The Relationship between Teachers' Self-Efficacy and the Integration of Web 2.0 Tools in K-12

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ABSTRACT

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The ubiquity of Internet infrastructure and its use in K-12 public schools allows teachers and students to utilize diverse Web 2.0 tools for teaching and learning. Web 2.0 tools have become prevalent among the digital generation, or so-called *Digital Natives* (Prensky, 2001). The integration of Web 2.0 tools benefits learners by offering them interactive and collaborative environments, through which they can interact with instructors, peers, friends and people worldwide (Tu, Blocher, & Roberts, 2008b). As this is a relatively phenomenon, it is unclear how Web 2.0 tools are being implemented in classrooms to facilitate learning. This study investigated the use of Web 2.0 tools in American K-12 public schools in order to identify the factors influencing the integration of these tools into classrooms.

A quantitative research design was adopted and a Web survey was conducted to elicit data regarding the use of Web 2.0 tools in the aforementioned environments. A nationwide sample frame was administered to collect the data in January 2010. A total of 559 inservice teachers responded to the research invitation and reminder letters (a response rate of 17%). Of these respondents, 78% reported on the use of Web 2.0 tools in classrooms, 68% reported demographic information, and 44% of the respondents were

included in multiple regression analysis tests to predict possible outcomes in Web 2.0 applications.

The results indicate that teachers rarely use Web 2.0 tools in their classrooms and are uncertain in using these tools. This study reveals several factors which influence the integration of Web 2.0 tools in K-12 school classrooms: teachers' self-efficacy in using Web 2.0 tools; professional development and school administrative support. Teachers' self-efficacy is the primarily predictor for the use of Web 2.0 tools in school classrooms. Professional development and school administrative support are additional significant predictors of the use of Web 2.0 tools. Other factors such as limited access to the Internet, a lack of training and confidence, the need for technology resources, and e-safety are issues of concern emerging from short open-ended questions.

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TABLE OF CONTENTS

Page

LIST OF TABLES

Page

LIST OF FIGURES

Page

CHAPTER 1: INTRODUCTION

Beginning in the early 1980s, the implementation and integration of computer technologies in K-12 education has earned widespread attention as well as investments in and support for developing related technology infrastructures and support from groups such as the US government, educators, policy makers and parents (Culp, Honey, Mandinach, & Bailey, 2003). For two decades this trend has remained a core issue for American K-12 educational institutions, and it has become synonymous with a set of essential skills said to be needed by American youth in order to compete successfully in the 21st century's highly competitive global economy (Culp et al., 2003; Partnership for 21st Century Skills, 2007). Meanwhile, evidence has indicated the positive academic results of integrating computer technologies in K-12 classrooms in the USA (Metiri Group, 2009; Bakia, Yang, & Mitchell, 2008). Accordingly, district administrators have reported that "the effective implementation of technology [instruction]…is the extremely important core mission of their districts" (Project Tomorrow, 2010b, p. 3). Moreover, teachers have reported that the adoption of technology in classrooms has made "students more motivated to learn" (Project Tomorrow, 2010b, p. 2). Based on these reports, it seems clear that the utilization of computer technologies in K-12 education is necessary as it will help facilitate the acquisition of the academic skills needed by American students for school as well as for the 21st century (Busch et al., 2007; Lemke, Coughlin, Garcia, Reifsneider, & Baas, 2009; Partnership for 21st Century Skills, 2008; Solomon & Schrum, 2007).

Based on a nation-wide survey report conducted by the National Center for Educational Statistics, the majority (91%) of the computers at public schools are used for instructional purposes; furthermore, they exhibit a very high rate (98%) of Internet access (Gray, Thomas, & Lewis, 2010a). The ubiquity of Internet infrastructure in K-12 public schools in the USA currently provides teachers and students more opportunities to utilize a number of Web 2.0 tools for teaching and learning more easily than was true over the past few decades (Gray et al., 2010a), but advanced computer technologies undergo constant updating and enhancement, and schools are constantly behind in the race to adopt the tools or applications of particular technologies.

The Internet has undergone vast changes over the last few decades. During the 1970s and 1980s, it gradually evolved from military use to more general applications (Solomon & Schrum, 2007). Due to the availability of browser software, the text-based Internet became visual World Wide Web (Solomon & Schrum). The World Wide Web today differs exceedingly from the original Web 1.0 as it was originally conceived and invented by Berners-Lee in 1991 (Solomon & Schrum). Web 1.0 required users to have professional computer skills, such as knowing the web programming language, Hypertext Markup Language (HTML), well enough to create a web page. It was application based and isolated from the users and creators (Solomon & Schrum). In contrast, Web 2.0 provides an interactive space "for creating and sharing by clicking and linking" web pages, an approach initiated in the early 2000s (Solomon & Schrum, p. 13). The Web 2.0 platform is more open in uploading, downloading, publishing and creating information and serves as a dynamic platform for participation by all interested end-users. This Web

2.0 platform provides a great opportunity for interactive and collaborative learning and teaching environments.

Web 2.0 tools are easily available online and have become the prevalent telecommunication tools among the digital generation, or so-called *Digital Natives* (Prensky, 2001). These *Digital Natives,* ranging from "K through college", grow up using and experiencing new technology, such as computers, digital tools and devices, cell phones, and videogames (Prensky, p. 1). They are familiar with digital tools as well as with participating in the Web 2.0 environment for both personal needs and schoolwork (Lemke, et al., 2009; Project Tomorrow, 2009b; 2010a). The utilization of Web 2.0 tools in K-12 schools is facilitating students' academic learning and has become nearly ubiquitous (Project Tomorrow). Schools need to take well-planned actions in considering such ideas as developing use policies, professional development, curriculum reform, and technical support aimed at engaging their students' needs regarding the adoption of Web 2.0 tools (Lemke et al.; Project Tomorrow).

Statement of the Problem

American youth expect more computer technology tools than schools can provide to enhance their learning (Farris-Berg, 2005; Project Tomorrow, 2008; 2009a; 2010a). Digital natives are asking schools to provide more online classes (Project Tomorrow, 2009a), more freedom to access the Internet at schools (Project Tomorrow, 2008) and access to personal communication and social network sites (Project Tomorrow, 2010a). Last but not least, they are asking teachers to increase the use of online tools for their learning (Farris-Berg). Based on prior nation-wide survey reports and studies (Bakia et

al; Lemke et al., 2009; Farris-Berg; Gray, Thomas, & Lewis, 2010b; Project Tomorrow, 2009a; 2009b; 2010a; 2010b; U.S. Department of Education, 2004), there is a gap between the educators and their students that must be bridged before computer technologies can be integrated into classroom instructions.

This study investigated the current use of Web 2.0 tools in American public K-12 classrooms to learn more about the actual classroom situation. Due to the constantly changing characteristics of advanced technology tools, the upgrading and improving of inservice teachers' technology skills and knowledge have become the essential factors affecting the integration of technology into school classrooms. For example, inservice teachers need to be prepared to use up-to-date technology applications as prior research has shown that professional development has a strong influence on how teachers integrate new technology into their classrooms (Chen, 2008; King, 2002; Lumpe & Chambers, 2001; Project Tomorrow, 2009a; Wells & Lewis, 2006). An investigation of whether professional development predicts the use of Web 2.0 tools provides teacher trainers insight into how they might more effectively construct their professional development plans to reduce the technology literacy gap between teachers and their students.

Prior research suggests that postponement of the implementation of computer technologies is highly related to technical problems at schools (Lumpe & Chambers, 2001; Rickard, Blin, & Appel, 2006; Wong & Benson, 2006; Zhao, Pugb, Sheldon, & Byers, 2002). The limitation of access to technology resources (e.g., access to the Internet at school and school administrative support) is a significant factor (Chen, 2008; Lumpe &

Chambers). Understanding the factors related to the integration of computer technologies may help improve future implementations of technology and Web 2.0 tools.

Teachers' self-efficacy not only has a significant influence on technology use (Curts, Tanguma, & Peña, 2008; Paraskea, Bouta, & Papagianni, 2008; Wang, Ertmer, & Newby, 2004; Watson, 2006) but also has an impact on practical classroom practice (Goddard, 2002; Goddard & Goddard, 2001; Hoy & Davis, 2006; Knoblauch & Hoy, 2008; Long & Moore, 2008; Margolis & McCabe, 2006; Milner, 2002) and student achievement (Martin & Marsh, 2006; Siegle & McCoach, 2007). Prior research has shown that well-planned professional development enhances teachers' self-efficacy (Faseyitan, Libii, & Hirschbuhl, 1996; Milbrath & Kinzie, 2000; Overbaugh & Lu, 2008; Shechtman, Levy, Leichtentritt, 2005; Ross & Bruce, 2007). It is clear that teachers' self-efficacy is a noteworthy variable whose relationship to technology integration should be assessed. This study sought to investigate the factors that are related to the using of Web 2.0 tools within practical school settings.

Purpose of the Study

First, this study examined the current integration of Web 2.0 tools by inservice teachers in K-12 public schools in the United States. Second, this study attempted to identify factors influencing the integration of Web 2.0 tools in school classrooms. Several specific factors (e.g., teachers' self-efficacy in using Web 2.0 tools, the duration of time spent by teachers on professional development, the possibility of accessing Web 2.0 tools from school and home) were assessed. Finally, support from the school administrators was examined to identify its importance for the use of these Web 2.0 tools.

Research Questions

The research question of this study is:

What factors predict teachers' use of Web 2.0 tools in K-12 classrooms?

The dependent variable of this study is the use of Web 2.0 tools in K-12 school classrooms.

The independent variables of this study are:

1. Web 2.0 tools integration self-efficacy
2. The number of hours of professional development teachers attended in the past school year
3. Teachers' access to Web 2.0 tools at school
4. Teachers' access to Web 2.0 tools at home
5. School administrators' support for the use of Web 2.0 tools in school classrooms

Significance of the Study

The integration of technologies in education is essential. Schools have to adopt technology tools into the educational setting to facilitate their students' developing of needed 21st century skills. The use of Web 2.0 technologies could benefit learners in creating and customizing personal and community learning spaces where they are involved in interactive and collaborative environments with instructors, peers, friends, and unknown people worldwide (Tu et al., 2008b). This characteristic of participation among end-users makes Web 2.0 a dynamic learner-centered environment allowing

pupils to interact with multi-learning tools, enabling them to learn at their own speed and according to their own individual learning styles and needs, to develop social skills, and to pursue lifelong learning after they leave school.

