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# Collaborating on Web 2.0 Technologies: The Best-Fit Model for the Behavioral Intentions of Preservice Teachers

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## Abstract

Professional collaborative partnerships among teachers are essential in delivering appropriate services, in an inclusive classroom for students with disabilities. Web 2.0 technologies are new, yet largely unexamined, tools that may be used to facilitate collaborative partnerships. Teacher preparation programs are currently attempting to understand the behavioral intention of preservice teachers on these new technologies. A total of 590 preservice teachers participated in this study and reported their current use, perceived benefits, and behavioral intentions on Web 2.0 technologies. The Decomposed Theory of Planned Behavior (DTPB) was used as a theoretical framework to help guide the study and identify possible behavior intention factors. The collected data was analyzed through Structural Equation Modeling (SEM) to find a best-fit path model that would lead to the behavioral intention of preservice teachers to use Web 2.0 technologies. This study found that preservice teachers are using Web 2.0 technologies at an increasing rate in their teacher preparation programs. Preservice teachers also reported perceiving peer interaction and sharing resources as the greatest collaborative benefits of these technologies. When the combined factors of attitude, subjective norms, and perceived behavioral control were identified, preservice teachers intend to collaborate on Web 2.0 technologies as professional teachers. Teacher preparation program faculty should be encouraged to use Web 2.0 technologies in their courses, with the understanding that it will benefit the future collaboration of teachers.

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## Chapter 1: Introduction

The No Child Left Behind Act (NCLB) and the Individuals with Disabilities Education Improvement Act of 2004 (IDEIA) establish the importance of professional collaboration among teachers (Bauer, Iyer, Boon, & Fore, 2010; Coderman & Johnston-Rodriquez, 2009; Parker, McHatton, Aleen, & Rosa, 2010). For students with disabilities, it is essential that general and special education teachers collaborate together, in order to deliver appropriate services in an inclusive classroom (Coderman & Johnston-Rodriquez, 2009; Dettmer, Thurston, Knackendoffel, & Dyck, 2009). These collaborative partnerships are often able to find creative solutions to the unique needs of students with disabilities, in part, because teachers share the challenging decisions as they work towards a common goal (Friend & Cook, 2010). Although effective collaboration provides solutions, it may also create new challenges for the classroom teacher. Challenges may include lack of time for meetings, lack of substantial preparation that empowers them to effectively collaborate, and the absence of motivation to collaborate on the part of the teachers (Byinton, 2011; Freeley, Ferdinandi,& Pedota, 2011). Overcoming these challenges and establishing the role of a collaborative teacher are dilemmas that many P-12 schools are currently addressing, as they try and meet the needs of their students with disabilities (Friend & Cook, 2010; Kochhar-Bryant, 2010; Sykes, Bird, & Kennedy, 2010).

Teacher preparation programs are charged with the responsibility of preparing teachers who collaborate with other professionals at the formative stages of their career

(Wesburn-Moses, 2009). Establishing this role starts with encouraging the preservice teachers' behavioral intention to collaborate with other professionals once they are in the classroom (Harvey, Yssel, Bauserman, & Merbler, 2010). However, teacher preparation programs experience the same challenges that professionals experience when they collaborate, including lack of time, preparation, and motivation. Similar to P-12 schools, teacher preparation programs are searching for innovative ways to teach preservice teachers the elements of effective peer collaboration, as they work to overcome its challenges (Levine, 2010; Wesburn-Moses, 2009).

Web 2.0 technologies are new, yet largely unexamined, tools that may be used to facilitate collaboration among current teachers and preservice teachers. Web 2.0 technology is a generic term for any collaborative technology that enables an interaction, instead of a one sided presentation of information on the Internet. Examples of Web 2.0 technologies include group blogs, wikis, social networking, and social bookmarking sites. If teacher preparation programs embrace these often-times recreational technologies into the learning environment, educational reformers believe that many of the challenges of collaboration may be overcome (Burden, Tinnerman, Lunce, & Runshe, 2010; Hasko & Colomer, 2011; Zhao, 2010). Ertmer et al. (2011) reported that using Web 2.0 technology in a teacher preparation course, helped to overcome collaborative barriers. Preservice teachers also showed increased motivation and the ability to interact with others without the challenges of time or place. The Ertmer study found that overcoming these challenges positively changed the perceptions of preservice teachers towards technology and collaboration. Hartshorne and Ajjan (2009) further substantiated that preservice teachers' perceptions of technology are a critical factor that directly influence

the behavioral intentions of the preservice teacher to use those technologies when they become professionals.

The purpose of this study focused on the empirical evidence of the current uses, perception of benefits, and the best-fit path model to determine preservice teachers' behavioral intention to adopt Web 2.0 technologies to collaborate with peers. The findings contribute to the literature by determining the factors in a best-fit path model that significantly influence preservice teachers' behavioral intentions to collaborate on Web 2.0 technologies, once they become professionals in the field. Collaborative professionals in the field are significant because they positively impact the educational programs and services provided to students with disabilities (Coderman & Johnston-Rodriquez, 2009; Dettmer, Thurston, Knackendoffel, & Dyck, 2009).

**Statement of the Problem**

There is extensive literature on models that prepare preservice teachers to collaborate, and to communicate to them the importance of collaborative work (Arndt & Liles, 2010; Bain, Lancaster, Zundans, & Parkes, 2009; Kenny, 2009). Recent research for using technology, including Web 2.0 technologies, is also included in teacher preparation programs (Baltaci-Goktalay & Ozdilek, 2010; Bravo & Young, 2011; Ertmer et al., 2011; Wang 2011). Lacking are studies that explore collaboration in Web 2.0 technology used in teacher preparation programs. Hartshorne and Ajjan (2009) noted that "little research has empirically explored students' perceptions of the benefits of using Web 2.0 applications" (p. 184).

The relationship between preservice teachers' use of Web 2.0 technologies to collaborate in teacher preparation programs, and their future intentions to use these

technologies in their professions, is a new issue in education. Thus, the relationship between use and intention has also gone largely unquestioned. Few studies (Cappa & Orellana, 2012; Hartshorne & Ajjan, 2009) explore the empirical relationship between current online practices of collaboration and behavioral intentions of preservice teachers who use Web 2.0 technologies. This study explored behavioral intention, understanding there is an established link between intention and future behavior. "Behavioral intention is found to be the most important predictor of actual behavior when the user has the information to form a stable behavioral intention and intends to take a specific action" (Hartshorne & Ajjan, 2009, p. 188).

The lack of empirical studies on the behavioral intention of preservice teachers to use Web 2.0 technologies, leaves concern for teacher preparation faculty who wish to use this tool in their classrooms (Cappo & Orellana, 2012). Instruction should be driven by research. Using Web 2.0 technologies to teach collaboration is currently unsubstantiated in research (Hartshorne & Ajjan, 2009). "These technologies have continued to evolve rapidly, and unless researchers study their impact on learning, educators may not harness their benefits for diverse learners and utilize them successfully" (Cappo & Orellana, 2011, p. 236). Marilyn Friend, the author of *Interactions: Collaboration Skills for School Professionals (2010)*, replied through email contact that, "Your topic is one that needs to be addressed, and I really would love to hear about what you find. Right now, though, I haven't seen anyone studying the topic" (personal communication, February 17, 2012).

**Purpose of the Study**

The purpose of this study focused on the empirical evidence of the current uses, perception of benefits, and the best-fit path model to determine preservice teachers'

behavioral intention to adopt Web 2.0 technologies to collaborate with peers. Understanding if preservice teachers are using Web 2.0 technologies, why they are using it, and what they intend to do through the use of Web 2.0 technologies, will be beneficial to teacher preparation faculty in colleges of education across the United States. Faculty then may determine if encouraging the use of Web 2.0 technologies in their courses will benefit the future collaboration of teachers, or if it is simply a trendy tool. This study was driven by directly informing teacher preparation faculty of the potential for students to continue to use these technologies, once they enter into the practice of teaching.

Identifying the factors and recognizing their influences on behavioral intention within the context of a specific best-fit path model, help teacher preparation faculty understand the predictive factors for Web 2.0 technologies. This determination may increase the value of participating in these technologies, or allow faculty to choose not to use these technologies in a current teacher preparation program.

**Research Questions**

Three research questions were developed to address the gap found in the research regarding the current uses, perception of benefits, and the behavioral intentions of preservice teachers on Web 2.0 technologies.

**Question 1.** To what extent do preservice teachers use Web 2.0 technologies in teacher preparation programs?

**Question 2.** What do preservice teachers perceive are the advantages of collaborating on Web 2.0 technologies?

**Question 3.** What is the best-fit path model, and its factors that lead through mediating factors, to determine preservice teachers' behavioral intent to adopt Web 2.0 technologies to collaborate with peers?

**Research Hypothesis**

The three different research questions each have a hypothesis developed from prior studies and theoretical frameworks.

**Hypothesis 1.** Preservice teachers are using Web 2.0 technologies in teacher preparation programs at an increasing rate.

The first hypothesis (question 1) reflects the findings from the Hartshorne and Ajjan (2009) study, which found a majority of preservice teachers didn't use or plan to use Web 2.0 technologies, with the exception of wikis. However, the researchers noted the growing trend in using these technology tools in teacher preparation programs, and predicted Web 2.0 technology would be increasingly used.

**Hypothesis 2.** Preservice teachers perceive collaborative advantages on Web 2.0 technologies.

The second hypothesis (question 2) utilizes the work of Friend and Cook (2010) and their research developing the advantages of collaboration. These researchers termed collaborative advantages as direct interactions, shared resources, shared decision making, and working towards a common goal.

**Hypothesis 3.** The DTPB path model, and its factors that lead through mediating factors, will be a best-fit to determine preservice teachers' behavioral intent to adopt Web 2.0 technologies to collaborate with peers.

The third hypothesis (question 3) is based on the theoretical framework of the Decomposed Theory of Planned Behavior (DTPB). According to the DTPB, developed by Taylor and Todd (1995), if an individual describes a high level of behavioral intention to use a particular technology, then he/she is more likely to, in fact, use that technology in the future. The DTPB identifies a path model that hypotheses, factors, and paths influencing an individual's behavioral intention to adopt certain technologies in the future.

**Scope of the Study**

The population for this study included preservice teachers in the midwest region of the United States. Preservice teachers are undergraduate and graduate students in public and private teacher preparation programs, who desire credentials as general and special education teachers. There are 12 factors measured in the DTPB path model, which helped to determine a sample size of greater than 400 participants. An appropriate sample size was established with 661 participants responding to the survey, and 590 of those responses were found appropriate to use in the study.

The DTPB survey was developed using the Decomposed Theory of Planned Behavior (Taylor & Todd, 1995) and designed by Hartshorne and Ajjan (2009) for use in their study, as they examined behavioral intention of preservice teachers using Web 2.0 technologies to supplement classroom learning. The DTPB survey was generated into Google Survey, providing a link for distribution and collection. The link was provided to teacher preparation programs, which electronically distributed the instrument to their students in the following teacher preparation programs: Greenville College, University of Missouri-St. Louis, Eastern Illinois University, Fontbonne University, Lindenwood University, Maryville University, McKendree University, Anderson University, Southern

Illinois University Edwardsville, Kaskaskia College and Webster University. Electronic collection of the data using Google Survey was provided in real time through the site with a total of 325 online responses. Physical copies of the surveys were also mailed to Universities who had agreed to distribute them to students and 336 completed surveys were returned. Teacher preparation programs who distributed the physical copies included: Missouri State, DePaul University, Greenville College, Kaskaskia College, Maryville University, University of Missouri-St. Louis, St. Louis University, Western Illinois University, Missouri State University, and the University of Illinois.

**Limitations of the Study**

Limitations of the study include the generalizability of the outcomes of this study with teacher preparation programs outside of the United States. Although schools in the study are selected from a wide sample, including rural, suburban, and urban, as well as graduate and undergraduate, the study did not sample any international or coastal universities. Cultural differences may influence views on collaboration and use of technology. Use of this study's findings to make conclusions pertaining to an international university is cautioned.

Although the dependent factor, behavioral intentions, has been shown to be a critical element in the future behavior of individuals who may adopt technology, it is not the actual future behavior. The DTPB supports the use of behavioral intention to make conclusions on the final behavior of an individual; however, the design is not a longitudinal study, and is not able to measure the actual behavior of future professionals and their use of Web 2.0 technologies.

The study is quantitative in nature and does not address how preservice teachers are collaborating on Web 2.0 technology or their insight as to why they would use it. There is a lack of a basic current knowledge regarding Web 2.0 technology; it was essential to begin the focus on the quantifiable current practices, perceptions of benefits, and intentions to use in the future. The research questions of this study did not focus on the rich descriptions of how Web 2.0 technologies are being used.

**Definition of Terms**

For the purposes of this study, "preservice teachers" represent undergraduate or graduate students preparing to become professional teachers. These students would currently be enrolled in a teacher preparation program, earning their degree in multiple areas of education.

"Web 2.0 technology" refers to an interactive, read-and-write web interface, in which an individual participates in an online dialog with other contributors. Web 2.0 technologies allow the creation, distribution, and modification of information by other participants (Ertmer et al., 2009; Hartshorne & Ajjan, 2009).

Friend and Cook (2010) define "collaboration" as "a style for direct interaction between at least two co-equal parties voluntarily engaged in shared decision making as they work toward a common goal" (p.7). This definition conveys how to complete an action, not what kind of activity is or is not collaborative. This definition is used in the study, because it gives an opportunity to view collaboration as a tool to use in schools, depending on whatever task or problem is presented.

The DTPB uses several terms in the path model that need to be defined for clarification. Hartshorne and Ajjan (2009), who also used the same framework for their

study, have defined many of these terms. For example, "attitude" is defined as "the extent to which the individual favors a particular behavior" (p. 186). Components of "attitude" then divide into three different definitions: perceived usefulness, perceived ease of use, and compatibility for the theory. "Perceived usefulness" measures the extent to which the user feels the technology is a helpful tool to complete tasks in the workplace. "Perceived ease of use," describes how effortless the technology is to use; and "compatibility" quantifies the flexibility of the Web 2.0 technology to the tasks that the individual needs to complete.

"Subjective norm" describes the "social pressure individuals experience when performing a particular behavior" (Hartshorne & Ajjan, 2009, p 186). Similar to attitude, the DTPB then divides subjective norm into components of "peer influence," which include other students in the same course or cohort, and "superior influence," including faculty who may encourage or incentivize the use of Web 2.0 technology in the preservice teacher's coursework.

Lastly, the DTPB uses "perceived behavioral control" to determine behavioral intention for use of technology. Perceived behavior control describes the "control individuals feel over their behavior" (Hartshorne & Ajjan, 2009, p 186). "Self-efficacy" describes the comfort level and self-confidence and individual has in their ability to use Web 2.0 technology. The DTPB defines it as "self-efficacy," and it becomes a component of the individual's perceived behavioral control, along with "facilitating conditions." Facilitating conditions includes the individual's technology and resource access (Hartshorne & Ajjan, 2009).

**Significance of the Study**

There is a lack of quantitative studies that analyze preservice teachers' current practices and perception of the collaborative benefits on Web 2.0 technologies. Likewise there is a lack of studies on the preservice teachers' behavioral intentions for professional collaboration in the future. The Hartshorne and Ajjan (2009) study did examine the current practices and perceptions of preservice teachers on Web 2.0 technology. Promising findings indicated statistically-strong relationships among the indicators in the DTPB, and future adoption of Web 2.0 technologies, to supplement classroom learning. The Hartshorne and Ajjan (2009) study guides the framework of this study, including the design, methods, instrument, and theory. However, the 2009 study considered specifically how Web 2.0 technologies supplemented classroom learning, and lacked comparing it to professional collaboration, a key element to the research questions posed in this study.

Effective professional collaboration among teachers is essential to the education of students with disabilities. Overcoming the challenges associated with collaboration may increase the behavioral intention of teachers to collaborate as they share resources and make decisions based on common goals. Although Web 2.0 technologies are a promising solution to these challenges, questions remain regarding many aspects that surround collaborating online. These questions include the current uses, perceived collaborative benefits, and behavior intention of preservice teachers with Web 2.0 technologies. This study seeks to further investigate those aspects and bring clarity to teacher preparation faculty trying to determine how to use Web 2.0 technologies in their courses.

## Chapter 2: Review of the Literature

This chapter reviews the literature that discusses the behavioral intentions of preservice teachers for collaborating with other professionals using Web 2.0 technologies to best meet the needs of students with disabilities. Beginning with addressing the changing role of the teacher, this chapter reviews previous studies that have described the challenges posed by the inclusive classroom. The constructs and various forms of collaboration are examined in order to understand essential preparation for meeting the diverse needs of students with disabilities. Collaboration on Web 2.0 technologies will be addressed as an innovative solution to meeting the challenges and disadvantages of collaboration. The chapter will conclude discussing the Decomposed Theory of Planned Behavior (DTPB) factors that may contribute to a preservice teacher's behavioral intention to use these technologies in future professional collaborative relationships.

### The Role of the Teacher

The No Child Left Behind Act (NCLB, 2002) dramatically altered the face of education in this decade. It mandated significant academic gains by all students on state standards, including students with disabilities, a subgroup largely left unaccounted for on standardized tests prior to 2002. Simply servicing this population is no longer enough, and evidence of outcome results are mandated (Friend, Cook, Hurley-Chamberlain, & Shamberger, 2010; Parker, Allen, McHatton, & Rosa, 2010). "High-stakes, standards-based accountability reforms, such as NCLB, have altered the context of public education across the United States, redefined teachers' work, and transformed the field of teacher education" (Brown, 2010, p. 477). Shortly after NCLB, the Individuals with Disabilities Improvement Act (IDEIA, 2004) revised the preceding version to give a clear directive to

schools that students with disabilities are to be accounted for academically, and "to be involved in and make progress in the general curriculum" (34 C.F.R. §300.320(a)(2)(i)(A)). IDEIA reinforced the principle of Least Restrictive Environment (LRE), in which students with disabilities are to be "educated with their non-disabled peers to the maximum extent appropriate" (Harvey, Yssel, Bauserman, & Merbler, 2010; Heward, 2009). NCLB (2002) bolstered IDEIA's mandate to educate students with disabilities in the general curriculum and established that all students needed highly qualified teachers. Students with disabilities were to be taught by teachers who knew how to teach the general curriculum and were certified in those areas, not simply in the area of special education (Harvey et al., 2010).

Schools are left with a clear direction: Students with disabilities need to make academic gains, and they need to do this with the general education curriculum (Coderman, & Johnston-Rodriquez, 2009; Harvey, 2010). Furthermore, solutions to the challenges mandated by both of these laws point to collaboration and coordination of strategies and services (Kochhar-Bryant, 2010). Coderman and Johnston-Rodriquez (2009) argue that the greatest implications of these two laws are that "general education and special education teachers now collaboratively discuss students' needs, problem solve, demonstrate instructional techniques, lead or participate in professional-development initiative, share resources, and network with other professionals and outside agencies" (p. 235). Current and future teachers need collaboration skills in order to accomplish these challenges.

For students with disabilities to meet the academic standards set by NCLB, they need access to the general education curriculum. Inclusive education is prominent in

educators' minds, and so is the complexity of this challenge. Advocates for school reform understand that they cannot seek change in curriculum and instruction without changing the role of the classroom teacher, as well. Teachers are expected to reach an increasingly diverse population in the general education classroom. The challenge of the increased number of "specialty" professionals needed to address students' needs creates difficulties for schools that must locate qualified people, and for teacher preparation programs to train those individuals (Sykes, Bird, & Kennedy, 2010).

A broad belief among educators is that the challenges of the inclusive classroom can be met through the collaboration of professionals (Byington, 2011; Dettmer, Thurston, Knackendoffel, & Dyck, 2009; Friend, 2010; Kochhar-Bryant, 2010).

> Educational researchers and practitioners have recognized the value of teacher collaboration as a general strategy for promoting the fertilization of pedagogical ideas, diffusion of knowledge, and cross-curricular implementation among teachers who often find themselves disconnected from each other in what has been amply documented as an isolationist teaching culture (Zavala, 2011, pp. 199).

Previous generations of teachers have worked in isolation, alone with their students, their plans, and their daily procedures behind the doors of their classroom, with little collegial interaction. In fact, most schools had cultures of self-sufficiency; labeling teachers who sought help as incompetent and incapable (Dettmer et al., 2009; Lester, 2009; Levine, 2010). However, researchers now claim that isolation hinders teachers' continued development in the field and slows progress (Lieberman & Mace, 2010). Today, with the challenges of inclusion and accountability outcomes, schools seek to understand how

collaboration among teachers may be part of the answer to meeting such high standards (Friend, 2010; Lester 2009). Nearly every other field, such as medicine, law, fashion, sports, journalism, and finance routinely use methods of collaboration to resolve their most challenging problems. A doctor who does not consult or collaborate with his peers, while treating a patient with an unknown illness, is arrogant and unprofessional. A decade ago, if a teacher did not consult or collaborate when a student had a challenging learning problem, he or she would have been seen as autonomous and independent (Dettmer et al., 2009).

Post NCLB, the field of education can no longer function without change, and the future generation of educators face serious challenges when they educate students with disabilities in the general education environment. School leaders began looking to professional collaboration to help educators with these challenges (Freeley, Ferdinandi, & Pedota, 2011). This, in turn, means a direct change in the role of the educator, with an increased emphasis on collaborative teaching, with a wide range of other disciplines, to appropriately address the needs of the inclusive classroom (Weburn-Moses, 2009; Zhao, 2010).

