Teachers need to acquire a knowledge base and framework to achieve the required level of success. The TPACK framework has been adopted as one way to further technology integration (Figure 1).

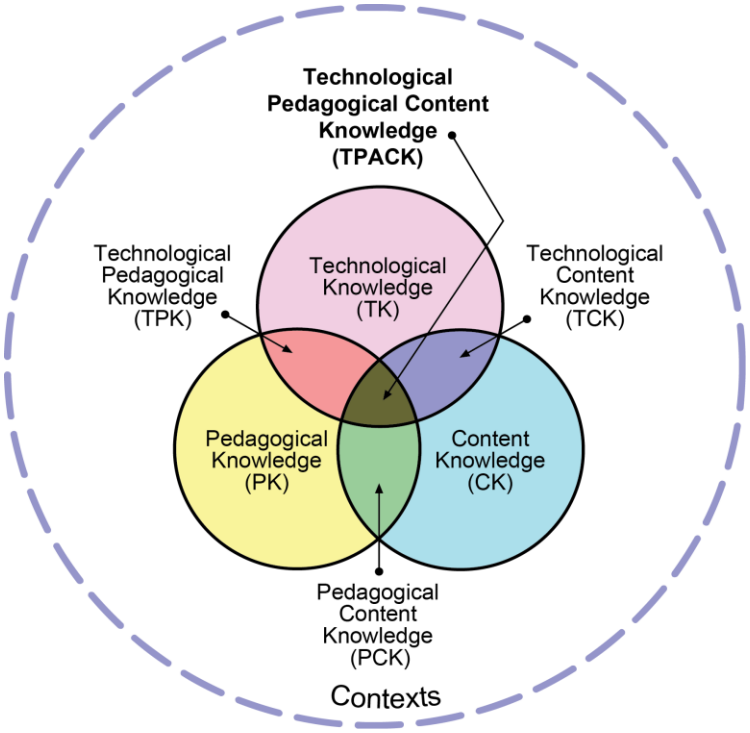


Figure 1. Technology integration through the use of the TPACK framework is illustrated by overlaying technology knowledge, pedagogical knowledge, and content knowledge. The intersection of the three creates TPACK. Reproduced by permission of the publisher, © 2012 by tpack.org

Prior knowledge, background, or familiarity with the problem was necessary when engaging the adult learner in problem-centered learning. Outcomes were the skills, attitudes, and the ability to add to the knowledge base of the adult learner. Value placed on the outcomes and applicability drove the willingness of participants to engage in learning (Matsuda et al., 2012, p. 12). The principle of problem-centeredness coupled with applicability seemed to have great

weight in determining the success of professional development. The current study was grounded in problem-centeredness and was designed to assist participants in collaborating in such a way that application was a key component.

Internal motivation to learn.

Another point worthy of mention is that the adult learner's readiness to learn and the problem-centeredness of the learning are closely tied to an internal motivation to learn. The motivation can be either intrinsic or extrinsic. Additionally, the motivation to learn flows from the learners' stages of development. Knowles et al. (2011) postulated that life-span theories may offer insight to learner motivation (p. 222). Further, motivation was tied to "solving problems or internal payoffs" (Knowles et al., 2011, p. 197). In either case, adult learners were more motivated when attention was paid to the stage of life and the situation of the learning.

Value placed on learning impacted motivation as well. In Beaudoin, Johnston, Jones, and Waggett (2013), teachers were motivated by the desire to increase content and pedagogical knowledge. The researchers examined the ways the post-secondary level institution could support such an increase. Specifically, new teachers, prepared in teaching as a second career, were more motivated to learn content because of both intrinsic and extrinsic factors. Teachers had a need to actively engage students in subject matter and saw the professional development as a means to achieving the goal. The ability to remain employed in the field motivated the teachers extrinsically. With technology integration as an area considered necessary to achieve desired student outcomes, educators are more motivated to learn how to skillfully incorporate technology into learning activities.

Motivation to learn was also linked to emotions. Knowles et al. (2011) concluded that "the most potent motivators for adults were internal ones- for example, quality of life, satisfaction and self-esteem (p. 198). Such motivators led to increased learning in professional development for teachers as adult learners. Going back to the study by Masuda et al. (2013), the researchers found that "all teachers in the study expressed their overall purpose in teaching as making a difference in the lives of children" (p. 10). The statement added credence to the belief that motivation was linked to emotion. Caring about the welfare of the children who sat in participants' classrooms could be seen as based on emotion. The internal motivation to learn was a powerful piece of the six-principled model of andragogy.

In summary, the six principles of Knowles' Adult Learning Theory can be seen as a model for developing professional development as well as a theory on which to build a conceptual framework for study of the process. When coupled with the TPACK framework, contemporary needs of adult learners with regard to technology are also addressed. Each of the principles has been shown to be tied to success in creating a model of professional development adult learners value, are motivated to attend, and are used to affect lasting professional change. Each principle has merit when viewed in isolation, but together the principles create a cohesive whole on which to build successful professional growth programs.

Professional Development Reform

McCarney (2004) investigated effectiveness of staff development that involved instructional technology. Teachers interviewed responded that the most effective professional development was that which was short in duration and of the traditional model. In other words, face-to-face contact with a tutor (McCarney, 2004, p. 69) was reported to be highly effective.

Results also showed teachers to be satisfied with classes outside the school day and away from the building.

In contrast, Gunn and Hollingsworth (2013) studied a district-wide approach to professional development over a three-year period. Each year, teachers were required to spend at least eight hours of professional development on technology integration (Gunn & Hollingsworth, 2013, p. 212). Findings indicated that more time spent on professional development increased the efficacy with which new technologies and software were utilized; however, sessions differed from site to site. In larger districts, face-to-face sessions in a de-centralized manner inside each building were seen to have a negative impact on ensuring identical information to be disseminated throughout the district.

Additionally, in the study under discussion, the district had multiple initiatives being implemented. Gunn and Hollingsworth (2013) concluded that time and ongoing professional development were needed to sustain the pedagogical changes. The adult learners involved were expected to devote increased amounts of time over a period of years to successfully implement changes. When coupled with the idea that andragogy requires learners to see value in what is being learned, long term professional development may lose steam if not continually evaluated for usefulness and validity. Using varied methods of delivery, acknowledging the needs of adult learners and acting on participant feedback to improve professional development is necessary.

From 2004 to 2013, teachers were required to spend increased amounts of time to develop professionally on multiple initiatives. With the integration of technology, more demands were put on teachers in and out of the classroom. VanLoon, Ros, and Martens (2012) explored learning as influenced by self-determination and intrinsic motivation. Although the study

involved student learners, some of the basic concepts investigated were applicable to all learners. For example, learners required autonomy support to allow perseverance in difficult situations (VanLoon et al., 2012, p. 1015). With more expected from teachers to improve pedagogy and content, whole group professional development needs to incorporate collaboration to offer the support necessary to keep participants motivated and engaged.

Collaboration and Reflection

Collaboration and reflection were steps toward lasting change; however, when viewed in the context of how adults learn, professional development reform continued. Camburn sought to investigate how reflection and collaboration could enhance professional practice in his 2010 study. His belief was: "there is a general lack of understanding about how a broader array of teacher's work experiences beyond traditional staff development supports teacher development" (Camburn, 2010, p. 465). This study collected data from 17 regions targeting metropolitan areas with a large concentration of teachers to sample. The participants were involved in both reflective practice and embedded learning. With regard to adult learning, these practices allowed teachers to see the relevance in day- to- day professional experiences and tied them to professional development. Camburn surveyed 1,540 teachers over a three-year period. The results indicated that reflection had a limited effect on sustained improvement in practice. The experiences and reflection varied in how they were correlated, and one third of the teachers reported disagreement with the idea "that their learning experiences provided them with useful feedback" (Camburn, 2010, p. 476). Reflection makes a valuable contribution to improvement when coupled with collegial conversations within a non-threatening relationship.

The collaborative arm of Camburn's research yielded different results. The teachers in the study reported they had collegial discussions of standards and provided feedback for one another. They were unlikely to observe each other but felt comfortable sharing knowledge and resources as a form of feedback to questions or discussions. Collaboration had a positive effect on teacher participation in professional development. According to these results, peer collaboration and working with experts were both powerful practices. Again, the relationships were based on trust and a feeling of collegiality.

To put it another way, the most interesting point in the Beaudoin et al. (2013) study was how teacher participants felt the most important element of eight elements in the researcher designed workshop was collaborative lesson development (p. 335). The conclusion of the study suggested more time be spent on collaboration or collaborative activities as a part of professional development. The recommendation was in keeping with experiential learning and motivation of adult learners.

Likewise, Moolenaar (2012) had this to say about the importance of collaboration and the relationship to professional development to effect change: "In the past 20 years, educational researchers and policy makers have become increasingly interested in teacher relationships and teacher collaboration to support teacher professional development" (p. 7). Moolenaar's 2012 research continued the investigation Camburn began in 2010. Both researchers looked at collaboration to discover the power teacher networking had over the success of professional development initiatives and how networks influenced collaborative relationships.

Further, in a causal-comparative study by Williams (2013), teachers were found to value the ability to work on collaborative teams instead of isolated learning situations. The result of

collaboration was a greater ability to accept or reject pedagogy or content not useful to a specific situation or experience. When responding to an interview question about the purpose of professional development, one emergent theme was "sharing your knowledge with one another" (Williams, 2013, p. 36). At the same time, a different response was recorded in that professional development meant "learning from district specialists" (Williams, 2013, p. 36). Again, as in Camburn (2010), the study spanned three years and conceded that school culture, involvement of teachers, administrative support, and grade level could all influence the success of collaborative efforts (p. 39). With this in mind, the current study sought to create opportunities for teachers to collaborate and then reflect on a less lengthy methodology using professional development of a more immediate nature.

Coaching

Although collaboration and reflection had a powerful effect on teacher development, the challenge of distance was an added variable in Mueller and Brewer (2013). Distance between professional practitioners created obstacles to professional growth. The investigation examined a coaching model which involved special education teachers. Coaches in the study included team members with diverse roles in the education of children with Autism Spectrum Disorder (ASD). Because distance between participants made it difficult collaborate as teachers in an on-going manner, researchers designed sessions including both university and peer coaches who spent time in the participants' districts and schools. The methodology was used in conjunction with workshops and data collection. The participants attended off-site professional development at the university and worked to create instructional teams which were used after the university experience during the subsequent school year. The end result was a four -tiered model that included: teacher development, coaching (peer-to-peer and expert), parent involvement, and data

collection. Coaching as a method of collaboration, in tandem with the model, had a positive impact on teacher practices and attitudes, which further improved student outcomes. Then again because of the distance, the coaches followed the teachers to their districts, which would not always be an option for districts with limited financial resources.

Using available personnel to form collaborative teams or coaching pairs could be an option for cases where financial constraints or lack of other resources make adding coaches to the staff unlikely. The Burke (2013) study included a coaching element coupled with reflective practice. Spanish teachers shared experiences in collaborative groups and had the opportunity to work with university coaches on-site to improve practice after classroom experiences. The experiential professional development model developed by Burke allowed teachers to practice new skills in an environment which encouraged discussion with peers and coaches. Feedback was immediate and collaboration resulted in improved practice. The experience included individual coaching which was appreciated, but participants felt the collaborative element offered a more valuable transformative when it came to teaching practice.

School districts have formed professional teams, specifically PLCs in many instances. There is an element of coaching because more experienced teachers were on teams with teachers who had less experience. Graham (2007) investigated professional learning communities in a new middle school where teachers had no prior relationships. The results showed the benefit of grouping like-grade and subject teachers to facilitate professional growth. Additionally, student achievement was tied to the success of the collaboration. The student achievement was also tied to teacher attitudes toward the school's collaborative culture. PLCs were not the only vehicle for collaboration. The next section elaborates on Graham (2007), Camburn (2010), and the relationship to the adult learning model.

Collaborative Communities

Collaboration has taken numerous forms. Professional Learning Communities, Teacher-to-Teacher networks, and School and University Collaborations were all mentioned by Darling et al. (1995) in a study of effective professional development reform (p. 83-84). Darling et al. also lend credence to the idea that professional learning in communities yielded the type of readiness and motivation Knowles proposed as being conducive to success. Social networks had an impact on the success of collaborative communities, as did team size, the ability to reflect, problem-based situations, and school culture.

Key to collaboration was the buy-in by the participants. A common theme in the literature was the emotional investiture teachers had in the professional collaboration for the betterment of students. The idea of having positively influenced student outcomes because of participation in growth activities, both pedagogical and content related, was noted in Graham (2007), Beaudoin et al. (2013), Hustad and Arntzen (2013), Burke (2013), and Masuda et al. (2013). Each of the collaborative efforts discussed in the literature shared similar end results. Specifically, the efforts were initiated for teacher improvement which was directly tied to improved student outcomes.

Professional Learning Communities

Another key point when collaboration was reviewed was the utilization of a community of professional learners. Graham (2007) utilized a case study methodology to investigate the effectiveness of a PLC on first year middle school teachers. In the study, teachers met in collaborative communities built from extensive evaluation of teachers, programs, attitudes, and observation by the administrator. The teachers were not involved in creating the teams.

The results indicated that collaborative teams of three or more reported significant change in classroom practice related to instruction and improvement. Teams of two teachers had less significant change resulting from the PLC activity. Additionally, "almost all the sixth and seventh grade teachers indicated that same-grade, same-subject PLC activities had an impact on their professional improvement" (p. 10). The reason for the change was reported to be the opportunity to collaborate. Teachers also reported the chance to reflect with input from others allowed a different perspective (p. 11). Therefore, according to Graham's results, a collaborative group of three or more teachers with the opportunity to reflect on collegial feedback had the greatest impact.

PLC formation had a negative side as well. Large groups encountered difficulty in sticking to the same group norms for lessons and pacing. Teaching was not as individually based, nor was there room for individual deviation from the group norms. In the Graham study (2007), the PLC formation began on the first day of a new school year for a new school. Not all school communities had the luxury of a fresh beginning (Graham, 2007, p. 13). It is only in isolated cases that an entire staff of teachers is able to begin without a shared history or already embedded building culture.

PLC activities, when joined to immediate feedback, allowed teachers to improve practice in the Burke (2013) study of world language course teachers. Qualitative data indicated collaboration for professional development on a daily basis was transformative. Although the results of the job-embedded professional development were positive, Burke concluded that educators involved would need involvement in the strategic planning process for overall professional development of this type. Key to success was the development of the network as well as planned opportunities for collaboration. The current study involved initial training on the

use of Twitter as a method of daily professional development, but the feedback element was initiated through self-directedness of participants.

School and University Collaborations

Although peer collaboration was important to professional growth, Camburn (2010) studied university support for instructional improvement. As mentioned earlier, the study sought to address the "general lack of understanding about how a broader array of teachers' work experiences beyond traditional staff development supports teacher development" (Camburn, 2010, p. 465). The participants had opportunities for growth provided by experts specially trained in instructional support, as well as collaboration strategies.