This study attempts to examine K-12 inservice teachers' use of a wide range of Web 2.0 tools, including collaborative tools, podcasts, social networks, image/photo sharing sites, and course management systems (CMSs). It is different from prior studies focused on collaborative tools, social network sites and podcasts. Further, only limited research has been conducted on the utilization of Web 2.0 tools by inservice teachers for classroom instruction. This study may shed light on the actual current use of Web 2.0 tools in K-12 classrooms.

The assessment of teachers' self-efficacy offers information about teachers' beliefs regarding their technology skills and knowledge based on the integration of computer technologies in their classrooms. While it is true that teachers' beliefs might not accurately indicate the capabilities they possess, prior studies indicate that positive or higher self-efficacy impacts the adoption of change actions (Evers, Brouwers, & Tomic, 2002; Overbaugh & Lu, 2008; Pajares, 2002; Paraskea et al., 2008). Knowing what teachers think regarding the knowledge and skills they possess could benefit the design or reform of professional development and be used to improve preservice teacher training programs. The study identified the factors influencing the utilization of these Web 2.0 tools in classroom instruction, which provides the insight into how barriers to technology integration may be diminished in the future.

Limitations and Delimitations of the Study

This study focused on the integration of Web 2.0 tools at K-12 schools in the USA. It is limited to the physical boundaries of the United States, although the World Wide Web's boundaries are admittedly limitless. The characteristics and needs of American youth, the infrastructure, and the learning environment at American K-12 public schools differ from those of other nations in this global village, which limits the generalizations of this research study to the population of the United States. Similar issues slowing the implementation of computer technologies at schools are shared to a certain extent worldwide, such as e-safety issues, the adoption of Internet use policies, the design and development of professional development, and the use of certain Web 2.0 tools.

There are innumerable Web 2.0 tools available online, and because they are being updated and/or created periodically, it is impossible to include all Web 2.0 tools in this study. Admittedly, the inclusion of the specific Web 2.0 tools being measured in this study may have been affected by researcher bias due to prior personal experience and the knowledge base of the researcher.

The list of the random samples of information was limited by the quality exhibited by the web site of each school district or school. Although the target samples' names and e-mail addresses were obtained from the web sites of the school districts or school, they were not always up-to-date regarding current conditions. For example, some teachers who had retired or left their positions had not yet been removed from the faculty or teacher list online, resulting in their receiving an invitation letter and reminders for this

study. Due to the inaccurate contact information from the samples' list frame, it was impossible to avoid the problem of being unable to identify a perfect group of samples.

Definition of Terms

The terms below are defined to clarify understanding of this study.

Collaborative tools: web pages (e.g., blogs and wikis) allowing the end-users to work on individual or group projects by adding, editing, or removing information online.

Computer technology: digital devices(e.g., cell phones, iPods, video games, desktop- and laptop computers, devices which plug into computers, and the Internet) enabling individuals or groups to manipulate data, seek entertainment, communicate and interact.

Course management system (CMS): web- or network-based software platform consisting of or making available instructional materials, communication areas, student assessment and progress tracing (Chang, 2008; Levy & Stockwell, 2006; Simonson, 2007). A virtual learning environment (VLE) serves the same purpose as a CMS (Chang; Levy & Stockwell; Simonson). Blackboard and Moodle are common commercial and open source, CMSs respectively.

Inservice teachers: teachers who are currently teaching in public schools in a part-time or a full-time position.

Podcasts: multimedia digital files (e. g., mp3 or video clips) capable of being uploaded and downloaded on the Internet and listened to or reviewed by mobile devices and computers.

Self-efficacy: "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments"(Bandura, 1997, p. 3).

Social network sites: web sites where the end-users contact, interact and communicate with people they know or do not know for social purposes, (e.g., Facebook, My Space, and Second Life).

Web 2.0: the use of web platform software applications to control and create information or data and to cooperative with individuals or groups online (Solomon & Schrum, 2007).

Web 2.0 tools: in this paper, Web 2.0 tools imply the use of Web 2.0 tools and applications (e.g., blogs, wikis, and podcasts) (Solomon & Schrum, 2007).

Web survey: web sites that store surveys. This allows the respondents to access a web site to fill out an online questionnaire. Web surveys often display the consent form by asking the respondent to click on the 'next' button for the agreement of data collection and may be contributed to anonymously, (e.g., Surveymonkey).

Organization of the Study

This dissertation is organized into five chapters as explained below. The first chapter introduces the study and presents its problems and significance. Chapter Two presents a research literature review of the definition and applications of Web 2.0, digital students, Bandura's theory of self-efficacy, professional development, community of practice, open sources, infrastructure and access at K-12 schools, e-safety, use policy, technology literacy and copyright issues. Chapter Three describes the methodology, the populations and samples, the construction of the measurement, the pilot study, the data collection process and the design of this study. Chapter Four includes the statistical analysis of the data and presents the final results. Finally, Chapter Five presents a

summary and interprets the research results for further implementation and research suggestions.

CHAPTER 2: LITERATURE REVIEW

Disclaimer: *Chapter 2 represents the work of researchers and authors related to this dissertation's research. This chapter attempts to synthesize, analyze, and present the previous research literature to provide a framework for the research conducted here and presented in Chapters 3-5. Every attempt has been made to document the content to the fullest; however, given the fallibility of humans, there may be errors in Chapter 2 due to the vastness of the content and number of researchers and authors examined.*

21st Century School Education – Web 2.0 Tools in Teaching and Learning

In this digital century, global society, economy, politics and ways of communication have changed. In his book *The World is Flat*, Pulitzer Prize winner Thomas Friedman (2006) argues that Americans and Western Europeans are being challenged by countries in the East such as India and China, who are utilizing their knowledge to adopt new technologies to compete in this global village more than ever before. After having had the advantage of being the leading country in the world over the last few decades, the United States is seeing its advantage disappear due to the merging of the world into a global society and technological innovation (Friedman).

Newer telecommunications technologies such as Internet-enabled computers and mobile phones have enabled businesses to recruit employees from around the world and use the cheapest labor to maximize profit, which has changed the global economy (Friedman, 2006). This new economic trend is leading to educational reform initiatives; technology is, sometimes, now integrated into educational curricula in order to train students to meet the need for skilled workers in this global village (Friedman; Partnership for 21st Century Skills, 2008).

But what kinds of workers do we need for this new century? Friedman (2006) identifies the types of workers needed by the labor market of this global economy: "great

collaborators and orchestrators, synthesizers, explainers, leveragers, adapters, passionate personalizers, green people, [and] localizers" (p. 276). Individual Americans who possess these skills might not worry about their jobs being replaced by automatization or outsourcing to developing countries or other competitive nations (Friedman), but many jobs are likely to be lost in the future. To prepare students for their future careers, educational institutions must change to help students learn new skills to reach beyond mere survival and enjoy a high quality life in this 21st century (Partnership for 21st Century Skills, 2008; Solomon & Schrum, 2007).

According to the Partnership for 21st Century Skills (2008), an organization composed of educators, policymakers, and business community members, the reasons for change include "fundamental changes in the economy, job and business… demands of new and different skills… [and to] bridge the achievement gaps in between the lowest- and highest-performing students" (pp. 2-9). An example of these can be seen in the increase of U.S. information service jobs, which reached 56 percent of the total in 1997 compared with 36 percent in 1967 (Partnership for 21st Century Skills). That particular trend has shown the need for more workers related to information service, knowledge-based work, and innovative technology rather than in the traditional manufacturing industry (Partnership for 21st Century Skills). The skills that students need to learn for the 21st century include:

> Critical thinking and problem solving, communication and collaboration, global awareness, creativity and innovation, flexibly and adaptability, initiative and self-direction, social and cross-cultural, initiative and self-direction, productivity and

> accountability, leadership and responsibility, and literacy of civic, health, information, media, and information and communications technology. (p. 13)

The 21st century skills needed by students are similar to those of the global workers named by Friedman. The need for educational change is both essential and urgent, and the only way to meet this urgent need is to take immediate action (Lemke et al., 2009).

One of the most effective tools to facilitate the changes needed is the use of technology (Busch et al., 2007; Lemke et al., 2009). Educators note that the implementation of classroom technologies enables students to easily comprehend 21st Century skills (Busch et al.; Lemke et al.). In 2007, a report by the International Society for Technology in Education (ISTE), the Partnership for 21st Century Skills and the State Educational Technology Directors Association (SETDA) called for attention to be paid to the integration of technology in education (Busch et al.). This report emphasized the use of technology to "develop proficiency in 21st century skills, support innovative teaching and learning, and create robust education support systems" (p. 3), reminding educators of the urgent need for technology applications in school settings.

A number of new technology tools, often called Web 2.0 tools, are easily available online to facilitate the changes mentioned above. These tools, which include blogs, wikis, podcasts, social network sites, image/photo sharing sites, and course management systems (CMSs) vary in function and can be implemented in a variety of subject areas and populations. Prior research (Anderson, 2007; Jonassen, Howland, Marra, & Crismond, 2008; Richardson, 2006; Rosen & Nelson, 2008; Solomon &

Schrum, 2007) indicates that the use of collaborative tools such as blogs and wikis not only increases the interaction between learners and their peers, learners and instructors, and learners with learning materials, but also creates in-depth learning involving authentic real-world activities (Lemke et al., 2009). These tools provide collaborative learning environments to allow students to work with their peers or other international students, which can enhance the awareness of cultural diversity (Anderson; Jonassen et al.; Richardson; Solmon & Schrum). The uploading and downloading of audio and video files (e.g., podcasting) provides an alternative curricular approach to traditional text-based learning materials which benefits students who have an audio-oriented learning style, and offers diversified learning activities (Jonassen et al.; Richardson).