**Inclusive Classrooms**

According to the U.S. Department of Education's Institute of Educational Sciences (IES) (2011), students with disabilities eligible for special education services constitute 13.4% of the public school population. Of these students, 56.8% spend more than 80% of their day with their non-disabled peers in the general education classroom. Interestingly, 95% of general education teachers have taught a student with a disability at some point in their career (Kirk, 2011, p. 13-15; Kennedy, Hart, & Kellems, 2011).

Today's classrooms are inclusive, diverse, and include a great amount of individuals requiring accommodations. Each of the students with disabilities receiving special education support and related services has an Individual Education Plan (IEP), a legal document explaining how the student receives educational instruction different from the established general curriculum, policies, rules, and/or assessments (Heward, 2010). The inclusion of so many students with disabilities could, in itself, be a huge challenge for educators. However, the aforementioned statistics do not include the growing population of students who are English Language Learners (ELL), students who are gifted, or students who are at-risk and struggling, and may not be eligible for special education services. The inclusive classroom is a challenging classroom for even the most experienced and highly qualified educator (Heward, 2009; Kochhar-Bryant, 2010; Zhao, 2010).

Educators have come to understand that complex learning and behavioral problems experienced with a child can only be addressed when looking at the child holistically. This means that it is important to address, individually, each child's unique medical, physical, emotional, social, and intellectual needs, in order to come to solutions (Kochhar-Bryant, 2010). Professionals alone, even those considered very capable, cannot meet the multiple individual needs for every dynamic situation by themselves behind their classroom doors. The role of the isolationist teacher, one who does not collaborate with other professionals, is no longer effective in today's inclusive classrooms (Dettmer, 2009; Kochhar-Bryant, 2010).

School reform, through NCLB and IDEIA, has led to two major changes in the classroom teacher's roles and responsibilities, according to Conderman and Johnston-

Rodriquez (2009). Primarily, the first change is that classroom is now inclusive, and the general education teacher is responsible for meeting many individual needs of students. Secondly, the change associated with adoption of a strategy of collaboration within the teacher's daily routine is critical to meet the needs of that inclusive classroom. Carter, Prater, Jackson and Marchant (2009) stated that, "Collaboration is a critical aspect of effective inclusion" (p. 61). Students with disabilities who are physically located in the general education classroom, but who do not have instructors who collaborate to understand how to accommodate their individual needs, are not receiving meaningful engagement or benefit from their academic instruction. Without clearly-outlined definitions and roles in collaboration, the special education professional may take a more subservient role. This creates an ineffective team of collaborators, and therefore, leaves professionals with the impression that inclusion is not beneficial to their students or themselves (McKenzie, 2009).

**Collaboration**

"Collaboration" is a buzz-word that is used frequently within educational circles; however, McKenzie (2009) noted that there exists the absence of a universal definition that is consistent among educators. Multiple frameworks and diverse viewpoints exist as to what collaboration is, and what it is not. Due to this inconsistency, and the acknowledgement that it is important to understand a common language, this section will describe collaboration and some of its practical elements through the current literature.

**History of collaboration.** In 1929, John Dewey wrote: *The Sources of a Science of Education,* a fundamental cornerstone work in the field. In this book, he reported that teachers should engage in collective inquiry. However, much of this idea was lost in

educational scholarship and practice until the late 1990s (Sims, 2010). Cooperative learning between students quickly became a recognized, valuable tool for students in the classroom. What took longer to establish was the educational community recognizing that this concept also applied to teachers in the general education setting (Sims, 2010).

Teachers can perform the daily instructional tasks of a classroom better with other teachers than singly with their individual skills. Collaborating with other professionals is going to be an essential vehicle in meeting the new challenge of the inclusive classroom (Wang, 2009). Special education teachers and therapists have a strong history of collaborating through teaming and consulting with other professionals who work with students with disabilities. This peer consultation, however, did not become a necessity among general education teachers until NCLB and IDEIA required that all students, including those with disabilities, had access to the general curriculum and to highly qualified teachers. It is no longer only special education teachers who need to collaborate with therapists, but general education teachers, as well (Friend et al., 2010).

**Collaboration as a construct.** Dettmer (2009) defined collaboration as "To labor together or work jointly in cooperative interaction to attain a shared goal" (p. 8). Similarly, Friend and Cook (2010) defined collaboration as "a style for direct interaction between at least two co-equal parties voluntarily engaged in shared decision making as they work toward a common goal" (p.7). More specifically, Parks (2009) defined collaboration as including three dimensions: joint work (completing a task), mutual engagement (building relationships) and shared repertoire (developing a history of stories). An understanding of the definitions offered by Dettmer (2009), Friend and Cook (2010), and Park (2009) posits that there are some critical concepts in common. First, the

definitions all convey how to complete the action, not what kind of activity is or is not collaborative. This gives collaboration a dynamic, open definition providing educators an opportunity to understand collaboration not as an activity, but as a tool that is able to meet different kinds of incoming challenges. Additionally, the definitions address the voluntary nature of collaboration.

Participants of collaboration must share mutual goals and responsibilities for decision making. Collaboration is not collectively dividing up tasks, but instead, coming together to solve problems and make decisions for the mutual goal. Dividing up tasks may create less work, but that is not the objective of true collaboration. Instead, the objective is one of more effective work. Collaboration is sharing the resources that each individual has with each other, so that the common goal can be met (Friend & Cook, 2010). Further, the authors warn against the dysfunction that can occur when individuals hoard the resources they have from the group. Also, shared credit and accountability for student outcomes may help to create a culture that encourages the fair distribution of resources. If the school's goal is to promote student learning, collaboration efforts become meaningful and effective (Dettmer, 2009).

Collaboration by coercion doesn't exist (Friend & Cook, 2010). It originates from the basic assumption that collaboration is good, helpful, and will overcome the many obstacles challenging today's classroom. Therefore, teachers will seek it out in their daily practice. Likewise, Parks (2009) noted in her findings that involuntary participation in collaboration leads to failure, while voluntary participation leads to positive outcomes. Effective collaboration is not something that administrators can mandate. It must be embedded into the perceived role of a teacher. Friend and Cook (2010) agreed that

mandated collaboration will waste time and resources at best, and at worst, may create a hostile environment for teachers and students alike.

Administration and school leaders may not be able to mandate collaboration, but they do need to support it. Building a culture of shared values and a willingness to find time and resources for the professionals in the school community will promote collaboration. Time to plan, communicate, and follow up with each other becomes a priority for those involved. Collaborating professionals must approach each other with professional courtesies and respect. This can make the difference between working together and dysfunctional partnerships. A collaborative relationship comes to an agreement on specific goals for students, and ensures coordination and implementation of student services. Communication should be open and honest, and participants should be willing to actively listen to each other and the ideas brought to the table (Bauer, Iyer, Boon, & Fore, 2010). According to Carter et al. (2009), when models of collaboration or training to develop collaborative relationships are not in place, teachers will focus on sharing information, and will not problem-solve, make decisions, or plan to adapt the curriculum. Effective collaboration needs a structured model to keep all teachers focused and on track with the most important goals of the session. Since there are multiple models of collaboration, it is helpful to address what they may look like in the schools.

**Coordination.** The first and simplest model in effective collaboration is a basic coordination of logistics. Simply sharing information, schedules, diagnoses, and other such basic communication with other professionals is necessary (Heward, 2009). This, however, is only the first step in collaboration, and as seen in the previous definitions, does not involve many of the critical elements for success. When teachers have not been

trained to collaborate effectively, they may stop sharing information, leaving many students' needs unmet, such as making decisions about adaptations to the curriculum (Carter et al., 2009).

**Consultation.** Unlike coordination, the practice of consultation may include decisions regarding students' programming, more than simply the sharing of information. Traditionally, consultation is considered unidirectional from expert to novice. However, consultation has evolved, due to different professionals demonstrating different areas of expertise. The expert role may change from one professional to another several times in the course of a meeting, each professional benefiting from areas that others are more familiar with than they are alone (Heward, 2009).

Related service providers and therapists, such as speech-language pathologists, physical therapists, and occupational therapists, have long consulted with special education teachers to provide services for students with disabilities in the special education classroom (Bauer et al., 2010). However, now that many students with disabilities are in the general education classroom, it is critical that therapists consult directly with the teacher who spends the greatest amount of instructional time with the students. With today's inclusive classroom, the teacher who spends the greatest amount of time directly with the students is likely the general education teacher. Consultation has taken on new challenges with this partnership, because most general education teachers have had little training or background with students with disabilities, particularly compared to the special education teachers with whom therapists collaborated prior to NCLB. Collaboration skills, therefore, are tested, as less planning time, higher volumes

of students, and increased pressure to meet the rigors of the general education curricula are common in the schools (Bauer et al., 2010).

**Teaming models.** The special education process moves through team-based decisions and collaboration at each step. Intervention assistance teams (also referred to as pre-referral teams), child study teams, and IEP teams are professionals with which educators must familiarize themselves. Teaming uses many of the valuable concepts found in coordination and consultation, and works within a more-equal playing field among participants, both in creating consensus and shared responsibility for the outcome of the decisions (Friend & Cook, 2010). Multiple professionals participate in teaming, and although their many different perspectives add value to the conversation, they can also bring increased conflict, if individuals consider their own agendas of greater importance than that of the team (Culan, 2009).

Three models for teaming are regularly practiced in schools, including multidisciplinary, interdisciplinary and transdisciplinary models. Multidisciplinary teams collaborate within each individual's respective discipline. The professionals assess, share with the team, and provide the services that best fit their area of expertise. Interdisciplinary team members may assess within their discipline, but will provide services that may integrate other disciplines. Professionals using a transdisciplinary model assess together, share together, and ultimately provide services together (Friend & Cook, 2009). Transdisciplinary teaming is considered the highest level of collaboration in teaming, and is shown to yield the greatest positive outcomes for students, inclusive practices, and family-centered interventions (Silverman, Hong, & Trepanier-Street,

2010). Co-teaching may be an example of transdisciplinary teaming used in a service delivery model (Friend & Cook, 2010).

**Co-teaching.** Co-teaching is rooted in team teaching, a strategy utilized in the general education classroom. One teacher, as an expert on a particular topic, delivers the lesson to multiple classrooms at the same time, with the assistance of the other teachers. In reflection, two of the greatest challenges that arose from the team teaching model were the large numbers of students in each classroom, and that teachers were of the same general education discipline and preparation. These challenges created learning obstacles for the numerous students who were taught by teachers who brought similar teaching strategies to the classroom. Teachers who practice co-teaching retain many of the valuable techniques of team teaching, but eliminate the challenges of numerous students and teachers from the similar preparation (Friend et al., 2010).

Although conceptualized in the 1980s, mandates from IDEIA and NCLB insisted that co-teaching become a practiced instructional strategy in classrooms across the United States (Arndt & Liles, 2010). More recently, Friend et al. (2010) define co-teaching as a unique partnership.

> The partnering of a general education teacher and a special education teacher or another specialist for the purpose of jointly delivering instruction to a diverse group of students, including those with disabilities or other special needs, in a general education setting and in a way that flexibly and deliberately meets their learning needs (p.11).

A co-teaching environment provides the opportunity for one teacher (usually the general education teacher) to demonstrate expertise in the curriculum or content, and the other

teacher (usually the special education teacher) to demonstrate expertise on specific instructional methods, such as differentiation, accommodations, and modifications. This combined collaboration creates an environment with a more robust curriculum than if services are delivered solely to students with disabilities by a special education teacher. At the same time, the classroom is better adapted to reaching students' individual needs than instruction provided solely with a general education teacher. Co-teaching improves educational outcomes for students with disabilities at a dramatic rate (Friend & Cook, 2010). Current research indicates that the collaborative interaction between teachers, when they practice co-teaching strategies, creates positive outcomes for children who are in inclusive classrooms (Parker et al., 2010).

**Professional learning communities.** Professional Learning Communities (PLCs) encourage teachers to collaborate to improve themselves as professionals, and to provide more opportunities for students' learning. Levine and Marcus (2010) state that "a small but growing body of research confirms that participation in more collaborative professional communities impacts teaching practices and improves students' learning" (p. 389). Collaborative groups of teachers in PLCs offer common goals and similar types of challenges that need solutions. For example, a common challenge is managing difficult behavior in the classroom, and teachers in PLCs can share ideas to address the needs of those students. Many professionals are better prepared to overcome the challenges of the classroom when they have the support of a community, like one provided by a PLC behind them (Levine, 2010). Communities provide a platform to reflect and critically think about teaching, and to receive feedback from others. "A community of practice tends to encourage every member to take responsibility for information-sharing and

problem-solving, to develop their personal identities in the community, and to foster unification of the community" (Yang, 2009, p. 12).

Peskin, Katz and Lazare (2009) note that PLCs are frequently used within schools that identity them as an excellent collaborative forum to problem-solving current challenges. Successful new teachers need to know how to navigate PLCs, which can be of great support for them in their first years. The Peskin et al. (2009) study incorporated a PLC model in 18 undergraduate teacher preparation programs, while teaching an educational psychology course that included 1400 preservice teachers as participants. Collaboration and connecting theory-to-practice were established strategies when a PLC model was used. Most importantly, it demonstrates to the preservice teacher that collaboration with other instructors makes learning more meaningful (Peskin, 2009).

**Challenges in collaboration.** Although collaboration may be a solution to many of the mandates set forth in NCLB and IDEIA, it also creates some new challenges. Teachers express that collaborating with others is difficult, due to lack of time, physical barriers and lack of motivation (Byinton, 2011). A lack of time becomes a huge concern, as face-to-face meetings can diminish the little and valuable planning time teachers have for planning instruction. Effective collaboration meetings can easily take up an entire planning period for a teacher, or require both teachers to meet before or after school. This can leave the teachers feeling resentful or unwilling to participate (Freeley, Ferdinandi, & Pedota, 2011). Place can be a barrier, as well, as creating an effective meeting requires the attendance of appropriate interdisciplinary professionals who may not be in the same physical location. Expensive travel costs serve as an obstacle that

many school districts are cutting from their budget, and the effects of this mean that some of the essential participants are not heard (Ertmer et al., 2011).

Motivation to collaborate is hindered by insufficient preparation and training that teach individuals to collaborate effectively. Many teachers do not understand the complex nature of effective collaboration, which leads to differing understandings of facilitating effective collaboration. The individualism on the part of the teachers, along with the institutional politics that exist in every school, leave many professionals unmotivated to participate in a collaborative relationship altogether (Friend & Cook, 2010; Kochhar-Bryant, 2010; Sims, 2010; Sykes, Bird, & Kennedy, 2010). Professional educators bring to schools diverse degrees, backgrounds, philosophies, perspectives, and priorities that can lead to effective decision making when used in collaboration. However, those same differences can result in conflict. Teachers can spend so much time trying to resolve conflict with other professionals, that they lose focus on the students' learning in their classrooms (Friend et al., 2010).

As many reforms direct teachers away from their previous isolation in the classroom, and towards participation in one of the many themed collaborative groups, Levine (2010) reports that increased popularity to be a part of a community has suddenly led to its lost meaning. The careless labeling of collaboration, as meaning any interaction among others decreases the power of the word. He warned that the importance that emerges from these communities, like PLCs, might be lost if teams are not carefully and intentionally constructed and monitored.

There is a large body of the literature that agrees that collaboration will lead directly to improved student achievement (Bain, Lancaster, Zundans, & Parkes, 2009;

Bauer, Iyer, Boon, & Fore, 2010; Byington, 2011; Carter, Prater, Jackson, & Marchant, 2009; Conderman, & Johnston-Rodriquez, 2009; Dettmer 2009; Friend, 2010; Kochhar-Bryant, 2010). However, Lingo, Barton-Arworod and Jolivette (2011) argue that there is a lack of empirical evidence of students' academic achievement connected to teacher collaboration. While data based decisions are now critical in making programmatic decisions, it is difficult to disseminate student academic improvement that is attributed to teacher collaboration. Other researchers caution against directly linking what "feels like" it must be good for kids with empirical evidence that collaboration "is" good for kids. More research or better questions are needed in the area of academic outcomes that support the positive impact of teacher collaboration (Hartshorne & Ajjan, 2009; Parks, 2009; Levin, 2010).

Professionals must collaborate with parents to create the student's educational program. Excellent collaboration with other professionals, while ignoring the parents of the student, will not result in the optimal successful partnership (Friend & Cook, 2010). Furthermore, each professional must have a solid knowledge base of their discipline and content area. Without first bringing something to the table to share with other professionals, collaboration (even with excellent communication skills) is not very useful (Sayeski, 2009). Both of these considerations are important to effective collaboration.

**Teacher Preparation**

The Obama Administration urges "revolutionary change- not revolutionary tinkering" in education, and notes that the heart of this change comes from teacher preparation programs (Huang, 2011; Kidd, 2013). Unless otherwise influenced, teachers teach the way they were taught in school. That could be an excellent model to follow, if

the classroom demographics are the same and the same results are desired (Dobler, Kesner, Kramer, Resnik, & Devin, 2009). Today's classrooms have changed along with the academic expectations; however, the demographics of American teachers have stayed consistent, and do not reflect many of the populations they educate in the inclusive classrooms (Zhao, 2010; Brown, 2010). Preservice teachers cannot just be told to be different from their childhood teachers. These new teachers need exposure to diverse classrooms and new tools in order to develop into professional teachers. A new model is needed for today's preservice teachers to establish the role of the classroom teacher as one who collaborates with other professionals (Dobler et al., 2009; Kidd, 2013).

The changing climate of the educational classroom is dramatic, and although most teacher preparation programs recognize this, many find it difficult to prepare the typical preservice teacher for the diverse environment (Skinner, 2010). "The imperative to change is clear and immediate. The need for all teachers to be well prepared to teach culturally and linguistically diverse students has been well documented" (Zhao, 2010 p. 428). Teacher preparation programs are the front lines that develop these changing roles for future educators, and can best prepare them for an inclusive classroom (Harvey, 2010; Wesburn-Moses, 2009).

**Concern for collaboration experienced in teacher preparation.** A major assumption in education is that preservice teachers are learning how to collaborate with professionals in their teacher preparation programs. However, this assumption was not found substantiated among research in the literature. Findings claim that less than one-half of those majoring in special education, and less than one-third of those majoring in general education, have exposure to course content in collaboration (McKenzie, 2009).

Many researchers in the field believe that the responsibility of reforming the roles of teachers falls to teacher preparation programs (Conderman & Johnston-Rodriquez, 2009; Jefferson, 2009; Kidd, 2013). However, for example, in a nation-wide survey of special education student-teaching practices, Conderman and Johnston-Rodriquez (2009) indicated that instead of the critical skills of learning how to collaborate and consult with other professionals, preservice teachers were required to spend the majority of their tasks on lesson planning and other traditional paper-type assignments. As a result of this, first-year teachers expressed that collaborating with other professionals was more challenging than paperwork or logistical issues. On a value scale ranging from 1 point (not prepared to collaborate) to 4 points (very prepared to collaborate), first-year teachers indicated they felt the least prepared in co-planning (M=2.54, SD= 0.88), working with other professionals (M=2.62, SD=1.04), and co-teaching (M=2.62, SD= 0.88) (p. 237). Eventually, 54% of first-year teachers in the study indicated that they needed assistance from their schools to better learn about and engage in collaborating with other professionals. Most new teachers felt that their teacher preparation programs had not prepared them for collegial collaboration, with only 29% of them remembering that the topic of collaboration was discussed in their coursework (Conderman & Johnston-Rodriquez, 2009).

Another national survey of preservice teacher preparation by Harvey et al. (2010) concurs with the Conderman and Johnston-Rodriquez (2009) survey results, noting the need for teacher preparation programs that provide more exposure to inclusive and co-taught classrooms. Universities with teacher preparation programs must form deliberate structures to support teacher collaboration as a necessary change for the profession,

turning the culture from isolationist to collaborative (Zavala, 2011). McKenzie's (2009) "National Survey of Preservice Preparation for Collaboration" reported that the concerns related to collaboration in the public school system were related to and perhaps attributed to faults in the colleges' and universities' teacher preparation programs. If educational reform seeks to change collaboration in the K-12 school environment, it may need to start with the methods of teacher collaboration in the teacher preparation programs.

In addition Friend et al. (2010) made a strong argument regarding the importance of preservice teachers learning the skill of collaboration. Without it, special education teachers who are placed into service models, such as co-teaching or teaming, can fall into the role of assistants, rather than professionals who can equally contribute and become instructional partners. General education teachers can become unable to fully utilize the resources and supports that are created in a collaborative relationship that benefits their students. Likewise, Silverman et al. (2010) stated that critical elements of a teacher preparation program ought to "construct a positive image of inclusive practice, incorporating a family-centered approach, and collaborating and relationship building across disciplines" (p. 461). Their findings indicated that when coursework and field experiences incorporated the critical elements, the preservice teachers began their first year of teaching with a positive outlook towards individuals with disabilities in their classrooms. They felt prepared and comfortable with interdisciplinary and transdisciplinary collaboration, which helped them meet their students' complex, individual needs.