Teachers were encouraged to reflect on teaching practice after collaboration with the team. Participants found the learning experiences provided through the embedded learning model allowed for deeper reflective practice, which 88 percent reported to enhance professional performance. Another variable studied was the use of observation within the collaborative group to improve practice. Teacher participants reported being comfortable with collaboration; however, participants did not want to observe peers in teaching. Group collaboration was a valuable asset in improving teacher practice, but observation was too close to evaluation to be accepted by the study participants.

Burke (2013) also examined how coaching from university staff impacted professional learning. Participants felt the assistance was valuable for keeping a feeling of support similar to that mentioned when discussing the autonomy support in the section on andragogy. The participants were beginning teachers as well as teachers with over 20 years of experience. When involved in new teaching methodologies or changes in pedagogy, support for teachers was

appreciated regardless of the level of experience. Support from universities had a positive effect on teacher efficacy through experiential professional development of the type in the Burke (2013) study. With this in mind, it is also necessary to look at the benefit peer-to-peer discussion had on the teacher participants involved. In the proposed study, coaching would be done by the participants unless experts were invited to join the network by a member of the group.

Teacher-to-Teacher Networks

Current research indicated that teacher-to-teacher networks have evolved from face-to-face networking in the last fifteen years. Cahn, Benjamin, and Shanahan (2013) examined the trend for medical schools to use technology based social media for networking. Part of the difficulty faculties had was carving out time for face-to-face meetings or professional development. Time factored into designing an effective means of getting faculty together for development (Cahn et al., 2013, p. 18). Similarly, participants in Burke (2013) were required to meet with peers before or after the school day for teacher-to-teacher discussion of daily teaching experiences. While this was not done daily in the study, time was an important factor in collaboration of this type. With technology and technology-based learning, teachers have been encouraged to network in a different way.

As an illustration, Harwood and Clarke (2006) discussed building a team philosophy with teachers at the core, but included other support structures. Although teacher-to-teacher networks were mentioned as being important, purely teacher-driven networks were seldom explored. The important elements of a philosophy of this type were a shared vision of outcomes, sharing knowledge, and group problem-solving (Clark, 2006, p. 30), but the group included district development coordinators and e-learning experts. Collaboration by teachers was seen as

necessary to "enhance the student experience" (p. 30) and was facilitated by a team of members with responsibilities other than classroom teaching. In the case of this study, the team approach included a coaching element and an instructional element.

Not only in the Harwood and Clarke (2006) study but in Williams (2013), it was noted that teachers also gained knowledge by having input from curriculum specialists. At the heart of the increase in teacher knowledge, however, was the collaborative culture of the school. The ability to work in a network of teachers with common goals and ideologies was a common theme across the literature.

Exploring a teacher-driven network to improve student learning had merit and was addressed in the current study. Additionally, the study explored new literacies utilized by teachers to pass along to students in order to allow for improved student experiences in a 21st century environment.

New Literacies

Collaboration can be leveraged in an environment which incorporates new literacies. These skills have been identified as important for student success in the 21st century. Although the century is already 14 years old and progress has been made, new literacies are important to incorporate into contemporary professional development. New literacies include collaboration, reflection, creativity, and critical thinking in order to solve problems. All of these literacies can engage adult learners when put into the theoretical context of andragogy. Kim, Hong, Bonk, and Lim (2009) investigated how reflection and project-based learning could be part of a Web 2.0 learning platform. By way of explanation, Web 2.0 is made up of web-based resources for sharing thoughts and ideas or collaborating in a more immediate way. Social networking sites,

such as: Facebook, Twitter, Linked-In, Google for Education, or cloud-based applications are labeled as Web 2.0 learning tools.

In the Kim et al. (2009) study, participants were randomly assigned to a team for the purpose of collaboration in a hybrid graduate class. The study measured satisfaction of the group and level of activity of the group participants. Ultimately, the results indicated that the more active and reflective the group was, the deeper the learning. Collaborative skills of the group, such as "collective reasoning, group critical thinking, and collaborative problem solving" (Kim et al., 2009, p. 345), were the agents through which deep learning occurred. Online learning communities engaged in collegial activity which incorporated the new literacies positively impacted teacher professional development if designed correctly. In previous sections the common threads were student outcomes and improved student learning. With the expectation of student learning to include collective reasoning, critical thinking, and the creation of information rather than its consumption by students, teacher professional development has further reform required. Gunn and Hollingsworth (2013) proposed that students in the 21st century are vastly different from students in earlier eras (p. 202). Teachers were required to differentiate instruction, integrate technologies, and incorporate higher order thinking skills. The study was designed to measure data over three years which involved professional development for technology initiatives. It was noted that the involved school district had a strong collaborative culture. Additionally, structures were already in place for initiatives involved with technology to be successfully implemented. Researchers felt the culture, support, and vision for school improvement were necessary pieces for success.

The current study took into account the progress education has made in creating learning environments where teachers collaborate. Also considered was the level of adaptability of

teachers to new literacies and technology integration in relationship to the students being educated. By designing a creative, collaborative, fluid method of professional development, teacher practice can be improved in a dramatic way.

Problem-Based Learning

The idea of online collaboration dovetails well with the idea of adult learning as problem centered. VanLoon and Martens (2012) studied student learning and structure as variables that effected motivation and learning outcomes. There were some implications applicable to adult learners when examining problem-based learning. A major feature of the learning model was the student-centeredness of the learning, or having learners assume responsibility for the outcomes. Problems similar to what would be encountered were incorporated into the design of the study as well. Students worked in isolation on problems using technology. The findings indicated the usefulness of problem-based learning, but found autonomy support was necessary to motivate the learners. In setting up a network for problem-based professional development, collaboration would be necessary for success. Online learning has been explored as a way to motivate learners as well as the ability to share resources and share innovations and ideas.

In their 2004 study of issues facing online learning communities, Charalambos, Michalinos and Chamberlain included the globalization of the economy and how teachers kept up with the explosion in the number of informational sources available to both teachers and students. Online collaboration minimized the distance between educators and their counterparts in other parts of the world. Instead of a limited collaborative group, teachers could problem solve with a greater number of colleagues, using a wider network of information. Charalambos et al. (2004, p. 139) pointed out that the interest in online learning communities increased every day. The study also

outlined the necessary qualifications for the success of an online learning community and the structure needed for success. Included were:

- distance separated participants meeting to solve a common problem to complete a common task which is clearly defined.
- all the necessary infrastructure, technology, support, and background knowledge to use online tools.
- interaction on an ongoing basis.
- timely completion of activities and appropriate feedback.
- "constructive dialog" and well defined expectations of behavior, with mutual support.
- sharing of resources and ideas.
- moderators or coordinators who can help facilitate discussion. (Charalambos et al., 2004, p. 138)

The most pertinent suggestion with regard to successful online collaboration as it related to andragogy was to give the participants ownership of the community.

As a part of ownership, the idea of reciprocity has been explored with regard to gratitude and the impact on sharing in online networks where participants form groups or networks with common needs. Chang, Lin and Chen (2011) investigated gratitude and feelings of helpfulness through interactions in a network of learners. In problem-based learning especially, having assisted in problem solving created a feeling of generosity that flowed through the network to other participants who sought help. Specifically, the researchers investigated how much gratitude influenced "upstream reciprocity" (Chang et al., 2011, p. 767). Participants filled out a gratitude questionnaire which measured the degree of goodwill that flowed through the network. The findings indicated that individuals who received help were more likely to help someone else in

return provided the individual was a part of the network. Network relationship in this case was a direct link to the recipient. However, individuals in positions on the fringes of the network were also assisted provided that the feeling of goodwill was sufficient to create a ripple effect. Again, this type of collaboration occurred in an informally connected network through a technology based modality.

When consideration was given to reciprocity with regard to the current study, the importance of willingness to share within the Twitter group impacted the success of that type of professional development. Additionally, sharing a common problem potentially increased the likelihood of a response even if the recipient were a stranger. Membership in the collaborative group and feelings of gratitude would impact reciprocity according to the Chang et al. (2011) study. All these factors were taken into consideration to build an effective online learning experience for the participants involved in the current study.

Leveraging Technology Resources

Equally as important was the use of resources in an online collaborative community such as that designed for the current study. Success in professional development programs has been increasingly tied to collaborative use of technological resources. In 2004, Grünberg and Armellini investigated the place email played in collaboration. Although the study took place in Uruguay, the implications of the results were universal. The quantitative data indicated that email messages between members in the collaborative group were utilized to communicate about professionally related topics and share resources. Teacher participants in the study used email messages 66 percent of the time to share resources rather than ask for them. Further investigation led the researchers to conclude that some of the participants "privatized" their exchanges which limited the use of information by the collaborative community. A vehicle for sharing was

necessary for rich discussion to occur among colleagues separated by distance, but keeping the discussion public was necessary for the sharing to be viewed as professional development.

Although email is currently used less than other methods, the evolution of technology and communication yielded important insights. Early studies involving technology provided a look into the social nature of professional development. With the advent of technology based communication, informal networks had already been formed and teachers were sharing although the length of time required to complete a conversation seemed sluggish when compared to current technology such as Twitter and Instagram.

Studies involving a particular segment of the teaching population can also add to the discussion with relation to the needs of teachers regarding a method of delivering professional development through technology. One such population group included teachers of Science, Technology, Engineering, and Math (STEM). In a previously noted study, Beaudoin et al. (2013) suggested university involvement with professional development as a way to improve pedagogy and content knowledge for alternately prepared teachers in STEM areas. The value of the study was to point out which element of a researcher created workshop was the most meaningful for participants. The findings indicated participants were most interested in how to collaborate on creating and delivering lessons. The nature of the workshop was traditional while more immediate collaboration would have been just as effective in allowing for collaboratively creating lessons.

Later, methods using other technology based communication were investigated by Turvey (2012). Not only did teachers communicate and collaborate through face-to-face meetings, they communicated in a more immediate way through texting. The two teachers

presented in the case studies communicated throughout the course of the day with a high degree of immediacy through text messaging. In contrast to Beaudoin et al. (2013), the teachers were able to share with one another as interactions with students took place.

Technology-based collaboration and collegial discussion through technology helped fulfill the need for teachers to create and deliver lessons. In addition, enhanced student learning was realized while adult learners to found value in planning and implementing this type of professional development network. Teachers with limited time or resources would benefit from collaboration through technology related methods. Current technological advances have led to social networking as a form of collaboration.

Social Networking

Collaboration in a public forum can also move teachers toward building a social network with colleagues who can assist in multiple ways. The most pertinent way is for teachers to connect on a professional level and leverage the connection to develop professionally. In Moolenaar's study of *A Social Network Perspective on Teacher Collaboration* (2012), relationships were examined within schools. The study found that "there were considerable differences" (Moolenaar, p. 12) in how the network flowed and who was included. Some schools had networks which included collegial groups clustered around a few key leaders. Others formed around members with the knowledge or expertise required to solve a particular problem or provide particular information. This would indicate that social networking for professional development would be dependent on the type of outcome desired.

The type of resources flowing through the network also dictated the content. The study analyzed relationships using linear models of a social network which showed how connections

were made and what effect these connections had on school improvement. As Moolenaar discovered, "The ultimate argument for examining social networks among teachers is the premise that patterns of teacher relationships affect student achievement" (p. 23). A possible downside of social networking in schools was also mentioned. Unless a moderator or facilitator was engaged in the network, some interaction could lead to exclusion of teachers or a few controlled the direction of the network, including the flow of information.

With this in mind, the idea of a moderator or instructional support person was a key piece in Kim, Hong, Bonk and Lim (2009). The researchers quantitatively explored the effectiveness of three different reflective practices on collaborative networks. The three practices were: group reflection, self-reflection, and instructor supported reflection. The results indicated that "deep learning through group reflection is necessary for team project learning in a Web-based community" (Kim et al., p. 345). In addition to the group reflection, opportunities for "collective reasoning, group critical thinking, and collaborative problem solving" (Kim et al., p. 345) were recommended. All three were mentioned as part of the new literacies in the previous section. Not only was the network more cohesive, relationships deepened and group satisfaction increased over the course of the study. Kim et al. (2009) concluded that technology based networks had the potential to improve collaboration. Interestingly, results also supported having a moderator in addition to group reflection, a similar concept to that reported by Moolenaar (2012).

In contrast to the previous two studies, Lapham and Lindemann-Komarova (2013) surveyed Russian teachers and identified valuable networking opportunities. Listed was social networking for professional discussion and development, which did not include oversight or moderation by a facilitator. Further, teachers reported formal training as the most often utilized method of professional development. Because of the differences in governance or the

educational system, the formal method of professional development was likely mandated by the schools rather than sought out by teachers. Value placed on the activity was more an indicator of personal choice.

In order to add value to adult learning through professional development, opportunities such as networking through social media, for example, Web 2.0 platforms should be explored. The current study relied heavily on social networking to facilitate professional learning. As innovative technology is introduced and new literacies become more widely incorporated in curriculum, network based professional development will become more prevalent. Examples of the progression of technology-based professional development were seen in literature reviewed in the next three sub-sections.

Social Media

In the past, studies indicated the use of teleconferencing as a method of social interaction with regard to professional development. With widespread use of technological resources, the literature on the use of social media has increased. Social media, such as Facebook, Instagram, Pinterest, Twitter, Tumblr, and LinkedIn, created networks of users with common interests. As interests changed, users changed networks, expanded networks, or left networks entirely. Social media began as a way to connect, but has developed into a set of community based communication tools. Within the communities, sub-groups appeared where users shared common interests or collaborated on creative projects. The term “network” no longer means face-to-face connection between individuals with a similar profession or job. Networks have become a fluid series of connections linking people who may not have professional commonalities, but have a need to share information.

Turvey (2012) contended that social and professional networks could converge though the use of social media. Further, social media and the influence of technology on day-to-day life for professionals have changed the way teachers develop professionally (Turvey, p. 740). Participants in the study were actively engaged in social media usage and had formed networks with friends. For the purposes of the study, the teachers also engaged in online discussion groups. Interestingly, the analysis included a framework for each teacher indicating levels of influence social media had on professional growth. Turvey (2012) concluded that the use of social media should be viewed first as a cultural process, then as a technological process. The implication was that technology was not the important aspect, the cultural or human sociological process by the use of a technological process, such as texting, was more important. The value of technology-based professional development would lie in the outcome, not the technological process. In essence, the shared social experience.

Within the context of a cultural process, social media has a place in professional development design. The literature further indicated attitudes toward reciprocating in social media networks could be beneficial when participants were strangers. Chang, Lin, and Chen published a study on gratitude in social networks online in 2011. The premise of the study was that gratitude had an impact on reciprocity or another helping behavior (Chang et al., p. 762). Specifically, the researchers postulated that "individuals who experience gratitude are more inclined to demonstrate upstream reciprocity" (Chang et al., p. 763). Within the realm of professional development, a feeling of gratitude could lead to engagement and readiness to learn, two important principles of andragogy. A caveat to the gratitude theory emerges with further exploration of the conclusions of the study, a participant's place within the network, either embedded or on the fringe, impacted willingness to help. Therefore, before a social network

could be effectively used for professional development within a group of teachers, some common thread should be introduced.