When students work on creating a podcast, they not only cultivate the skills of communication, collaboration, innovation, and creativity but build leadership and responsibility skills as they develop new ideas for content, deal with technological problems, and negotiate with group members while producing the final product of their work (Jonassen et al**.,** 2008; Richardson, 2006; Solmon & Schrum, 2007; Williams, 2007). Buffington (2008) reports an instance of a teacher who used Flicker, a photo sharing web site, for art course instruction; students (and the teacher) posted feedback on specific images under their Flicker course account for a class discussion. This system offered the opportunity to practice critical thinking, writing skills, peer review and feedback techniques for a collaborative learning experience. The most extreme example is probably the use of a course management system (CMS), which offers a 24/7

interactive learning environment for both teachers and students (Levy & Stockwell, 2006; Simonson, 2007).

Web 2.0 implicitly supports new trends in global educational and should be integrated into school classrooms as soon as possible (Lemke et al., 2009). The Metiri Group study, 'Leadership for Web 2.0 in Education' (Lemke et al.), indicates that Web 2.0 tools are being more rapidly adopted in society as a whole than within K-12 schools. This report calls for action among educational leaders to facilitate the integration and implementation of Web 2.0 tools into education settings to promote deep and authentic learning (Lemke et al.).

What is Web 2.0?

Tim Berners-Lee, the inventor of the World Wide Web, addressed his original conception of the Web at the MIT Technology Review Emerging Technologies conference in February 2005:

> The original thing I wanted to do was make it a collaborative medium, a place where we can all meet and read and write… Collaborative things are exciting, and the fact people are doing wikis and blogs shows they're [embracing] its creative side (Carvin, 2005, para. 3).

Berners-Lee wanted the Web to be a place for connection where "all the information stored on computers everywhere were linked…All the bits of information in every computer at CERN, and on the planet, would be available to [him] and to anyone else. There would be a single, global information space" (Berners-Lee, 1999, p. 4). The original Web, now often known as Web 1.0, did not meet Berners-Lee expectations

(Carvin, 2005). In the early 1990s, Web 1.0 had a high threshold for online publishing. For example, it required an understanding of HTML for content production (Anderson, 2007; Richardson, 2006; Rosen & Nelson, 2008; Solomon & Schrum, 2007). Web 1.0 became a one-way street for communication, sometimes called 'read Web', a place where the majority of Internet users simply collected information (Albion, 2008; Rosen & Nelson; Solomon & Schrum). Years later, after the advent of new technologies, Berners-Lee's ideal read/write Web, now called Web 2.0, facilitates collaboration and communication (Anderson; Richardson; Rosen & Nelson; Solomon & Schrum).

The ideal definition of Web 2.0 varies by subject and use according to scholars, academic researchers, educators, students, policy makers, and others (Anderson, 2007; Buffington, 2008; Carvin, 2005; Jonassen et al., 2008; Richardson, 2006; Rosen & Nelson, 2008; Solomon & Schrum, 2007). A general definition is that Web 2.0 is the conceptual framework for a web-based platform where users are able to use collections of technology tools to create and post content, interact in social networking, collaborate on tasks with other human agents, rework existing content, and share data or work results (Buffington; Jonassen et al.; Solomon & Schrum)**.** In this read/write Web 2.0 world, everyone is able to participate in and control the content 24/7, and its boundaries are limitless (O'Reilly, 2005; Solomon & Schrum). It is new, open, free, democratic, participatory, cross-cultural, global, and unlimited by time zones (Solomon & Schrum).

The term Web 2.0 – though coined by Darcy DiNucci – was brought into the public consciousness and popularized by Tim O'Reilly, a leading technology-related publisher, and his colleagues at a conference brainstorming in 2004 (Albion, 2008;

Anderson, 2007; Buffington, 2008; O'Reilly, 2005; Solomon & Schrum, 2007). According to O'Reilly, Web 2.0 should be seen "as a set of principles and practices that tie together a veritable solar system of sites that demonstrate some or all of those principles, at a varying distance from that core" (http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html, para. 7). Within the Web 2.0 platform, users are able to build and control their own data, services are offered instead of packaged software, collective intelligence is harnessed, software is not just a single device, and data are able to be remixed and transformed (O'Reilly). For O'Reilly, Google is a good example of this as it offers services, continuously releases its software, and allows its users to manage their data online. Meanwhile, Google acts as a database where massive amounts of data are collected; it serves as a browser, search engine and server for its end-users and their online activities. This platform merges numerous services and keeps its software up-to-date for the end-users connected into and through the Internet (O'Reilly).

As opposed to Web 1.0, where a minority of users familiar with HTML could collect and use online information for uploading and creating web pages (Solomon & Schrum, 2007), Web 2.0 is open to all users. There are few barriers to the use of Web 2.0 tools, and with basic computer technology skills, most users could offer feedback on blogs, write or edit information on wikis, add tags to images or web pages, and upload pictures, images or podcasts (Solomon & Schrum). This dynamic Web environment is open for uploading, posting, publishing and creating contents under user control.

One of the most important characteristics of Web 2.0 tools is that many of them are open source and freely shared (Solomon & Schrum, 2007). The open source supporters "believe that the source code for programs should be available for anyone else to study, use, enhance, and distribute" (Solomon & Schrum, p. 50). Programmers – and other users – are able to contribute feedback to aid in the revision and regular upgrading of open source software. The creators of open source software are community members from around the globe with various cultural backgrounds and nationalities. No-cost does not mean that choice is limited; in fact, there are myriad choices among open source software, such as the CMS Moodle, the web browser Mozilla Firefox, the image editors Gimp and Tux Paint, and the sound editor Audacity.

If the decision is made to use open source software programs, school districts and administrators do not have to divest large portions of their budget to purchase licensed software for each school year (Solomon & Schrum, 2007). This could also benefit teachers as they can adopt any software that meets their instructional goals and individual students' needs without worrying about the adapting of school infrastructure. Students benefit from being able to use such software for free, both in and out of school.

Blogs, one of the most widespread Web 2.0 tools, symbolize this democratic and participatory web world. Different from the hierarchical production of news from corporate media conglomerates or local stations, blogs allow the public to post information, express their ideas or critical comments on public affairs, and share personal experiences online according to their own willingness and time schedule. Blogs have expanded beyond personal use into public forums for politics, journalism, scholarship,

education, business and entertainment, and they are widely credited for establishing and maintaining online communities (Rosenbloom, 2004; Vogel & Goans, 2005). Friedman (2006) cites the example of the BBC Web Site, which civilians to upload information and photos of the London underground bombings, thereby implicitly embracing the use of blogs as a complement to traditional journalism. In this information-driven age, blogging and uploading information online will be part of the array of tools flattening the world of the global villager (Friedman). With the use of blogs, more people are able to express their opinions and collect individual ideas than ever before. With other sites such as Wikipedia, an encyclopedic collection of content from various online contributors, anybody is able to add to this vast reservoir of information, while existing information may be edited by other users. This online encyclopedia stores more information than the well-known Oxford Encyclopedia (Solomon & Schrum, 2007).

The features of participatory Web 2.0 are affecting both education and daily life (Bull, Hammond, & Ferster, 2008). It is becoming increasingly common that students are required to use the Internet to accomplish their academic schoolwork. Jones and Madden (2002) report that more than half of college students contact their peers and teachers through the Internet, and the majority (73%) of them reported that they use the Internet for information searching rather than physically visiting the library (9%). Nearly eight out of ten (79%) said that the Internet provides a positive academic experience.

Web 2.0 Tools in Teaching and Learning

The use of Web 2.0 tools offers learners the opportunity to interact with information of high quality and depth (Lemke et al., 2009). From the yearly national

report of technology use in U.S. public schools, Gray et al. (2010a) found that the majority of public schools use technology devices for instruction, such as digital cameras (93%) and interactive whiteboards (73%). Rich forms of digital curricular content (e.g., text, images, audio and video) are available for teaching and learning on the Web (Wells & Lewis, 2006). Current research indicates that using Web 2.0 tools benefits teaching and learning in educational settings (Anderson, 2007; Buffington, 2008; Imperatore, 2009; Jonassen et al., 2008; Lemke et al.; Norton & Hathaway, 2008; Solomon & Schrum, 2007). Lemke et al. supports the use of Web 2.0 as valuable, and the majority (over 77%) of district administrators "agreed or strongly agreed" that "Web 2.0 has value for teaching and learning" (p. 7).

Web 2.0 tools facilitate collaboration and interaction, offer possibilities for immediate feedback, foment social connections and communities, and harness collective intelligence with no associated costs (Anderson, 2007; Buffington, 2008; Imperatore, 2009; Jonassen et al., 2008; Liu, 2008; Norton & Hathaway, 2008; Solomon, & Schrum, 2007). With Internet connectivity, users can freely tailor these tools to meet their personal needs and interests. Schools that integrate Web 2.0 as a learning tool may "attract students to school work, meet individual learning needs, develop students' critical thinking skills, provide an alternative learning environment, expand learning outside schools, and prepare students for lifelong learning" (Lemke et al., 2009, p. 7). This read/write web influences education in ten major domains:

> [O]pen content, numerous teachers and 24/7 learning, social, collaborative, construction of meaning knowledge, conversation replace lecture in teaching,

> know where to learn, active readers, web as notebook, writing in multiple forms, mastering in production rather than test, and contribution. (Richardson, 2006, p. 127)

Collaborative Tools

Blogs and wikis are two of the most popular collaborative Web 2.0 tools in educational settings due to the ease of use and characteristics of collaborative features. They engage end-users in cooperative or collaborative group work related to real-world practice or research studies. These tools allow interactive group work as well as individual work.

Blogs. A blog is a medium for communicating, sharing information and expressing oneself that has gained considerable attention among Internet users (Blood, 2002). This communication medium is a web site, often designed to imitate a journal or diary, and new entries are placed at the top in reverse chronological order. Information can be uploaded and hyperlinked to other websites, and readers are allowed to post responses or comment (Blood; Du & Wanger, 2007; Friedman, 2006; McPherson, 2006; Vogel & Goans, 2005). With the capacity to access the Internet, anyone can gain access to a blog anywhere and anytime (Blood).