Although research findings indicate that teacher preparation programs do not seem to be responding to the preservice teachers' need to learn how to collaborate, many

state teaching standards are being revised to include collaboration goals. Illinois Professional Teacher Standards (IPTS, 2010) stipulate that in one out of their nine teaching standards, the professional teacher will "build and maintain collaborative relationships to foster cognitive, linguistic, physical, and social and emotional development. This teacher works as a team member with professional colleagues, students, parents or guardians, and community members" (p.6).

Additionally, skills, such as consulting and contributing to teams, are embedded into the Interstate New Teacher Assessment Standards Consortium (INTASC). These standards are to be infused into teacher preparation programs across the United States, in an attempt to address this particular research-to-practice gap observed and documented frequently in education (Conderman & Johnston-Rodriquez, 2010).

**Methods to Teach Collaboration.** Traditional teacher preparation programs are structured in ways that lead to discipline-specific isolation. Methods for teaching the content areas are often taught in different courses than those methods that are taught for students with disabilities, as if different best practices exist for different students. This method, known as the separate spheres model, is disjointed in nature. It builds an underlying assumption that reinforces an ideology that, for example, a math teacher teaches math, and if a student has a disability, then someone else will address his/her needs (Arndt & Liles, 2010). The authors' qualitative study of preservice teachers constructed a co-planning project between university students who were social studies majors and special education majors. The social studies majors and special education majors partner-planned a social studies lesson, and then collaborated in order to differentiate and accommodate instruction for students with disabilities. As a result, both

students of these separate majors perceived that their partners demonstrated a more positive and willing attitude to work with students with disabilities, and were open to collaborating with other professionals in different disciplines. However, the preservice teachers continued to hold a "separate spheres framework" (p. 15), indicating that the collaboration helped them to provide services that their students needed, which were not necessarily delivered by them. Instead of each course developing individual topics from introduction to mastery, courses would embed large concepts, such as collaboration, throughout multiple courses. This model would disperse the concept through multiple viewpoints, deepening the understanding of the preservice teacher (Bain, Lancaster, Zundans, & Parkes, 2009).

The common characteristic of a successful method to preparing preservice teachers for collaboration is to let them participate in authentic collaboration (Ertmer et al., 2011; Macy & Squires, 2009; Peskin, Katz, & Lazare, 2009). Their participating in collaborative elements may occur in both practical and conceptual models, in order to develop into collaborating professional teachers.

***Practical models.*** The practical models include an apprenticeship model for teaching, where preservice teachers have specific skill-sets to learn. They learn the skill-sets on a knowledge level, and acquire firsthand how to implement those practices into their classrooms. Field experiences within a real world context are critical to this model. Supporting a practical model, Conderman and Johnston-Rodriquez (2009) reported that "coursework on inclusion, collaboration, or educating students with disabilities is insufficient without opportunities to practice those skills in authentic settings" (p. 241). Field experiences are the highest rated and most important component in a teacher

preparation program. First-year teachers concur that it is the field experiences that best prepare them for their classrooms. Extended field experiences in a skilled and qualified teacher's classroom, along with the supervision from a professor, are critical in preparing the preservice teacher for collaboration. Educators may agree on the value of field experiences, but identifying the most effective approach continues to be debated (Hanline, 2010; Sims, 2010).

Macy, Squires and Barton (2009) offer characteristics of an approach needed in effective field experiences relating to collaboration. Per their findings, the philosophy of the university should be congruent with what is happening in the field school. Firstly, contradictory values related to how the different institutions value collaboration may confuse preservice teachers at a time when they attempt to understand basic concepts of teaching (Haneline, 2010; Kenny, 2009). Secondly, field experiences should provide opportunities for the preservice teacher to practice what is being presented in the coursework. If the coursework emphasizes collaboration among teachers, the preservice teacher needs to observe that collaboration taking place. Finally, a diverse set of complex issues should be encountered during the field experience. Preservice teachers need to model how teachers in the school district collectively problem-solve through complicated issues (Macy, Squires & Barton, 2009). Haneline (2010) concurs, explaining that many field experiences may focus on the practical lesson planning and behavior management, yet miss out on the collaborative processes of instructional decision-making and reflective critique.

***Conceptual model.*** Compared to "practical models," conceptual models reflect more critical thinking strategies that encourage understanding theories and approaches on

a wider level than on a specific skill-set. This model can give the preservice teacher improved capabilities to judge and think-through future teaching dilemmas and situations that will inevitably occur in their careers. Strong learning theory in metacognition and critical thinking activities during collaborative learning are emphasized in this model (Kenny, 2009).

Due to the complexity of assumptions, skills, and dispositions that are embraced by those who wish to become good collaborators, Dettmer et al. (2009) conclude that it is best to have preservice teachers participate in actual school collaboration meetings and consultation situations during their undergraduate study. Preservice teachers are newly-prepared in theory courses, in-tune with technology, and reading the most current research on best practices. As such, they may be helpful resources to schools that have been doing the same thing in the same way for years. Most importantly, serving as resources can develop the preservice teachers' ability to collaborate with other professionals, and prepare them for an expectation that school teams work together and within a hierarchy. It is also critical that higher education professors of teacher preparation programs collaboration with their peers in their own teaching. Professors should co-teach a lecture, or give credit to their peers' ideas, during a course that would demonstrate to students the value of collaboration.

Cullen (2009), and Macy and Squires (2009), suggest that learning how to be an active part in the collaborative experience in the start-up of the school year is as important as learning how to teach a lesson. For example, prior to the beginning of the school year, the teacher preparation week is filled with collaborative long- and short-range planning, staff meetings, consultation regarding incoming students, and various

team building activities. A traditional student teacher misses this critical process and some of the most important elements of how to collaborate within a school. *Building on Opportunities for Student Teaching and Learning* (BOOST) is studied by Macy and Squires (2009), who reported that when the preservice teacher works in collaboration with the professional teacher for the first week of school, the results are positive for the classroom, as well as for the level of confidence preservice teachers receive for establishing their own classroom in the future.

***Cooperative learning projects.*** Collaboration can be taught in the university classrooms through cooperative learning projects. However, as Bain et al. (2009) noted, there is a large gap between research and practice in many of the cooperative learning projects attempted in teacher preparation classrooms. This simply perpetuates the misconceptions and the weaknesses of ineffective collaboration. When cooperative learning activities are based on research-proven features, such as "task structure, mutual interdependence and individual accountability" (p. 216), the preservice teacher can experience the benefit of collaboration. Brown (2010) also noted that the preservice teachers are the first products of K-12's high-stakes testing, and they experienced learning through multiple-choice answers. Learning through multiple-choice assessments, and not through cooperative learning, leaves many preservice teachers with little desire or experience to use peers when they become teachers. There is reported to be a current resistance among the new generation of teachers towards collaboration once they become professionals. Teacher preparation faculty are examining new tools to overcome this resistance and the challenges of collaboration, so that they can successfully prepare the preservice teachers to collaborate as professionals (Brown, 2010).

**Web 2.0 Technologies**

Technology offers promising tools that help teachers collaborate, whether they are coordinating, consulting, teaming or sharing in a professional learning community. The Internet (also known as the "Web") has expanded from a space where students simply obtain information, to a space where they can create, interact, and share with each other. This evolution in the Internet has coined the phrase: "Web 2.0 technologies" (Hartshorne & Ajjan, 2009). A Web 2.0 technology "forum" (herein referred to as "Web 2.0 technologies") refers to an interactive, read-and-write Web interface, in which an individual participates in an online dialog with other contributors (Baltaci-Goktalay & Ozdilek, 2010; Ertmer et al., 2011). Examples of Web 2.0 technologies are blogs, wikis, social networking and social bookmarking spaces in which interaction, although virtual, becomes natural (Hartshorne & Ajjan, 2009). "New social-sharing applications are transforming the Web technology from Web 1.0 (read-only) environment to Web 2.0 (read/write) technologies" (Baltaci-Goktalay & Ozdilek, 2010, p. 4737). This expansion of the capabilities of the Web has led to the growth of how individuals utilize and envision the purposes of the Web. "The Web has changed from static HTML pages where visitors locate and copy information to a participatory, interactive space where they create, collaborate and share information" (O'Bannon & Britt, 2012, p. 293).

These technologies provide a platform that creates interaction and makes it seamless to share information and ideas. Lieberman and Mace (2009) noted that social networking sites have created online communities of professional educators who are able to collaborate with each other, regardless of the physical distance between one small rural school and another large urban school. Establishing professional learning communities

(PLCs) online results in outcomes that have been positive, including "transformation of practices, philosophies, instructional time, and collegial interactions" (p. 80). Using technology in this way can change professional development from static and irrelevant to interactive and valuable, which may address teachers' specific needs in the classroom. It can also turn a single-day workshop into ongoing learning, if the participants engage in a post-workshop, online community with others. Such collaboration can lead to follow-through and more sustainable use of ideas after new information is gleaned (Lieberman & Mace, 2009). The most significant implications of Web 2.0 technologies are the communicative and collaborative nature of these sites, and the new abilities that they provide educators, as they collaborate with others (Ertmer et al., 2012).

**Blogs.** Communities of professional educators are creating online blogs, one type of Web 2.0 technologies, to collaborate. Examples of specific blog forums include websites such as Blogger, Blogspot, Wordpress, and Edublogs. Yang (2009) defined a blog as "an online journal that users can continuously update in their own words" (p. 13). Blogs are creating new avenues of innovative ideas in educational practice. The lack of time or physical distance from others is a critical issue in schools, and hinders authentic collaboration. Online blogs reduce expensive travel costs and use time and resources effectively, while expanding the diverse pool of voices used in the collaborative process (Byington, 2011). Sharing ideas through writing provides individuals the opportunity to participate during a time that is convenient for them, instead of trying to find a time that is convenient for the entire group. Although they have a flow, blogs are not asynchronous. For example, one member may participate after school, another in the middle of the night, and someone else may contribute the next morning. Also,

participants have time to think through their concepts and formulate their thoughts more carefully than the immediate processing of information that tends to happen when in a face-to-face conversation. When this writing is exposed in a group blog, then the collaborative process can enrich each individual's construction of knowledge, as well as group sharing (Yang, 2009).

**Wiki**. A wiki format creates an interactive space where teachers are able to post their explanation of a topic, and also share links, pictures, videos, and other resources that might be valuable to a team decision-making process (O'Bannon & Britt, 2012). Common examples of wikis include: Seedwiki, WetPaint, and Wikispaces. Bravo and Young (2011) explained a wiki as easy to edit by contributing members of the online group, which may lead to a valuable collaborative process. Although not the only type of wiki, Wikipedia is the most popular, yet it is mostly considered unscholarly and useless in the educational setting. In fact, what makes a wiki unscholarly (the fact that anyone can edit the information) in a controlled community can make it a valuable, collaborative tool. "The collaborative nature of wikis promotes a synergy that comes from the contributions of many members rather than only one" (O'Bannon & Britt, 2012, p. 294). A group-created wiki can be a private Internet site, in which terms are defined by the group and resources shared (O'Bannon & Britt, 2012). Wikis were used in the Ertmer et al. (2011a) study, and found to have "the potential to empower conversational knowledge creation across time, distance, and organizational boundaries" (p. 251). In addition, they have the potential to create cross-cultural experiences, without the challenges or financial burdens involved in cross-cultural experiences. O'Bannon and Britt (2012) found significant gains in academic achievement when using a wiki in their class of preservice

teachers. Their results highlighted interactions and comments that students made to each other during peer presentations, endorsing wiki as a collaborative model.

**Social Networking**. Focusing on a community of individuals who share a similar interest, activity, or relationship enables social networking to build relationships among people (Baltaci-Gokalay & Ozdilek, 2009). Examples of social networking include Facebook Chat and Discussion Boards. Traditionally, social networking has been a leisure activity for many students. At times, it can distract them from their studies. School leaders are now harnessing the use of "Facebook Chat" into their communities for individuals who use this social media frequently. Facebook Chat is a free, real time forum that enables participants to engage in written conversations. Ertmer et al. (2011b) found high levels of effective collaboration in international and cross-cultural Facebook forums, compared to a control group in a corresponding face-to-face class.

Discussion boards are an additional social networking option that many educators have utilized and found effective both in the development of critical thinking and collaborative working with or among peers. Unlike Facebook Chat, discussion boards provide a private and password-protected space that enables educators to communicate ideas regarding their common interests. Discussion boards that are distinctive to a community or school can also help to separate the recreational from the educational, as they are controlled by the invited participants (Matheson, Wilkinson, & Gilhooly, 2012).

**Social Bookmarking**. Most educators have favorite websites, articles, or resources that they have bookmarked atop their browsers for easy access, because they use the sites frequently. Extending this tool to a social bookmarking site can create both the ability to access favorite sites from any computer, and also share those websites with

peers and students. Examples of social bookmarking include: Delicious, I Keep Bookmarks, and Pinterest (Bruff, 2011), and are similar in their look, performance and purpose. Bruff (2011) attests to the tool's simplicity:

> Students most likely won't find this difficult. After all, you're asking them to surf the Web and tag pages they like. That's something they do via Facebook every day. By having them share course-related content with their peers in the class, however, you'll tap into their desires to be part of your course's learning community. And you might be surprised by the resources they find and share (para.10).

In addition, Bruff (2011) explains that social bookmarking is a space that is specifically set up to share resources found on the Internet. When students are asked to research a topic, or a community is trying to solve a problem, sharing information and the websites marked in this forum can lead to a more-informed group, more capable of making decisions.

**Additional technologies.** Related tools of online communities include: podcasts, Skype and gaming. Podcasts add an audio component to an online format, so that individuals can talk and hear each other's actual voices. They can be used to disseminate information quickly and effectively, and show increased comprehension levels of information, when compared to traditional reading of the same information (Kennedy, Hart, & Ryan, 2011). Real time video-conferencing, such as Skype, adds the visual component to the audio of the podcast. Using schools like Skype, new teachers are finding ways to collaborate with mentors that eliminate the frustrations of time and travel commonly associated with face-to-face collaboration (Schneider, 2009).

Gaming, including the use of Massive Multiplayer Online Games (MMOGs), and Second Life Virtual Environment games, is also finding its way into academia. Schrader, Archambault and Oh-Young (2011) reported that using gaming in the educational environment lead to improved motivation, reading and literacy, communication, exploration, problem-solving, and most notably, collaboration. Likewise, the virtual environment created in the Schrader et al. (2001) study changed the perceptions of educators from gaming being "addictive or a waste of time" (p. 276) to the realization of its open-endedness and complex interactions provided a collaborative environment among participants. The Du (2012) study found that the collaborative nature of many Second Life Virtual Environment games motivated students, and were preferred by young female players, in particular.

**Technology and Teacher Preparation**

Technology and e-learning have been used successfully in the fields of medical and business education for decades. The teacher preparation field has long been hesitant to embrace technology as a means to instruct the preservice teacher (Burden, Tinnerman, Lunce, & Runshe, 2010). However, as the field of education increases in complexity and globalization, it is important that teacher preparation programs successfully prepare the preservice teacher for the educational classroom that is integrated with technology (Zhao, 2010). "Developing innovative uses of technology may assist in meeting the demand for highly qualified teachers for students with disabilities" (Kennedy et al., 2011, p. 90). Baltaci-Goktalay and Ozdilek (2010), along with Hasko and Colomer (2011), noted the divide between the student, a "technology native," and the teacher, a "technology immigrant." As undergraduate students have grown into the role of the preservice

teacher, they have brought with them a technological literacy that current teachers do not possess. The preservice teacher of today enters teacher preparation programs with a technology pedagogy that is more advanced than their peers past teacher preparation. Teacher preparation programs that can connect today's technology with the goals of creating a collaborative teacher can have a positive impact on preservice teacher learning (Warner, Steffen, Cope, & Peery, 2011).

The idea that Web 2.0 technologies engage multiple individuals, encourages transformation in the learning process. Web 2.0 technologies provide several opportunities for shared context and resources, self-directed learning, and collaborative learning, making them very attractive to educators, as well as to students (Jimoyiannis, 2013). New learning environments offer extended learning opportunities by encouraging engagement, participation, discussion, and dialogue. Web 2.0 technologies also provide a wide range of ideas, representations, collaborative content, competence, and online learning identity. Jimoyiannis (2013) acknowledged three reasons why Web 2.0 technologies should be utilized during education. First, Web 2.0 technologies engage 21st century skills, and are utilized in the world outside of education. Second, they offer a constructivist approach by shifting control to learners, extending learning to a more informal one, and promoting learner autonomy. Also, Web 2.0 technologies create effective, task-oriented personal learning spaces for learners. Third, students possess the readiness to use and adopt Web 2.0 technologies as an effective learning environment. Many students are already familiar with social networking outside of school, so implementing it in school is comfortable for them.

Likewise, Baltaci-Goktalay and Ozdilek (2010) measured perceptions of preservice teachers and found that their thoughts about Web 2.0 technologies were positive and accepting. In fact, the researchers explained that the current generation of preservice teachers not only uses the Internet to simply obtain information, but it is also used to share, create, and interact with others as they discuss concepts. Although preservice teachers are already collaborating on the Internet during their daily lives, many have not been encouraged to do so in their teacher preparation programs.

**Collaborative advantages**. Web 2.0 technologies' collaborative spaces address many of the challenges to collaboration previously mentioned in the review of time, place, and motivation. Byington (2011) reported that the asynchronous capabilities of Web 2.0 technologies overcame the challenge of coordinating time for a meeting. Students are able to write on the blog at the time most convenient for them, instead of a time that is the most convenient for the entire group, which also adds the benefit of giving students extended time to reflect. A blog has an ease of use, and quick exchange of ideas, along with a record of a history of those ideas and a forum for several perspectives. Yang's (2009) study expressed that the blog was easier and more inviting for students than a traditional collaborative group. The study also showed a significant amount of active participation from students who increased their critical thinking skills.

Web 2.0 technologies open opportunity of place, and provide access to the interaction with scholars and professionals from all over the world. Individuals with Internet access can participate while they are at home, without incurring travel costs (Ertmer et al., 2011; Lapp, Wolsey, Fisher, & Walope, 2011). Web 2.0 technologies can also influence the motivation level of participants. Bravo and Young (2010) stated,

"Collaborative practice on public wikis can motivate and engage students in meaningful ways and challenge students to produce their best work" (p. 3). Students work harder for an authentic audience, than when they are only writing for a teacher, and Web 2.0 technologies create that audience to encourage their best work through the collaborative process (November, 2010; Bruff, 2011).

Typically, the amount of actual face-to-face classroom time a preservice teacher gains with the professor is very limited, and it is difficult to ensure that students receive all the information that they need to process collaboratively with other students. Using technology in different and innovative ways can assist teacher preparation programs with high demands of developing competent teachers. The use of Web 2.0 technologies does not need to be an area of distraction for new teachers; instead, those in teacher preparation programs have the potential to connect these technology vehicles for building active collaboration (Lieberman & Mace, 2010). Collaboration using Web 2.0 technologies can give preservice teachers greater access to practicing teachers, and to real-world problems in their field experience.

Many teacher preparation programs emphasize the importance of reflective practices, and will utilize student journals for reflection and critical thinking related to preservice activities (Byington, 2011). Collaborative journal writing increases the experiential value, as students share ideas and give peer feedback. When this activity is completed through the platform of a blog, for example, it creates a discussion space that enhances the reflective process through collaboration. In turn, this emphasizes to the preservice teachers that collaboration is beneficial (Yang, 2009).

> Reflection through blogs empowers teachers to give and receive more positive and immediate feedback from peers to resolve personal and professional problems. Therefore, teachers have more opportunities for critical reflection upon their own and others' teaching and learning through the use of blogs (Yang, 2009 p.12).

A group blog, for example, allows students to start with a mutual point of interest, or an experience in which they are collectively participating. A field experience or discussion point in a course could serve as a mutual point of interest. Then, the blog is open for them to discuss and respond through text, receiving feedback, and learning about the original point of interest through exchanges with one another (Yang, 2009).

**Advantages of Web 2.0 technologies.** Researchers conclude that Web 2.0 technologies should not be seen as anything more than a trendy tool, if it is only efficient but not effective, when using it for collaboration (Baltaci-Goktalay & Ozdilek, 2010; Bravo & Young, 2011, Ertmer et al., 2011). For example, Ertmer et al. (2011) created a qualitative study to gain a rich description of the collaboration that was happening on the Wiki that preservice teachers used, reporting that many of the conversations were just as effective as if they had occurred face-to-face. In addition, Baltaci-Goktalay and Ozdilek (2010) concluded "that the Web 2.0 technologies can be used for supporting the courses in teacher programs, as it has potential to improve learning and ensure interaction among learners and teachers (p. 4741)."

Friend and Cook (2010), who defined effective collaboration as having a "direct interaction," and a "common goal," with participants "engaged in shared decision making" (p. 7), do not limit collaboration to face-to-face interactions. In fact, the

researchers endorse technology and its advantages in their book, *Interactions* (2010): "The topic of technology has been at least briefly addressed in each chapter of this text, because it is a significant factor in the evolving understanding of collaboration for the twenty-first century" (p. 342). However, the researchers do leave some questions open regarding the effectiveness of online collaboration in regards to the key elements of direct interaction, common goals, and shared decision making.

**Disadvantages of Web 2.0 technologies.** Jimoyiannis (2013) acknowledged that Web 2.0 technologies were not originally meant for educational purposes. As a result, many educators here used Web 2.0 technologies in ineffective ways. Educators must be wary of the fact that Web 2.0 technologies are not to be used as isolated "add on" effects to regular, teacher-centered instruction, but rather used as learning tools to support students' active learning. When Web 2.0 technologies are used as isolated "add ons," preservice teachers may be turned away from the idea of ever using Web 2.0 technologies within their classrooms. Web 2.0 technologies demand extra time and maintenance, so if they are not used properly, they can cause an enormous amount of wasted time.