Wikis

Exchanging knowledge in a more immediate timeframe could be provided by wikis. Collaboration through wikis was studied by Kimmerle, Moskaliuk, and Cress (2011). Users of wikis generally built a knowledge base to share or as an interactive platform for group knowledge. When interaction lead to sharing artifacts, the emphasis shifted from individual knowledge building to group knowledge building (Kimmerle et al., p. 139). In contrast to Kimmerle et al. (2011), Donne (2012) found active engagement and transparency to be stressful roadblocks to collaboration.

The implications for professional development were such that individuals posted knowledge, collaborated on common problems, looked for solutions, and built community in order to further professional growth. Prior knowledge was essential for the utilization of a wiki whereas other means allowed users to explore previously unknown topics with colleagues having more knowledge of the concept under discussion. Kimmerle et al. (2012) concluded that internalization of material contained in the study wikis was low since all the information was contained on the wiki page (p. 145). If learners used the wiki as a reference rather than an instructional tool, information was less important than where the information was kept.

In the same way, Donne (2012) studied web connections through wikis to engage a community of users. Again, the purpose of creating a wiki was to build a knowledge base. Essentially, the study showed that the wiki replaced the textbook as a vehicle for acquiring knowledge (Donne, p. 33). The upside, according to participants, was that users did not have to

match schedules or be in the same location. For use in a professional development setting, a wiki could add a way for participants to share knowledge; however, the exchange of ideas would be lacking. Participants in the study also reported stress as a factor in wiki creation. Contributions were visible and the amount of work or contributions of each individual to the group was apparent. The end result was that success in using a wiki depended on active engagement.

Micro-blogging (or Twitter)

Moving forward, a more contemporary means of social interaction using technology is micro-blogging and more specifically, the use of Twitter. Tabor and Minch (2013) investigated the potential of incorporating digital learning media to interest participants in life-long learning. According to Wright (2010), Dominzi, (2013), Tabor and Minch (2013), Twitter, as a vehicle for promoting social interaction and life-long learning, had the potential to change how people interact as adult learners.

Dominzi's (2013) study in particular found student participants utilized Twitter to connect to the content of the course 47 percent of the time. Most of the qualitative data indicated a supportive, connected collaboration (Dominzi, p. 48). Other benefits of Twitter as a collaborative methodology cited in the study included: connecting to everyday lives through content, becoming more reflective, and fostering a greater sense of community (Dominzi, p. 51). Again, the collaboration, community building, and experienced based pieces of the research added more evidence to the belief that adult learners were motivated to learn when there was a need to know, a relationship to experience, included problem-centeredness, or fostered an internal motivation to learn.

Twitter has been shown to be effective for personal learning in a professional capacity. Sie, Pataraia, Boursinou, Rajagopal, Margaryan, Falconer, Bitter-Rijpkema, Littlejohn, and Sloep, (2013), investigated the phenomenon of a "Tweetstorm" to discover networked connections between adult learners. Central to the study was the question of motivation for professionals to use social networks for professional reasons. The researchers also acknowledged the drawback of micro-blogging as inability for "in-depth discussion" (Sie et al. 2013, p. 61). The Tweetstorm method created a format for discussion which allowed participants to see tweets and follow the discussion, essentially overcoming the downside of the Twitter platform. Additionally, the Tweetstorm only lasted 45 minutes making it a quick method for collaboration (Sie et al. 2013, p. 66). Interestingly, the highest category for tweets was the category labeled "Motivation". More statements were recorded about motivation through collaborative learning than "Sharing" or "Different" (Sie et al. 2013, p. 68). In short, the participants commented on the motivational element of the Tweetstorm more than the way it differed from other methods of sharing. Adult learners in this study had a high level of motivation for participation in the learning experience.

In a similar study conducted by Zilincik, Navrat, and Koskova, (2013), researchers sought to discover preferences and intent of users in a Twitter group. The study was set up the way Sie et al. (2013) conducted the Tweetstorm investigation in that users were able to interface and see the entire Twitter conversation through topic phrases and recommended content which filtered out irrelevant tweets. The result was a concentrated conversation via Twitter (Zilincik et al., p. 2). The study allowed researchers to refine tools professional development designers could use to create preference based twitter groups. The implications for professional development

implementation of a Twitter based course or session were validated through the researchers' feedback model.

Summary

Adult learners, through the use of online tools and collaborative practices, could benefit professionally from the use of methodology based on the principles of andragogy. The concept of Malcolm Knowles' andragogy was fully explained and developed as the framework for exploration of the attitudes of teachers toward digital professional development. Review of current literature included how professional development had been changed or reformed and what part new literacies such as reflection, collaboration, creativity, and critical thinking played in contemporary professional development. Multiple methods of support were examined as well. Coaching, collaboration by experts, and professional learning communities made up the transition from expert lead, top-down professional development and formed the bridge to more contemporary forms of professional development. Social networking and social media connected the collaborative methodology to the social and professional networks found in the most current research.

For the most part, the flow of the investigations revealed changed attitudes toward professional development in general. A deeper look at available studies indicated a shift in delivery methods that more closely mirrored the principles of the framework. Factors beyond simple professional development for relating information have caused development planners to evaluate sessions for the ability to improve the quality of teaching overall. In turn, students of teachers involved in continuous professional growth, benefited through improved professional practice and a sense of community and support. Taking into consideration the nature of adult

learners, changes in educational and technological resources, and new literacies, professional development have already become areas ripe for change.

Professional development has the power to impact student achievement and improve teaching and learning. Experts on the topic, such as Darling-Hammond and McLaughlin (1995, 2000), and Michalec (2013) agreed about the need for reform. Specific reform should address the need to reach teachers through collaboration to aid in reflective practice and assist with professional growth. Because teaching and learning are linked through the skill of teachers to prepare and present material in ways that reach students, professional development is central to school improvement through improving the expertise, skills, and knowledge of teachers.

Time, schedules, and wise use of limited financial resources continue to cause educators to re-create methods of professional development. Using technology and technology based professional development has the potential to allow educators to model new literacies in a unique way. Gao, Lu, and Zhang (2012) looked at 21 studies completed between 2008-2011. The critical analysis showed the value of Micro-blogging (Twitter) in education, including use for professional development. Creativity, collaboration, and innovation can be modeled through the use of Web 2.0 interfaces such as Wikis, Email, and Twitter. The ability to connect people in close proximity as well as globally was evident through the amount of research being done on a world-wide scale. None of the studies analyzed by Gao et al. (2010), however, were done at the elementary level (p. 797-801). At the same time, as problem-based learning and collaboration skills are stressed as part of the new literacies, teachers will be expected to keep ahead of the learning curve that accelerates daily regardless of the location or level of student.

The body of research shows that through continuous adjustment and being mindful of how adult learners best function in an educational setting, attitudes toward professional development can be positively impacted. Technology based professional development can facilitate a positive shift and strengthen powerful practices in elementary classrooms. When designing a research study, recruiting participants, and gathering data through the use of a qualitative methodology the researcher should review core developments or precepts explored in previous research. In addition, the idea that professional development is a means to an end must be kept at the forefront. The reason for professional development is that students ultimately benefit from improved professional practice. Support of educators who know how to create, collaborate, think critically, and reflect on experiences should be at the core of any professional development effort.

CHAPTER III: METHODOLOGY

The purpose of this chapter is to describe the methodology selected for the examination of social media usage and implications for the use of Twitter as a method of professional development for K-8 teachers. Descriptions of participants, setting, and procedures were included. Descriptions of data collection, data analysis, and limitations of the study were described. This qualitative study included a Twitter users group and a researcher created website which included information and background for use in four modules of a **t**echnology, **p**edagogy, **a**nd **c**ontent **k**nowledge workshop (TPACK). The researcher used a case study methodology to examine participant responses and participant attitudes toward an immediate and collaborative type of professional development using micro blogs, specifically a Twitter group.

Research design

This case study examined teacher attitudes toward social media as a form of professional development and sought to answer the over-arching question: Does a Twitter users group created as a teacher-to-teacher network for the purpose of real-time, synchronous communication or asynchronous communication, facilitate professional development within a group of teachers from various school districts who participate in a Twitter forum?

The choice of a case study can be rationalized when little is known about a situation or when a program or procedure changes over time (Leedy & Ormrod, 2010). The use of a case study methodology for the current study was appropriate since the use of a digitally presented professional development session with a Twitter group is a new method of delivery. By way of explanation, teachers have embraced the use of Twitter informally, but schools do not regularly include Twitter as a way to deliver professional development workshops. Therefore, using the case study to conduct an in-depth examination of a particular professional development method

on unfamiliar subject matter with a focus on one group or organization was considered to be the most suitable for the situation (Marshall & Rossman, 2010).

An important key point with regard to case study methodology is the way in which data was collected. In qualitative research, data collection generally includes interviews with participants. According to Creswell (2013) a characteristic of the case study is "using multiple sources, such as interviews, observations, documents, artifacts" (p. 79). In the current study, data was collected through tweeted exchanges, interviews, digital documents, web postings, or other artifacts created during the course of the workshop. To clarify, digital documents were solicited to be shared by participants as a part of the workshop, and artifacts meant any product created by participants and shared through links to personal websites or document sharing applications. The use of Twitter called for analysis of all digitally collected data produced by the participants during the course of the study. The collection process began with the introductory module and demographic survey (Appendix B). Interviews through Google Hangouts or face-to-face were completed at the end of the four weeks of data collection.

At the same time, the study was also "an in-depth study of a bounded system" (Creswell, 2013, p. 77). The participants were recruited from an initial tweet to an established group of teachers who had varying degrees of experience and had collaborate through the use of Twitter. The group was seen as a bounded system since only teachers from the specified Twitter group participated. Not only was the group bounded, the time period was bounded as well. Each of four modules of the workshop were delivered within four weeks during the fall semester of the school year.

Finally, while participants were being observed through tweeted exchanges, the focus of the study was the effectiveness of the workshop connected to the use of Twitter. In essence, only one case was studied, multiple forms of data were collected, and the study took place within a bounded system during a clearly defined period of time. All of these criteria indicated the best methodology for this investigation was a qualitative case study.

Participants and Setting

The researcher used a purposeful sample of teachers willing to participate in a professional development Twitter group. Purposeful sampling and this particular setting are indicated since "the inquirer selects individuals and sites for study because they can purposefully inform an understanding of the research problem and central phenomenon of the study" (Creswell, 2013). Criteria for participation included being a practicing teacher with access to a mobile device capable of connecting to the internet. Administrators, curriculum specialists, and other support staff were included. A tweeted solicitation was employed to recruit participants (Appendix C). The number of participants was 14. Further, four of the participants volunteered for digital interviews. The districts represented by teachers belonging to the Twitter group were fairly consistent in levels of technology, had schools of varying sizes, levels, and locations in urban and rural areas, and teachers from grades K-12. The study focused only on grade levels K-8. As such, the participants represented a cross-section of teachers which gave interesting insight into the level of engagement in the workshop.

The setting was virtual since the group of teachers who participated were from various school districts including both rural and urban schools with student populations varying in size from fewer than 100 to slightly more than 1,700. High school teachers and un-graded special needs teachers, more specifically Special Education teachers, were not included in the study.

Procedure

The case study design included a workshop delivered through a dedicated Twitter network, through the Group Tweet application, and password protected website (Appendix D) connected to the study. A solicitation was sent through the Twitter forum. A second, very similar second group was accessed to fill the number of needed participants. The researcher did not need to seek permission to study teachers as the group was a virtual community made up of teachers who participated in the forum on a strictly voluntary basis. The forum was not an official Twitter forum managed by a specific school district, members were teachers from multiple school districts who formed the group. Further, the researcher had no professional relationship with any of the members of the Twitter forum. Respondents were directed to a link attached to a secure website accessible only through the use of a password. IRB approved informed consent documentation (Appendix E) and Rights of Research Participants (Appendix F) links were provided on the website. Further, the website contained information for accessing a survey. The questions on the survey gathered demographic information and was used to analyze the make-up of the group.

In order to continue to workshop modules, participants were directed to click on the Informed Consent link to proceed. Although copies of informed consent documents were available on the website through links, participation in the workshop constituted consent. Participants had the option to request hard copies of all consent documentation via email or print documents from the website. Anonymity was protected through the use of only pseudonyms in place of Twitter usernames for the duration of the study. All participants were advised of the potential risk, ability to withdraw at any time, and notice of compensation. Participation in the workshop was purely voluntary. There was little or no risk, and no compensation was offered;

however, participants participated in a no-cost professional development program. The total time investment of a participant did not exceed two hours over the course of four weeks. For participant volunteers who participated in the digital interview, the total time did not exceed two and a half hours. A workshop timeline and projected duration of participation was included. A potential benefit of the program was that participants could have acquired usable knowledge of TPACK which could be implemented in classrooms during or after the study.

Data Collection

Qualitative data was collected. The researcher followed "an analytical trail" (Corbin & Strauss, 2009) and continued to add categories or themes until saturation became apparent and no new information emerged from the analysis. If professional development occurred through Twitter interactions, or collegial conversations suggested multiple avenues to solve common problems, the analysis required a broadening of categories to accommodate a change in thinking on the part of the participants. Because the research period was segmented into four modules, data analysis began from the onset of the first tweeted conversation. Theoretical sampling and the use of open coding continued throughout all four of the workshop modules. In this way, comparisons were made and the researcher was able to explore relationships through comparison of situations or experiences of the participants from start to finish.

Data collection tools were designed to enable the researcher to ask questions and make comparisons throughout the analytical process. Corbin et al. (2009) made the assertion that "the asking of questions is useful at every stage of analysis" (p. 69). Each module of the professional development workshop incorporated multiple opportunities for participants to interact via Twitter after viewing or reading information on the researcher created website. Strategies for professional growth included tweeted conversations about TPACK elements, lesson

planning/sharing, link-sharing, or other participant created artifacts. Collected data was chunked by module, which allowed for ongoing analysis. In this way, "immersion in the setting and the researcher's and participants' world view" (Marshall & Rossman, 2010, p. 93) emerged throughout the four-week collection period. A table of collection tools, their relationship to specific research questions, and method of analysis is included in Chapter IV.

Since the study was planned for four weeks, modules were opened one at a time, one per week. Short two or three minute videos and subsequent opportunities to tweet reactions, reflections, or observations took less than 15 or 20 minutes per week. Participants were in control of the amounts of time spent on each module and Twitter conversation. Questioning occurred after each new module and consequently, tweeted conversations were initiated both during the introduction of a new module and after completion. By using tools such as tweeted exchanges, participant created documents, participant posted web links, and digital communications, it was possible to create an understanding of participant experiences and the primary and secondary research questions were answered. As such, the process was further described by outlining participant behavior through analysis of Twitter conversations and comments.