Dave Winer was the pioneer credited with launching the first entry on Scripting News in April 1997, an entry which heralded the beginning of the blog age (Blood, 2002; Du & Wanger, 2007). Initially, blogs were created and maintained by professionals using the computer language code, Hypertext Markup Language (HTML) (Blood). Today there are many blog management tools and hosting services, such as Blogger and Pitas, to help

would-be blog users create their own blogs (Du & Wanger, 2006; Vogel & Goans, 2005). Many blog services are free, but others require membership fees based on the users' personal needs. Some blogs require membership permission to post comments, while others are public for any readers or reviewers.

The urge to bring one's own voice online has been prevalent in recent years (Lenhart & Fox, 2006). Blogs offer a new 'medium stage' for everyone, often replacing less personalized traditional media like newspaper, TV stations, and radio stations. Easy access to this simple (i.e., it does not require any advanced computer technology skills) and fast publishing option is one of the reasons for its prevalence and popularity among the general public (Blood, 2002; Du & Wanger, 2006).

Blogs in educational settings can be found for a wide range of uses and at all levels; they could be a tool for data sharing at school libraries (Oatman, 2005a; Vogel & Goans, 2005), a source of information among teachers (Clyde, 2005; Poling, 2005; Shaffer, Lackey, & Bolling, 2006), an alternative paperless digital classroom (Aylward, 2004; Clyde; Downes, 2004; Du & Wanger, 2007; Ferdig & Trammell, 2004; Poling, 2005; Repman, Zinskie, & Carlson, 2005; Richardson, 2005; Skiba, 2006), or a tool for improving writing skills and collaborative learning (Blood, 2002; Clyde; Downes; Du & Wanger; Richardson; Skiba) or increasing social interaction/presence (Dickey, 2004).

Cautions about the adoption of blogs into education need to be recognized and translated into warnings regarding issues of privacy, security, validity of contents, and usage policy (Richardson, 2006; Solomon & Schrum, 2007). In addition, issues may arise as to how to evaluate, credit and trust the reliability of blogs. Unfortunately, addressing

these issues can be time-consuming work, and teachers need to use their wisdom to facilitate student technology skills in this blogging world (Richardson).

Class Blogmeister (http://www.classblogmeister.com) was created by David Warlick especially for classroom use (Solomon & Schrum, 2007). It offers teachers full control of their blog sites for professional publication and classroom management, activities, such as the posting of curricula, comments and students' work (Solomon & Schrum). This site is available for educators and requires teachers to follow the Children's Online Privacy Protection Act (COPPA) guidelines for participants under 13 years of age in order to not reveal students' personal identification (Terms and Conditions, 2009, http://classblogmeister.com/conditions_sl.php, para. 7).

Drupal (http://www.drupal.org) is open source software that may be used by persons or communities to publish, organize and manage information on a website maintained and upgraded by a worldwide community (About Drupal, 2009, http://drupal.org/about, para. 3). It features discussion forums, content management systems, personal web pages, blogs, social networking, podcasting, file sharing, newsletters, and picture galleries (About Drupal). In Australia, Swinburne University of Technology has constructed their online astronomy courses using Drupal (Barnes et al., 2008).

Edublogs (http://edublogs.org), created by James Farmer (All about Edublogs, 2010, http://edublogs.org/about/, para. 4), is a free education blog site enabling schools to customize their own domain (All about Edublogs). This site offers a variety of updating features, themes, and support sites for their users.

Gaggle Blogs (http://www.gaggle.net) is devoted to offering teachers, students and parents a safe environment for interacting online. Teachers are able to control the content contributions and feedback, and inappropriate words or phrases are filtered out with regular teacher notification (About Gaggle.Net, 2010, https://www.gaggle.net/home/safety/, para. 6-15). It scans for pornographic content or links such as embedded images, linked pictures, URLs and blog messages (About Gaggle.Net, para. 9).

Wiki. The first Wiki was "created in 1995 by Ward Cunningham" and named after a short phrase of the native Hawaiian language, "*wiki*-*wiki*[,] which means quickly" (Jonassen et al., 2008, p. 105). A wiki is actually a modified web page allowing collaborative individual or group users to add, edit or remove online information at any time and from any location (Jonassen et al.; Richardson, 2006; Rose & Nelson, 2008; Solomon & Schrum, 2007). With basic typing skills, it is easy to create content and share information online by adopting available wiki web sites, which may be available publically or accessible only with permission.

Wikipedia, an online encyclopedia, is one of the most famous wikis in the world. Anyone can contribute to this encyclopedia by editing information on existing entries or by adding new entries (Jonassen et al., 2008; Solomon & Schrum, 2007). This largest of wiki sites was launched in 2001 and contains 15 million free articles (Wikipedia, 2010, http://en.wikipedia.org/wiki/Wikipedia) in 269 languages (List of Wikipedia, 2009, http://meta.wikimedia.org/wiki/List_of_Wikipedias). Although more articles are available on Wikipedia than through a traditional encyclopedia such as Encyclopedia

Britannica, many reviewers and observers have raised the problems of quality and reliability (Jonassen et al.; Solomon & Schrum). Because of the well-known and fundamental fact that anyone can edit content (Wikipedia, Natural of Wikipedia, Editing model, http://en.wikipedia.org/wiki/Wikipedia), concerns regarding authentication and authorship copyright are not unknown (Hemmi et al., 2009).

Teachers can use wikis for collaborative group and individual instruction in a wide range of subject areas, such as writing, music, history (Oatman, 2005b; Richardson, 2006) and English as a second language (Mak & Coniam, 2008). It is a tool that allows "students to join together in a knowledge-building community" in which students are able to develop critical and reflective thinking skills (Jonassen et al., 2008, p. 105). History or revision records, one of the unique functions of wikis, allow users to review previous work, revise or revert to the version they prefer, compare thoughts from different members of the group, and practice social negation without social presence (Hemmi et al., 2009). This means that wikis allow teachers to track individual or group progress, revise instructional materials according to student feedback or comments, enable group assignments and heighten understanding for the needs of individual learners. Students are able to immediately contribute their own thoughts, ideas and opinions, learn from peer and instructor feedback, and practice writing skills, critical thinking, and team work (Jonassen et al.; Solomon & Schrum, 2007).

Research indicates that the use of wikis in education improves writing skills and collaborative group work (Jonassen et al., 2008; Mak & Coniam, 2008; Richardson, 2006). Oatman (2005b) reported how Sarah Chanucey, an elementary teacher in New

York, used wikis to teach writing skills as well as to facilitate her students' creation of the school's web-based newspaper. This teacher used pbwiki.com to create her own wikis so that 140 third grade students could have "a communal and fun space" for practicing their writing skills (Oatman, p. 52). Bud Hunt, a high school teacher in Longmont Colorado, agrees with the benefit of using wikis to improving his students' writing skills (Oatman). In Hong Kong, Mak and Coniam found that using wikis in writing classes improved students' writing skills and empowered their collaborative skills. This project required secondary students learning English as their second language to work collaboratively on a school brochure for their parents over the course of two months. Mak and Coniam reported that students increased the quantity of text written, exuded confidence as writers with enhanced creative writing skills, built up real-world experience by investigating detailed information for their brochure and target audience, and developed collaborative skills through peer reviewing.

Wikispaces (http://www.wikispaces.com) is free for educators and offers some ad-free sites for K-12. Educators can set personal preferences for security and educational purposes (Wikispaces: Private label, 2010, http://www.wikispaces.com/site/privatelabel). Teachers can set up their wiki sites to be public, allowing everyone to see and edit; to be protected, allowing anyone to see but only members to edit; and private, allowing only members to review and edit (Wikispaces: Private label). They can invite people to join their wiki space to view or edit information there.

The PB of PBworks(formerly known as Pbwiki) (http://pbworks.com/) stands for 'peanut butter', which promotes the idea that wikis can be used "as easily as a peanut

butter sandwich" (Solomon & Schrum, 2007, p. 220). The old name, sites, and function of Pbwiki are still available. The new PBworks includes more Web 2.0 tools, such as multimedia features, RSS, Tags, and had added access control, document management, and mobile support (PBWorks: Education features, 2010, http://pbworks.com/content/edu+features?utm_campaign=nav-tracking&utm_source=Top%20navigation). It is free for educators.

Podcasts

Podcasting is a technology innovation for listening to and reviewing audio files and video clips on the Web (Anderson, 2007; Jonassen et al., 2008; Richardson, 2006; Solomon & Schrum, 2007; Williams, 2007). Any individual with simple audio recording devices, such as a computer and/or a computer plug-in/line-in microphone and the ability to access the Internet, are able to create, publish or contribute to a podcast worldwide (Jonassen et al.; Solomon & Schrum; Williams). Listeners or reviewers can access podcasts via live stream or download them to their computer or mobile gadgets according to personal needs. Differing from downloading online audio or video files, podcast web sites commonly offer automatic download by RSS subscription, one of the unique features of podcasting (Anderson; Jonassen et al.; Solomon & Schrum; Williams). Listeners or reviewers can regularly receive updated podcasts with a series of episodes.

A podcast is a combination of two words, broadcast and iPod (a portable data device from Apple) (Anderson, 2007; Solomon & Schrum, 2007), which initially featured an audio file saved in MP3 format (Anderson; Jonassen et al., 2008). Video podcasts are now widely available and easily accessible online. In school classrooms, podcasts are

used in a number of ways, such as to effect “curriculum enhancement, promote programs and activities, research, share school news, professional development, archived lessens (classroom recordings), field recording (field notes, interviews), study support (repetitive listening)“ (Williams, 2007, p. 30), as well as for library promotion and the sharing of students’ learning experience (Eash, 2006). Some teachers have uploaded podcasts for students who missing class due to illness so that they may review the content (Williams).

One of the advantages of using podcasts is that the functions of replaying, pausing, rewinding, previewing and stopping offer reviewers a great opportunity to adapt podcasts to their own individual learning styles and needs (Williams, 2007). The creating of podcasts in school classrooms allows students to work as a team for collaborative learning goals (Jonassen et al., 2008). This helps learners to contribute and share their skills and knowledge to broader audiences beyond their individual schools, such as an international audience (Jonassen et al.). In addition, learners and teachers can record their own podcast for notetaking, curriculum feedback and experience sharing for personal reflection (Jonassen et al.).