Using Web 2.0 technologies demands forethought when used in teacher preparation programs. Hasko and Colomer (2011) warn that preservice teachers will resist technology tools if they believe that such tools are outdated or irrelevant to daily practice. Teacher preparation programs must be open and intentional when applying most current technology, as they seek to use it to further collaboration (Burden et al., 2010). Wang (2011) expressed that intentional instructional design when using Web 2.0 technologies is critical to its success, in order to develop a sense of a learning community and a collaborative experience. Important are the careful matching of partners, the

controlling of group size, and setting clear expectations and immediate consequences for not meeting those expectations.

Schneider (2009) found in her study that structure and guidance to fully participate were critical in the successful use of Web 2.0 technologies. She explained that it should never be assumed that simply setting up Web 2.0 technologies, and then abandoning them, will be beneficial. Participants need the structure and guidance of a facilitator who participates frequently and consistently, until there is an understanding of the expectations and how the collaborative interaction may work.

Byington (2011) identified several disadvantages, as well, including the fact that students may not have consistent and reliable access to technology. The posting of incorrect information may misinform other students more quickly than when there is an instructor available who can refute the incorrect information. The study also identified that it was easy to not participate, thus students needed to be reinforced frequently.

User-anxiety related to new technology is another disadvantage to using Web 2.0 technologies. David Mathew (2012) established the importance of Web 2.0 technologies being implemented slowly and intentionally, staying away from "flashing everything all at once" (p. 112). Preservice and practicing teachers may both be anxious regarding the new and previously unused technology. Proper support and preparation decreases this anxiety, helping users participate in the collaborative process. Shepherd and Aagard (2011) examined older adults, age 65 and older, and their participation with Web 2.0 technologies. They found significant anxiety among participants in three specific areas, including lack of access to the technology, lack of prior experience which overwhelmed participants, and fear regarding appropriate security. The researchers agreed with

Mathew (2012) that the best way to overcome anxieties is to start introducing the content in small segments of instruction and build onto the experiences. According to Yoo and Huang (2011), anxiety with Web 2.0 technologies is correlated with previous experiences, as they found significant differences when observing students from various cultures. Those differences in attitude and anxiety related to the lack of prior exposure that students had with the Web 2.0 technologies.

**Behavioral Intention and the DTPB Model**

During the mid-1990s, technology emerged at a rapid pace, changing how individuals in all sectors of society were interacting with others and gaining information. Organizations were challenged, as they tried to understand the new technologies, how the individuals in their organizations were perceiving technology benefits, and learn the factors that would indicate who would utilize technology for the benefit of the organization (Taylor & Todd, 1995). In reaction to these changes, the researchers decomposed the belief structure in the Theory for Planned Behavior (TPB), which had previously been established by Ajzen (1991). This revised theoretical model, called the Decomposed Theory of Planned Behavior (DTPB), was designed to explain the complex factors that influence an individual's behavioral intention leading to actual behavior. Taylor and Todd (1995) explained that behavior is a direct function of behavioral intention.

Behavioral intention is the "cognitive representation of a person's readiness to perform a given action" (Du, 2011, p. 43). Predictive properties of behavioral intention are often addressed through specific factors (Ajzen, 1991; Baltaci-Goktalay & Ozdilek, 2010; Capo & Orellana, 2012; Taylor & Todd, 1995). "Behavioral intention is found to be the

most important predictor of actual behavior when the user has the information to form a stable behavioral intention and intends to take a specific action" (Hartshorne & Ajjan, 2009, p. 188). Likewise, Taylor and Todd (1995) reported a statistically significant path from behavioral intention to behavior. Understanding behavioral intention through the factors of attitude, subjective norms, and perceived behavioral control provides confidence that actual behavior will come after the demonstration of behavioral intent.

> Teachers' own beliefs and attitudes about the relevance of technology to students' learning were perceived as having the biggest impact on their success… Teachers noted that the strongest barriers preventing other teachers from using technology were their existing attitudes and beliefs towards technology (Ertmer et al., 2012, p. 423).

While addressing the attitudes of inservice teachers and their use of Web 2.0 technologies, specifically Second Life Virtual Environments, Du (2011) measured their participants' behavioral intention, because of that factor's strong correlation with actual behavior. Also measuring other factors, including attitude, he concluded that teachers would continue their use of technology in the future, because of their behavioral intention supported by attitude.

The Taylor and Todd (1995) DTPB model (refer to Figure 1, located on page 57) that originated from its earlier TPB model, focused specifically on individuals' behavioral intention to adopt new technologies. Due to the specific explanation of technology in this model, multiple researchers have used this approach to understand the behavioral intention of individual's future adoption of Web 2.0 technologies (Baltaci-Goktalay & Ozdilek, 2010; Capo & Orellana, 2012; Hartshorne & Ajjan, 2009). Each study found a strong correlation

between the behavioral intentions to use technology and the DTPB's three beliefs of *attitude, subjective norms,* and *perceived behavioral control*. Those three beliefs were then decomposed into the factors that would influence them.

**Explanation of the Beliefs and Terms.** *Attitude* was determined through perceived usefulness, perceived ease of use, and compatibility.

> Perceived usefulness is the individual's perception of how well this innovation will help them perform their job. Perceived ease-of-use is the degree to which a person believes that using a particular system would be free of effort. Compatibility is the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters (Capo & Orellana, 2012, p. 240).

*Subjective norms* "refers to the perceived social pressure to perform or not to perform the behavior" (Ajzen, 1991, p. 188), and includes peer influence and superior (which could be a supervisor or teacher) influence. *Perceived behavior control* "refers to how easy or difficult it is to accomplish a task as viewed by an individual" (Capo & Orellana, 2012, p. 240). Facilitating conditions of resources and technology are the perception of the resources available and the individuals own self confidence in carrying out the task, which was termed self-efficacy (Hartshorne & Ajjan, 2009).

Further, Harshorne and Ajjan (2009), Baltaci-Goktalay and Ozdilek (2010), and Capo and Orellana (2012) indicated significant positive correlation between the factors in the DTPB and the behavioral intention to use Web 2.0 technologies. The Capo and Orellana (2012) study, focusing on practicing, high school teachers and participants, reported that even though there was a strong correlation between the DTPB factors and behavioral

intention, teachers displayed low attitude, low subjective norm, and low perceived behavioral control. Therefore, they did not intend to use Web 2.0 technologies in the future. The factors that led to the dependent variable of behavioral intent included many elements that, if understood by a professor, could lead to a better understanding of what might influence preservice teachers to adopt Web 2.0 technologies in the future.

**Summary**

Both the NCLB and IDIEA laws challenge today's classrooms in their overwhelming focus on the success for all students, including those with disabilities (Parker et al., 2010). Students with disabilities are given access to the general education curriculum and to highly qualified teachers, which has changed the general education classroom (Harvey et al., 2010). Classrooms have become increasingly inclusive, and teachers are challenged to meet the multiple needs of all students in a classroom. The role of classroom teachers has changed, emphasizing the need for collaboration as an important skill (Dettmer, 2009). Collaboration integrates disciplines and ideas from multiple viewpoints, and allows teaching staff to make decisions that are better for students (Friend & Cook, 2010). This paradigm shift in the role of the teacher, from an isolationist to a collaborative partner, has proven to be a very difficult change for school districts, where teachers are engaged in established roles of working in isolation and non-receptiveness to change (Lester, 2009; Dettmer et al., 2009).

Many educational reformers believe that the hope for this role change to collaborative partners depends on improving teacher preparation programs. Such programs influence preservice teachers at a time when they can establish, early-on, their role as teachers (Dobler et al., 2009). Studies of teacher preparation programs report that

when teaching collaborative skills to preservice teachers, they must be actively engaged in effective collaboration; it is not enough to simply discuss the importance of collaboration in the classroom (Conderman & Johnston-Rodriquez, 2009). Active collaboration in a teacher preparation program results in an increased value of the collaboration process, a positive outlook toward teaching students with disabilities, as well as establishing the role of a teacher who collaborates in future classrooms (Kenny, 2009). Innovative technologies, such as Web 2.0 technologies, are promising for teaching collaboration to the preservice teachers. Blogs, Wikis, Social Networking, Social Bookmarking, along with additional tools noted herein, give interactive and collaborative platforms for preservice teachers to experience collaboration. Many of the challenges of time, place, and motivation that are experienced with traditional face-to-face collaboration can be overcome with the use of Web 2.0 technologies in preservice environments (Byington, 2011).

## Chapter 3: Methods

Teachers who collaborate with other professionals benefit students with disabilities (Byington, 2011; Dettmer, Thurston, Knackendoffel, & Dyck, 2009; Friend, 2010; Kochhar-Bryant, 2010). However, the challenges of effective collaboration, including lack of time, motivation, and place, have created a problem of practice in the field of education. Web 2.0 technologies, including blogs, social networking, wikis, and social bookmarking have been observed as innovative ideas to overcome teachers' challenges to collaborate (Ertmer et al., 2012; Hartshorne & Ajjan, 2009; Yang, 2009). Although innovative, using Web 2.0 technologies in order to collaborate with peers has not been fully established as best practice. There are still remaining questions and unexamined hypotheses that warrant further study (Baltaci-Goktalay & Ozdilek, 2010; Hartshorne & Ajjan, 2009; Lieberman & Mace, 2009).

This chapter explains methods for conducting this study, including the focused research questions and established hypotheses, and then describes the research design. The research design for this study will be further detailed in terms of data instrumentation, population and sample, data distribution and collection, data preparation, and data analysis.

### Research Question and Hypothesis

Teacher preparation programs are beginning to utilize Web 2.0 technologies to instruct preservice teachers how to collaborate with their peers. The goal of this instructional approach is for preservice teachers to use Web 2.0 technologies when they become professionals (Baltaci-Goktalay & Ozdilek, 2010; Hartshorne & Ajjan, 2009; Warner, Steffen, Cope, & Peery, 2011). However, the current uses, perception of benefits,

and the behavioral intention to adopt Web 2.0 technologies are unknown. Due to these unanswered positions in the literature, this study established three focused research questions to help clarify aspects surrounding Web 2.0 technologies for teacher preparation faculty.

**Question 1.** To what extent do preservice teachers use Web 2.0 technologies in teacher preparation programs?

**Hypothesis 1.** Preservice teachers are using Web 2.0 technologies in teacher preparation programs at an increasing rate.

The first question and corresponding hypothesis reflect the growing trend in teacher preparation programs to use technology. Although recent studies (Hartshorne & Ajjan, 2009) asked this question only 4 years ago, advances in usability, as well as an increased focus on 21st century skills in teacher preparation, support the idea that preservice teachers are using Web 2.0 technologies at an increased rate. In 2009, Harshorne and Ajjan found a significant number of preservice teachers didn't use or plan to use Web 2.0 technologies. Although, the researchers noted the growing trend in using these technology tools in teacher preparation programs, and predicted Web 2.0 technology would be increasingly used. This question will address this prediction of increased use.

**Question 2.** What do preservice teachers perceive are the advantages of collaborating on Web 2.0 technologies?

**Hypothesis 2.** Preservice teachers perceive collaborative advantages on Web 2.0 technologies.

The second question and corresponding hypothesis utilizes the work of Friend and Cook (2010) and their research developing the advantages of collaboration. These

researchers termed collaborative advantages as direct interactions, shared resources, shared decision making, and working towards a common goal. These advantages are essential in making the distinction between effective and efficient collaboration and have been established for face-to-face collaboration, and have been largely unexamined when collaborating online. The perception of these advantages will not determine if online collaboration is or is not effective. Although, it will give insight into what preservice teachers are feeling when they are collaborating online, and how they view these technologies.

**Question 3.** What is the best-fit path model, and its factors that lead through mediating factors, to determine preservice teachers' behavioral intent to adopt Web 2.0 technologies to collaborate with peers?

**Hypothesis 3.** The DTPB path model, and its factors that lead through mediating factors, will be a best-fit to determine preservice teachers' behavioral intent to adopt Web 2.0 technologies to collaborate with peers.

The third question and corresponding hypothesis is based on the theoretical framework of the Decomposed Theory of Planned Behavior (DTPB). According to the DTPB, developed by Taylor and Todd (1995), if an individual describes a high level of behavioral intention to use a particular technology, then he/she is more likely to, in fact, use that technology in the future. Taylor and Todd (1995) expanded the DTPB, as they deconstructed the Theory of Planned Behavior developed by Ajzen (1975).

The DTPB was recently used by Hartshorne and Ajjan (2009) in their study determining behavior intentions of preservice teachers, as they participated in Web 2.0 technologies. The DTPB identifies a path model that hypotheses, factors, and paths

influencing an individual's behavioral intention to adopt certain technologies in the future. The DTPB path model creates a theorized path from identified DTPB factors to behavioral intention for future adoption of Web 2.0 technologies.

The identified factors of the DTPB path model are perceived usefulness, perceived ease of use, and compatibility, which will impact the factor of attitude. Peer influence and superior influence will impact the factor of subjective norm. Self-efficacy, facilitating condition-resources, and facilitating condition-technology will impact the factor of perceived behavioral control. The factors of attitude, subjective norm, and perceived behavior control are the independent factors that then influence the dependent factors of behavioral intention of the preservice teacher. The DTPB path model, identified in Figure 1, guides the hypothesis for research question three.

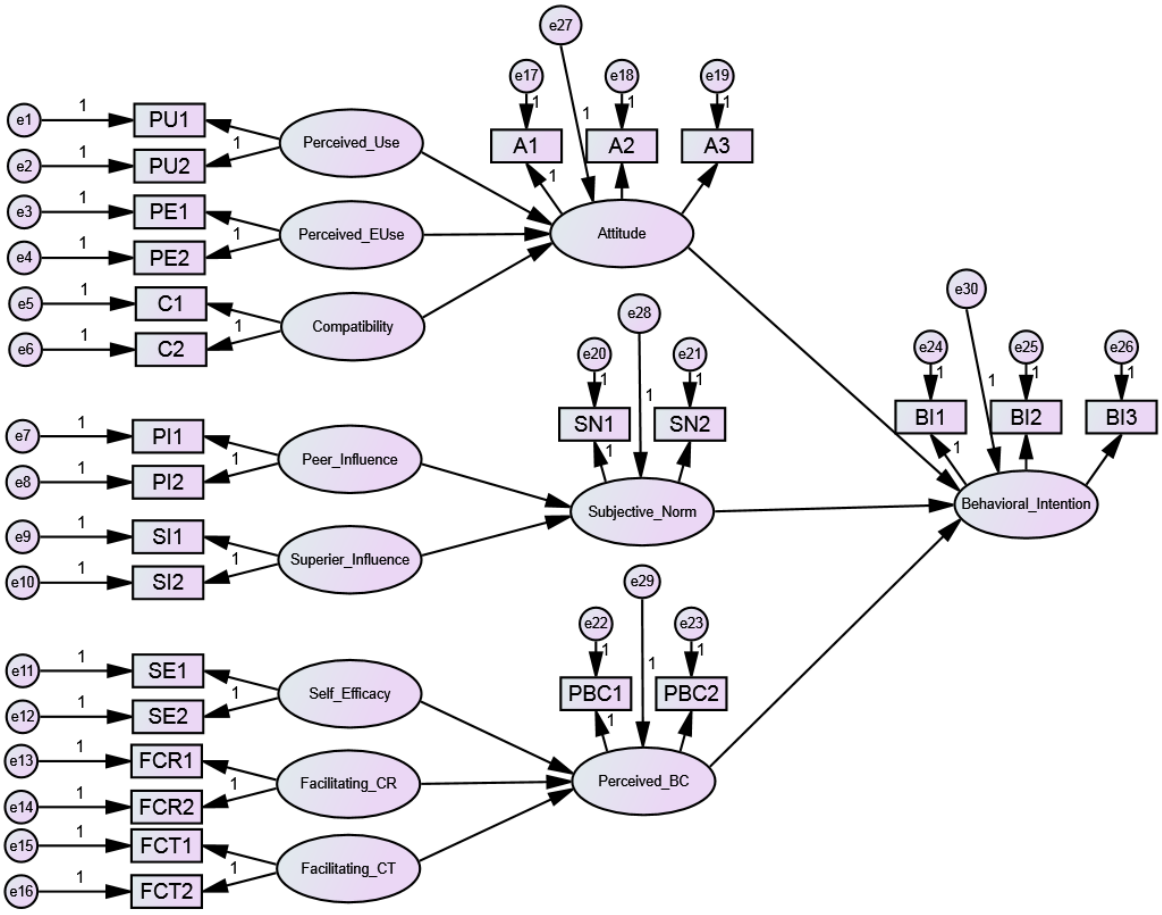



*Figure 1.* DTPB path model: Factors that influence an individual's behavioral intention for future use of Web 2.0 technologies. e= error variance, indicating the amount of unexplained variance. By Hartshorne. R., & Ajjan, H., 2009. Examining student decisions to adopt Web 20 technologies: Theory and empirical tests. *Journal Computer Higher Education, 21,* 183-198.

**Research Design Overview**

The first and second research questions will be analyzed with descriptive statistics, including distribution, measures of central tendency, and correlation. The third research question explores the pathways of the factors identified in the model; therefore, a path analysis was the appropriate design when comparing the theoretical DTPB model to the collected data of this study. "Path analysis was developed to assess the direct and

indirect effects of some variables that were theorized to be causes of other variables" (Meyers, Gamst, & Guarino, 2006, p. 585). This study sought to measure the effects of the pathways between factors that lead to the behavioral intention of the preservice teacher. If the model and pathways of the DTPB fit the data collected, the DTPB would be confirmed, and may be used to understand the behavioral intention of the preservice teacher's use of Web 2.0 technologies to collaborate. However, in the event that a model is not a good fit for the data, modification of the model is necessary in order to determine the best-fit path model. Understanding which factors hold the most influence on the behavioral intention of preservice teachers will help faculty identify impacting factors.

**Data instrumentation.** Meyers, Gamst and Guarino (2006) describe path analysis using correlational procedures, and support that "the data on most or all the variables have been collected at the same time and under the same conditions for all participants" (p. 587). Data is best collected using a survey design that will ensure that its collection is completed at the same time and under the same conditions. Survey design is described by Creswell (2002):

> In this procedure, survey researchers collect quantitative numeric data using questionnaires (e.g., mailed questionnaires) or interviews (e.g., one-on-one interviews), and statistically analyze the data by describing trends about responses to questions and testing research questions or hypotheses. They also interpret the meaning of the data by relating results of the statistical test back to past research studies (p. 396).

This study followed this description and past research studies that used the DTPB model to interpret the new data collected. The DTPB survey instrument was developed

using the DTPB theory (Taylor & Todd, 1995), and was designed by Hartshorne and Ajjan (2009) for use in their study, as they examined behavioral intention of preservice teachers using Web 2.0 technologies to supplement classroom learning.

**Modifications to the instrument.** The DTPB instrument originally measured supplemental learning with Web 2.0 technologies in the classroom, and was not specific to collaboration. Modifications to the instrument were needed in order to address the research questions for this study. Permission to adopt, use, print, and modify the original instrument was granted through email communication by the originator of the instrument Richard Hartshorne (R. Hartshorne, personal communication, July 10, 2012). Modifications are explained in the following section, as is the field test, in order to ensure the continued reliability and validity of the instrument after the completed modifications. The original DTPB survey instrument can be found in Appendix A along with the modified DTPB survey instrument located as Appendix B.

***Section I: Background information.*** The first section of the DTPB instrument includes demographics, and requests descriptors, such as gender, age, university, standing, and major. Questions in the modified version are consistent with the original with the exception of additional questions regarding an Amazon Gift Card and participation in a follow up study.

***Section II: Web 2.0 technology use.*** The second section of the DTPB instrument addressed Web 2.0 technologies use, and the first research question of this study. This section was also used to ensure that preservice teachers completing the survey had experience with Web 2.0 technologies. Included were items that asked about a participant's comfort level on various Web 2.0 technologies, and to what extent they used those

technologies in their teacher preparation program. The survey divided the various Web 2.0 technologies among blogs, wikis, social networking, and social bookmarking. This section was not modified from its original form, and offered a five-level Likert Scale.

***Section III: Web 2.0 technology perception.*** The third section of the DTPB instrument related to the perceptions of the preservice teachers' use of Web 2.0 technologies and the second research question of this study. The original instrument specifically measured supplementing classroom instruction, and not collaboration, so modifications were necessary. Guiding the modification of the instrument to address professional collaboration was the definition developed by Friend and Cook (2010): "…a style for direct interaction between at least two co-equal parties voluntarily engaged in shared decision making as they work toward a common goal" (p.7). Sharing resources, decision making, and working towards a common goal are elements of effective collaboration, replacing the original elements of improving grades, improving writing ability, and improving satisfaction, which relate to supplementing in-class learning.

***Section IV: Web 2.0 technology intention.*** The fourth section of this instrument addressed the intention of the preservice teacher and established the data used to analyze the third research question of this study. This section included 28 different prompts that addressed the various factors theorized to impact the behavioral intentions of preservice teachers and their adoption of Web 2.0 technologies. Each DTPB factor was measured with two-to-three separate prompts. Modifications were limited to changing the term "supplemental instruction" to "collaboration" throughout the various prompts. For example, the modifications changed the original statement, "I feel that using Web 2.0 technologies will supplement my instruction" to "I feel that using Web 2.0 technologies will help me

collaborate." A five-level Likert Scale used the terms "strongly disagree" through "strongly agree."