The initial Twitter post came from the researcher with a link to a researcher created website. Each participant had the ability to participate both passively and actively in discussions, or tweets. Over the study period, participants asked questions, tweeted answers, interacted digitally, or posted links and pictures to add to the discussion within the group. The researcher, after the initial post each week, did not post information or suggestions for follow-up topics on the TweetDeck. All information on the website as a part of the TPACK workshop was available after the initial opening of the module. Participants used the information to implement techniques

or principles of TPACK in their classrooms. After each module of the workshop, users were encouraged to follow-up through Twitter conversations or tweets with links to documents, artifacts, and other materials suitable for group sharing. Active participation was voluntary. Qualitative analysis methodology was utilized to allow for multiple layers of meaning. It was the intent of the researcher to explore rich layers of data through the use of digital interviews. Participants in the workshop were asked through a tweet to follow-up the workshop experience by participating in a digital interview to last approximately 30 minutes through either Google Hangouts or face-to-face. Collected data and its analysis added to the current knowledge base while it provided a no-cost professional development workshop for participants on a timely subject. At the end of the semester, the group was dissolved, the TweetDeck account was closed, and the website was made inactive.

TPACK Framework Workshop goals and objectives

Technology courses are not the sole source of digital knowledge and expertise. Teachers should be offered development opportunities that incorporate tools and skill sets to enhance pedagogy, content, and knowledge by using technology tools (Mishra & Koehler, 2006). Workshop goals and objectives created for this investigation were related to acquisition of necessary technology integration skills and competencies. All goals and outcomes were tied to classroom experiences and interactions with colleagues.

Within the TPACK framework, participants explored technology, content, and knowledge by a “thoughtful interweaving of all three key sources of knowledge” (p. 1029). An explanation of the framework and its relevance was provided in the review of literature in Chapter II. For the purposes of the study, the researcher utilized a TPACK based professional

development workshop to provide teacher participants with opportunities to collaborate through activities that incorporate TPACK principles.

Upon successful completion of the workshop, participants should have been able to:

- Integrate technology based learning experiences into a variety of curricular areas.
- Create student activities with an emphasis on collaboration and innovation through the use of technology tools and web-based applications.
- Use Twitter to engage in collegial discussions and interactions on the subject of the use of TPACK methods.

The TPACK workshop contained four modules accessed during each of the four weeks of the study. The subjects of the modules were as follows:

1. Introduction to the TPACK framework and methodology
2. Lesson planning with TPACK
3. Assessing TPACK lessons
4. Sharing TPACK with colleagues

The workshop was designed to give an overview of TPACK, it provided an opportunity to practice its principles, and allowed teacher participants to work on technology integration at a self-directed pace through a no-cost professional development session.

Data Analysis

Ongoing analysis occurred throughout the study period. The review of literature was used to provide suggested themes or categories for data analysis in the initial stages, and according to Marshall and Rossman (2010), looking at previous research as well as the conceptual framework

can give insight into clustering categories and patterns. In this study, Tweeted exchanges, artifacts, documents, and materials related to each of the workshop modules were analyzed initially for categories, and patterns through the use of Inspiration 9 software.

Interviews were conducted as a means to triangulate data (Appendix G). The interviews were comprised of ten open-ended questions designed to reveal teacher attitudes and beliefs toward professional development, the use of technology for professional development, and the use of a TPACK strategy for technology integration. By including open-ended questions similar to those used in face-to-face interviews, experiential data was collected for the purpose of examining attitudes toward the use of Twitter in conjunction with the TPACK workshop.

Using qualitative data from participants' interview responses provided a more complete picture of teacher attitudes and beliefs toward social media via Twitter as professional development and allowed for richer layers of meaning. After transcription, interview responses were analyzed by breaking down the content into "manageable segments that were analyzed separately" (Leedy & Ormrod, p. 144). Further, commonly used individual words, themes, or codes may emerge and were color coded. As patterns were noted, a matrix was utilized. The researcher hand sorted and organized the extracted data. A re-examination of data categories before reporting findings in tables and a narrative format took place.

Data Quality Measures

Data triangulation strategies included: the use of digital interviews following completion of all four modules of the workshop, member checking, and use of participants' responses to provide data rich narratives to identify common categories. More specifically, participant tweets

were included in the written analysis to illustrate actual lines of conversation or discussion. Additionally, an audit trail was completed by the dissertation committee chairperson.

Because the case study methodology was utilized, results were compared to other studies of a similar nature. Previous researchers have studied the use of Twitter for professional development on a limited basis; therefore, the studies available were few in number. Conclusions, comparisons, and interpretation of the results were discussed in Chapters IV and V.

Limitations

Limitations related to the design of the study included: inability to generalize to other districts, the four-week time frame, and participant familiarity with Twitter and TPACK. The results of the study were not generalizable to other school districts or professional development situations, but the strength of the design was in studying the delivery method and not the participants themselves. Participants could also choose to withdraw or discontinue participation in the study due to the length of commitment. Although the study took a minimal amount of time, four weeks was possibly too long for teachers to remain engaged.

Delimitations

The study used a TPACK workshop because it was useful in the selected setting. As such, the decision could have been seen as delimiting. Additionally, since the researcher chose to include only teachers in the participant group it was a delimitation that excluded any conclusions about the use of district resources for professional development with regard to administrative decision making.

Summary

This qualitative case study explored the delivery of a technology integration professional development workshop via Twitter. Participants were solicited from a Twitter forum created by teachers from various school districts and numbered 14. Chapter III outlined the research methodology and explained the procedures for data collection with a brief overview of planned data analysis. As has been noted, all IRB requirements with regard to ethical considerations were met and the confidentiality of participant information was protected by using pseudonyms. Data quality measures were employed to assure requirements of the program were met.

CHAPTER IV: FINDINGS

Introduction

Professional Development, as stated in previous chapters, has the power to change professional practice as well improve teaching and learning in a classroom. Previous researchers, such as Camburn (2010) and Timperley (2008), examined the development of teacher practice with regard to context and experience respectively. Both were found to be necessary to professional development experiences rich with meaning for participants. Creswell (2014) stated that "qualitative approaches allow room to be innovative and to work more within researcher designed frameworks" (p. 21). Given these points, a qualitative study designed to take into account adult learning theory had the potential to add to current knowledge about teacher professional development and new methods of technology integration.

The purpose of this case study was to explore whether a Twitter users group, created as a teacher-to-teacher network for the purpose of real-time, asynchronous communication, facilitated professional development by a group of 14 teachers in various school districts who participated in an independent Twitter forum. This chapter reports the findings of the research on the use of Twitter as Professional Development. The findings of the study indicated that teachers who have opportunities to respond using a quick, immediate method of professional development, shared information and experiences with one another, but not through synchronous communication. The overarching question was: Does a Twitter users group created as a teacher-to-teacher network for the purpose of real-time, synchronous communication or asynchronous communication, facilitate professional development within a group of teachers from various school districts who participate in a Twitter forum? Three sub-questions were also identified:

- What are teachers' attitudes and beliefs toward social media, specifically Twitter, as a form of professional development in a small Twitter forum across various school districts?
- How do teachers use social media, specifically Twitter, as a method of professional development in a Twitter forum across various school districts?
- Do teachers form collaborative groups through the use of the Twitter exchanges?

Questions were designed to explore new literacies teachers use to improve student experiences in a 21st century environment. Using technology to enhance or facilitate professional development, and the attitudes of teachers toward this method were also determined to be worthy of inclusion.

Participants were recruited by use of a tweet through an individual account attached to a users' group comprised of teachers with the desired credentials. All potential participants were directed to the original recruiting tweet from the account called "@SharaeGeldes". The tweet also asked participants to send an email inquiry to the researcher at pwallinger06@csm.edu for additional details and instructions for joining the study. When the initial response was slow, the researcher created a step-by-step instructional email for a uniform response to inquiries from potential participants. The researcher was also able to direct teachers to the original tweet through conversations at a professional learning event in early November as well as through social media, specifically Facebook. All participants were directed to the original tweet and subsequently emailed the researcher for details. The instructional email included a formal letter of explanation.

Fourteen participants began the study the third week of October 2016. Seven of the fourteen participants completed a demographic survey as a part of the introductory phase of the researcher created website. All survey participants were female. Forty-three percent had been

teaching for 11-15 years, 43 percent were teachers in the intermediate grades (grades 4 and 5), and 57 percent responded that their comfort level with technology was intermediate. Seventy-one percent used their smartphone frequently, which was described as more than 11 times per week. Eight of the fourteen participants finished the twitter component of the study at the end of the four-week web-based workshop.

Participants in the group engaged in Twitter discussion after viewing information regarding the use of Technology, Pedagogy, and Content Knowledge (TPACK) to integrate technology into lessons in their classrooms. All information was made available at the same time to all participants through a website developed by the researcher. One module of the website was made available each week. Participants could go back and access the information at any time. Four participants were recruited to engage in the interviews, either face-to-face or digitally, for the purpose of the additional data collection. Two participants elected to complete interviews digitally using Google Hangouts, and two elected to be interviewed face to face in their classrooms.

The tweeted data and the interviews were treated as one data set, although the interview responses and tweets were not analyzed simultaneously. A systematic approach was developed based on principles of qualitative content analysis for the initial examination of the data (Gläser & Laudel, 2013). Through multiple readings of the tweeted data and interview responses, a deeper understanding of the participants' experience was achieved. The analytical process also included "meticulous attention to language and deep reflection on emergent patterns", (Saldaña, 2009, p. 10). Although the language varied, the essence of the tweeted information, interview responses, and other digital communication, such as emails, enabled the researcher to tell a richer story using the participants' words.

Content Analysis - Conceptual Analysis

A content analysis approach was used to construct a series of categories. The researcher used initial extraction of the data to create a fluid template which could be adjusted as additional categories emerged. The method of analysis was deemed appropriate since the data points came from Twitter use, two face to face interviews, and two digital interviews using Google Hangouts. Participant responses varied in the use of specific language, but the terminology was similar. Due to the varied experience levels of participants in using Twitter and digitally based professional development, the language regarding technology was not identical.

All tweets, twitter messages, and notifications from the group designated as "@Researchwall" were analyzed for content categories. As a method of organization, the tweets were analyzed first according to order of the workshop modules and second, dates of tweets. Categories were created as subsets of the broader categories determined by the language of the research questions by looking for words and phrases related to the concepts presented in the workshop modules. Each module targeted a technology integration skill for the purpose of professional development. Interview responses were categorized through the use of the specific interview questions and integrated into the tweet analysis. Both implicit and explicit uses of words and phrases were recorded as part of the category since the data was conversational and came from a group of participants using the same educational jargon, ideologies, pedagogies, and from similar classroom situations. The final template was determined after all data had been examined multiple times and no further connections to categories could be discovered. The researcher completed the process by hand, with the aid of an electronic organizational tool, Inspiration 9, to create category charts and outlines of the data. Additional organization was accomplished through the use of category matrices.

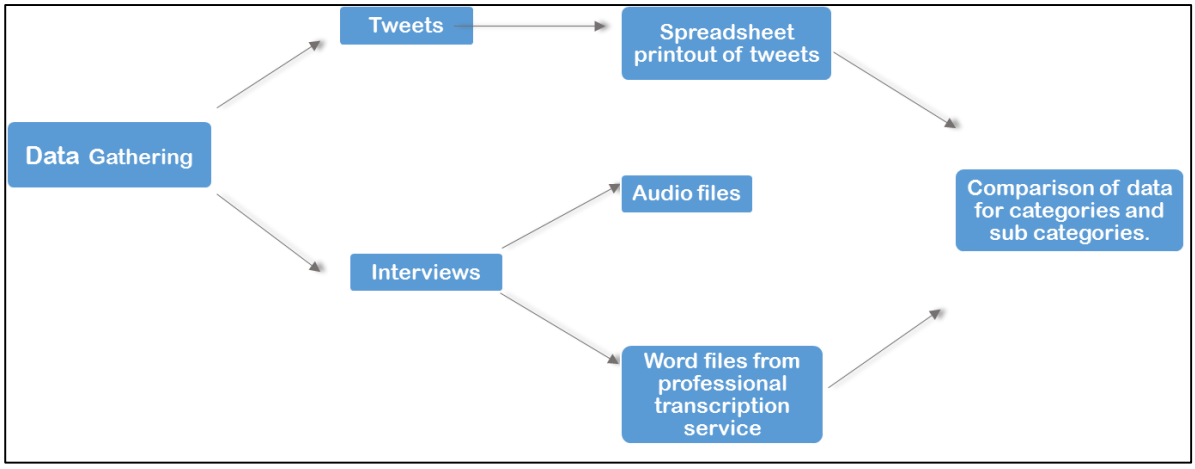
Analysis

Overarching Question

The overarching question for the study was: Does a Twitter users group created as a teacher-to-teacher network for the purpose of real-time, synchronous communication or asynchronous communication, facilitate professional development within a group of teachers from various school districts who participate in a Twitter forum? The three sub-questions derived from the broader overarching question allowed the researcher to break the data apart into categories and as Corbin and Strauss recommended, "analyze the data for process", (p. 100).

Analysis began with categorization of data gathered through tweets and interviews. The researcher was able to download a spreadsheet of tweets from the TweetDeck employed throughout the study for the purpose of discussion by participants. A sorting process followed in order to break the data apart and relate the concepts to one another by using broader categories. The next step was to cull through the tweets in each category and explore relational concepts or sub-categories. Using this process, a picture of the professional development began to emerge. Conversely, when a strand fell apart or showed no connection, there was no further concept development and the potential sub-category was discarded.

Figure 2 Wallinger Analysis Process



The purpose of the initial analysis was to create what Gläser & Laudel called an information base (Coding Versus Extracting Information section, para. 6). Because the research questions were related to theory as explained in Chapter 2, further analytical steps followed content analysis. The theoretical framework of the study, Adult Learning Theory (Knowles et al., 2011) was used with Mishra and Koehler's TPACK (2006). The theory addressed the needs of adult learners and had a direct bearing on design and implementation of effective professional development with regard to teacher attitude. Teachers, as adult learners, were impacted by each of the six principles of the theory, which lead to engagement and success in a professional growth program. The study of a new professional development platform using Twitter and designed with the needs of adult learners in mind yielded the following findings which are arranged by sub-question.

As shown through the analysis of the tweets with regard to the modules, "qualitative inquiry demands meticulous attention to language and deep reflection on emergent patterns", (Saldaña, 2011, p. 10). By analyzing tweets in this manner the researcher was able to further extract meaning applicable to the three sub-questions as well as the overarching question. Coupled with the analysis of the interviews and insertion of tweet analysis into the category matrix, richer descriptions were possible.