At Willowdale Elementary school, Radio WillowWeb, is a place where teachers and students post their podcast creations on a variety of unique topics for a wide range of subjects and grade levels (Eash, 2006; Hargardon, 2007; Richardson, 2006). These podcast selections include holiday traditions from Canada, Scotland, Russia, and China, the history of the United States Constitution, various aspects of life in colonial times, a book about energy, and a review of the office of the President of the United States as well

as the election process. Students and teachers interview each other, sharing learning experiences, or read textbooks to create unique podcasts for the members of their school.

Piecka, Studnicki and Zuckerman-Parker (2008) proposed a study in creating podcasts to improve the learning of science among their 7th grade students. They planned to bring together science and computer teachers to collaborate in a science classroom to create a technology- and content-based learning environment. As envisioned, the project requires five weeks for students to learn how to create podcasts for a group project. It proposes a mixed approach of quantitative and qualitative assessments to evaluate the final results. Piecka et al. predicted that this project will not only increase "student motivation, technical skills, and content knowledge" but also "student motivation, technical skills, and content knowledge", but "create authentic podcast products in a collaborative learning environment" (p. 203).

Audacity (http://audacity.sourceforge.net/) is a free open source software program for sound editing. It is widely used to create audio podcasts for both PC and Mac platforms, offering functions such as recording, editing, format conversion of different audio files into wav or mp3 files, multiple audio mixing tracks, and note taking. When using this program, the Lame mp3 encoder file (http://lame.buanzo.com.ar/) should be downloaded if the user wishes to convert Audacity files into mp3 files (Williams, 2007).

Social Networking Sites

Social networking sites are web sites that allow people to interact, connect, contact, communicate with others, express themselves and create communities (Franklin & Consulting, 2007). In short, they are the Web 2.0 tools that bring people together

through personal conversation and profile presentation for a number of purposes. Examples of social networking sites are Facebook, MySpace, and Second Life. Although social networking sites are most popular for personal socializing, they are used in educational and professional settings (Gray, Thompson, Clerehan, Sheard, & Hamilton, 2008) such as professional communities and cross cultural language learning communities. Educators promote the use of social networking sites because of as knowledge sharing platform; the most important feature, however, is that students voluntarily invest time and energy to maintain their social network site (Maloney, 2007). Scholars suggest that the use of social networking might truly focus on informal learning settings (Selwyn, 2007). Based on a research of 907 undergraduate students using Facebook in the United Kingdom, Selwyn found that students who used Facebook for role identity, experience sharing, cultural learning and online interaction were less successful academically. They recommended that Facebook be used solely for informal learning purposes because that particular online experience is similar to traditional informal learning experiences, such as after-school phone calls and chatting during break time (Selwyn).

Social networking sites are extremely popular and have become the new way of social connecting and communicating among this ‘digital generation’ (Lenhart & Madden, 2007; Project Tomorrow, 2008; 2010a). According to a nationwide phone survey accomplished for a PEW Internet & American Life project, more than half (55%) of American teenagers aged 12 to 17 use social networking sites such as Facebook or MySpace for social interaction (Lenhart & Madden, p. 1). This digital generation uses

social networking sites to maintain friendships with their current friends or prior schoolmates, schedule plans with friends, or make new friends online. About one in two (55%) of these teenagers reported creating a personal profile online, but the majority (66%) set profile access limitations (Lenhart & Madden, p. 2).

This communication platform has become a routine activity for America's youth. Lenhart and Madden (2007) reported that nearly half (48%) of these online teenagers visit social networking sites daily or even more often, with about one-third (28%) visiting once a day, and one in five of them (22%) visiting several times a day (p. 2). Similar results were found by the NetDay Speak Up online survey, which reported that in 2008 less than half (40%) of middle school students but the majority (67%) of high school students had their own personal presence on sites such as Facebook, MySpace, or Xanga (Project Tomorrow, 2008, p. 2). More than half (50%) of these high school students routinely used these tools (Project Tomorrow, p. 2). This survey was conducted online in late 2007 with 319,223 K-12 students inform across the USA (Project Tomorrow). The same trend is found among the American youth; around half (43%) of students in grades 9^{th} to 12^{th} reported that a social networking site is the main communication tool which they used with their friends (Project Tomorrow, 2010a).

In contrast, the National Center for Education Statistics (2010) revealed a nationwide report that was conducted in the winter and spring of 2009 to examine the rare use of social networking sites by public school teachers (Gray et al., 2010b). This report indicated that very few (8%) of the teachers gave the response 'sometimes or often' when they were asked about using social networking sites for instructional or

administrative purpose (Gray et al., p. 12). With the use of social networking sites so prevalent among American teens, educators should take note of this trend and evaluate the pros and cons of adapting social networking sites to classroom instruction.

Second Life (www.secondlife.com) is a three-dimensional (3D) virtual world created by Linden Lab and launched in 2003 (Rymaszewski et al., 2007). Users choose between various free or paid memberships to join Second Life. In this virtual world, residents disguise their actual identities behind avatars to communicate with others and are able to perform regular (as well as less common) human activities such as chatting, walking, running, dancing or even flying. The makers of Second Life have endowed the area with its own economic system; users may purchase products and services, such as virtual objects or property (land) with Linden dollars (Carter, 2008).

A growing number of education sites may be found in the world of Second Life, and it has been adopted by many subject areas, such as languages (Cooke-Plagwitz, 2008), mathematics, science, art, cultural studies, problem-based learning (Good, Howland, & Thackray, 2008) and by a variety of educational settings, including K-12 schools and higher education (Carter, 2008; De Lucia, Francese, Passero, & Tortora, 2009). In recent years, a growing number of universities have invested time and money in researching the educational possibilities of Second Life (Selwyn, 2007). “Over 120 colleges, universities and non-profit organizations” (Carter, p. 42) have developed their own virtual campus, “conferences, exhibits, presentations and virtual experimentation” (Carter, p. 42). Upon accessing Second Life, many university virtual campuses can easily be found, such as Harvard University, Stanford University, and the Open University

(Selwyn). Some virtual distance learning courses are offered in Second Life (Carter). This virtual campus offers future students an alternative opportunity to experience college life and might even help decisions regarding future college plans.

For K-12 education, Teen Second Life offers an alternative virtual learning environment to children between 13 and 17 years of age. Czarnecki and Gullett (2007) reported how a troubled teenager rebuilt his virtual life in Teen Second Life by running a clothing business. Another girl reported that she joined the summer camp in Teen Second Life to learn about public policy and international issues, which resulted in the raising of a substantial quantity of Linden dollars.

In the fall of 2006 the Public Library of Charlotte and Mecklenburg County (PLCMC) and the Alliance Library System (ALS) started to build a virtual island in Teen Second Life, which they named Eye4You Alliance (Czarnecki & Gullett, 2007). This Eye4You Alliance Island is an interactive and informative virtual space for teenagers where youth are able to take classes, hold book reviews and discussions, and tell their own stories. It not only offers teenagers a virtual library but also invites teenagers to create programs and services in this virtual world.

The Vital Lab, a science project created by the graduate fellows of Ohio University and local school teachers at Second Life, is a place where students learn science through a digital curriculum (Ohio University, 2009). In this virtual world, students are able to experience a diverse array of lab experiments without having to worry about being hurt by chemical materials.

Facebook (www.facebook.com) is a free international social web site where users present their personal profile, maintain friendships, and share interests and experiences (Facebook Resources, 2010, http://www.facebook.com/facebook#!/facebook?v=app_10531514314). On average, Facebook users have 130 friends on their sites (Statistic Facebook, 2010, http://www.facebook.com/press/info.php?statistics, para. 1). Traditional typed text, still images or photos, and multimedia files and videos may all be uploaded and shared online (Facebook About, 2010, http://www.facebook.com/facebook) and mobile access is now available with more than 100 million users (Statistic Facebook, para. 5). This site claims to have over 400 million active users, and half of them routinely log on at least once daily (Statistic Facebook, para. 1). Users are able to set privacy level for their sites to control the types of information they would like to share with their friends, friends' friends or general public (Facebook Privacy, 2010, http://www.facebook.com/privacy/explanation.php, para. 1-2)

MySpace (http://www.myspace.com) is a social networking platform hosted in the United States and launched in 2004 (MySpace.com Fact Sheet, 2010, http://www.myspace.com/pressroom?url=/fact+sheet/, para. 1). It offers members numerous technology tools; such as personal web sites, instant message service, music and video, and mobile access for communication to help in maintaining friendships (MySpace.com Terms, 2009, http://www.myspace.com/index.cfm?fuseaction=misc.terms, para. 1). This site claims to

have over 100 million monthly active users worldwide; this includes around 70 million users in the United States (MySpace.com Fact Sheet, para. 1).

Image/photo Sharing Sites

It has been said that a picture is worth a thousand words; visual communication provides unique opportunities to express ideas through images (Jonassen et al., 2008). People use beauty or attractive images to help them convey specific information or express their personal stories (Jonassen et al.). Professional photo editing or sharing software can be quite expensive, but some free download or open-source Web 2.0 tools offer functions and features similar to those of commercial software and can be adopted for school use (Solomon & Schrum, 2007). According to Buffington (2008), a photo sharing site, Flickr, was used for art course instruction. This photo sharing site may be implemented to provide a platform for critical thinking, writing skills, peer review and interaction between instructor and students.

Flickr (http://www.flickr.com) is a free online photo management and sharing application (Solomon & Schrum, 2007). It allows users to post images, photo albums, and slideshow presentations to share online with their friends through e-mail invitation (Buffington, 2008; Solomon & Schrum). Users are able to add notes, tags, and maps, post comments, and edit images/photos online (Buffington; Solomon & Schrum). This site offers a tag search function so users can find other people who share the same tag of their images/photos online (Solomon & Schrum).