**Reliability and validity.** The original DTPB survey was found to be internally reliable with a Cronbach's alpha ranging from 0.799 to 0.97, which is an acceptable level of reliability. Table 1 addresses the variation for each factor and the reliability of the items of the original instrument.

Table 1
*Cronbach's alpha reliability (Hartshorne & Ajjan, 2009, p. 191)*

| Variable | Mean | SD | Reliability |
|---|---|---|---|
| Behavior | 3.33 | 1.30 | 0.799 |
| Behavioral Intention | 3.23 | 1.41 | 0.900 |
| Attitude | 3.43 | 1.32 | 0.911 |
| Ease | 3.49 | 1.30 | 0.881 |
| Perceived usefulness | 3.33 | 1.30 | 0.919 |
| Peer influence | 2.69 | 1.57 | 0.974 |
| Subjective Norms | 2.34 | 1.48 | 0.876 |
| Perceived behavioral Contrc | 3.48 | 1.29 | 0.739 |
| Faculty influence | 2.38 | 1.68 | 0.941 |
| Compatibility | 3.33 | 1.43 | 0.918 |
| Facilitating conditions | 3.55 | 1.46 | 0.797 |
| Self-efficacy | 3.63 | 1.35 | 0.934 |

Note: SD = Standard Deviation

A field test and analysis for reliability and validity of the modified instrument occurred in January 2013, in a Greenville College education class consisting of 40 preservice teachers. Internal reliability was determined by completing an analysis of Cronbach's alpha for each of the factors on the modified instrument. Cronbach's alpha determined that the questions were consistently reporting a similar response to the original DTPB instrument when comparing corresponding factors.

Table 2
*Cronbach's alpha reliability during field test (January, 2013)*

| Variable | Mean | SD | Reliability |
|---|---|---|---|
| Behavior | 3.37 | 0.92 | 0.740 |
| Behavioral Intention | 3.60 | 0.92 | 0.844 |
| Attitude | 3.89 | 0.75 | 0.789 |
| Perceived ease of use | 3.92 | 0.65 | 0.596 |
| Perceived usefulness | 3.97 | 0.61 | 0.809 |
| Peer influence | 3.52 | 0.90 | 0.856 |
| Subjective Norms | 3.33 | 0.92 | 0.903 |
| Perceived behavioral Contrc | 3.72 | 0.98 | 0.863 |
| Supervisor influence | 3.71 | 0.79 | 0.635 |
| Compatibility | 3.97 | 0.75 | 0.831 |
| Facilitating conditions | 3.52 | 0.96 | 0.830 |
| Self-efficacy | 3.67 | 0.97 | 0.878 |

Note: SD = Standard Deviation, n=40

Validity for the modified DTPB instrument was re-established during the field test, including internal, external, and construct validity. Threats to internal validity were minimalized, due to the wide cross-section of multiple universities in the sample. Rumrill, Cook and Wiley (2011) argued that the best assurance of internal validity was to "reduce the possibility of systematic group difference that may influence scores on the dependent measures" (p. 101). Internal threats, such as history, an outside event influencing the outcomes, maturation, and/or the growth of the participants, are accounted for due to the single-use survey instrument administered to the same participants. Threat of instrumentation changes in measuring from pre-test to post-test, attrition, and changes in participants from pre-test to post-test, are also addressed, due to administering the instrument during a single event.

Threats to the external validity were minimized, as the characteristics of the sample were developed and included the similar demographics, such as gender and graduate standing, as the population to which the findings can be generalized. Stimulus characteristics and the similar experiences of each participant were of concern, as some

preservice teachers may have had experience with Web 2.0 technologies in their teacher preparation program that differed from other participants. Stimulus characteristics may be a threat to the external validity of this study, as these different experiences may change the perception of the benefit, and therefore, the intent to use Web 2.0 technologies. This study's design attempted to minimize this threat by asking about the involvement of the participant with Web 2.0 technologies in Section II of the instrument. Experiences and background of each participant were noted and taken into consideration when conclusions were made regarding which participants were excluded in the study and how the findings were interpreted.

Collaboration is an abstract construct; therefore, construct validity is essential. Linking an abstract construct to a concrete research procedure, and then back to the conceptual interpretations, must be established as valid, in order to determine substantive findings (Rumrill, Cook, & Wiley, 2011). A consistent fit between the current literature's recognized definition of collaboration and the working definition of collaboration in the instrument was established. Each question in the instrument was evaluated during the field test to ensure that the instrument measured what it claimed to measure, and supported the study's definition of collaboration.

**Population and Sample**

The population for this study consisted of preservice teachers in the midwest region of the United States. Preservice teachers included undergraduate and graduate students in public and private teacher preparation programs, who desire credentials as general and/or special education teachers. The 12 factors measured in the DTPB path model determined the need for a sample size greater than 400 participants.

**Data Distribution and Collection Procedures**

The DTPB survey was distributed both electronically and physically through hard copies. The electronic survey was generated into Google Survey, providing a link for distribution and collection. The link was provided to select teacher preparation programs, who distributed the instrument to their students. Physical copies were mailed directly to course instructors who had agreed to distribute them to the students in their select courses. Distribution of the survey and data collection occurred during the summer and fall of 2013, after IRB was approved through the University of Missouri- St. Louis. Participants for the survey were recruited through their universities. The following teacher preparation programs were requested to participate in the study: Anderson University, DePaul University, Eastern Illinois University, Edwardsville, Fontbonne, University, Greenville College, Kaskaskia College, Lindenwood University, Maryville University, McKendree University, Missouri State, Missouri State University St. Louis University, Southern Illinois University, University of Illinois, University of Missouri-St. Louis, Webster University, and Western Illinois University.

Informed consent from each of the preservice teachers participating on the instrument was presented in the form of the initial page of the survey. The informed consent expresses the intent of the study, and potential harm that may occur, and is listed on Appendix C. Participants were able to give their informed consent electronically, by selecting the prompt "next," and proceeding to answer the questions; otherwise, they were redirected out of the online survey website. If it was a physical survey, then copies of the informed consent were signed and collected.

In the invitation requesting their completion of the survey (Appendix D), participants were informed of their eligibility to win a $50 Amazon gift card. The email and consent form clarified that they were requested to enter their contact information at the end of the survey, in order to enter winning the Amazon gift card. Collecting contact information was necessary for distribution of the gift card. Participants in the study would also have the opportunity to participate in a five-year follow-up study; contact information was needed in order to participate in that study. The participants were able to complete the survey without entering to win the gift card or participate in the follow up study; in such cases, they would not be requested to provide their contact information.

As participants read the prompts, they submitted their answers electronically onto Google Survey. Electronic collection of the data, using Google Survey, was provided in real time, and sent to the researcher's password-protected Google account. Physical copies were collected and entered manually into a password-protected Excel spread sheet.

Contact information for participants in the file were entered to win the Amazon gift card. Information for participants who chose to not participate in the follow up study was destroyed after the distribution of the gift cards. However, if participants requested to participate in the follow up study, their contact information was coded (example: Joe Smith will be known as "Participant #12"), and the coded contact information was linked to their responses on the survey. Actual contact information and code are kept in a secured file, separate from the responses to the survey. The secured file is held on a locked flash drive that was coded for privacy purposes and to ensure the confidentiality of the individual participants.

**Data Preparation**

The collected data was prepared and assumptions checked in order to analyze the data accurately and make interpretations. Initially, inappropriate responses need to be removed from the submitted surveys. During the initial proposal meeting for this study the members of the dissertation committee decided that individuals not identified as preservice teachers (as established in Chapter 1), or individuals who had never been exposed to any of the Web 2.0 technologies, should be removed from the sample. It is common practice to remove unengaged participants, including a respondent who did not complete the survey, or consistently indicated the same response for questions in the survey. “Same responses" for the questions are determined when an individual’s answers to the questions obtained a standard deviation of less than .3.

Missing values are also addressed during the preparation of the data for analysis. The electronic version of the survey was set so that participants must answer all the questions prior to submission. The survey would return the individual to missing questions prior to submission if a question had not been addressed. If there are missing values in the paper versions of the survey a multiple imputation approach is used. This means that first, Little’s MCAR (Missing Completely At Random) test is used to ensure that the data missing is at random and there was not a problem with a specific question. It is then appropriate to input new data for the missing data using the expectation maximizing algorithm.

There was an attempt to minimize data entry errors during the collection of the surveys. The electronic version had a direct feed from the Goggle survey to an Excel document, which was then copied into SPSS without manual input. However, the paper

version needed manual input into Excel, and there should be assurances taken to check for improper entry. Frequencies may be run to determine any entries that were outside of the range of the possible options. In the event that this happens, these surveys will be eliminated from the total sample size used for the study.

Certain data preparations for Structural Equation Modeling (SEM) are used to ensure that assumptions regarding the data are correct. Kurtosis of the collected data is checked for each question. Exploratory Factor Analysis is identified as the tool used to analyze the DTPB factors in order to ensure appropriate validity and reliability on the data. First Adequacy is determined by finding (KMO) Kaiser-Meyer-Olkin Measure of Sampling Adequacy. A Pattern Matrix will be created to ensure discriminate validity. And then in order to establish reliability of each factor, Cronbah's Alpha was run again for each of the factors.

**Data Analysis Procedures**

Demographic information of participants to determine gender, age, institution, and graduate or undergraduate standing of the sample was documented. The first and second research questions analyzed the survey data with descriptive statistics, including distributions and measures of central tendency. Blogs, wikis, social networks, and social bookmarking were measured and compared regarding both their use and perceived benefits. The descriptive statistics are reported using one table for current use of Web 2.0 technologies, and one table for the perceived benefits of Web 2.0 technologies. Correlations were run between the demographic information and the data collected from the use and perception of Web 2.0 technologies.

The third research question was analyzed using inferential statistics and path analysis in the form of Structural Equation Modeling (SEM) to determine the fit between the DTPB model and the collected data. Meyers et al. (2006) established steps in a process when using a path analysis, and analyzing the paths between the variables:

1. Draw out the interrelationships of the variables in the form of a diagram.
2. Indicate the hypothesized strength (e.g. relatively strong, moderate, modest, weak) and direction (direct or inverse) of each variable's presumed effect on each other in each of the "paths".
3. Perform the analyses yielding the path coefficients for each path.
4. Compare the obtained path coefficients with the hypothesized path strengths and directions.
5. Evaluate how well the causal (predictive) model fits the data based on the results of the analysis (p. 586).

This study followed the first step of Meyers et al. (2006) process, by applying the DTPB model, established by Taylor and Todd (1995), to diagram the interrelationships identified in Figure 1 on page 57. Path analysis distinguished the statistically significant and insignificant pathways between the independent variables of the DTPB factors and the dependent variable of behavioral intentions. Independent variables of perceived usefulness, perceived ease of use, compatibility, peer influence, superior influence, self-efficacy, facilitating condition-resources, and facilitating condition-technology impact the direction of the dependent variables of attitude, subjective norm and perceived behavioral control. However, the dependent variables attitude, subjective norm, and perceived behavioral control, were also used as independent variables that impacted the final

dependent variable of behavioral intention. According to Meyers et al. (2006), if a variable does not have an arrow pointing directly at it, then it will always serve as an independent variable in path analysis. It may also be true that some variable may be used as both independent and dependent, if the model shows arrows leading to and away from the variable. These variables are considered the mediating factors in the research question.

The second step of this process hypothesized the strength in the steps of path analysis. According to the findings in Hartshorne and Ajjan (2009), another study that used the DTPB model, the factors of DTPB had an effect on the paths to behavioral intention. Attitude was found to have a strong beta weight of .614 ($p<0.01$). Subjective norms resulted in a beta weight of .220 ($p< 0.01$), which is considered a strong influence on behavioral intention, perceived behavioral control had only a modest influence with a beta weight of .08 ($p<0.05$). These findings were supported by additional studies that analyzed the DTPB model (Baltaci-Gokalay & Ozdilek, 2009; Capo & Orellana, 2012). Taking these findings into account, it can by hypothesized that attitude and subjective norm will have a strong impact on behavioral intention, and perceived behavioral control will have a modest impact. These categories of "strong" and "modest" are ultimately incorporated into the term "best-fit," used in the original hypothesis of this study. If a pathway has a weak or no beta-weight, then that pathway should be eliminated in order to establish "best-fit" (Hopper, Coughlan, & Mullen, 2008).

The third step in the process is to "perform the analyses yielding the path coefficients for each path" (Meyers et al., 2006, p. 586). Path analysis has traditionally been accomplished through applying multiple regression for each pathway, which

"employs the ordinary, least squares method to calculate the path coefficients" (Meyers et al., 2006, p. 594). This establishes the beta weights of each path, and indicates effect of the factors on the dependent variable. Meyers et al. (2006) encourages the use of model fitting or SEM, as opposed to multiple-regression, for path analysis that will calculate the "maximum likelihood of the path coefficients" (p. 597). Maximum likelihood procedures will find the estimated parameters resulting in the highest likelihood of the proposed model based on the data. Meyers et al. (2006) explain that it leads to a better overall fit of the model, which is not taken into account when using multiple regression. In SEM, and not in multiple-regression, the indirect and total effects of a variable are calculated. This impacts the analysis of the DTPB model, as perceived usefulness is hypothesized to have an effect on attitude. Attitude is hypothesized to have an effect on behavioral intentions (indirect effect), but it will also analyze the path between perceived usefulness and behavioral intentions (total effect).

Using multiple regression is considered a "partial-information technique." SEM is known as a "full-information technique" (p. 613), because it takes into account all of the information or factors at once, in a single analysis, instead of breaking up and performing an analysis on each individual path. This study completed a path analysis using SEM, the data was analyzed using AMOS (Analysis of MOment Structures), and not SPSS. AMOS, unlike SPSS, has the capabilities to calculate all the path coefficients simultaneously. Analyzing the data through model-fitting, and not through multiple-regression, will result in a stronger claim of best-fit.

The fourth step required the application of the DTPB model (Figure 1) and, "compared the obtained path coefficients with the hypothesized path strengths and

directions" (Meyers et al., 2006, p. 586). The obtained path coefficients are identified and compared on tables and models reported in Chapter four of this study.

Finally, the fifth step, "Evaluate how well the causal (predictive) model fits the data based on the results of the analysis" (Meyers et al., 2006, p. 586), will be addressed. Fit refers to a model's ability to reproduce the same results with future data (discriminate validity). In order to make this evaluation, model-fit indices were used to determine the fit between the DTPB model and the collected data. Model-fit indicators of Chi Square-Based Measurement of Discrepancy/Degrees of Freedom (CIM/DF), Standardized Root Mean Square Residual (SRMR), Root Mean Square Error of Approximation (RMSEA), and Comparative Fit Index (CFI) were examined to determine the best-fit model.

The literature has established thresholds that help determine a constant standard of a fit model (Hooper, Coughlan & Mullen, 2008; Meyers, Gamst, & Guarino, 2006). CIM/DF, a frequently used indicator, establishes good fit in two different ways. Initially, it looks at the CIM/DF indicator and the p-value of statistical significance. The CIM/DF indicator should be lower than 5 to be considered a reasonable fit; however, a lower number is more desirable. The desirable model should not be statistically significant, because researchers are predicting a close fit between the predicted and observed relationships (Marsh & Hocevar, 1985). At the same time it is critical to realize that with the complexity of the model a large sample size will inflate this indicator.

Meyers et al. (2006) suggested supplementing the CIM/DF indicator with other indicators to determine best-fit. CFI measures the fit of the proposed model in relation to

the independence model. "These measures indicate the improvement of the hypothesized model compared with that baseline. Values of these indexes can range from 0 to 1, and values of .95 or greater are deemed acceptable" (p. 608). The researchers also suggested using RMSEA as an indicator of a good fit. RMSEA averages the residuals between the observed correlation/covariance of the sample and the estimate of the expected model from the total population. "A value of .08 indicates good fit" (p. 608).

SRMR is the standardized square root of the average squared amount by which the sample variances and covariance differ from their obtained estimates. A zero indicates perfect fit, and the smaller the number, the more desirable the model. However, indicators less than .08 may indicate a good fit and will establish linear growth of the model (Hooper, Coughlan & Mullen, 2008). For additional clarification, Table 3 outlines established thresholds.

Table 3

*Model-Fit Indicators*

| Indicator | "Threshold" |
|---|---|
| CMIN/DF | <5 |
| SRMR | <. 08 |
| RMSEA | <. 08 |
| CFI | >.9 |

Hooper, Coughlan and Mullen (2008) note that, given the complexity of SEM, it is common to find that an original model does not fit the collected data. The authors suggested that local modifications may be appropriate, but cautioned against correlation of error terms. "It is good practice to assess the fit of each construct and its items individually to determine whether there are any items that are particularly weak" (p. 56). Factors with low beta weights (less than .20) may be removed from the analysis. After this has been completed, each construct should be modeled in conjunction with every other construct to determine whether discriminant validity has been achieved.

**Summary**

The three research questions established the quantitative approach to developing the research method in this chapter of the study. Using the DTPB survey instrument, the data was collected electronically and physically in the Midwest region of the United States. The data were prepared and analyzed using descriptive statistics for the first and second research questions. The third research question was analyzed using a path analysis to determine if the hypothesized DTPB model would fit the current data. The path analysis employed SEM by utilizing AMOS, which was able to indicate model-fit index. The model-fit index could then be compared to the established model-fit thresholds to determine a best-fit path model. Understanding the best-fit model helps to establish which factors impact a preservice teacher's decisions to use Web 2.0 technologies for future collaboration.

## Chapter 4: Data Results

The purpose of this study focused on the empirical evidence of the current uses, perception of benefits, and the best-fit path model to determine preservice teachers' behavioral intention to adopt Web 2.0 technologies to collaborate with peers. This chapter reports the results from the data collected in midwestern teacher preparation programs using the Decomposed Theory of Planned Behavior (DTPB) instrument. Demographics of the sample are reported and explained, as the percentages mirror the overall population of preservice teachers. Results from the data preparation are described addressing the validity and reliability of the study. The results for the three research questions are reported in tables and models.

### Description of Sample

The following teacher preparation programs participated electronically in the study: Anderson University, Eastern Illinois University, Southern Illinois University of Edwardsville, Fontbonne University, Greenville College, Kaskaskia College, Lindenwood University, Maryville University, McKendree University, Southern Illinois University, University of Missouri-St. Louis, and Webster University. There were a reported 9,500 electronic requests distributed to students identified as education majors in these institutions. Electronic collection of the surveys using Google Survey was provided in real time, through the site, with a total of 325 responding, for a rate of return of 3.42%. Physical copies of the surveys were also mailed to universities who had agreed to distribute them to students. Ten teacher preparation programs distributed the physical copies: DePaul University, Greenville College, Kaskaskia College, Maryville University, Missouri State, Missouri State University, St. Louis University, University of Missouri-St. Louis, University of Illinois,

and Western Illinois University. There were 549 physical copies of the surveys sent directly to course instructors who agreed to distribute to students. There were then 336 completed surveys returned through the mail. This resulted in a return rate of 61.2%.

**Data Preparation Procedures**

A total of 661 individuals responded to the DTPB survey, and preparation for the analysis began in November of 2013. Respondents to the survey who did not identify as preservice teachers, were removed from the sample during data preparation. This included a total of 13 individuals, who indicated during the demographic portion that they were already practicing teachers (returning for additional coursework), those with majors outside of education, or a professor who took the survey not understanding the requested demographics. A total of 32 respondents indicated they had never used any of the four proposed Web 2.0 technologies, and they were removed from the sample. An additional 24 unengaged responses were removed from the sample during the preparation period. The paper version of the survey needed manual input into Excel; great precision was used during input, and then it was checked for accuracy. Frequencies were run to determine any entries that were outside of the range, and two surveys fell outside of the possible options. Both surveys were eliminated from the total sample size used for the study.

Missing values were addressed during the preparation of the data for analysis. There were 14 missing data points on the paper version of the survey which needed to be addressed. The sign rate for Little's MCAR test indicated .674, meaning that the missing data was not statistically significant. Therefore, there was a failure to reject the null hypothesis, and the missing data was random. It was then appropriate to input new data

for the missing data using the Expectation Maximizing Algorithm. The surveys with the missing values did not need to be removed from the sample.

The survey used a Likert Scale to reduce outliers; the range was within the scope of the target demographic. Of the original 661 participants responding to the survey, 590 of those responses were found appropriate to use in the study. Respondents were used for analysis after those who were not part of the sampled population, unengaged respondents, and surveys with data entry errors were eliminated from the study. An appropriate sample size was established for this study, as the goal of 400 was surpassed.

**Validity and reliability.** Kurtosis of the collected data was checked for each question to ensure assumptions about the data were correct prior to analysis. All scales fell below the recommended 3.0, with the exception of the age range. Age had a kurtosis level of 9.51; this is likely due to the fact that a large number of preservice teachers were undergraduate students and between a similar age range of 18-23. The questions in the survey that indicated the factors to be used in the path analysis were all below the appropriate level of 3.0. The highest factor was attitude at .872, falling well below the appropriate threshold.