The results from the first phase of the content analysis enabled the researcher to complete a category matrix that could be expanded and rearranged during Phase 2. The second phase yielded further reduction of the data by searching through the tweets and interviews for important ideas for comparison and inclusion. Essentially, what Gläser and Laudel (2013)

describe as the "noise" in the data was discarded (From Texts to Explanations section, para. 3.1.2). Remaining, purer forms were sorted and further examined for placement in the appropriate category.

Content Analysis

During Phase 2 data from the tweets and interviews was extracted and categorized for inclusion in the initial categories created in Phase 1. Patterns had already emerged in the initial stages of analysis and into the more in-depth Phase 1 of analysis, consequently, Phase 2 allowed for final categories to be determined. These were:

- Teacher's attitudes about Twitter for Professional Development were both positive (ex: great) and negative (ex: confusing).
- Teachers used Twitter for four purposes: to share experiences, give advice, share lessons, and recommend apps.
- Collaboration was related to the use of Twitter, but not overtly evident.
- Communication throughout the study via Twitter was asynchronous.
- Participants reflected on professional practice and technology integration in the classroom.

Each of the first three categories were tied to specific research questions, the fourth category reflected language used in the over-arching question, and the last category was tied to the overarching question, sub-question one and sub-question two. The last category emerged as part of the professional development process seen through both sub-questions one and two. All participant names were changed to pseudonyms to ensure that confidentiality was preserved.

Sub-question 1

What are teacher' attitudes toward social media, specifically Twitter, as a form of professional development in a dedicated twitter group across various school districts?

Category 1: Teacher's attitudes about Twitter for Professional Development were both positive (example: great) and negative (example: confusing).

The first sub-question was designed to explore attitudes of teachers toward Twitter as a form of Professional Development. Teacher participants were asked to use a Twitter forum to discuss Modules on a researcher created website. In adult learning theory, the need to learn was often related to professional growth or a need to strengthen job skills (Burke, 2013). Attitude toward professional development using Twitter logically fit into the need for remaining current and improving professional practice. In the study, data showed that "attitude", in the first module and in the interviews could be examined through the way participants engaged and through specific interview questions. These were: 1)" How did you feel about the use of a website to provide workshop information?" 2) "What was the most useful part of the presentation?" and 3) "How did you feel about the use of a Twitter group?". Through the extraction of tweet data and interview data, the category regarding attitude was added to both category matrix 1 and 2. Further, "professional development" was added as a category after extracting data gained through interview questions 1) "How did you use the information from the TPACK modules?", 2) "How did you interact with the other participants?" and 3) How could you share the information you gained with other teachers?".

In sub question one, categories of attitude and professional development were extracted for use in the matrix. Data was examined for evidence of how teachers viewed the use of Twitter

for professional development. Through the interviews, both negative and positive attitudes were noted. Modules 1 and 3 yielded the most evidence of tweets reflecting these categories. The major category from sub-question one was that teachers' attitudes about Professional Development using Twitter were both positive and negative.

During Module 1, participants tweeted on a limited basis. All participants accessed the website, but only three participated in the tweeted conversation. Little connection was noted between the tweets. Participants were also confused at the onset of the research. One participant in particular, Judy, tweeted about being unsure where the tweet was being displayed. At the beginning of the study Judy tweeted, "is this walling ear research wall?", and later the same day "Is this private? It shows up with everything else". Judy used the notification wall to send two messages expressing her confusion over the use and location of the TweetDeck. Another participant, Sarah, emailed the researcher and expressed frustration with the enrollment process saying "Ok....with the help of a 6th grader!!! I'm told my username is…" after having trouble supplying a username. As a result of these exchanges, categories called "confusion", and "isolated participation" were added to the category matrix.

Responses from Sean, during a face-to-face interview, indicated he felt confused. When asked about the use of a Twitter group he responded "Uh, first time I was confused" and then "I saw the value in it." Although confused, Sean was able to overcome the initial feeling of confusion and posted tweets of his own. Having seen the value in it indicated a change in attitude once he had seen other participant posts. This shift illustrated the adult learner's need to know (Knowles et al., 2010). Being intrinsically motivated and having a need to know allowed the participant to shift from confused to a more positive feeling toward the use of Twitter during the last two modules of the study.

Similarly, Diane had an initial response of "I believe Twitter is a good group, unfortunately, I wasn't as comfortable as what I thought I was using Twitter. I normally just look at the tweets, I don't normally tweet on other people's comments, it was confusing at first for me." Diane indicated that she found other digital media to help her feel more comfortable. Again, the learner's need to know enabled Diane to continue to contribute to the @researchwall discussion and leverage her prior knowledge of technology resources to solve a problem. Diane asked for a face-to-face interview, although she was not uncomfortable with technology and had indicated she used other electronic options for gathering information.

Conversely, Jackie, responded positively to the question about use of a Twitter group by saying "Love it! I'm a big Twitter user but I loved that… I don't know I feel like it's a great resource, so you're getting ideas from other people, and you're helping other people, hopefully, so I like that as a PD option, yes I liked it." Jackie's attitude was positive and professional development was specifically mentioned. She was comfortable with social media and had experience with Twitter. Jackie also requested a digital interview through Google Hangouts.

During the interview with Sandy, when asked about the use of a Twitter group, she indicated she was comfortable with Twitter and responded "I thought it was good", She also said, "when I was able to scan through what everybody had posted it was nice to read through what some of the things that some people were sharing." Sandy's attitude toward the use of Twitter was positive and she found it beneficial to scan the other users' posts.

Overall experiences were positive, even though three participants specifically commented on being confused or having difficulty connecting to the TweetDeck or Twitter. Each found a way that personally fit his or her needs as adult learners to overcome the confusion and continue

the professional development experience. The researcher was able to draw this conclusion because the participants went on to tweet comments or observations in the next module of the workshop. Participants who felt comfortable did not need to adjust, since each had previous experience with digital media and found it easy to use. Sandy and Jackie in particular tweeted throughout the entire study.

Sub-question 2

How do teachers use social media, specifically Twitter, as a method of professional development in a Twitter forum across various school districts?

Category 2: Teachers used Twitter for four purposes: to share experiences, give advice, share lessons, and recommend apps.

Sub-question 2 was designed to explore the use of social media, specifically Twitter, by a group of teachers for professional development purposes. Through Modules 2 and 3 of the workshop, participants were able to share information on suggested topics or create topics for discussion. The idea that adult learners were self-directed and responded best when the learning was problem based were evidenced through the increased number of tweets during Modules 2 and 3. Self-directedness and problem based learning were two of the six principles of adult learning (Knowles et al., 2011) applicable in this instance. In the interviews, questions five and six addressed the way participants used the Twitter group and workshop during the course of the study. Specifically, the questions asked, “How did you use the information from the TPACK Modules?” and “How did you interact with other participants in the study.” Responses to these questions were similar from all four participants interviewed. Although the participants did not

interact directly, each indicated they reviewed the other tweets and subsequently posted asynchronous responses.

From module to module, participants went back to a previous concept or mentioned a specific device more than once. For example, in the first module of the workshop, these concepts were introduced: TPACK and the use of technology in lessons. Participants shared experiences using technology in the classroom as it related to the participants' individual experiences. Both interview data and tweets showed use of the module information within the context of classroom experience. Participants reflected on personal experience and drew from situational knowledge to apply the information from the modules. This finding was consistent with the principle of learning related to experience, (Knowles et. al, 2011).

Module 2 presented questions for participant discussion on successes with technology, applications used, and projects for students. The tweets indicated participants were familiar with the concepts. Language used by participants was more personal with similar words, specific examples were: "engaged" or "engagement", and linking student work with specific devices or projects. The number of tweets tripled in the time frame for the second module. During the week of Module 2, six participants shared names of devices, applications, or web-based learning tools they had used successfully with students. It was noted that Judy and Sarah, who each had difficulty in the beginning week, tweeted during week two. Judy tweeted, "I also use Chromebooks. The kids seem to enjoy them, however, I don't use them on a daily basis." Sarah tweeted "Having one iPad I use for small groups. My biggest tool is the smartboard. I have started using Chromebooks too!" and "Promethean Boards aging out, but they provide an easy way to view video, computer content, and use as a whiteboard with interactive pens." Each of the

tweets showed reflection on personal practice to share information with peers. Two points to note:

- the participants were interactive, although not synchronously as the tweets were in the same module but two days apart, and
- Judy and Sarah overcame the difficulty with initial confusion, found the TweetDeck, and tweeted personal experiences the second week.

Throughout modules one and two the tweets followed the suggested topics from the workshop. Other participants continued to view the website, but did not contribute on the TweetDeck. Jackie, Judy, Diane, and Sandy used both the website and tweet deck in their participation. Kelly and Diane used both the website and TweetDeck, but were not as vocal through tweets. Additional categories of "devices" and "projects" were added to the matrix as sub-categories.

The level and number of participants remained stable at eight in Module 3. There was a slight increase in the number of tweets and the number of participants actively tweeting remained the same. Website access dropped from 14 participants to eight over the first two weeks of the study. It was noted that all 14 participants viewed the workshop, but all 14 did not add to the TweetDeck. The time frame from the beginning to the two-week midpoint was from October 25th through November 7th, which marks the beginning of the second quarter of the school year and moves toward the holiday of Thanksgiving. During the second week of TweetDeck use, continuing into the third week, "Lurkers", accounts without permission to participate, were visible in the notifications panel. Lurkers were identified as application developers of Kahoot and Classkick, participants' colleagues, and one other non-related educator. Lurkers did not interact directly with participants, but were able to read participant tweets and comment within

the restricted panel of the TweetDeck. Comment examples were, "@researchwall Glad to hear you enjoy using Kahoot! It's such a great way to know where to go next with your students!" There were a total of five Lurkers who followed the @researchwall account. Although Lurkers were interesting to note, the categories in the matrix were not adjusted to include "Lurkers", since the tweets were not germane to the module or tweeted discussion.

Module 3, week three data showed that the participants shared ways to assess student work. Tweets were related to rubrics and ways to formatively assess students. Two specific tweets mentioned the words "as a Parent", "my son", or "parents" in general and came from Diane and Sandy. The mention of parents indicated that participants used web-based applications as a means to share assessment with parents in a visual form using actual student work. While not part of the workshop specifically, it was an ancillary topic for Module 3. Reporting results to parents was noted as a part of developing ways to report progress and added to the category matrix.

Participants gave specific examples of technology based tools used in the classroom and specific assessment activities. Also noted was commentary on keeping parents informed. These included a variety of applications which were common among participants. Most common among these apps were Google classroom and Explain Everything. Evidence of professional development could be seen in the tweeted comments. Findings from the interview data were similar when looking at the category of use.

All four of the participants interviewed responded the same way when asked about sharing information with other teachers. Table 1 shows the responses. Sandy had a specific

presentation scheduled for the staff of her school, but the other participant responses were more speculative.

Table 1: *Participant Responses for Sharing Information*

Q 8: How could you share the information you gained with other teachers?
Sandy: "I'm presenting to our staff about using technology in the classrooms so I could take some of the stuff that I learned from there and show our staff in a meeting." **Jackie:** "just kind of talk about the benefits of the…of having that PD group on a Twitter and how much it really does benefit you and how… I mean you could tweet out a question and get a ton of responses within 30 minutes" **Sean:** "one of the things we are working on is more ways for professional development and I have told Mr. D (principal)that I think we have a lot of knowledge here that we don't share…like what is it people already know how to do?" **Diane**: "I could show them the things that were talked about on the tweets."

Participants responded similarly to the question and all indicated the ways in which they would have opportunity to take information from the study and share with others. While the tweets shared in the moment, interview responses showed a willingness to share after the Twitter experience. The sub-category of "sharing information" relates to sub-question 3 as well as sub-question 2.

Sub-question 3

Do teachers form collaborative groups through the use of the Twitter exchanges?

Category 3: Collaborative relationships were related to the use of Twitter, but not overtly evident.

Sub-question 3 was created to explore types of teacher participant interactions during the study. With 14 participants who were working in classrooms, the survey findings indicated that

the seven participants who completed the survey were demographically different in years of experience and level of technology use. The group was similar in that all participants worked with students from Kindergarten through Grade Eight. Because the researcher was a classroom teacher and had experience using technology in the classroom, researcher bias was taken into consideration and adjustments were made to the matrix so only data driven categories and sub-categories were included.

The data showed that the two participants with the most experience in using Twitter in educational practice were the most prolific. Because of the experience level, differences in their posts were noted. Further sub-categories emerged when analysis of all tweets was completed. The other participant voices were quieter during the tweets, meaning the wording was less conversational and more formal. To illustrate, the following two tweets contain noticeable differences in language and conventions. On November 11, Sandy tweeted "Assess Ss learning w/rubrics. I use Rubistar to make rubrics. Rubistar.4teachers.org/index.php Rubrics check for understanding, creativity, & effort". And on November 14, Diane tweeted "I use rubrics and picture documentation". The first tweet included a comment and source, while the second only a comment. The two tweets were similar, and showed collaboration in that Diane responded to Sandy's comment on the use of rubrics to assess student work. Further, the tweets on the same subject were not synchronous, but in this case indicating asynchronous collaboration. None of the tweets were synchronous, with the exception of tweets posted by the same user in order to continue a thought. Both Sandy and Jackie employed the use of multiple tweets to extend commentary. The additional sub-category of "tweet-speak" was added to the matrix. Tweet-speak was nested under the broader category of "use". Further, tweets containing tweet-speak

were saved to an evidence matrix for use during Phase 2. Table two offers examples and meanings of the shortened forms used by Sandy and Jackie in their Twitter posts.

Table 2: *Shortened Forms used in Twitter Posts*

User	Shortened Form	Meaning
BOTH SANDY AND JACKIE	Ss	Students
	w/	with
	apps	applications
	pic	picture
	u	you
SANDY	r	are
	2teach	to teach
JACKIE	luv	love
	gr8	great

With Sandy and Jackie, evidence indicated each possessed facility with Twitter and had an expertise other participants did not exhibit. Support for the addition of the category came during the interviews. Both participants volunteered for interviews and requested the interviews be completed digitally through Google Hangouts. These two participants were also the first to tweet at the beginning of the study, had the most suggestions throughout the study, and the most tweets of all who participated. The tweeted communication and interview responses also indicated that Jackie and Sandy had more practical classroom experience integrating technology than any of the other participants.

From the overarching question

Did teachers use Twitter synchronously and asynchronously?

Category 4: Communication was asynchronous.

The overarching question was intended to explore specific aspects of Twitter as professional development, including whether the interaction included both synchronous and asynchronous communication. The category matrices both included references to synchronicity and asynchronicity, but only matrix 2 listed evidence from the participants through extracted interview data.