Picasa (http://picasa.google.com/) is a downloadable photo management and sharing application hosted by Google. It provides the features of photo editing, slideshow

presentation, photo collages and movie clips creation, photo album organization, and uploading of photos/images (About Picasa 3.6, 2010, http://picasa.google.com/features.html). Users are able to tag their images/photos on the Google map to indicate the specific location where these images/photos were taken (About Picasa 3.6, 2010).

Course Management Systems (CMSs)

CMSs are used to facilitate online learning environments for learners and teachers, in or out of class time, for face to face traditional classrooms, hybrid courses, distance education for course administration, teacher instruction and student progress tracking (Blair & Godsall, 2006; Cavus, 2007; Levy & Stockwell, 2006; Machado & Tao, 2007; Simonson, 2007). It provides a choice of tools for the supplementing of course content, performance assessment, interaction, communication and cooperation (Hanson-Smith, 2007; Levy & Stockwell; Simonson; Watson & Watson, 2007). Instructors and learners are able to use CMSs' built-in tools, such as the discussion board, chat rooms, online quizzes, the digital drop box, HTML links, wikis, blogs, as well as other tools for course instruction (Levy & Stockwell), or to embed extra software from outside the CMSs, such as Hot Potato. Hot Potato tests can be embedded in Moodle during the course design and setup according to the instructors' needs or the pedagogical purposes (Levy & Stockwell). Commercial and open-source CMSs are available for educational use with plenty of products on the market to choose from. Blackboard and Moodle are commonly used CMSs.

Various concerns regarding the adopting of commercial or open source CMSs include shrinking education budgets, ease of use/ navigation within CMSs, prior learning experience using CMSs, and technical support issues (Kennedy, 2005; Levy & Stockwell, 2006; Watson & Watson, 2007). Some K-12 schools have started to use CMSs in recent years for the purpose of providing more online courses for their students and bridging the gap into higher education (Blair & Godsall, 2006).

Trotter (2008) reported an 8th grade teacher had not only used Moodle to post assignments and teaching materials but also set up a chat room for classroom communication in Texas. Perkins and Pfaffman (2006) reported the integration of Moodle into a high school science courses. The integration of Moodle into the school classrooms has improved and enhanced the communication among teachers, students and parents, the academic performance of students and teachers' organization and curriculum design (Perkins & Pfaffman). Schools in South Florida adopted a CMS to create e-portfolios online for preparing their students for higher education and future job applications (Blair & Godsall, 2006).

Digital Students

Do students think and learn differently from their teachers due to the rapid changes in advanced technology that abound, such as computer technology, TV, multimedia, and video games? Enriched visual and audio entertainment for leisure time, such as TV, movies, and video games, is more easily obtained by newer generations than by others in the past thirty years. Prensky (2001) believes that "Our students have changed radically. Today's students are no longer the people our educational system was

designed to teach." (p. 1). Prensky called them "*Digital Natives*" who "think and process information fundamentally differently from their predecessors" (p. 1), such as parents and teachers. Undoubtedly, our students of a generation who have grown up familiar with advanced technology and will likely continue their education in a technologically enriched environment.

Current K-12 students are the *digital natives* who embrace information and technologies not only as tools to acquire knowledge and skills for school work but for their social life and daily activities. According to a nationwide telephone survey conducted in late 2006, teenagers aged 12 to 17 are heavy Internet users; among the 935 teenagers sampled, 93% described the Internet as a platform for social interaction to share their creations, express their feelings or stories, and contact friends (Lenhart, Madden, Macgill, & Smith, 2007, p. i). Teenagers set up their own personal social network sites, upload personal profile information to share with friends or strangers, upload and download videos, write their own blog entries, post comments or feedback to other people's blogs, post photos or videos, and contact friends through e-mail.

This new digital generation is consuming the Internet and Web 2.0 tools much faster than in the past years. Only 73% of American teenagers were reported as Internet users in 2000 (Lenhart, Madden, & Hitlin, 2005, p. i). A few years later Lenhart et al. (2007) reported that more than half (64%) of teens reported active involvement with a variety of online content creation in 2006, compared with 57% in 2004 (p. 2). An even larger increase was observed among teen bloggers, from 19% in 2004; to 28% in 2006 among youth in the same study (p. 3). Until late 2006, more than half (57%) of teen boys

reported watching online videos on platforms such as YouTube, and 19% of them had posted videos (Lenhart et al., 2007, pp. 28-29). A similar study conducted by the same organization revealed that by 2007, half (55%) of online teenagers had posted personal profiles online and used social networking site very often, with 48% reporting that they visited social networking sites daily or more often, and 22% visiting those sites several times a day (Lenhart & Madden, 2007, p. 2).

These *digital natives* know what they want from technology but their teachers or schools do not seem to know what their students need. According to a report focused on the attitudes, perceptions and behavior toward technology use among K-12 students, "today's high school students are highly tech-savvy" (Farris-Berg, 2005, p. 1) and similar to the *digital natives* described by Prensky. This report, titled *Listening to students' voices on technology: Today's tech-savvy students are stuck in text-dominated schools*, captured the voice of American youth. The report reviewed the literature for the attitudes, opinions and voice of students' in grades 6-12 or between the ages of 12 to 17. Dating from late 2000 to 2004, it involved thousands of samples with a variety of research methodologies including web-based surveys, group or class facilitated discussions, focus groups, and individual interviews, and offered a summary of the findings. Based on this 2005 report, students are increasing their Internet use, "are sophisticated technology users" (p. 2), believe technology is important and essential to their education, complained about the limited technology access at school, use computers and Internet as communication tools mainly from home, "use the Internet as a virtual guidance counselor, virtual textbook and reference library, virtual tutor, study short-cut, study

group, virtual locker, backpack, and notebook" (pp. 6-7) for their schoolwork, and claim that technology has vastly changed their life, yet their counterpart adults have reacted as though nothing had happened (Farris-Berg). Meanwhile, Farris-Berg reported that students are frustrated by the prominent text-based traditional teaching style of their school systems; teens expect an increase of computer technology and Internet access in school, diverse ways of using technology in learning activities, and challenging technology-driven instructional exercises.

In summary, students today are growing up in a technology-rich environment. These *digital natives* are familiar with numerous technology tools, they are technology-savvy, and they know what they want and need in using technology for fun or their social life. They will need help from their teachers in facilitating the integration of technology into their learning.

Theoretical Framework - Bandura's Theory of Self-Efficacy

The theory of self-efficacy from the well-known Canadian psychologist, Albert Bandura (1925-), was used as the theoretical framework for this study. Self-efficacy has been widely used to predict a broad range of self perception in the integration and implementation of innovation in educational settings. Research finds self-efficacy is an admirable and reliable predictor of behavior changes (Faseyitan et al., 1996; Lumpe & Chambers, 2001; Pajares, 2002). Empirical evidence has proven the validity of using self-efficacy to predict human behavior related to change agents (Bandura,1982; Faseyitan et al.; Pajares).

Self-efficacy has been adopted in a wide range of studies in educational settings (Faseyitan et al., 1996; Garcia, 2004; Hsieh, Cho, Liu, & Schallert, 2008; Huai, Braden, White, & Elliott, 2006; Karaca, 2008; Pajares, 2002; Poulou, 2005; Scott & Baker, 2003; Siegle & McCoach, 2007; Yilmaz, 2009). Studies of self-efficacy to predict the integration or implementation of technology in education support self-efficacy as a highly reliable measurement (Curts et al., 2008; Faseyitan et al.; Lumpe & Chambers, 2001; Morales, Knezek, & Christensen, 2008; Niederhauser & Perkmen, 2008). This study employed self-efficacy as the theoretical framework for the investigation of predicting the use of Web 2.0 tools in K-12 schools.

Review of Self-Efficacy

Humans are social animals who try to survive in society by controlling visible or invisible and predictable or unpredictable social phenomena to pursue a better quality of life. The exercise of control allows people to attain desired results, expel unwanted consequences and offers incentive motivation. As Bandura (1997) asserts, “people’s level of motivation, affective states, and actions are based more on what they believe than on what is objectively true” (p. 2). According to Bandura (1994; 1997), efficacy beliefs are mainly a core of action, and it is personal efficacy that leads people’s lives. In other words, when people are provided with proper skills or knowledge and sufficient incentives, efficacy perceptions will influence their decisions according to the time and effort they put in to cope with stressful or difficult situations (Bandura, 1977; 1982; 1989; 1994; Pajares, 2002)

Self-efficacy is the judgment of one's own capabilities in executing tasks, assignments, projects or work (Bandura, 1977; 1982; 1984; 1994). Bandura (1997) describes self-efficacy as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (p. 3). Beliefs of efficacy influence human actions, perseverance, resilience, thoughts, stress and depression, and accomplishment (Bandura, 1982; 1984; 1989; 1994; Pajares, 2002; Pajares & Schunk, 2002). This judgment dominates the individual's behaviors regardless of whether the judgment is right or wrong (Bandura, 1982). In the real world, what people do and believe are not matched completely all the time. Consequently, people's behaviors do not equate to their actual capabilities but to their perceptions of self-efficacy, which dominate "what people do within the knowledge and skills they possess" (Pajares, para. 15).

Bandura (1977; 1982; 1984; 1989; 1994) argues the stronger the belief, the higher the possibility of finishing or completing the tasks; people with high self-efficacy accomplish tasks exceeding their capabilities in that current moment. Furthermore, some people might accomplish tasks far beyond their capabilities (Bandura, 1982; Pajares & Schunk, 2002). With the belief that one's actions can bring about the desired result, individuals are often more willing to take risks, try new things, or engage in unfamiliar tasks with a resulting successful accomplishment (Pajares, 2002). In contrast, people with low-efficacy might underestimate their ability to cope with difficult tasks and fail to finish the work.

Four Sources of Self-Efficacy

Bandura (1977; 1982; 1994; 1997) claims four sources as the major information in constructing people's self-efficacy: performance accomplishment, vicarious experience, verbal persuasion and physiological states. An individual's self-efficacy is based on information from prior successes or failures experience, observation of other people's behavior, persuasion by their peers, friends, or some other expert, and their personal feeling, mood, anxiety, tension and other physical states.