The Exploratory Factor Analysis was identified as the tool used to analyze the DTPB factors in order to ensure appropriate validity and reliability on the data. First, Adequacy was determined by finding the (KMO) Kaiser-Meyer-Olkin Measure of Sampling Adequacy, that reported a score of .953 with a significance level at .000. This is an appropriate indicator, as anything above .7 is acceptable. Communalities were appropriate, above the acceptable level of .30. The lowest was PBC1 at .476, which is still within the appropriate threshold. There were no residuals 0 (0%), which is appropriate, as anything

below a score of 3% is adequate. Convergent validity was established by an indication that the factors loaded highly; anything above a score of .3 is acceptable. They all scored above this mark, with .33 as the score that was the lowest.

Discriminate Validity was unable to be established when a Pattern Matrix was created. There was a cross-loading of the factors, indicating that each factor was not completely clean. Cross loading, a single item loaded on multiple factors, could indicate a problem establishing discriminate validity for the study. However, there was more than a .2 difference between the factors, which means although it is not preferred, it is tolerable.

Reliability of each factor was established while using Cronbah's Alpha for each of the Factors. The results, per Table 4, were similar to the field test that was established in January of 2013. These scores indicate that the DTPB survey continues to be a reliable instrument and the items are internally consistent as well as test-retest consistent.

Table 4

*Cronbach's alpha reliability (November 10,2013)*

| Variable | Mean | SD | Reliability |
|---|---|---|---|
| Behavior | 3.67 | 0.92 | 0.795 |
| Behavioral Intention | 3.96 | 0.76 | 0.828 |
| Attitude | 4.00 | 0.68 | 0.808 |
| Perceived ease of use | 3.82 | 0.75 | 0.673 |
| Perceived usefulness | 3.95 | 0.71 | 0.736 |
| Peer influence | 3.71 | 0.77 | 0.697 |
| Subjective Norms | 3.50 | 0.81 | 0.816 |
| Perceived behavioral contro | 3.97 | 0.86 | 0.702 |
| Supervisor influence | 3.64 | 0.86 | 0.780 |
| Compatibility | 4.00 | 0.72 | 0.781 |
| Facilitating conditions T | 4.06 | 0.88 | 0.779 |
| Facilitating conditions R | 4.01 | 0.85 | 0.766 |
| Self-efficacy | 4.03 | 0.94 | 0.931 |

Note: SD = Standard Deviation, n=590

**Demographic Information**

Demographic information of participants in this sample was collected and differentiated by gender, age, institution, and graduate or undergraduate standing. Participants in the study included 15.3% (n=90) males and 84.7% (n=500) females. Participants' ages were categorically reported in four groups: 85.6% (n=505) within the ages of 18-23, 7.6% (n=45) within the ages of 24-29, 3.2% (n=19) within the ages of 30-34, and 3.6% (n=21) above the age of 35. Majors or intended educational fields were reported as 52.5% (n=310) Elementary, 11.5% (n=68) Early Childhood, 12.5% (n=74) Special Education, 4.6% (n=27) Ancillary (such as Art, PE or Music), and 18.8% (n=111) content specific Secondary Education. In order to gain many perspectives of individuals preparing to become teachers, both undergraduate and graduate programs were sampled. Graduate students were not practicing teachers, but rather preservice teachers who had returned to higher education to receive an advanced degree in education. These graduate students represented 11.7% (n=69) of the sample. The remaining 88.3% (n=521) were preservice teachers enrolled in undergraduate programs.

**Use of Web 2.0 Technology**

The first research question addressed: To what extent do preservice teachers use Web 2.0 technologies in teacher preparation programs? Descriptive statistics, including distributions and measures of central tendency, were used to analyze the preservice teachers' use of different Web 2.0 technologies. There were a wide variety of Web 2.0 technology forums, including blogs, wikis, social networks, and social bookmarking. Each forum was measured and compared regarding both their use and perceived benefits. Table 5 indicates

participants' "comfort level" and includes the percentage results from the item: "Please select your comfort level with the following Web 2.0 technologies."

Table 5

*Comfort Level*

| Variable | Blog | Social Network | Wiki | Bookmarking |
|---|---|---|---|---|
| Never Use % | 26.1 | 0.3 | 9.0 | 10.7 |
| Novice % | 19.7 | 1.2 | 17.1 | 7.1 |
| Familiar % | 29.7 | 8.5 | 37.3 | 17.8 |
| Competent % | 20.3 | 38.6 | 30.2 | 33.7 |
| Expert % | 4.2 | 51.4 | 6.4 | 30.7 |

Note: n=590

The survey continued to question participants regarding their use of Web 2.0 technologies in teacher preparation courses. Table 6 indicates the extent a preservice teacher uses specific Web 2.0 technologies in their education coursework. Percentage results are reported from the item: "To what extent do you use the following Web 2.0 technologies in your teacher education programs?"

Table 6

*Extent of Use*

| Variable | Blog | Social Network | Wiki | Bookmarking |
|---|---|---|---|---|
| Never Use % | 35.1 | 8.8 | 25.8 | 32.5 |
| Used Minimally % | 24.7 | 22.7 | 35.3 | 21.2 |
| Used % | 26.6 | 24.9 | 25.8 | 19.0 |
| Used Frequently % | 10.7 | 28.6 | 10.0 | 18.0 |
| Used Throughout % | 2.9 | 14.9 | 3.2 | 9.3 |

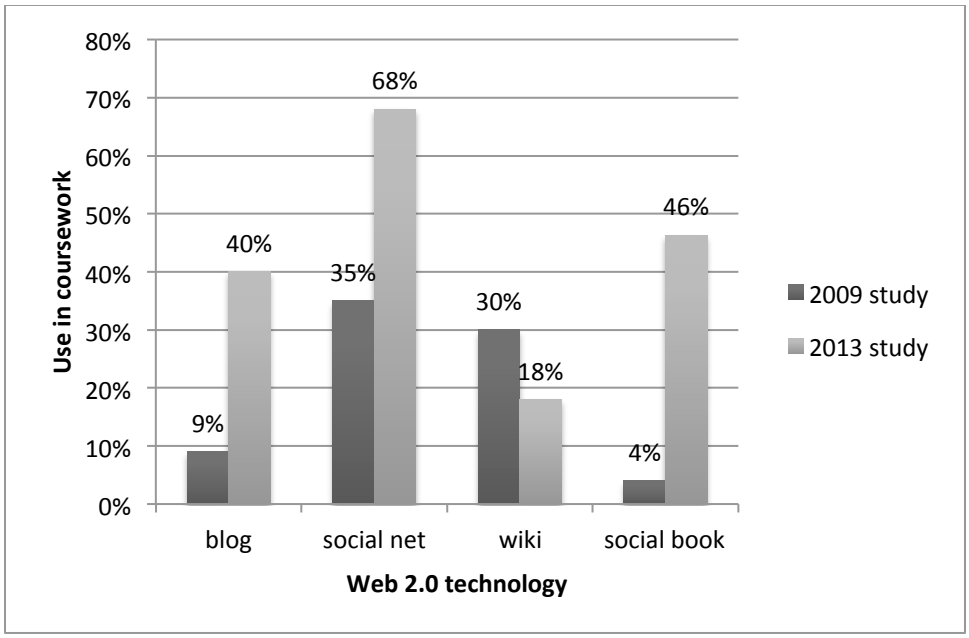
Note: n=590

Preservice teachers are reporting that they are using Web 2.0 technologies in their classes, with Social Networking as the most frequently used forum. The hypothesis for this question however, addressed the increased rate in use of Web 2.0 technologies not just the

reported use. Hartshorne and Ajjan (2009) previously addressed the extent of use in their study. Replicating this question into this study provided the opportunity to compare results between the data reported four-years ago and determine if there was an increase.

Table 7

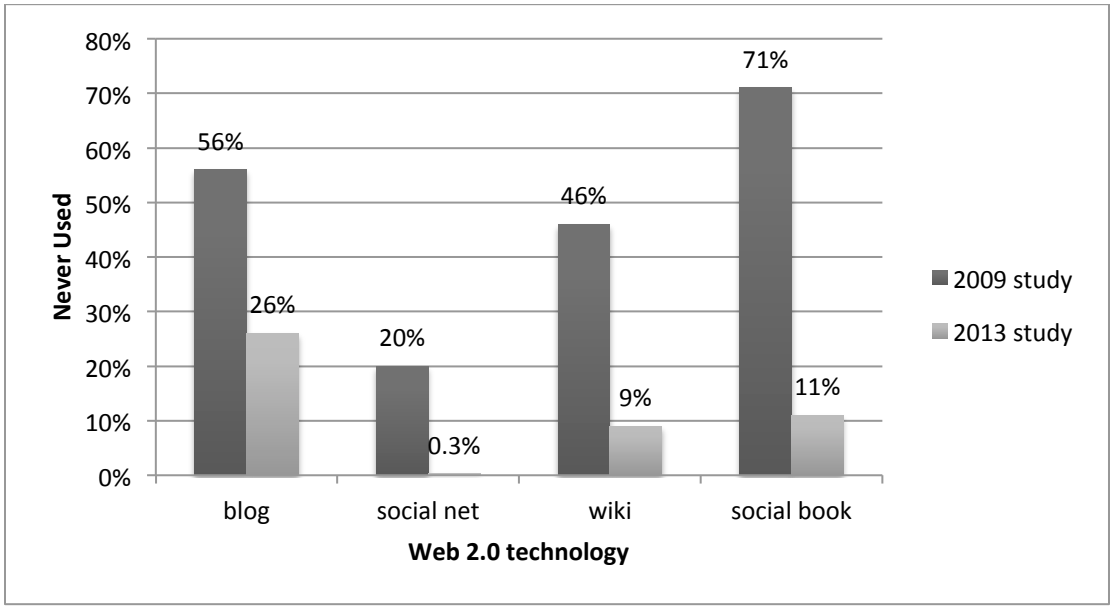
*Increase in the extent of use*




Preservice teachers for this study reported a dramatic increase in the extent of use with these technologies from the Hartshorne and Ajjan (2009) study four years ago. The most significant increase being on social bookmarking. The only forum that indicated a decrease in use were wikis, which went from 30% to 18% use. Table 8 reports the significant decrease in preservice teachers who have never used Web 2.0 technology forums from the 2009 study to the current reported data for this study. This table was reported because it was significant that even if preservice teachers didn't use Web 2.0 technologies in their education coursework, they still have access and are using it.

Table 8

*Decrease in the never use*




**Perception of Collaborative Benefits**

Preservice teachers' perceptions of the collaborative benefits of Web 2.0 technologies were considered essential during the research design. It is important to determine how collaboration was perceived by preservice teachers when using each of the different forums, and how the definition of collaboration detailed by Friend and Cook (2012) was perceived in those forums. Each of the four Web 2.0 technologies (blogs, social networking, wikis, and social bookmarking) were assigned to a prompt: "What are, in your opinion, the advantages of using each of the following Web 2.0 technologies to collaborate in your education courses?" The six options are listed in Table 9 with the indicators: Improve my interaction with Faculty (Faculty), Improve my interaction with other peers (Peers), Share resources (Resources), Share decision making (Decisions), Work toward a common goal (Goals) and, I do not know of any advantages (I do not

know). Participants were able to check more than one option and the results are reported in percentages on Table 9. This table indicates that a majority of respondents see sharing resources as an advantage on Web 2.0 technologies. The majority of respondents do not see making decisions or sharing goals as an advantage on Web 2.0 technologies.

Table 9

*Collaborative Perception*

| Variable | Blog | Social Network | Wiki | Bookmarking |
|---|---|---|---|---|
| Faculty | 38.1 | 47.6 | 11.9 | 13.4 |
| Peers | 58.5 | 75.4 | 14.9 | 22.9 |
| Resources | 71.5 | 65.1 | 59.8 | 78.5 |
| Decisions | 32.7 | 37.5 | 19.7 | 24.4 |
| Goals | 33.4 | 32.4 | 27.1 | 21.7 |
| I do not know | 12.4 | 4.1 | 30.0 | 16.8 |

Note: n=590

**Best-Fit Path Model**

The third research question was "What is the best-fit path model, and its factors that lead through mediating factors, to determine preservice teachers' behavioral intent to adopt Web 2.0 technologies to collaborate with peers?" The data analyzed per the research question applied the DTPB model and includes regression weights (beta) of the pathways. P-values of statistical significance are reported on Table 10, followed by the model in Figure 2. Table 10 and Figure 2 both indicate strong pathways between Compatibility, Peer-influence, Superior-influence, Self-Efficacy, Facilitating Condition-Resources, Attitude, Subjective Norms and Perceived Behavioral Control. However, the pathways of Perceived Use, and Facilitating Condition-Technology are weak and do not show a strong indication that if a preservice teacher believes these factors that they will

lead to behavioral intention to use Web 2.0 technologies once they become a professional teacher.

Table 10

*Path Analysis Model 1: Original DTPB Model*

| Equation | $R^2$ | Beta |
|---|---|---|
| Behavioral Intent (I) | .519 | |
| I=A+SN+PBC | | |
| A | | .443** |
| SN | | .236** |
| PBC | | .543** |
| Attitude (A) | | |
| A=PU+PE+C | .384 | |
| PU | | .056 |
| PE | | -.075 |
| C | | .934** |
| Subjective Norm (SN) | | |
| SN=PI+SI | .563 | |
| PI | | .760** |
| SI | | .248** |
| Perceived Behavioral Control (PBC) | | |
| PBC=SE+FC-R+FC-T | .612 | |
| SE | | .213** |
| FC-R | | .438** |
| FC-T | | .114 |

**$p<0.01$

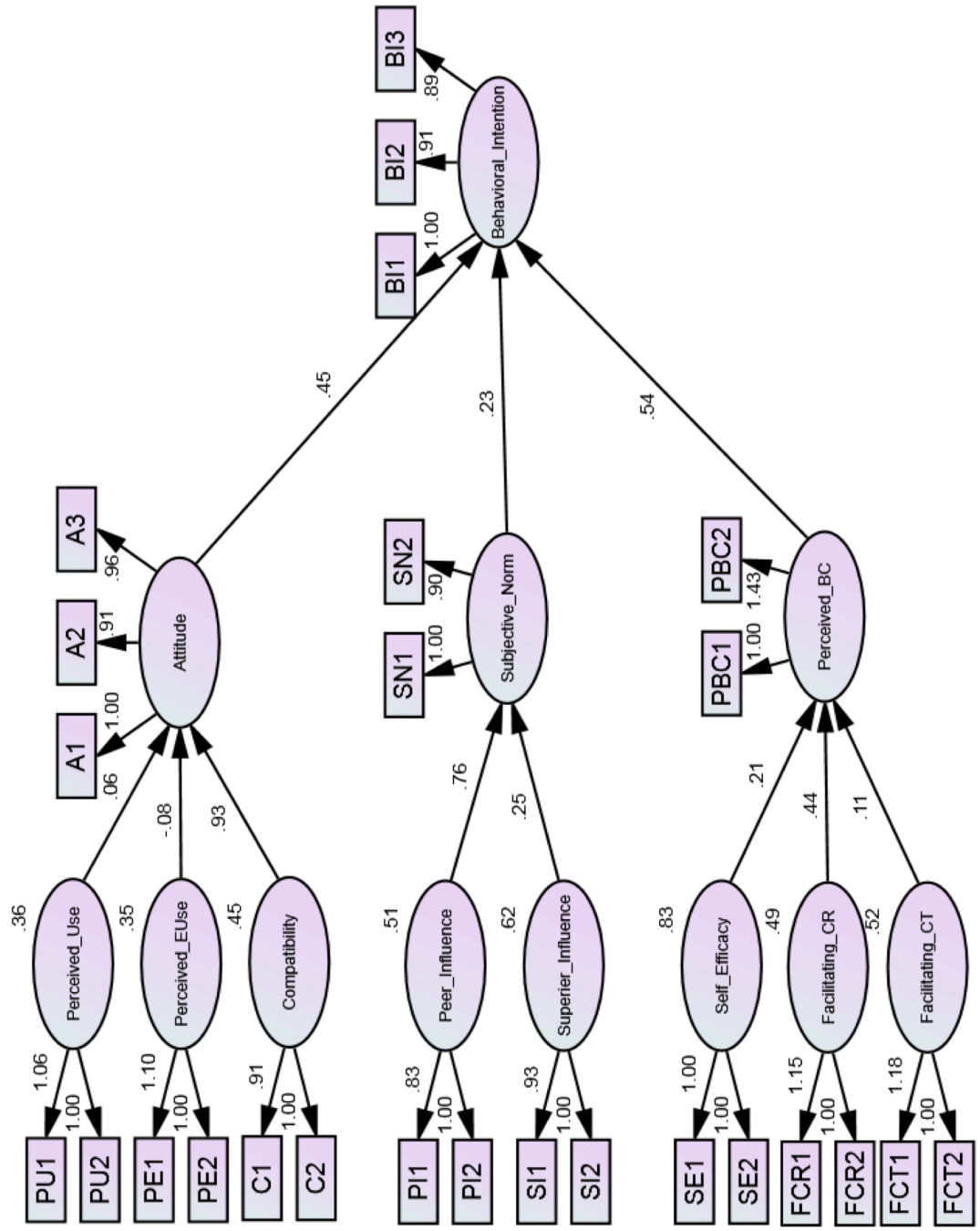



*Figure 2.* Path Analysis Model: Original DTPB Model. e= error variance, indicate the amount of unexplained variance.

Model fit indicators were also analyzed on the original DTPB path model (Figure 2). The DTPB path model is not a good fit according to the following model fit indicators: CMIN/DF: 11.859 (statistically significant at .000), SRMR: .266, RMSEA: .136 and CFI: .689. Following model modification procedures by Hopper, Coughlan and Mullen (2008), the pathways of Perceived Use (.06) and Facilitation Condition-Technology (.11) were removed from the original model. Due to the cautions from the researchers (Hopper et al., 2008) the correlation of error terms were not used to modify the model. The following Modified Model is described in Table 11, along with Figure 3. Table 11 and Figure 3 both indicate strong pathways between Compatibility, Peer-influence, Superior-influence, Facilitating Condition-Resources, Attitude, Subjective Norms and Perceived Behavioral Control. However, the pathways of Perceived Ease of Use (.09), and Self-Efficacy (.16) are weak and do not show a strong indication that if a preservice teacher believes these factors that they will lead to behavioral intention to use Web 2.0 technologies once they become a professional teacher.

Table 11

*Path Analysis Model 2: Modified Model*

| Equation | $R^2$ | Beta |
|---|---|---|
| Behavioral Intent (I) | .536 | |
| I=A+SN+PBC | | |
| A | | .437** |
| SN | | .246** |
| PBC | | .572** |
| Attitude (A) | | |
| A=PEU+C | .400 | |
| PEU | | -.090 |
| C | | .996** |
| Subjective Norm (SN) | | |
| SN=PI+SI | .563 | |
| PI | | .760** |
| SI | | .248** |
| Perceived Behavioral Control (PBC) | | |
| PBC=SE+FC-R | .647 | |
| SE | | .163** |
| FC-R | | .586** |

**$p<0.01$

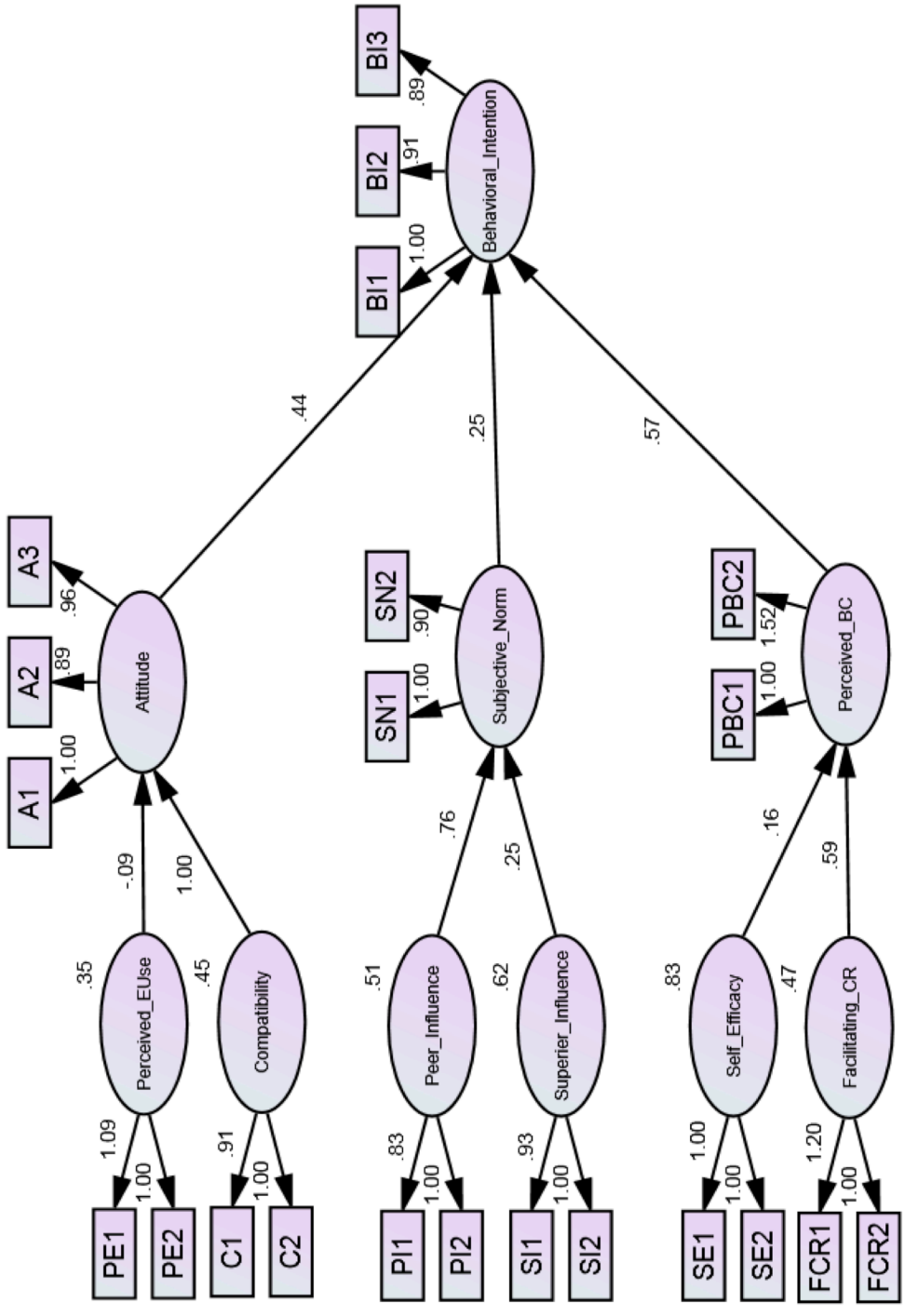



*Figure 3*. Path Analysis Model 2: Modified Model. e= error variance, indicate the amount of unexplained variance.