While the group posted collegial tweets, participants did not overtly form distinct groups or partner with one another to collaborate or converse synchronously. There were only two instances of participants asking direct questions at the beginning of the study during the first module. Judy asked "is everyone having a good night" and again asked if "this is walling ear research wall". Although Judy attempted to start a conversation, other participants did not respond to the questions. Similarly, Jackie responded in her interview that "I tried to like, piggyback off of other people's ideas, as well as put my own out there to kind of get a conversation going." There was no evidence of a conversational thread beginning with Jackie's post.

The most compelling participant evidence that all posts were asynchronous came from Sandy during the Google Hangout interview. She said "I don't think I was ever really on there when somebody else was on there at the same time." The tweets in general indicated attention to the website content, but not a direct collaboration through a tweeted conversation between participants. Time was also a factor in when participants tweeted. Seventy-one percent of the

tweets were posted in the evening or later at night. The tweet analysis showed that participants did not tweet every day, nor did participants post at consistent times of the day.

Category Five: Participants used the Twitter group for reflecting on professional practice and how technology was used in teaching.

This category was originally added was a sub-category of the overarching question and interpreted as a reference to professional development. Evidence for the "reflection" category came from both the tweets and interviews. The website content suggested discussion points, but the participants had to reflect on practice to respond through the TweetDeck. All four of the interview participants' responses referred to going back to look at information previously posted. In the final data extraction, the categorical evidence was strong enough to merit making "reflecting on professional practice" the fifth category. The tweets from week four were a direct result of participant reflection.

The last module of the workshop asked participants to discuss successes and failures, how or what they learned from students, and suggestions for new things to try. Diane, a participant who had consistently participated throughout the study, tweeted "Flop: got all kids logged on to Google Classroom to type their sight words and then they couldn't do it because I didn't share it with all!" Sandy posted "learned that I need 2teach digital citizenship. Not all parents understand it. Digital Compass is a helpful tool." Each tweet was posted during the last module and were specific to personal experience. Participants thought about classroom interaction, pedagogy, and how they integrated technology, whether a success or a failure.

Tweet numbers in the fourth module declined slightly. The dates of module 4 were November 15th through the 23rd. Only three participants posted during the last week of the study,

although eight continued to access the website and participate in the workshop without tweeting. Further scrutiny yielded no additional evidence of reflection by participants other than those already discussed and the researcher posted the final tweet on the day the study concluded, thanking participants for taking part in the study. The tweet also included a request for volunteers to be interviewed during the last two weeks of data collection.

The researcher was able to see a direct relationship between reflection and practice through comments extracted from interview data. Participants shared thoughts about reading what others posted, going back to read posts from previous weeks, and mentioned that they had time to think about how their experiences influenced what they taught in the classroom. Each of the participants interviewed was open to sharing experiences, reflecting on practice, and offering opinions which added a rich layer of personal experiences in the face-to-face and virtual setting.

Summary

The major findings of the study can be reported as five categories. First, that users had both positive and negative attitudes about the use of Twitter, but in general overcame confusion or frustration and participated in professional development. Second, teachers used Twitter for four purposes: to share experiences, give advice, share lessons, and recommend apps. Third, collaboration was indirectly related to the use of Twitter and not overtly evident. Fourth, tweets were posted as users had time, and none of the posts were synchronous. Finally, reflection was a part of the professional development process.

Data collection provided evidence from postings on the TweetDeck, two face-to-face interviews, and two Google Hangout interviews. All data was examined through a process designed by the researcher and based on Gläser & Laudel's Qualitative Content Analysis (2013).

The researcher used a two phase analysis to extract important information which influenced the creation of the category matrices.

All analysis was additionally tied to the conceptual framework based on Malcolm Knowles theory of andragogy and Mishra and Koehler's TPACK (2006) as explained, in depth, in the review of literature. The most evident principles were that participants reflected on previous experience to share both successes and challenges in teaching practice, the learners were self-directed, and the learning was problem-centered and intrinsically motivated. While the participants were under no pressure to complete the workshop, a core group of eight out of the initial fourteen completed all four modules, which showed that the participants viewed the workshop and Twitter participation as valuable to improving professional practices.

Through the interview process, participants indicated that they would share the information they gained in some way after the study ended. Sean related the fact that his school was looking for professional development ideas and the staff could use what "people already know how to do". Sandy and Jackie spoke about presenting to their building staff and tweeting out questions. Finally, Diane talked about "showing people some of the things on the tweets". Each of the four interview participants expressed the desire to share the information with colleagues after the conclusion of the study.

The findings, in general, showed:

- The users had positive (it was great) and negative (confused) attitudes toward the use of Twitter.
- Teachers used Twitter for four purposes: to share experiences, give advice, share lessons, and recommend apps.

- Tweets were posted as users had time, with no synchronous communication on the TweetDeck.
- Professional Development occurred and participants used reflection to consider professional practice and personal experiences to add to the posted information.

Overall, the analysis enabled the researcher to answer the research questions in a meaningful way using the research methodology. Chapter Five will discuss an interpretation of the findings and the implications of using Twitter for Professional Development. Limitations of the study and recommendations for further study will also be presented.

CHAPTER V: DISCUSSION

As stated in Chapter I, professional development has the power to affect what and how teachers teach. Further, the inclusion of technology as a method of enhancing and often driving curriculum and instruction requires a new model of pedagogical practice. According to Darling-Hammond and McLaughlin (1995), "Beginning with preservice education and continuing throughout a teacher's career, teacher development must focus on deepening teachers' understanding of the processes of teaching and learning and of the students they teach" (p. 82). Under these circumstances teachers, as adult learners, must be open to rethinking what and how they teach in order to best reach students in their classrooms. There must also be some degree of adaptability to changing student populations and the use of digital technologies, which teachers must understand and facilitate, in order to teach technologically savvy students.

With a melding of both Adult Learning Theory (Knowles et al., 2011) and the Technology, Pedagogy, and Content Knowledge or, TPACK, model created by Mishra and Koehler (2006) as a framework, a study on the use of social media, specifically Twitter, for teacher professional development had the potential to change the professional development offerings. Teachers self-directed their growth opportunities with "Un - Conferencing" and EdCamps, both of which were participant managed. Opportunities for collaboration were not always readily available or teachers found themselves working in an isolated environment where limited resources dictated that professional development was restricted to large group, expert led workshops. The large group delivery method often fell short of meeting the needs of all participants or had limited results in creating lasting change to benefit students. To illustrate, Timperley (2008) believed that "Professional learning opportunities that have little impact on student outcomes typically focus on mastery of specific teaching skills without checking whether

the use of those skills has the desired effect on students" (pg. 8). Technology allowed teachers separated by distance to meet virtually with experts, other teachers, or whomever they choose from the convenience of wherever they happened to be.

Purpose of the Research

The purpose of the study was to explore the use of social media and implications for the use of Twitter as a method of professional development to deliver a TPACK workshop. Attitudes of teachers toward a more immediate and collaborative type of professional development using a Twitter group were examined. It was the premise of the investigation that collaborative, immediate, and interactive methods more clearly aligned with a school district's goal of providing professional learning opportunities for teachers as adult learners in the most efficient and meaningful ways.

A qualitative case study was designed to explore the following research questions:

Does a Twitter group created as a teacher-to-teacher network for the purpose of real-time, synchronous communication or asynchronous communication, facilitate professional development within a Twitter forum across various school districts?

- What are teachers' attitudes and beliefs toward social media, specifically Twitter, as a form of professional development in a small Twitter forum across various school districts?
- How do teachers use social media, specifically Twitter, as a method of professional development in a Twitter forum across various school districts?
- Do teachers form collaborative groups through the use of the Twitter exchanges?

Participants in the group engaged in Twitter discussion after viewing information regarding the use of Technology, Pedagogy, and Content Knowledge (TPACK) to integrate technology into lessons in their classrooms. All information was made available at the same time to all participants through a website developed by the researcher. One module of the website was opened each week. Participants could go back and access the information at any time. Four participants were recruited to engage in interviews, for the purpose of additional data collection and another deeper layer of experience from participants, either face to face or digitally. Two participants elected to do interviews digitally, using Google Hangouts, and two elected to be interviewed face to face in their classrooms. The tweeted data and the interviews were treated as one data set, although the interview responses and tweets were not analyzed simultaneously. A systematic approach was developed based on principles of qualitative content analysis for the initial examination of the data. (Gläser & Laudel, 2013).

A content analysis approach was used to construct a series of categories. The researcher used initial extraction of the data to create a fluid template which could be adjusted as additional categories emerged. The method of analysis was deemed appropriate since the data points came from Twitter use, two face to face interviews, and two digital interviews using Google Hangouts. Participant responses varied in word choice, consequently, concepts were grouped according to meaning and not the specific language. The terminology was similar, but due to the varied experience levels of participants in using Twitter and digitally based professional development, the language was not identical.

Through the use of content analysis, the research study yielded findings reported as categories. These categories included how teachers viewed the use of Twitter for professional development, four ways teachers used the Twitter group, that collaboration was not overtly

evident through back and forth conversations, communication was asynchronous, and reflection was a part of the development process. Chapter Five includes the discussion of each of the categories with implications for professional practice as well as recommendations for further research.

Sub-Question 1

What are teacher' attitudes toward social media, specifically Twitter, as a form of professional development in a dedicated twitter group across various school districts?

Assertion 1: Teacher's attitudes about Twitter for Professional Development were both positive (ex: great) and negative (ex: confusing).

The assertion for sub-question 1 was that participants had both positive and negative attitudes toward the use of Twitter as a method of professional development. Although participants voluntarily joined the Twitter group, two had difficulty beginning the study (Judy and Sarah), and through responses during the interviews, both Sean and Diane said they found it confusing. Table 3 shows the tweets and interview responses with a negative connotation.

Table 3: ***Tweets and Interview Responses – Negative Connotation***

Source	Connotation	Comment	Cause	Participant
Interview	Negative Attitude	"1st time I was confused;"	Toward Twitter	Diane
Interview	Negative Attitude	"Confusing at first;"	Toward Twitter	Sean
Tweets	Negative Attitude	"is this walling ear research?"	Difficulty finding @researchwall	Judy
Email	Negative Attitude	"Ok....with the help of a 6th grader!!! I'm told my username is…"	Confusion on username	Sarah

Although the initial responses were negative, each of the participants sought help to overcome the frustration or negative feelings and continue the study. Sarah tweeted for another two weeks before dropping out of the Twitter group and Judy continued through the end of the third week. Judy finished the workshop through the website, but didn't continue her Tweets. Frustration had an impact on visible participation, but one participant saw the value of finishing the workshop. The adult learning theory principle, the learners' need to know and intrinsic motivation (Knowles, et al., 2011) pushed the participants to continue. To elaborate, knowledge of technology integration as an element of what teachers need to know had an effect on participants' continued use of the website. The need in this case was for what was learned, how it was learned, and why the learning was necessary (Knowles, et al., p. 147).

During the interviews, both Diane and Sean reflected on their initial confusion and mentioned "feeling confused at first" or "first time I was confused", but followed with ways they found to overcome the frustration. Again, the participants were intrinsically motivated to continue and ultimately volunteered for the interview after the workshop concluded and articulated the motivation through their interview responses. Furthermore, by continued participation in the workshop and interviews Diane and Sean allowed their need to know overcome their confusion.

In the literature, the need to know was a factor in the success of professional development. According to a study by Kindle (2013), "teachers benefit from professional development that has depth and breadth, and when they are included in the planning process" (p. 178). In the current study, the participants had control of where the professional development would go next through the TweetDeck posts, they chose what information to use from the

website, and they chose the time. Essentially, each participant could participate when and how they needed. What this meant was that participants read posted comments as schedules permitted, chose what information to post themselves, or changed the subject when they posted about a divergent topic. For example, in Module 2, participants posted about engagement one day and favorite applications the following day. The participants changed the professional development to meet their needs in the moment.

Given these points, the other side of the assertion was that participants also had positive feelings about the use of Twitter. Table 4 shows the interview responses made by Jackie and Sandy when asked about their use of the Twitter group and the website. The recorded responses were very positive and the participants showed enthusiasm for the use of technology as a method to connect with other participants. Jackie's response was more effusive than Sandy's, but overall the word choice and attitude was had a positive connotation. The field notes also showed that the participants were relaxed and comfortable with the use of a digital interview. Looking back at the Kindle (2013) study, these participants had prior knowledge of the medium, were comfortable, and felt in control of the professional development which led to their personal benefit.

Table 4: ***Tweets and Interview Responses, Messages – Positive Connotation***

Source	Assertion	Comment	Cause	Participant
Interview	Positive Attitude	"Love it. I'm a big Twitter user, but I loved that."	Use of Twitter	Jackie
Interview	Positive Attitude	"I absolutely loved it, I think it's efficient, no paper mess to keep track of and it was easy to access."	Website	Jackie
Interview	Positive Attitude	"I thought it was good"	Use of Twitter	Sandy
Interview	Positive Attitude	"I really liked it. I thought it was easy to access."	Website	Sandy

As adult learners who were asked to integrate technology into their own experiences, the participants who were negative at first were able to overcome the frustration and actually became very positive about the experience. Sean was a good example of this shift in thinking. Hesitation came from not being used to a website for professional development and then going to a second application. As shown by his response, "the process to get onto there the first time was a little, having to go through several steps, was a little tough", having to access Twitter after using the website was seen as a process. After consideration of what he was able to see as a positive he went on to say, "I think it's a good way for everybody to share information and post to get everything in one place." As far as the Twitter group, he remarked, "I saw the value in it." Not as enthusiastic, but positive.

Diane had the same attitude shift, but was positive about the website from the beginning. It is important to remember that Diane was the participant who used a technology solution to her problem. She went to other sites to find out about Twitter when she felt confused or frustrated. Her response was, "I went and found some different videos or different comments on how to post a tweet." Diane found a solution and continued to participate. She had the technology tools available to work through her difficulties and used the tools to her advantage. The problem solving strategy illustrated that Diane's need to know about Twitter use compelled her to find a work-around.

Eventually, the attitude shift allowed participants to access information and share insight, comments, or experiences. By way of illustration, Burke (2013) studied the concept of self-directedness. Methodology in the Burke study was the use of an experiential professional

development course offered to teachers. Burke evaluated teachers' prior experience and level of familiarity with the basic principles of communicating in a world language, as opposed to them simply learning about the world language. Teachers were found to be more apt to be successful if there was a higher level of self-directedness involved. For the professional development using Twitter to be successful the adult learners in the study had to be willing to call on prior knowledge and skills. Attitudes changed when participants drew on previous experience or found the skills they already possessed were useful for technology based professional development.

Sub- Question 2

How do teachers use social media, specifically Twitter, as a method of professional development in a Twitter forum across various school districts?

Assertion 2: Teachers used Twitter for four purposes: to share experiences, give advice, share lessons, and recommend apps.

The second assertion to come from the research findings addressed the uses participants had for the Twitter group. Four distinct purposed were evidenced by participant tweets and interview responses. Participants shared experiences, gave advice, shared lessons, and recommended applications others could leverage in their classrooms. Each purpose was clearly a part of the posts or was influenced by accessing the website to view the weekly workshop module.