Performance accomplishment is perhaps the most discussed aspect of self-efficacy, encompassing prior performance and mastery experience that provides authentic experiences leading to the development of personal efficacy (Bandura, 1977; 1982; 1984; 1997; Pajares, 2002). The successful experience strengthens perceived self-efficacy; the opposite is true of failure experiences (Bandura, 1982; 1997; Pajares). An easy success creates the expectation quick results and predisposes discouragement when met with failure (Bandura, 1994; 1997). The experience gained by overcoming barriers and problems helps form a resilient sense of efficacy because individuals learn that success requires perseverant effort (Bandura, 1994; 1997). When success has been achieved after difficulty, people accumulate rich experience in dealing with obstacles and are more confident in what they can do. Tschannen-Moran and Hoy (2007) found that mastery experiences are the most effective sources of teacher's self-efficacy beliefs. In comparing 255 novice and career teachers, they found that novice teachers reported lower mean self-efficacy beliefs than experienced teachers. Regarding their past experience, career

teachers more satisfied with their professional development were endowed with a greater sense of self-efficacy

Vicarious experience may be gathered by observing model behavior as a reference to shape personal expectations (Bandura, 1982; 1994; 1997). According to Bandura (1977; 1997), comprehensible model behavior conveys better efficacy information than does vague model behavior. In one experimental study Bandura (1977) reported on snake phobia therapy in which phobics observed therapists touching or having other contact with snakes; this greatly helped the phobics overcome their phobia. Model behavior is a powerful tool for individuals who have little prior experience with the tasks they are assigned (Pajares, 2002). As observers discover characteristics of the model, they reflect the model behavior and increase their own capabilities (Bandura, 1994; Pajares). Finally, Scott and Baker (2003) support the modeling and observation of experienced teachers to enhance the self-efficacy of their students' teacher, while Bandura (1977) claims prior- or mastery experience produce a stronger, higher and more generalized efficacy expectation than does vicarious experience.

Due to convenience and availability, verbal persuasion is widely used to increase self-efficacy, but it is the weakest due to the lack of authentic experience (Bandura, 1977). People might not believe what others say to them when the information contradicts personal experience, although people invest great effort when told that they possess the capability to cope with difficult tasks. Social persuasion empowers perceived self-efficacy, which guides individuals to try as hard as they can so that they are able to cope with taxing situations while simultaneously developing new skills that strengthen

personal efficacy (Bandura, 1977; 1994; 1997). Conversely, it is easier for negative persuasion to weaken perceived self-efficacy than for self-efficacy to be strengthened by positive persuasion (Bandura, 1994). Persuaders should be cautious when using verbal persuasion (Bandura, 1994; Pajares, 2002). A study by Faseyitan et al. (1996) agrees that social persuasion can build personal self-efficacy. As parts of their professional development training program, Faseyitan et al. held workshops where verbal persuasion and shared personal experiences were offered to interested participants to increase their self-efficacy in using computers with their teaching.

Individuals' somatic, physiological and emotional responses such as sweating, tension, shakes, fatigue, windedness, aches, pain and mood, provide significant information for the constructing of beliefs of efficacy (Bandura, 1977; 1994; 1997; Pajares, 2002). Bandura (1977) argues that "people rely partly on their state of physiological arousal in judging their anxiety and vulnerability to stress" (p. 198). The degree of vulnerability is a cue for individuals to judge success or a failed performance. Mood states play a vital role in interpreting, judging, organizing and retrieving memory and experience in terms of influencing beliefs of efficacy (Bandura, 1997). A positive mood enhances and reinforces efficacy beliefs because it triggers past accomplishment and happy experiences (Bandura, 1994; 1997). On the contrary, a negative mood not only lowers self-efficacy but accumulates stress, anxiety or fear, resulting in low self-efficacy (Bandura, 1994). People with good/happy moods might overestimate their capabilities and fail their assignment, whereas, individuals who succeed despite a bad/sad mood might really underestimate their capabilities (Bandura, 1997).

The study of Evers et al. (2002) found results consistent with this argument; they observed that teachers' self-efficacy was positively related to burnout level. Evers et al. reported that teachers with stronger negative attitudes tended to spend less time adopting educational practice innovations and experienced more depersonalization and emotional tiredness. On the contrary, "teachers with a strong sense of self-efficacy were more willing to experiment with new educational implementations" and were less vulnerable to burnout (Evers et al., p. 231).

Professional Development and Teacher's Self-Efficacy

A considerable number of studies have documented that professional development enhances teachers' beliefs of self-efficacy (Faseyitan et al., 1996; Overbaugh & Lu, 2008; Ross & Bruce, 2007; Shechtman et al., 2005) regarding the integration and implementation of technology for practical instruction (Albion, 2001; Chen, 2008, Curts et al., 2008; Faseyitan et al.; Littrell, Zagumny, & Zagumny, 2005; Lumpe & Chambers, 2001; Milbrath & Kinzie, 2000; Niederhauser & Perkmen, 2008; Overbaugh & Lu, 2008; Yuen & Ma, 2008; Wang et al., 2004; Watson, 2006; Wozney, Venkatesh, & Abrami, 2006). Factors influencing teachers' self-efficacy in integrating technology include comfort using computers (Albion), time to integrate curriculum, instruction, assessmentm access to Internet at home (Curts et al.), teacher training (Chen; Vannatta & Fordham, 2004), vicarious experience (Wang et al.) and confidence in performing computer tasks (Ropp, 1999). Some research even found that improvements of teachers' self-efficacy persisted long after the professional development training (Watson; Overbaugh & Lu).

Faseyitan et al. (1996) found that professional development programs enhanced university faculty computer self-efficacy in a number of ways, such as bettering their understanding of how to implement computers as instructional tools, increasing their confidence in using computers, and developing their knowledge of computer-based instructional tools. This mixed method professional development program, which included showcases, seminars, workshops and funding, indentified the hands-on workshop as the most effective way to increase computer self-efficacy among faculty. This finding reconfirms Bandura's (1977; 1982; 1984; 1997; Pajares, 2002) argument that performance and mastery experiences are the most influential source of self-efficacy information because they provide authenticity.

In Watson's (2006) study on the training of West Virginia's K-12 teachers to use the Internet for education, it was found that teacher's self-efficacy was significantly improved and sustained over time after the training program. The 389 teachers were provided evidence to increase their self-efficacy beliefs after the training. Seven years after the training, the same measurement was applied to test the same group of participants. Similar self-efficacy scores were observed in the follow-up as were found in the initial assessment indicating that once self-efficacy is formed, it persists over time.

In Greece, Paraskea et al. (2008) investigated 286 secondary teachers during a professional training program on using and implementing technology for classroom instruction. Teachers generally holding strong beliefs in their self-efficacy had stronger computer self-efficacy. Because teachers with high general efficacy were more willing to learn new things or skills and were more open-minded to new ideas, they were more

willing to try new learning technologies as they believed in a high likelihood of success in accomplishing the new tasks (Paraskea et al.). They found a strong and positive relationship between a teacher's subject area, prior experience with computers and software, and computer self-efficacy. This study agreed with earlier research that showed prior positive experience as the highest factor affecting computer self-efficacy. It provided evidence that implementing computer software for instruction enhances computer self-efficacy. Paraskea et al. indicated that their result of no correlation between prior computer training and computer self-efficacy conflicts with prior studies by Milbrath and Kinzie (2000). Paraskea et al. argued that the quality of training might determine its effectiveness in increasing computer self-efficacy and facilitating the integration of computer technology in education.

A study conducted by Overbaugh and Lu (2008) investigated the impact of professional development among 377 in-service K-12 teachers and agreed with prior research as to the positive relationship of self-efficacy with the integration of technology in classroom instructions (Chen, 2008; Faseyitan et al., 1996; Lumpe & Chambers, 2001; Milbrath & Kinzie, 2000; Watson, 2006). This mixed (quantitative and qualitative) research approach not only found a statistically significant improvement in participants' self-efficacy but also yielded interview results indicating that participants had changed their teaching approach after taking professional development technology training. Overbaugh and Lu reported that an increase of teachers' self-efficacy was sustained long after training, which is consistent with Watson's study. Teachers reported that they felt more comfortable in implementing technology tools or resources for their instruction and

were confident in meeting required technology standards by applying technology-based/ enhanced pedagogical approaches (Overbaugh & Lu).

Wang et al. (2004) studied the improvement of preservice teachers' self-efficacy by offering opportunities to observe model teachers' practical technology experience with such things as lesson plans and -generated products in K-12 schools. The participants who reviewed video segments on successful technology integration made more significant improvements in their perceived self-efficacy than those who did not participate in the experience. Their findings confirmed prior research on the benefit of using vicarious modeling experiences for teacher training as well as the significance of using teachers' self-efficacy as an indicator of successful integration of technology. They emphasized the importance of enhancing teachers' self-efficacy as a necessary factor for the successful implementation of technology in teaching.

A three-year study of computer technology training among prospective teachers supported prior research hinting at the positive effects of professional development in improving computer technology use (Milbrath & Kinzie, 2000). This study found that time was an element crucial to developing a positive computer attitude and increasing perceived self-efficacy in the implementation of computer technology. A study by Evers et al. (2002) suggested that teachers with strong self-efficacy are more willing to implement new educational practices, which reconfirms Bandura's assertion that "[people] with strong sense of self-efficacy enhances human accomplishment and personal well-being" (Pajares & Schunk, 2002, p. 14).

Teacher's Self-Efficacy and Its Influence in Students' Learning

Research has shown that teacher's beliefs of self-efficacy have a dominant effect on practical classroom practice (Goddard, 2002; Goddard & Goddard, 2001; Hoy & Davis, 2006; Knoblauch & Hoy, 2008; Long & Moore, 2008; Margolis & McCabe, 2006; Milner, 2002) and have an impact on student achievement (Martin & Marsh, 2006; Siegle & McCoach, 2007). Research indicates that teachers with a strong sense of self-efficacy tend to put great effort into their teaching (Knoblauch & Hoy), work harder with students who have learning difficulties (Brady & Woolfson, 2008; Poulou & Norwich, 2002), are more willing to implement new strategies or adopt innovations (Evers et al., 2002), help students feel that they are important members of their classroom, and have positive and personal relationships with students (Siwatu, 2007).