Model fit indicators were also analyzed on the Modified DTPB path model (Figure 3). The modified DTPB path model is a better fit than the original DTPB model; however, according to the following model fit indicators it is still a poor fit. The following are the reported model fit indicators for the Modified DTPB path model: CMIN/DF: 5.711 (statistically significant at .000), SRMR: .266, RMSEA: .089 and CFI: .885. Due to SEM being a "full-information technique" (Meyers et al., 2008, p. 598), a change in one part of the model will impact other parts of the model. As displayed in Figure 3, the constructs of Self-Efficacy and Perceived Ease of Use were directly impacted and decreased below the .20 beta weight level. In order to achieve a more desirable model, the pathways of Perceived Ease of Use (-.09) and Self-Efficacy (.16) were removed from the pathways. The following best-fit model is posted in Table 12 along with Figure 4.

Table 9

*Path Analysis Model 3: Best-Fit*

| Equation | $R^2$ | Beta |
|---|---|---|
| Behavioral Intent (I) | .489 | |
| I=A+SN+PBC | | |
| A | | .441*** |
| SN | | .213*** |
| PBC | | .535*** |
| Attitude (A) | | |
| A=C | .448 | |
| C | | .932*** |
| Subjective Norm (SN) | | |
| SN=PI+SI | .547 | |
| PI | | .772*** |
| SI | | .245*** |
| Perceived Behavioral Control (PBC) | | |
| PBC=FC-R | .473 | |
| FC-R | | .863*** |

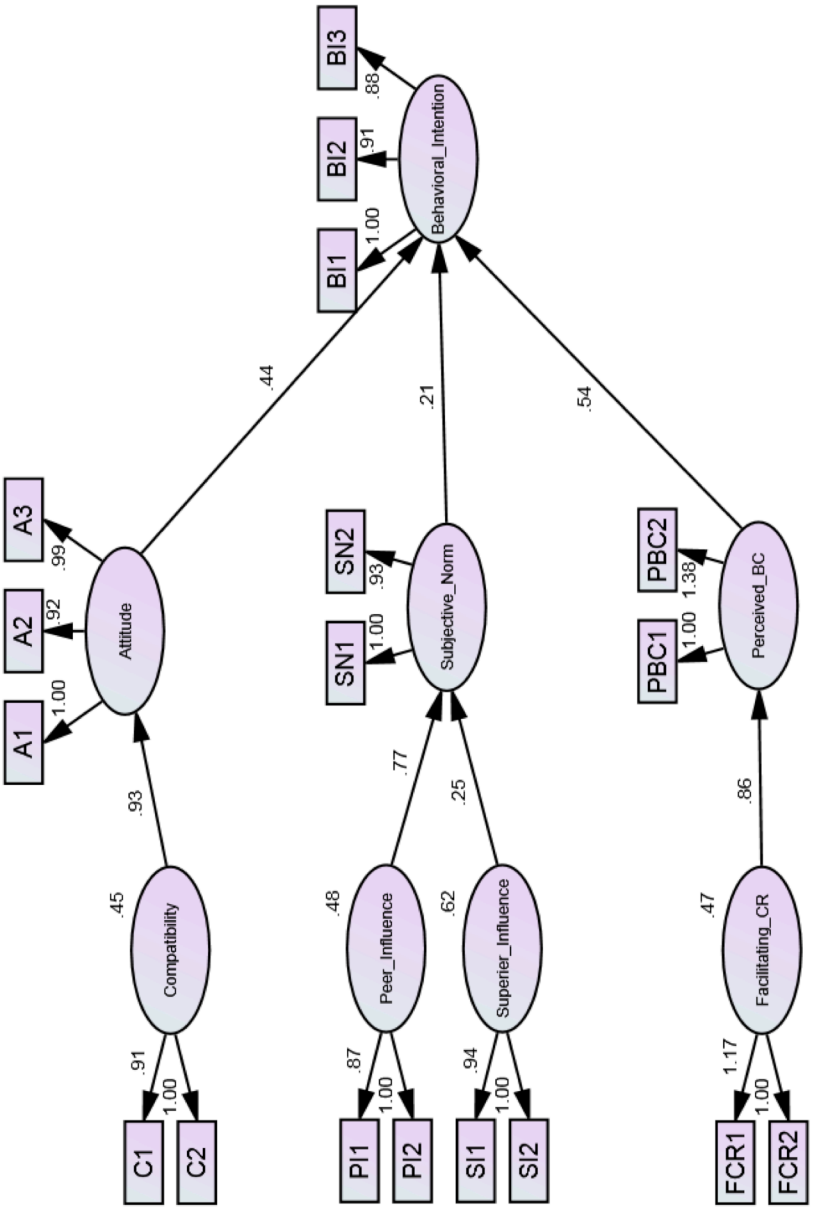



*Figure 4.* Path Analysis Model 3: Best-Fit. e= error variance, indicate the amount of unexplained variance.

Table 12 and Figure 4 both indicate strong pathways between all of the listed factors Compatibility, Peer-influence, Superior-influence, Facilitating Condition-Resources, Attitude, Subjective Norms and Perceived Behavioral Control. These strong pathways indicate that if a preservice teacher believes these factors that they will lead to behavioral intention to use Web 2.0 technologies once they become a professional teacher. Model fit indicators were analyzed on the Best-fit DTPB path model (Figure 4). The Best-fit DTPB path model is a good fit according to the following model fit indicators: CMIN/DF: 2.615 (statistically significant at .000), SRMR: .034, RMSEA: .052 and CFI: .966. Each of the model-fit indicators is considered within the suggested thresholds, and it is determined that a best-fit model is achieved. This indicates that not only do each of these factors lead to behavioral intention but that when they are combined together they will lead to a strong indication that a preservice teacher will have the behavioral intention to use Web 2.0 technologies once they become a professional.

**Summary**

Results of the analyzed data from the DTPB survey collected in the summer and fall of 2013 were reported. Demographics of the 590 sampled respondents mirror that of the preservice teacher population. The collected data was prepared according to the research design addressed in chapter 3 and was appropriate for analysis. Results of research questions one and two were reported in tables 5,6 and 9. Results for the third research question were reported in tables and on the models that represent the path analysis. The original DTPB path model was not found to be the best-fit path model according to established model-fit thresholds. Table 13 summaries the model-fit

indicators, the established thresholds and the corresponding results for each of the analyzed models.

Table 13

*Model-Fit Indicators*

| Indicator | Threshold | Original Model | Modified Model | Best-Fit Model |
|---|---|---|---|---|
| CMIN/DF | <5 | 11.859 | 5.711 | 2.615 |
| SRMR | <.08 | .530 | .2666 | .034 |
| RMSEA | <.08 | .136 | .089 | .052 |
| CFI | >.9 | .689 | .885 | .966 |

note:

Modifications to the model, based on the indications of Table 13, including removing the constructs Perceived Use, Perceived Ease of Use, Self-Efficacy and Facilitating Conditions- Technology. These modifications created a new model that helped to determine the factors that worked together to indicate a preservice teachers' behavioral intent to adopt Web 2.0 technologies to collaborate with peers

# Chapter 5: Interpretation

Students with disabilities benefit from teachers who use effective professional collaboration to design and implement programs. Teacher preparation programs are seeking innovative ways, such as Web 2.0 technologies, to encourage the role of the collaborative teacher. The purpose of this study focused on the empirical evidence of the current uses, perception of benefits, and the best-fit path model to determine preservice teachers' behavioral intention to adopt Web 2.0 technologies to collaborate with peers. Understanding whether preservice teachers use Web 2.0 technologies, their perception while using them, and what they intend to do with these technologies will be beneficial to faculty in teacher preparation institutions. Faculty who are designing programs or courses may then determine if utilizing Web 2.0 technologies in their courses will benefit the future collaboration of teachers.

This final chapter presents a discussion regarding the interpretation of the results of this study. Limitations of the study are explained. Appropriate actions are recommended for teacher preparation faculty considering the implementation of Web 2.0 technologies into their programs. Suggestions are also reported for possible future research, based on the results and limitations of this study.

## Current Use of Web 2.0 Technologies

Hartshorne and Ajjan (2009) previously addressed the first research question in this study. To what extent do preservice teachers use Web 2.0 technologies in teacher preparation programs? Replicating this question provided the opportunity to compare results between this study and one four years ago. This comparison confirmed the hypothesis that preservice teachers are using Web 2.0 technologies in teacher preparation

programs at an increased rate across all areas, as seen in table 7 and table 8 reported in chapter four.

Teacher preparation programs have increased their use of Web 2.0 technologies, and there are fewer preservice teachers who do not have exposure to Web 2.0 technologies. If preservice teachers are not regularly using these technologies in their teacher preparation courses, they are certainly aware of and collaborating with these websites during their daily lives. The preservice teachers reported a dramatic increase in comfort level with these technologies from the study four years ago.

Overall, preservice teachers use Web 2.0 technology forums at an increased level from 2009. They are comfortable with many of the different forum options and are using them in their teacher preparation coursework. The methods in which preservice teachers are using Web 2.0 technologies are not entirely transparent according to this study. However, there are two different possible approaches that may explain some of the increase within the last four years. First, course instructors may be giving specific assignments on one of these forums. Perhaps one such assignment might look like a discussion board regarding a topic the students are reading in class. This approach was likely happening during the 2009 study and continues into the 2013 study. The second possible approach could be that the preservice teachers are using Web 2.0 technologies, initiated by the students themselves. For example, preservice teachers could have an assignment of creating a lesson plan that the instructor did not intend to be completed on Web 2.0 technologies. Preservice teachers might use a social bookmarking site such as Pinterest in order to share resources with each other and get ideas for the plan. This

second approach is not initiated or monitored by course instructors; however, it is certainly closer to the way a practicing teacher might collaborate online.

Over the past four years, social bookmarking has the most dramatic increase in use of the four different types of Web 2.0 technologies. This is likely a natural result from the recent growing popularity of Pinterest for recreational use. Four years ago, social bookmarking was a rarely-used site called Delicious; it was cumbersome and lacked organization. Few people were on it, and therefore few people joined. Use of Web 2.0 technologies is dependent on the participants' use, and when Pinterest gained in popularity, it grew quickly. If participants are visiting and posting, a site comes alive with activity, and then when a new individual visits the site, it is exciting and full of resources. However, without new content these websites become stale and vacant. Users of Pinterest were accessing it for recreational purposes, but then when they were on the site, they quickly became exposed to a vast amount of teaching and educational materials and ideas.

There were no statistically significant correlations using Pearson's Correlation, between gender/age/standing and use of Web 2.0 technologies. The Shepherd and Aagard (2011) study regarding older adults found significant anxiety when the subjects participated in Web 2.0 technologies. It was anticipated that there might be similar correlations with the finding of this study. However, it is important to recognize some key differences between this study and the Shepherd and Aagard study. The older adults in this study were generally in online graduate teacher education programs and had a higher level of exposure to these technologies than the general population. That exposure and previous success has likely led to a use and comfort level that is higher than the

general population's. Attitude and perceived behavioral control on these technologies may be a factor that is more powerful than age. The findings on the first research question support the findings on the third research question.

**Perception of the Benefits**

One of the great fears among those skeptical about collaborating on Web 2.0 technologies is that it will be efficient, but not as effective, as face-to-face collaboration. Friend and Cook (2010) defined the key elements of effective collaboration as interactions, shared resources, shared decision making, and common goals. Based on their definition, preservice teachers are reporting mixed perceptions regarding whether one can effectively collaborate on Web 2.0 technologies. Table 9 shows the results for this research question and can be found in Chapter Four of this study. The majority of preservice teachers do report that there are collaborative benefits to Web 2.0 technologies. In fact, very few respondents indicated, "I do not know of a collaborative benefit", regarding Web 2.0 technologies (blog= 12.4%, social network= 4.1%, wiki= 30.0% and bookmarking= 16.8%). Although the majority of users believe that these forums have the capabilities to collaborate, and feel generally positive about sharing resources or interacting with others, they are most skeptical about being able to make decisions or share common goals on these sites.

**Interactions.** Interacting with peers is an important element of Web 2.0 technologies, and is embedded into the definition of collaborative technologies. Social Networking rated the highest among Web 2.0 technologies in interacting with peers (75.4%), which had been expected due to the nature of a discussion board's interactive tendency. Conversations between individuals can occur on private messaging boards and

can help facilitate an individual interaction. However, when conversations between individuals happen on the public platform of social networking, there may be multiple opinions and interaction between larger groups of interested parties. Interestingly, many preservice teachers do not find that using Web 2.0 technologies would help them to interact with faculty (blogs= 38%, social network= 47.6%, wiki= 11.9%, social bookmarking= 13.4%), although many scored their interaction with peers higher on all four of the Web 2.0 technologies (blogs= 58.5%, social network= 75.4%, wiki= 14.9%, social bookmarking= 22.9%). Respondents are collaborating with each other on these sites at a higher rate than they are with teacher preparation faculty. This influences the DTPB factors of peer influence and superior influence in the Subjective Norm factor of the third research question, which will be discussed later.

**Shared resources.** Sharing resources was perceived by a majority of respondents for each of the Web 2.0 technologies (blog= 71.5%, social network= 65.1%, wiki= 59.8% and bookmarking= 78.5%). Resources may be seen as virtual and not only material resources. Sharing resources is user friendly in social bookmarking, as students are able to easily share different websites that have instructional ideas embedded on the pins. Blogs also have the capacity to share ideas and resources that might be found on the web, and other individuals are able to easily access that material. It is not surprising that so many preservice teachers perceived sharing resources on these forums.

**Shared decision making**. Effective collaboration is centered on being able to make good decisions for kids with disabilities. A minority of respondents perceived that they make decisions on Web 2.0 technologies (blogs= 32.7%, social network= 37.5%, wiki= 19.7%, social bookmarking= 24.4%). In order to make a collective decision, the

subtleties of negotiating and communicating are essential. Communicating through technology can result in misinterpreted cues or intentions. Preservice teachers' perceptions that decisions are not made on these forums may be due to their understanding of the intricacy of shared decision making.

**Common goals.** Sharing common goals is also perceived by a minority of the reporting preservice teachers in this study (blogs= 33.4%, social network= 32.4%, wiki= 27.1%, social bookmarking= 21.7%). The results are similar to the findings with shared decision making; however, the interpretation of the reason is different. Sharing a common goal is not about the intricacy of communication, but of the makeup of the group collaborating together. It refers back to how participants are using these technology forums. If a course instructor initiates them, all participants likely have a common purpose and common goals. However, the second approach to collaborating that is initiated by students in the course may have more of a random makeup, and participants may have very different goals for working on the technology.

**Wiki.** Although each individual Web 2.0 forum is not addressed in the interpretation, it seemed appropriate to make a note about wikis. Wikis were rated highest in regards to respondents not knowing how an individual would collaborate on them (30%). Currently, the most popular wiki, Wikipedia, is the site that most individuals identify with as a wiki. However, most individuals use Wikipedia as more a of definition resource than an interactive website. Wikipedia, unlike eduWiki, is considered an unscholarly source when used as a definition resource, and is generally discouraged in academic courses. This evolution in the purpose of the wiki has moved wikis away from

collaborative engagement, and this has possibly resulted in its decline in collaborative perception by preservice teachers.

Preservice teachers perceive peer interaction and shared resources on these Web 2.0 technologies, making these technologies efficient collaborative tools. However, with the low indicators in shared decision making and shared common goals, precautions should be taken when implementing these tools. The second hypothesis, "Preservice teachers perceive collaborative advantages on Web 2.0 technologies", was not supported during this study.

**Behavioral Intention of Preservice Teachers**

This study was largely influenced by the credible works of the Hartshorne and Ajjan (2009) study, the works of Friend and Cook (2010), and the theoretical framework of the DTPB theory. The hypothesis for this study was created largely based on these works; therefore, during the original proposal of this study, the researcher had full confidence that the hypothesis could be supported by the newly collected data. However, in research, it is essential to hold a non-biased approach to the interpretation of the findings (Rumrill et al., 2011). The DTPB path model, and its factors that lead through mediating factors, was not a best-fit to determine preservice teachers' behavioral intent to adopt Web 2.0 technologies to collaborate with peers. Therefore, the research hypothesis is not supported by the collected data for this study. When the DTPB model was analyzed, the model-fit indices (CMIN/DF= 11.859, SRMR= .530, RMSEA= .136, CFI= .689) did not fit under the determined model-fit thresholds (CMIN/DF= <5, SRMR= < .08, RMSEA= <. 08, CFI= >.90). As the findings from the data collected in this study

were unable to establish a good-fit, this data is not able to support the DTPB model's discriminate validity or its ability to reproduce the same results in the future.

Simon (2006) suggests that if the hypothesis does not emerge, it is important to discuss the circumstances that may have affected the results. The unsupported hypothesis for this study may result from two different interpretations that are significant to consider.

The first interpretation addresses that the previous studies (Baltaci-Goktalay & Ozdilek, 2010; Capo & Orellana, 2012; Hartshorne & Ajjan, 2009) that addressed the DTPB model found it to be successful determining the strengths of the DTPB factors, and these studies also used a path analysis. However, these studies used a multiple regression approach and did not address a model-fit (SEM). The use of multiple regression during path analysis does not take into account all the factors together at the same time, and is known as a "partial-information technique" (Meyers et al., 2008, p. 598). Analyzing the DTPB model through SEM provided an original perspective on the model's ability to reproduce.

The second interpretation recognizes that the previous studies (Baltaci-Goktalay & Ozdilek, 2010; Capo & Orellana, 2012; Hartshorne & Ajjan, 2009) specifically addressed Web 2.0 technologies as supplements to in-class learning, not through the benefits of collaboration. This key component may also have impacted the success of the hypothesis in this study. The results for the second research question of this study regarding the perception of collaborating benefits of Web 2.0 technologies were somewhat mixed. If students are perceiving Web 2.0 technologies as an efficient--but not effective--collaborative tool, that would impact the factors that influence preservice teachers' behavioral intention to use Web 2.0 technologies. If an individual does not

perceive the effectiveness of the tool when collaborating, then that may impact the model differently than their perception of the effectiveness of using Web 2.0 technologies as a supplement to in-class learning.

Due to the unsupported hypothesis for this study, further investigation was needed to answer the third research question. Modifications to the model provided a way of identifying the factors that are able to determine behavioral intent, and most importantly determine what factors from the original model were able to work together as a model. A best-fit model, within the thresholds of model-fit indicators, helped to establish the model's ability to reproduce the outcomes in the future and can be referenced from Chapter Four.

**Interpretation of Factors**

According to the collected data, the following statement answers the research question addressed in this study: The best-fit path model (Figure 4), and its factors of compatibility, peer influence, superior influence, and facilitating condition-resources led through mediating factors of attitude, subjective norms, and perceived behavioral control, are to determine preservice teachers' behavioral intent to adopt Web 2.0 technologies to collaborate with peers. The best-fit model addresses all the remaining DTPB factors together. In order to have behavioral intention, it is stronger if all of these factors are present in an individual, and not just one or two on their own. The factors collectively work together to influence behavior intention.

**Attitude.** The factor of attitude (β=. 441) is a strong desire to use Web 2.0 technologies to collaborate and impacted by compatibility (β= .93) if the preservice teacher perceives how well the tool of Web 2.0 technologies works with

collaboration. There is a very strong indication if a preservice teacher perceives Web 2.0 technologies as compatible with collaboration, then they are highly likely to have a strong desire to use these technologies, which will lead to behavioral intention. However, their perceived use or perceived ease of use, meaning a preservice teacher's feeling that if they use these technologies it will enhance their job or help them collaborate better, was not supported by the data.