The first week of the workshop was an introduction to technology integration through the TPACK model (Mishra & Koehler, 2006). The number of posts was low and since the module was an introduction, the suggested topics were related to integration and technology use in the participants' classrooms. Jackie and Sandy were the first to post and both shared the use of iPads.

The tweets were descriptive and talked about student creativity through lessons from each participant's classroom experience. The adult learning theory principle (Knowles et al., 2010) related to experiential influence on learning was applicable to what Jackie and Sandy posted. Clearly, learning was facilitated through the way the information was presented, but the concept was internalized through a comparison to prior learning through a classroom experience. Further thought was also given to the fact that these two participants were intrinsically motivated.

The study was not a required professional development opportunity, and there was no external motivation to continue. VanLoon, Ros, and Martens (2012) explored learning as influenced by self-determination and intrinsic motivation. In the study, it was discovered that learning was more likely to occur if the learner was intrinsically motivated. Motivation was a factor in the previously discussed assertion that Diane, Sean, and Judy overcame the frustration and confusion to continue the study, and Sandy was unable to move beyond frustration and dropped out of the study completely. Unless a participant had strong intrinsic motivation and found technology integration to be important to daily practice, continued participation was unlikely. With regard to professional development, when coupled with the idea that andragogy requires learners to see value in what is being learned, long term professional development may lose steam if not continually evaluated for usefulness and validity, (Gunn & Hollingsworth, 2013).

The other purposes for the use of the Twitter group were to give advice, share lessons, and recommend apps. By using words like 'engaged" and "engagement", and linking student work to specific projects, the participants let others in the group know what had worked for them and how students were actively involved in the lesson by the use of particular apps or strategies using an iPad or Chromebook. The mention of student participation by using the word

engagement was indicative of a successful lesson in the participant's classroom. Technology had the potential to influence student engagement, but a teacher was necessary to guide its use.

The very nature of technology is that the use of a device is not readily apparent. By way of illustration, an iPad and an android tablet differ in the apps that can be downloaded. Teachers who use technology successfully do so after having learned what works and what does not while using specific devices in the classroom. Giving advice was an important component of professional development and also indicated participant reflection on professional practice before posting something sure to be read by others. Judy tweeted, "I also use Chromebooks. The kids seem to enjoy them, however, I don't use them on a daily basis." Sarah tweeted "Having one iPad I use for small groups. My biggest tool is the smartboard. I have started using Chromebooks too!" and "Promethean Boards aging out, but they provide an easy way to view video, computer content, and use as a whiteboard with interactive pens." Each of the tweets showed reflection on personal practice to share information with peers. Overall, the participants who continued through the end of the workshop were intrinsically motivated by a need to know the information for professional growth and development. Sarah had good advice or pertinent comments, but did not follow through after the second week.

Sub-question 3

Do teachers form collaborative groups through the use of the Twitter exchanges?

Assertion 3: Collaboration was indirectly related to the use of Twitter, but not overtly evident.

Assertion 3 speaks to the element of collaboration. During the study, a core group of participants continued through each module of the workshop. Not all tweeted consistently. Jackie and Sandy were most engaged and gave the other participants valuable information on

technology integration. These two participants were strong contributors and reached out to the others. Jackie mentioned trying to "piggyback off of other people's ideas" in order to start a discussion. Although Jackie attempted to form a direct connection, there was no direct conversation and tweets were not synchronous. There was a loose collaboration due to the method of communication having been a Twitter group with participants accessing the same website and posting comments during the same period of time.

Collaboration in the traditional sense was not evident. A different definition of collaboration has emerged with the advent of new literacies and the use of web-based communication platforms. Being in the same room at the same time is no longer required. New literacies include collaboration, reflection, creativity, and critical thinking in order to solve problems. All of these literacies can engage adult learners when put into the theoretical context of andragogy. Kim, Hong, Bonk, and Lim (2009) investigated how reflection and project-based learning could be part of a Web 2.0 learning platform. In the study, participants were randomly assigned to a team for the purpose of collaboration in a hybrid graduate class. The study measured satisfaction of the group and level of activity of the group participants. Ultimately, the results of the Kim et al. study indicated that the more active and reflective the group was, the deeper the learning. The twitter group showed evidence of reflection through tweeted comments and interview responses.

Although the entire group of participants during this Twitter study was not active, those who were had an indirect relationship. When put into the context of new literacies and how groups work through Web 2.0 learning platforms, the active participants gained deeper understanding, although not collaborating in the strictest sense of the word. Use of web-based

professional development took away the face-to-face connection. None of the group purposefully connected with a single other participant on the TweetDeck.

Moolenaar (2012) had this to say about the importance of collaboration and the relationship to professional development to effect change: “In the past 20 years, educational researchers and policy makers have become increasingly interested in teacher relationships and teacher collaboration to support teacher professional development” (p. 7) The single most important type of collaboration in the current study was implied through the responses from the interview question about sharing information. Each of the interview respondents mentioned ways in which they would have the opportunity to take information from the study and share it with others. Direct interaction and collaboration could come after the conclusion of the study as these participants share with other teachers in their buildings or professional circles.

From the overarching question

Did teachers use Twitter synchronously or asynchronously?

Assertion 4: Communication was asynchronous.

Asynchronous communication was noted throughout the study. During the data collection, each of the tweets was timestamped as it was posted. None of the tweets were posted synchronously, but Jackie and Sandy used multiple tweets, posted one after the other, to continue a thought or expand on an idea. None of the other participants used this strategy. Twitter has not generally been considered a conversation tool. As twitter added more capabilities, such as adding links or features such as TweetDeck for groups, conversation has begun.

Evidence emerged through analysis which indicated that the posts were added to the TweetDeck at a participant’s convenience. Professional development that considered time and

distance was mentioned in the literature as having an impact on adult learning. In their 2004 study of issues facing online learning communities, Charalambos, Michalinos and Chamberlain included the globalization of the economy and how teachers kept up with the explosion in the number of informational sources available to both teachers and students. Online collaboration minimized the distance between educators and their counterparts in other parts of the world. Instead of a limited collaborative group, teachers could problem solve with a greater number of colleagues, using a wider network of information. Charalambos et al. (2004, p. 139) pointed out that the interest in online learning communities increased every day.

Participants in the current study had the ability to dictate where and when they added to the TweetDeck or how often they went back to the posted comments. The members of the twitter group were not bound by a specific period of time to have access to other participants' input. Because the participants were not compelled to collaborate in a workshop with time constraints, problem solving and reflection were possible.

Final Assertion: Participants reflected on professional practice and technology integration in the classroom.

Reflection was an important component of professional development during the study. In the literature, reflection was an important part of lasting change through professional development. Camburn sought to investigate how reflection and collaboration could enhance professional practice in his 2010 study. The Twitter study allowed teachers to reflect on previous experience to share successes and revisit challenges in teaching practice. Essentially, reflection made a valuable contribution to improvement when coupled with collegial conversations within

a non-threatening relationship. In the study under discussion, Twitter conversations were reviewed and analyzed for the degree of reflection.

Jackie expressed her belief on the value of the experience when she said "you know I like the website, I thought there was a lot of good information there, but I also liked…going through like I said, the Twitter feed and reading different people's tweets and getting some different ideas". When asked about the use of TPACK she said, "I took a step back and really thought about how I – what I was doing in my classroom". When Jackie reflected on her own practice, she was able to tweet information with deeper meaning. She had ideas and strategies, but reflection validated how she put her technological pedagogy into practice. Jackie's professional development experience through the use of Twitter had the desired effect.

Significance

The review of literature indicated that traditional methods of delivery for professional development offered limited engagement, did not result in sustained or lasting change, or addressed a narrow scope of pedagogical, content, or knowledge questions without taking into account the needs of individual teachers with context specific concerns.

Many times school districts spend limited dollars allocated to professional development on the types of opportunities that reach large groups of teachers all at once and address clearly defined methodologies or a single, narrowly defined and scripted topic. At the same time, many research based professional development programs address methodologies or teaching strategies which have been shown to be effective in specific circumstances or, in context specific situations. When the context differs or participants find no similarities to personal context, the program fails to produce optimal results for positive student learning (Timperley, 2008). In

essence, professional development programs must be applicable to the participating teacher's practice. While the context is important, so is the ability to integrate prior practice with changes in the way students learn or in available materials and technologies currently being used in classrooms. Given these points, the TPACK (Technology, Pedagogy, Content, and Knowledge) model of technology integration (Mishra & Koehler, 2006) was explored as a means of addressing changes in pedagogy, content, and knowledge with regard to technology usage.

Significance for Teachers

The findings of the study indicated that teachers who have opportunities to respond using a quick, immediate method of professional development, had mainly positive attitudes and when faced with difficulty, and were able to share information and experiences with one another. The teacher participants in the study grew professionally through the use of a web-based workshop and a Twitter users' group to discuss and share information after reflecting on personal professional practice. The teachers in the study had varying levels of comfort with Twitter, but used prior knowledge to work through difficulties with the web-based workshop and Twitter users' group.

Through the discussion of the findings, significance was placed on five assertions. These were:

- Teacher's attitudes about Twitter for Professional Development were both positive (example: great) and negative (example: confusing).
- Teachers used Twitter for four purposes: to share experiences, give advice, share lessons, and recommend apps.
- Collaboration was related to the use of Twitter, but not overtly evident.

- Communication throughout the study via Twitter was asynchronous.
- Reflection was a part an important part of the development process.

Each of the assertions held significance when looking at how to reach the target audience with maximum impact. Every school district wrestles with planning strategically for the expenditure of funds to improve student learning through curriculum, methodology, and personnel. With the largest portion of the budget being spent on personnel, developing teachers and staff professionally will always be a priority. Good quality teachers impact the quality of educational experiences a school provides. With the inclusion of technology as a method of enhancing and often driving curriculum, instruction requires a new model of pedagogical practice. According to Darling-Hammond and McLaughlin (1995), "Beginning with preservice education and continuing throughout a teacher's career, teacher development must focus on deepening teachers' understanding of the processes of teaching and learning and of the students they teach" (p. 82). Under these circumstances teachers, as adult learners, must be open to rethinking what and how they teach in order to best reach students in their classrooms. There must also be some degree of adaptability to changing student populations and their use of digital technologies, which teachers must understand and facilitate, in order to teach digitally oriented students. Furthermore, because student needs vary and change from subject to subject, or from day-to-day, thought must be given to the fluid nature of teaching. Web 2.0 tools, such as Twitter, open up the dialog in an immediate, relevant way to address emergent needs of teacher collaborators.

Significance for Administrators/ Planners

Professional development planners are responsible for the wise use of funds to facilitate growth for teachers or staff. Using web-based tools such as Twitter or websites offer a low cost, high impact alternative to expert-led large group sessions that require a particular time, travel by

the expert and the participants, and space to hold the workshop or conference. Administrators and planners must take the changing needs of their teaching professionals into account when designing professional development or engaging experts for workshops.

The participants in the study showed evidence of having the tools and expertise to assist colleagues with improvement in professional practice. Their use of Twitter to communicate and collaborate validated the idea that participant led sessions on technology integration, using acquired skills and techniques, had an impact on adult learning in the current study. Each of the participants who posted information about suggested topics used the opportunity to reflect on and improve practice and to share experiences to connect with other teachers. Professional development in the truest sense improves practice and influences student learning. During this study, teachers shared classroom experiences and how the experiences impacted their students.

Significance of the Framework

The six principles of Knowles' Adult Learning Theory were a model for developing professional development and used as a theory on which to build a conceptual framework for a study of the process. Contemporary needs of adult learners, as seen through the Knowles principles of adult learning, were coupled with TPACK (Mishra & Koehler, 2006) to investigate the usefulness of Twitter as a platform for professional development. The following principles were shown to be tied to success:

- the learner's need to know
- self-directedness
- problem solving (related to context of the learner)
- intrinsic motivation.

Additionally, what Gunn and Hollingsworth studied in 2013 about new literacies had implications for creating a model of professional development adult learners valued, were motivated to participant in, and were used to affect lasting professional change. The ability to collaborate and to reflect on professional practice, were equally as important as the adult learning principles. All of the previously mentioned factors had a part in the creation of a cohesive and successful professional growth program such as the web-based workshop followed by the opportunity to post on the TweetDeck.

Recommendations

For further research.

Through an examination of the findings, dissection of the literature review, and application of the six principles of Knowles' Theory of Andragogy (2011), is was clear that professional development using Twitter has powerful implications. Although the study methodology explored the research questions developed by the researcher, in depth examination of a larger Twitter group with established connections could add to the knowledge gained through this study.

Upon concluding the content analysis and compiling the findings, the researcher was able to consider recommendations for further research. These included working with a sample from a single district, with the same professional development needs. Consideration should also be given to a shorter period of time for the workshop, perhaps during one week devoted to teacher in-service. A group with collegial ties, or one comprised of volunteers from a single building could yield further insights into how the groups self-directs or if bonds form between teachers of similar grade assignments, subjects, or interests. By adding scheduled "meets", or a mutually

agreed upon time to be engaged in Twitter discussion, for example every Saturday, a future researcher could examine synchronous communication. Having scheduled meets may have an impact on keeping participant engagement at a higher level. Scheduling time to participate could lead to greater numbers of participants tweeting more often. Although the Twitter study was strictly qualitative, the demographic survey analysis could be expanded to add quantitative elements. Data on age, gender, and experience, or correlation to technology usage and technology expertise could yield further insight into how teachers might engage in technology based professional development.

Participation rates in completing the demographic survey was only 50 percent. A change in how the survey was presented, such as making survey completion a gateway to the first module could have made a difference in compliance rate. Making further participation contingent upon survey completion is recommended.

Although discussed briefly, future research on emerging technology leaders could be of interest. The data had some evidence of early adoption of TPACK ideology as a catalyst for teacher leadership, but there were not enough specific tweets or interview responses to include in the category matrix. Using a larger sample may give greater evidence of group dynamics and the effect on collegial discussion. Further study or phenomenological research could yield additional insight into professional development reform.

To improve the current study.

An interesting question emerged in Sandy's interview dialog. She asked why the researcher did not use a hashtag for the Twitter group. In the event that confidentiality was not an

issue, a hashtag would have been a more user friendly way to have the group interact. As such, longer strands of conversation would have been evident.

The TPACK workshop was a strong component of the study. Participants appreciated the format, content, and graphics. Timing of the workshop, during the weeks preceding the holidays, could have been a factor in the drop from 14 participants to eight during Module 3. Another suggestion, in hindsight, would be the inclusion of a link to Twitter instructions or videos. Instructions might have been valuable for participants who were unfamiliar with tweeting through the use of a TweetDeck. Giving participants a chance to become more confident with tweeting could lead to higher rates of participation on the TweetDeck.