**Perceived behavioral control**. The factor of perceived behavioral control (β=. 535) refers to an individual's self-confidence and whether they feel in control when they are using Web 2.0 technologies. Perceived behavioral control is strongly impacted by facilitating condition- resources (β= .86), which refers to an individual's ability to have access to the technology needed to use Web 2.0 technologies to collaborate. If a preservice teacher has the resources to use Web 2.0 technologies, they will feel self-confident in their abilities and then are likely to use them to collaborate. However, the factor of self-efficacy, meaning individuals' perception that they can perform on Web 2.0, was a weak relationship in this path model. Preservice teachers have had extensive experiences with technology in the past, they understand that if they have the resources (facilitating conditions), then eventually their self-confidence (perceived behavioral control) will improve. They have been able to figure out technology by simply using it and that they don't need to necessarily go through an instruction manual to learn how to perform on the technology. This generation has learned much of how to use technology by simply playing around with it, and that impacts their behavioral intention when presented with new technologies.

**Subjective norm.** The factor of subjective norm refers to how the referent groups (peers and superiors) influence the decisions to adopt technologies. There is a notable difference between Hartshorne and Ajjan′s (2009) findings of peer influence (β=. 205) and this study's 2013 findings of peer influence (β=. 77,) as well as the 2009 superior influence (β =. 719) and the 2013 superior influence (β=. 25). The weight of these paths has had significant changes within the past four years, and there may be some interesting cultural shifts happening in the perception and use of Web 2.0 technologies that need to be addressed. The current findings show that peer influence had a strong (β =. 77) indicator, meaning that a preservice teacher's peers have a significant amount of influence on his/her intention to use Web 2.0 technologies in the future when mediated through subjective norms. According to the second research question in this study, preservice teachers are interacting with their peers on Web 2.0 technologies more than they are interacting with faculty. Superior influence, however, decreased from the 2009 Hartshorne study (β =. 719) to this study (β =. 25). Although it is still above .20 and significant in influencing preservice teachers behavioral intentions, superior influence has dramatically decreased in influence, and these finding need interpretation.

It is possible that one interpretation for this decline would be that in the 2009 study, Hartshorne only used students in his direct program, and likely had greater (superior) influence in the presentation of Web 2.0 technologies. This 2013 data used preservice teachers from a variety of programs throughout the mid-west area, and was possibly drawing from programs that were using Web 2.0 technologies due to peers mentoring peers, instead of instructor-directed assignments or activities. An additional interpretation might relate to the increase in social bookmarking from the 2009

study. Students on these technologies do not appear to be learning about these technologies through the instructors of the coursework, but rather through their peers. Finally, it is also important to acknowledge that many teacher preparation program faculty have been reluctant to engage in online collaboration in their classes. However, their lack of engagement does not mean that students are not engaging with these technologies. They are simply doing it with each other and not with their superiors. This is of concern for teacher preparation faculty, as there are multiple resources on these websites that are not quality best-practice sources. If preservice teachers are using these based on the recommendation of peers and not of experienced faculty, they are likely engaging in poor quality resources without a guide for how to use these resources appropriately.

The interpretation of the strengths and weaknesses of these factors can lead to specific recommendations that teacher preparation faculty should consider as they develop programs for preservice teachers. Limitations and further research based on these findings and interpretations will also be addressed.

**Recommendations**

Teacher preparation program faculty might apply the findings of this study to the development of their courses that address collaboration between professionals. Reflection on the study can be valuable, as the researcher is then able to understand what hypotheses were carried into the research process and how many of those hypotheses were supported or unsupported as a result of the study. The hypothesis that preservice teachers are using Web 2.0 technologies at an increasing rate was supported by the study, and leads to the recommendation that teacher preparation program faculty must be aware of these

technologies and understand that, even if they are not directly assigning material on Web 2.0 technologies, their students are still utilizing them. Ignoring the increase in use means that students will be unguided in their approach to these technologies, and may not have the critical tools needed to discriminate between the best practices that are presented online and the misinformation.

A hypothesis was made that Web 2.0 technologies were collaborative technologies, and therefore, collaboration, was taking place on Web 2.0 technologies. The hypothesis was challenged when the responses to the perception of Web 2.0 technologies suggested that preservice teachers are efficiently collaborating on these forums (interacting with peers and sharing resources); however, preservice teachers are not perceiving that they are effectively collaborating on these forums (making decisions or sharing common goals). For faculty of teacher preparation programs, this should influence how Web 2.0 technologies are used in the classroom. Web 2.0 technologies should be utilized, but greater emphasis on using these tools to interact and share resources is appropriate. An example would be determining what Pinterest sites are based on best practice, and how to tell if one is or is not. Giving preservice teachers assignments where they are then required to support the resources they find online with theory and other proven research based resources will help develop critical consumers of online resources.

Caution should be used with online collaborative assignments that encourage preservice teachers to make programmatic decisions regarding an individual student or share common goals. Although it is not surprising that preservice teachers do not perceive shared decision making or common goals on Web 2.0 technologies because of

the complexity, the conclusion does not have to be that it cannot be done. As established in the literature review there are multiple strategies and approaches for teaching collaboration that is face-to-face. It is very understandable to then assume that strategies and approaches for how to collaborate on Web 2.0 technologies would need to be in place for participants to do it effectively. Currently these forums are set up in classes and then left to run on their own or students are participating on these forums without supervision of instructors. Creating common rules, procedures, and direct development may in fact lead to individuals making decisions and sharing common goals online.

**Limitations**

The research question for this study specifically analyzed behavioral intention. Although there is literature that supports the indicator of behavioral intention to follow through with actual behavior (Hartshorne & Ajjan, 2009), that actual behavior was not measured in this study. This limitation was recognized as a significant factor during the proposal of this study, and was therefore addressed. The consent form and proposal were written with a follow-up study to analyze the actual behavior of preservice teachers on Web 2.0 technologies in the future. However, until that follow-up study is completed, teacher preparation program faculty should be cautious with their assumptions that behavioral intention will directly lead to behavior.

This study was quantitative in nature, and did not address many of the questions regarding why individuals may have indicated perceptions or intentions towards behavior. This was a limitation, as the researcher was left to make predictions regarding the results.

Perception of the benefits of a tool is not a direct indicator of what that tool can actually do, meaning that simply because a preservice teacher perceives an activity on Web 2.0 technologies, it may not, in fact, be the case.

**Suggestions for Further Research**

Web 2.0 technologies are largely underrepresented in research in the field of teacher preparation, and there are multiple opportunities for further research. As mentioned in the limitations, a follow-up study should be available see if the behavioral intention that was reported by the participants led to actual behavior.

Additionally, during the findings section of this study, the researcher compared the findings from the DTPB survey with ones that were reported in a 2009 study. Although these changes seemed significant, these only gave two points of comparison. A future study would be very beneficial to see if these trends do or do not continue.

**Conclusion**

This study found that preservice teachers are using Web 2.0 technologies at an increased rate in their teacher preparation programs. Preservice teachers perceive peer interaction and sharing resources as the greatest collaborative benefits of these technologies. When the combined factors of attitude, compatibility, subjective norms, peer influence, superior influence, perceived behavioral control, and facilitating conditions are identified, preservice teachers intend to collaborate on Web 2.0 technologies as professional teachers. Teacher preparation program faculty should be encouraged to use Web 2.0 technologies in their courses with the understanding that it will benefit the future collaboration of teachers.

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*Appendix A*

*Original DTPB Instrument*

Section I: Background Information

**1) Gender**

Male Female

**2) Age**

16-21 22-27 28-33 34-40 Over 40

**3) University/School**

UNC-Charlotte Other:

**4) Year at university/school**

Freshman sophomore Junior Senior Graduate Other:

**5) College/Department:**

Section II: Web2.0 Technologies

**6) Please list your comfort level with the following Web 2.0 applications**

NeverUse Novice Competent Proficient

Blogs (Blogger, WordPress)

Wikis (Seedwiki, Wikipedia)

Social Networking (Facebook, MySpace)

Social Bookmarking (Digg, de.licio.us)

Instant Messaging (MSN Messenger, Yahoo Messenger) Internet Telephony

(Skype) Audio/Video Conferencing

**7) What do you think of using Web 2.0 technologies such as Wikis or Facebook to supplement your in-class learning**

**8) To what extent do you use the following Web 2.0 applications to supplement your in-class learning:**

Don't use and don't plan to use

Don't use but plan to use

Use Frequently Always occasionaly use use NA

Blogs (Blogger, WordPress)

Wikis (Seedwiki, Wikipedia)

Social Networking (Facebook, MySpace)

Social Bookmarking (Digg, de.licio.us)

Instant Messaging (MSN Messenger, Yahoo Messenger)

Internet Telephony (Skype) Audio/Video Conferencing

**9) What is in your opinion the advantages of using each of the following web 2.0 technologies to supplement in-class learning?**

Improve my interaction with faculty

Improve my learning

Improve my satisfaction with the course

Improve my interaction with other students

Improve my grades

Improve my writing ability

**10) Which of these Web 2.0 technologies do you most frequently use (or might use in the near future) to supplement your in-class learning:**

**11) Thinking of that Web 2.0 technology you use (or could use) most frequently to supplement your in-class learning (based on question 11) to what extent do you agree or disagree with the following statements:**

I believe that I could communicate to others the consequences of using Web 2.0 to supplement my in-class learning

I would have no difficulty explaining why Web 2.0 technologies may or may not be beneficial

I plan to use Web 2.0 technologies to supplement my in-class learning

I intend to use Web 2.0 technologies within the next semester

Web 2.0 is useful to supplement my in-class learning

The advantage of using Web2.0 outweighs the disadvantages of not using it

Using Web 2.0 is a good idea

I feel that using Web 2.0 will be easy

I feel that using Web 2.0 will be easy to incorporate in my learning environment

I feel that using Web 2.0 will help me learn more about the subject

I feel that using Web 2.0 will improve my satisfaction with the course

I feel that using Web 2.0 will improve my grades

To help me better learn the material, I will incorporate Web 2.0 technologies to supplement my in-class learning

My peers think I will benefit from using Web 2.0 technologies to supplement my in-class learning

My peers are using Web 2.0 technologies to supplement their in-class learning

My teacher confirms my ability and knowledge to use Web 2.0 technologies to supplement my in-class learning

My teacher think it is important I use Web 2.0 technologies to supplement my in-class learning

Using the Web 2.0 technologies is entirely within my control

Strongly Agree Neutral Disagree Strongly Don't Agree Disagree know

I have the knowledge and ability to use Web 2.0

Peers who are important to me would think that I should use Web 2.0 technologies to supplement my in-class learning

Peers who influence my behavior would think that I should use Web 2.0 technologies to supplement my in-class learning

*Appendix B*

*DTPB Instrument*

DTPB Instrument

**Section 1: Background Information**

1. I have read this consent form. By selecting "yes" and proceeding to the survey, I hereby consent to my participation in the research described above.
   - Yes
   - No
2. Gender
   - male
   - female
3. Age
   - 0-17 (individuals under 18 will not be able to participate)
   - 18-23
   - 24-29
   - 30-34
   - 35-39
   - Over 40
4. University/School: _____

5. Standing at University/College
   - Undergraduate
   - Graduate

6. Major: _____

7. Win a $50 Amazon Gift Card: Your contact information is needed in order to notify and distribute the gift card in the event that you win. Please leave either your email or mailing address.

_____

8. Are you willing to be contacted for a follow up study? At the time of the follow up study, you will again have the opportunity to decline.
   - Yes
   - No

**Section II: Web 2.0 Technology Use**

"Web 2.0 technologies" is a generic term for any collaborative digital, online system that enables two-way interaction (instead of a one-sided presentation of information on the Internet).

Examples of Web 2.0 technologies are group blogs, discussion boards, social networking, class wikis, or social bookmarking websites

9. Please check your comfort level with the following Web 2.0 technology applications

| | Never Use | Novice | Familiar | Competent | Expert |
|---|---|---|---|---|---|
| Blogs (Blogspot, Tumbler) | | | | | |
| Social Networking (Facebook, Discussion Boards) | | | | | |
| Wikis (wikispaces, Wikipedia) | | | | | |
| Social Bookmarking (Delicious, Pinterest) | | | | | |

10. To what extent do you use the following Web 2.0 technology applications in your teacher education programs? Please check appropriate box.

| | Never used | Used Minimally | Used | Used Frequently | Used throughout coursework |
|---|---|---|---|---|---|
| Blogs (Blogspot, Tumbler) | | | | | |
| Social Networking (Facebook, Discussion Boards) | | | | | |
| Wikis (wikispaces, Wikipedia) | | | | | |
| Social Bookmarking (Delicious, Pinterest) | | | | | |

**Section III: Web 2.0 Technology Perception (please check all that apply)**

11) What are the collaborative advantages to using a BLOG?

*Examples are blogspot or tumblr*

- Improve my interaction with faculty
- Improve my interaction with other students
- Share resources
- Share decision making
- Work towards a common goal
- I do not know of any advantages

12) What are the collaborative advantages to using SOCIAL NETWORKING?

*Examples or Facebook or Discussion Boards*

- Improve my interaction with faculty
- Improve my interaction with other students
- Share resources
- Share decision making
- Work towards a common goal
- I do not know of any advantages

13) What are the collaborative advantages to using a WIKI?

*Examples are Wikispaces or wikipedia*

- Improve my interaction with faculty
- Improve my interaction with other students
- Share resources
- Share decision making

- Work towards a common goal
- I do not know of any advantages

14) What are the collaborative advantages to using SOCIAL BOOKMARKING?
*Examples are Pinterest or Delicious*
- Improve my interaction with faculty
- Improve my interaction with other students
- Share resources
- Share decision making
- Work towards a common goal
- I do not know of any advantages

**Section IV: Web 2.0 technology Intention**

Thinking of Web 2.0 technology that you use (or could use) most frequently to collaborate to what extent do you agree or disagree with the following statements (please circle one):

15. I feel that using Web 2.0 technology will help me collaborate
Strongly Disagree 1 2 3 4 5 Strongly Agree

16. I feel that using Web 2.0 technology will overcome some of the challenges of collaboration
Strongly Disagree 1 2 3 4 5 Strongly Agree

17. I feel that using Web 2.0 technology will be easy to incorporate in my learning environment
Strongly Disagree 1 2 3 4 5 Strongly Agree

18. I feel that using Web 2.0 technology will be easy
Strongly Disagree 1 2 3 4 5 Strongly Agree

19. I feel that using Web 2.0 technology will help me collaborate with others
Strongly Disagree 1 2 3 4 5 Strongly Agree

20. To help me collaborate, I feel Web 2.0 technology fits well
Strongly Disagree 1 2 3 4 5 Strongly Agree

21. Web 2.0 technology is useful to collaborate
Strongly Disagree 1 2 3 4 5 Strongly Agree

22. The advantage of using Web 2.0 technology outweighs the disadvantages of not using it
Strongly Disagree 1 2 3 4 5 Strongly Agree

23. Using Web 2.0 technology for collaboration is a good idea

Strongly Disagree 1 2 3 4 5 Strongly Agree

24. My peers think I will benefit from using Web 2.0 technologies to collaborate
Strongly Disagree 1 2 3 4 5 Strongly Agree

25. My peers who are important to me are using Web 2.0 technologies to collaborate
Strongly Disagree 1 2 3 4 5 Strongly Agree

26. My instructor confirms my ability and knowledge to use Web 2.0 technologies to collaborate
Strongly Disagree 1 2 3 4 5 Strongly Agree

27. My instructor thinks it is important I use Web 2.0 technologies to collaborate
Strongly Disagree 1 2 3 4 5 Strongly Agree

28. Those who are important to me would think that I should use Web 2.0 technologies to collaborate
Strongly Disagree 1 2 3 4 5 Strongly Agree

29. Those who influence my behavior would think that I should use Web 2.0 technologies to collaborate
Strongly Disagree 1 2 3 4 5 Strongly Agree

30. I know enough to use Web 2.0 technology
Strongly Disagree 1 2 3 4 5 Strongly Agree

31. I have the knowledge and ability to use Web 2.0 technology
Strongly Disagree 1 2 3 4 5 Strongly Agree

32. I know what types of resources I need in order to participate on Web 2.0 technology
Strongly Disagree 1 2 3 4 5 Strongly Agree

33. I can use Web 2.0 technologies using any computer connected to the Internet
Strongly Disagree 1 2 3 4 5 Strongly Agree

34. I know what types of technology I will need in order to participate on Web 2.0 technology
Strongly Disagree 1 2 3 4 5 Strongly Agree

35. Web 2.0 technologies are compatible with the computer I already use
Strongly Disagree 1 2 3 4 5 Strongly Agree

36. Using Web 2.0 technologies is entirely within my control
Strongly Disagree 1 2 3 4 5 Strongly Agree

37. I have the knowledge and ability to use Web 2.0 technology
Strongly Disagree 1 2 3 4 5 Strongly Agree

38. I plan to use Web 2.0 technologies to collaborate
Strongly Disagree 1 2 3 4 5 Strongly Agree

39. I intend to use Web 2.0 technologies within the next semester
Strongly Disagree 1 2 3 4 5 Strongly Agree

40. I will use Web 2.0 technologies when I become a professional
Strongly Disagree 1 2 3 4 5 Strongly Agree

41. I would have no difficulty explaining why Web 2.0 technologies may or may not be beneficial
Strongly Disagree 1 2 3 4 5 Strongly Agree

42. I believe that I could communicate to others the consequences of using Web 2.0 technology to collaborate
Strongly Disagree 1 2 3 4 5 Strongly Agree

*Appendix C*

*Consent Form*

**Department of Education**

8001 Natural Bridge Road
St. Louis, Missouri 63121-4499
Telephone: 314-516-5109
E-mail: ljac42@umsl.edu

# Informed Consent for Participation in Research Activities

## The Behavior Intentions of Preservice Teachers Collaborating on Web 2.0 Technologies during their Teacher Preparation Programs

Participant _____HSC Approval Number _____

Principal Investigator _Lisa Amundson_____ PI's Phone Number _(618) 954-8617____

1. You are invited to participate in a research study conducted by Lisa Amundson. The purpose of this research is to determine the preservice teachers' behavioral intent to adopt Web 2.0 technologies to collaborate with peers.
2. a) Your participation will involve completion of a one-time, 15-minute electronic survey regarding your behavioral intentions to use Web 2.0 technologies to collaborate with peers.
   Web 2.0 technology is a generic term for any collaborative technology that enables an interaction, instead of a one-sided presentation of information on the Internet. Examples of a Web 2.0 technology would be a group blog, wiki, social networking, or social bookmarking site.
   b) Approximately 400 preservice teachers may be involved in this research throughout the Midwest region of the United States.
   c) The amount of time involved in your participation will be approximately 15 minutes- and you will eligible to win a $50 Amazon gift card for your time. In order to contact you in the event that you won the gift card, you will be asked your contact information at the end of the survey. Providing your contact information is optional. You may also request to be contacted in five years for a follow up study that will determine actual behavior as related to your intended behavior to collaborate on Web 2.0 technologies. Participating in the follow up study is optional.
3. There are no known risks associated with this research.
4. There are no direct benefits for you participating in this study
5. Your participation is voluntary and you may choose not to participate in this research study or withdraw your consent at any time. You will NOT be penalized in any way should you choose not to participate or withdraw.
6. All demographic and personal information will be password-protected as it is received through Goggle Survey. After the data has been cleaned and uploaded onto SPSS and AMOS, it will be deleted from the Goggle Survey account and kept on a secured password-protected file. Contact information for subjects who would like to enter to win the Amazon Gift Card, but would not like to participate in the follow up study, will be destroyed after the distribution of the Gift Cards. However, if subjects wish to participate in the follow up study their contact information will be coded (example: Joe Smith will be known as "Participant #12") and the coded contact

information will be linked to their responses on the survey. Actual contact information and code will be kept on a separate secured file from the responses to the survey. The secured file will be on a locked flash drive that will be coded for privacy purposes and to ensure the confidentiality of the individual participants.

7. If you have any questions or concerns regarding this study, or if any problems arise, you may call the Investigator, Lisa Amundson at (618) 954-8617 or the Faculty Advisor, Dr. Patricia Kopetz at (314) 516-6557. You may also ask questions or state concerns regarding your rights as a research participant to the Office of Research, at 516-5899.

I have read this consent form and have been given the opportunity to ask questions. I will also be given a copy of this consent form for my records. By selecting "Next" and proceeding to the survey, I hereby consent to my participation in the research described above.

Paricipant's Signature Date

Signature of Investigator or Designee Date

*Appendix D*

*Invitation to Survey*

You are invited to participate in a **15 minute research study**, conducted through the University of Missouri St. Louis. The study seeks to collect information from individuals who are preparing to be teachers. We are interested in how you are currently collaborating online with your peers and what your intentions are to do so in the future.

You will be eligible to win a **$50 Amazon Gift Card**. In order to contact you in the event that you win the gift card, you will be asked your contact information at the end of the survey. However, providing your contact information is optional and not necessary for participation. If you do provide your contact information it will be password protected and then destroyed after the follow up study is completed.

Your participation is voluntary and you may choose not to participate in this research study or withdraw your consent at any time. You will NOT be penalized in any way should you choose not to participate or withdraw.

If you are interested, please access this LINK to find the consent form and survey. If they link does not work for you, please copy and paste the following link into your browser

https://docs.google.com/forms/d/13DFkwcjqF5KA8RVB6uDe7yjQ4E1TqmQDrP4ol4i6Uao/viewform

If you have any additional questions please contact the researcher Lisa Amundson at (618) 954-8617 or through email at lisa.amundson@greenville.edu

Thank you for your time!

Lisa Amundson
University of Missouri St. Louis
College of Education