While data collected through tweets was more directly related to uses for Twitter, data collected during the interviews added to the understanding of participant attitudes toward technology integration and specifically uses for technology as part of direct instruction. Adding interview questions about participant beliefs regarding student learning when presenting technology based experiences would also add valuable insights. Additionally, questioning participants about technology based lessons or activities planned with the TPACK framework in mind and how it influences student engagement could also be valuable.

Conclusions

Professional development is a requirement in many districts for continued advancement or continued employment. Finding new ways to engage adult learners is required in an age where technology continues to evolve. Factors beyond simple professional development for relating information have caused development planners to evaluate sessions for the ability to improve the quality of teaching overall.

In the current study, using Twitter for professional development showed that teachers appreciated the immediacy of a Twitter group to share experiences, give advice, share lessons, and recommend apps. Findings indicated that participants used the TPACK workshop to spark commentary on suggested topics. Most tweeted comments were made as teachers had time or after they reflected on classroom experiences. Collaboration followed reflection as participants asynchronously communicated ideas or suggestions. Participants viewed this type of communication as convenient and useful for development of technology integration skills.

To conclude, students of teachers involved in continuous professional growth, benefited through improved professional practice and a sense of community and support. Web 2.0 tools such as Twitter provided the immediacy teachers desired in a professional development program. The use of technology based workshops or social media should be considered as a means for teachers to collaborate. New literacies dictate that teachers involved in professional learning should be able to see the relevance, take time for reflection, and collaborate as they have time in order to get the full benefits school districts can provide through development opportunities.

Taking into consideration the nature of adult learners, changes in educational and technological resources, and new literacies, professional development has already become an area ripe for change. As participant Jackie said in response to the question: So how do you feel about the use of a Twitter group? "Love it. I'm a big Twitter user but I loved that…I don't know; I feel like it's a great resource. So you're getting ideas from other people, and you're helping other people, hopefully, so I…I like that as a PD option, yes I liked it."

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Appendix A

TPACK Workshop Outline

I. Introduction to TPACK

- A. Definition
- B. Background of Mishra and Koehler
- C. You Tube video “TPACK in Two Minutes”

II. Lesson Planning with TPACK

- A. Integration of selected tool or application
- B. Including standards in lessons
- C. Sharing with other participants

III. Assessing TPACK Lessons

- A. Types of products
- B. Rubric building
- C. Shared examples of rubric building sites

IV. Sharing TPACK with Colleagues

- A. Approaching administrators
- B. Demonstration opportunities and mediums

Timeline

A. September 28-30: Recruitment of Participants

B. October 5-9: Module 1

C. October 12-16: Module 2

D. October 19-23: Module 3

E. October 26-31: Module 4

F. November 2-6: Digital Interviews

Ongoing: Weeks 1-4. Participants decide how much time to devote to Twitter conversations. Individual tweets take less than 60 seconds to post. Tweets are limited to 140 characters and can include links or urls for websites, blogs, or other social media sites.

Appendix B

Demographic Survey

Check only one response for each of the following questions:

1. Gender
   ___ Male

   ___ Female

2. Years in Teaching
   ___ 0-5

   ___ 6-10

   ___ 11-15

   ___ 16- 20

   ___ 21 or more

3. Subject or Grade Taught

   ___ Primary (K-2)

   ___ Intermediate (3-5)

   ___ Middle School (6-8) Check all that apply

   ___ Math

   ___ Science

   ___ Social Studies

   ___ Religion

___ Language Arts

___ Reading

___ World Language

___ Music

___ Media

___ Other

4. Confidence Level with Technology

____ Beginner

____ Intermediate

____ Expert

5. Please indicate how often you use the following electronic devices:

1= not at all, 2= sometimes, 3= daily

___ I-Pad or Tablet

___ Smart Phone

___ Laptop

___ Desktop

___ Chromebook

___ Other (Please indicate specific device) _____

Appendix C

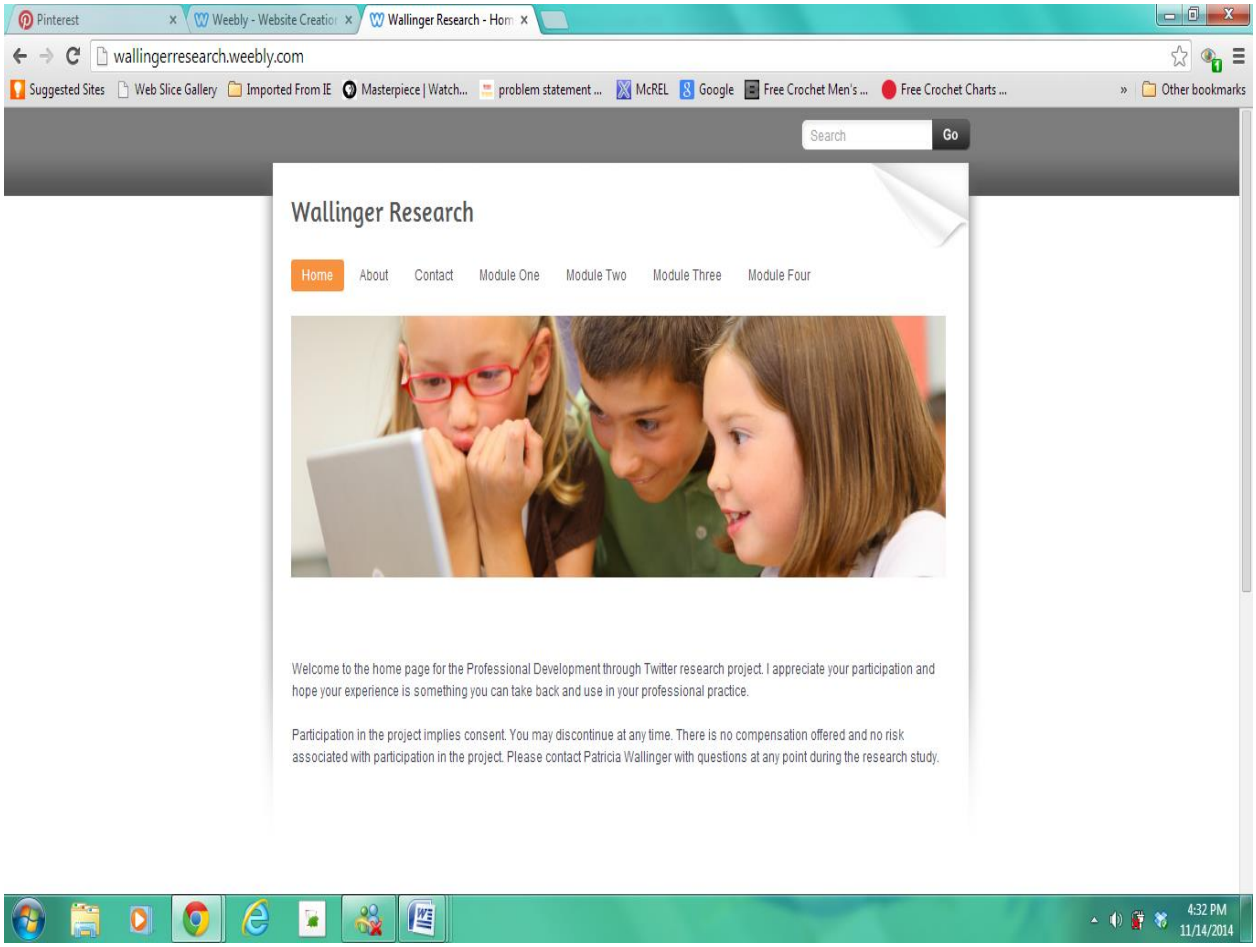
Tweet 1 for recruitment: “Participate in a study of Professional Development using Twitter. Email pwallinger06@csm.edu for information on how to volunteer.”

Tweet 2 for recruiting volunteers from participant list to complete digital interviews: “Needed: 6-10 participants to do a digital interview as follow-up. Only 10 questions, takes less than 30 minutes, add to knowledge of PD!”

After completing the four modules a tweet will go out to participants: “Twitter convos ready to review, email pwallinger06@csm.edu for access to link.”

Appendix D

Screen shot of the password protected website for the project.



Appendix E

ADULT CONSENT FORM

IRB#: 1508 Approval Date: September 30, 2015 Expiration Date: October 1, 2016

Title of this Research Study. Professional Development Using Twitter

You are invited to take part in a study of Professional Development using Twitter. These forms are to help you decide whether or not to participate. If you have any questions, please ask.

Why are you being asked to be in this research study?

You are being asked to participate in this research study because you are a teacher who is required to complete a set number of hours for Professional Development each year.

What is the reason for doing this research study?

The purpose of this study is to investigate how a Twitter group can be used to deliver a professional development workshop. This may differ from how teachers usually participate in professional development offered by the schools where they currently work. The research may help understand if electronically delivered workshops, with a participant deciding when to participate, and how much to participate could be used in addition to traditional methods of delivery.

What will be done during this research study?

Participants will be asked to:

- access a secure website once a week for four weeks;
- view 2-5 minute informational videos or slides;
- tweet reactions, comments, helpful information, or links for the purpose of professional development;
- spend as much or as little time participating as you desire;
- participate in a voluntary digital or face-to-face interview at the end of the study.

Participant Initials _____

ADULT Consent Form - PAGE TWO

What are the possible risks of being in this research study?

There are no known risks to you from being in this research study.

What are the possible benefits to you?

You will be participating in an electronic professional development workshop which may be useful to you in your daily practice. However, you may not get any direct benefit from being in this research study.

What are the possible benefits to other people?

Your participation may add to knowledge about the effectiveness of professional development delivered electronically, rather than traditional methods of professional development.

What are the alternatives to being in this research study?

Instead of being in the research study, you can choose not to participate.

What will being in this research study cost you?

There is no cost to you to be in this research study.

Participant Initials _____

ADULT CONSENT FORM – PAGE THREE

Will you be paid for being in this research study?

You will not be paid or compensated for being in this research study.

What should you do if you have a concern during this research study?

Your well-being is the major focus of every member of the research team. If you have a concern as a direct result of being in this study, you should immediately contact one of the people listed at the end of this consent form.

How will information about you be protected?

Reasonable steps will be taken to protect your privacy and the confidentiality of your study data. All identifying information will be kept confidential and the only persons with access to any data will be those directly involved with the study. Results may be published in professional journals, at professional conferences, or as a part of the requirements for the Doctor of Education with an emphasis on Educational Leadership through the College of Saint Mary.

The only persons who will have access to your research records are the study personnel, the Institutional Review Board (IRB), and any other person or agency required by law. The information from this study may be published in scientific journals or presented at scientific meetings but your identity will be kept strictly confidential.

Participant Initials _____

ADULT Consent Form - PAGE FOUR

What are your rights as a research participant?

You have rights as a research participant. These rights have been explained in this consent form and in The Rights of Research Participants that you have been given. If you have any questions concerning your rights, talk to the investigator or call the Institutional Review Board (IRB), telephone (402)-399-2400.

What will happen if you decide not to be in this research study or decide to stop participating once you start?

You can decide not to be in this research study, or you can stop being in this research study ("withdraw") at any time before, during, or after the research begins. Deciding not to be in this research study or deciding to withdraw will not affect your relationship with the investigator, or with the College of Saint Mary (also add any other sites to this statement, if needed).

You will not lose any benefits to which you are entitled.

If the research team gets any new information during this research study that may affect whether you would want to continue being in the study, you will be informed promptly.

Documentation of informed consent.

You are freely making a decision whether to be in this research study. Signing this form means that (1) you have read and understood this consent form, (2) you have had the consent form explained to you, (3) you have had your questions answered and (4) you have decided to be in the research study.

If you have any questions during the study, you should talk to one of the investigators listed below. You will be given a copy of this consent form to keep.

If you are 19 years of age or older and agree with the above, please sign below.

Signature of Participant: Date: Time:

Participant Initials _____

ADULT CONSENT FORM- PAGE FIVE

My signature certifies that all the elements of informed consent described on this consent form have been explained fully to the participant. In my judgment, the participant possesses the legal capacity to give informed consent to participate in this research and is voluntarily and knowingly giving informed consent to participate.

Signature of Investigator: Date: October 1, 2015

Authorized Study Personnel.

Principal Investigator: Patricia A. Wallinger, Ed.D. (c) Phone: (402) 659-5115

Appendix F

THE RIGHTS OF RESEARCH PARTICIPANTS*

AS A RESEARCH PARTICIPANT AT COLLEGE OF SAINT MARY YOU HAVE THE RIGHT:

1. TO BE TOLD EVERYTHING YOU NEED TO KNOW ABOUT THE RESEARCH BEFORE YOU ARE ASKED TO DECIDE WHETHER OR NOT TO TAKE PART IN THE RESEARCH STUDY. The research will be explained to you in a way that assures you understand enough to decide whether or not to take part.

2. TO FREELY DECIDE WHETHER OR NOT TO TAKE PART IN THE RESEARCH.

3. TO DECIDE NOT TO BE IN THE RESEARCH, OR TO STOP PARTICIPATING IN THE RESEARCH AT ANY TIME. This will not affect your relationship with the investigator or College of Saint Mary.

4. TO ASK QUESTIONS ABOUT THE RESEARCH AT ANY TIME. The investigator will answer your questions honestly and completely.

5. TO KNOW THAT YOUR SAFETY AND WELFARE WILL ALWAYS COME FIRST. The investigator will display the highest possible degree of skill and care throughout this research. Any risks or discomforts will be minimized as much as possible.

6. TO PRIVACY AND CONFIDENTIALITY. The investigator will treat information about you carefully and will respect your privacy.

7. TO KEEP ALL THE LEGAL RIGHTS THAT YOU HAVE NOW. You are not giving up any of your legal rights by taking part in this research study.

8. TO BE TREATED WITH DIGNITY AND RESPECT AT ALL TIMES.

THE INSTITUTIONAL REVIEW BOARD IS RESPONSIBLE FOR ASSURING THAT YOUR RIGHTS AND WELFARE ARE PROTECTED. IF YOU HAVE ANY QUESTIONS ABOUT YOUR RIGHTS, CONTACT THE INSTITUTIONAL REVIEW BOARD CHAIR AT (402) 399-2400. *ADAPTED FROM THE UNIVERSITY OF NEBRASKA MEDICAL CENTER, IRB WITH PERMISSION

Appendix G

Interview Questions and scripted comments:

Thank you for participating in the study. I would like to ask you a few questions about your experience. It consists of ten questions and should take less than an hour. Your participation is greatly appreciated. A copy of the questions and your responses will be provided to you in order to check for accuracy after the interview has been transcribed.

1. How often did you access the website and use the Twitter group?
2. How did you feel about the use of a website to provide workshop information?
3. How did you feel about the use of a Twitter group?
4. What was the most useful part of the presentation?
5. How did you use the information from the TPACK modules?
6. How did you interact with other participants in the study?
7. What would you say you followed through with that came from the study? Could you expand on that?
8. How could you share the information you gained with other teachers? Your students?
9. How would you describe your overall experience?
10. What other comments or questions do you have?