Siegle and McCoach (2007) found that in-service instructional strategies training for teachers resulted in enhanced student mathematics achievement. This study compared treatment and control groups among 40 fifth-grade classrooms with 872 total students over four weeks. Teachers in the treatment group were trained to understand the concept and strategies of self-efficacy, after which they implemented those strategies in their classrooms. Self-efficacy strategies focused on the use of past experience, observation of other models, and verbal persuasion as sources of self-efficacy information. By complimenting students on their abilities and skills, students were helped to recognize successful experiences and facilitated observation of peer successes with similar tasks. Importantly, this study yielded significant improvement in the students' mathematics achievement.

Bandura (1977; 1982; 1984; 1997) emphasized the importance of mastery experience in forming perceptions of personal self-efficacy, with intermediate successes or failures culminating in the master experience. Based on the study of Wolters and Daugherty (2007), there is a link between teachers' self-efficacy in instructional practice, and their teaching experience at their particular academic level. Wolters and Daugherty reported that teachers with more teaching experience had higher self-efficacy and more confidence in their teaching and classroom management than did teachers with less experience. This research was conducted among 1,024 K-12 in-service teachers in Texas showed congruence with earlier research indicating that teachers with more experience are more positive in their behavior, attitude, and interaction with students, and are more effective instructors than novice teachers. In addition, they explained that experienced teachers received more effective professional training-to-practice skills resulting in higher self-efficacy among experienced teachers than novice teachers. Wolters and Daugherty suggested that their findings are consistent with Bandura's (1997) assertion that self-efficacy is increased "through enactive mastery experience" (p. 189).

Self-Confidence and Self-Efficacy

Self-confidence is a related concept to self-efficacy and has been assigned some different attributes due to differing definitions (Zulkosky, 2009). It has been defined by the Merriam-Webster's online dictionary, 2010 (http://www.merriam-webster.com/dictionary/self--confidence) as "confidence in oneself and in one's powers and abilities". Copeland (1990) asserted that self-confidence "is a learned concept which develops over time through the constant reinforcement of positive behaviors" (p. 7).

Based on a concept analysis of self-confidence conducted by White (2009), the attributes of self-confidence included three main characteristics: belief in positive achievements, persistence, and self-awareness. Davidhizar (1993) stated that "self-confidence is the feeling that one knows how to do something, has the power to make things happen, and knows that one's efforts will be successful" (p. 218). As noted here, self-confidence is based on prior knowledge, support from collegial or self-encouragement, experience and practice, preparation for situations, and experience of success (White).

This differs from self-efficacy, which is concerned "with the judgment of what [an individual] person can do with specific skills", whereas self-confidence focuses on "the specific skills the individual person has" (Zulkosky, 2009, p. 98). Munroe-Chandler, Hall, and Fishburne (2008) explained that self-confidence is "an [athlete's confidence] to be successful in a sport [for example] to play soccer well"; self-efficacy is the "belief that an [athlete] can be successful in specific tasks, skills or under specific conditions" (p. 1540). Zulkosky gave the example of a runner who might feel capable of running short distances but is less sure for long distance running. It reflects that this person has a high self-efficacy in running short distances but low self-efficacy for long distances (Zulkosky). As Zulkosky stated, "self-confidence is an individual person's characteristics which influence personal behavior, in contrast, self-efficacy is related to specific situations which are task-oriented" (pp. 98-99).

Professional Development

The need to integrate and implement computer technologies into K-12 classrooms has attracted the attention of public and private stockholders in the United States since

1983, when the report *A Nation at Risk* was released by the National Commission on Excellence in Education (Culp et al., 2003; U.S. Department of Education, 2004). Since that time, numerous investments have been made related to infrastructure, professional and technical support at K-12 schools (Lawless & Pellegrino, 2007; Pellegrino, Goldman, & Lawless, 2007). Meanwhile, educational technology standards have been published by professional organizations and emphasized by government reports to promote and facilitate technology integration and guide teachers in the many uses of technology in the classroom (King, 2002; Lawless & Pellegrino; Pellegrino et al; Solomon & Schrum, 2007), such as, National Educational Technology Standards (NETS), the International Society for Technology in Education (ISTE) and the No Child Behind Left Act of 2001 (ISTE, 2008; NETS, 2005; U.S. Department of Education, 2001). Numerous publications have emphasized the use of technology in the curriculum (King, 2002), with online professional development communities (Drexler, Baralt, & Dawson, 2008; Gunawardena et al., 2009; Hanson-Smith, 2006; Ning, 2009; Tu, Blocher, & Ntoruru, 2008a) and trend reports related to technology use (Culp et al.; Lemke et al., 2009; Metiri Group, 2009; Project Tomorrow, 2008; National Center for Education Statistics, 2005a; 2005b; U.S. Department of Education, 2008).

The U.S Department of Education (2004) describes those of the digital generation as “far ahead of their teachers in computer literacy” (p. 11). Students are more familiar with computer technologies than teachers, but these students need further help to apply these technologies to academic fields (Heun, 2006; Miners & Pascopella, 2007). Additionally, there is an increasing demand for technologically savvy educators with

increasing numbers of students requesting online learning opportunities. The report titled 2009 Trends from Project Tomorrow (2009a) states that 40 percent of 6-12th grade students selected an online class as part of their dream school and that almost half of those surveyed are interested in taking online classes. Unfortunately, the students' demand far outstrips the supply, as there are not many teachers able or willing to teach an online class (Project Tomorrow). In order to meet the needs of the students and keep up with the rapid change of advanced technologies; in-service teachers need ongoing professional development to improve their knowledge base (Delacruz, 2004; Guskey, 2000; Project Tomorrow) regarding the use of advanced technologies in their teaching.

Evidence indicates that professional development plays an important role in education (Guskey, 2000) and technology practice (Chen, 2008; King, 2002; Lumpe & Chambers, 2001). In a two-year study of 307 teacher participants, Lumpe and Chambers (2001) found 14 categories of contextual factors which influence teachers' beliefs in using technology, they are "resources, professional development, internet access, quality software, classroom structures, administrative support, parental support, teacher support, technical support, planning time, time for students to use technology, class size, mobile equipment, and proper connections" (p. 103). In a similar study related to technology use, Chen reported that teacher training, classroom pedagogy, and perceived capability have a direct effect on Internet use, with teacher training as the most significant determinant of Internet use. Prior research conducted by King indicated that professional development not only improved pedagogy but also practice in using educational technologies. This study included 175 experienced teachers over 36 months incorporating a mixed research

approach of qualitative and quantitative research, reconfirming the importance of professional development for instructional technology integration. The body of professional research suggests that teacher training, or professional development, is one of the more important factors influencing the use of classroom technologies among teachers.

According to a National Center for Education Statistics survey (2000), almost all (99%) public school teachers had access to computers and the Internet at school and more than half (66%) indicated that they used computers or the Internet for classroom instruction. Teachers who had completed at least 32 hours of professional development reported that they felt very well prepared and were more willing to create assignments for computer and Internet use than those teachers who had received less than 32 hours of professional development in the last three years.

A recent study revealed that an increasing number of schools conducted professional development for classroom technology integration (Wells & Lewis, 2006). Results of their nationwide survey revealed that “the majority (83%) of public schools offered teacher professional development on how to integrate the Internet into their curriculum during the previous academic school year” (Wells & Lewis, p. 10). More than half “(51%) of these public schools offered their teachers online courses” for professional development (Wells & Lewis, p. 10). Project Tomorrow (2009a) cited 29 states in the U.S. that have created online or virtual schools, and reported that the majority of teachers are offered online classes. Evidence suggested that the more teachers participate in professional development, the more they implement technologies into their instruction

and the more confident they are in the use of technology (Chen, 2008; King, 2002; Project Tomorrow, 2009a; Wells & Lewis, 2006).

The efficiency of professional development influences the adoption and integration of technology in classroom practice (Lawless & Pellegrino, 2007; Meskill, Anthony, Hilliker-VanStrander, Tseng, & You, 2006; Rickard, Blin, & Appel, 2006; Zhao et al., 2002). According to a literature review of K-12 teacher's professional development regarding technology integration, Lawless and Pellegrino (2007) found that technology was used mainly as a delivery medium instead of for content use in professional development for teaching and learning. These results agreed with the study conducted by Zhao et al. (2002). Lawless and Pellegrino (2007) examined research studies published between 1999 and 2004, including both qualitative and quantitative studies, revealing several important features of professional development: 1) one-shot workshops were among the most common forms of professional development but did not meet teachers' needs and were often impractical for classroom instruction; 2) embedded design-based models not only benefited teachers in self learning, reflection, and curricular technology integration but also facilitated teachers in developing communities of practices; 3) the trend of providing mentors or coaches in supporting change benefitted both mentees and mentors in the use of computer technology; and 4) the train-the-trainers model works well in approaching large scales of teachers but often fails to be adopted for local needs.

Previous research supports these observations, which might improve the development and design of professional development for classroom technology

integration (Meskill el al, 2006; Rickard et al., 2006; Wong & Benson, 2006; Zhao et al., 2002).

Positive feedback and mentor support during professional development were found important in a study by Meskill et al. (2006). In this study, one teacher was cited as saying ”It was beneficial to learn more creative ways to use technology from another person. It was helpful to discuss together ways to use technology to enhance what the kids were learning…[Inservice participant Venus]” (Meskill et al., p. 291). This study revealed that not only the mentees but also the mentors increased their confidence and efficiency in integrating computer technology with real classroom settings.

Research studies indicate that the utilization of Web 2.0 for disseminating various subject areas at numerous grade levels has not yet been widely implemented in real classrooms (Lemke et al., 2009; Liu, 2008). In order to implement Web 2.0 tools in the school setting, school systems must undergo restructuring according to the six categories identified by Lemke et al., including “instructional approach; focus on student-centered learning; systemic change to effective use of Web 2.0; time and resources for professional development; accommodations for 24/7 learning; and greater access to technology and the Internet” (p. 41).

Although the positive influences of Web 2.0 tools are welcomed, the downside of adopting these tools is worth considering. Barriers to Web 2.0 use include both “educator issues and technical problems” (Lemke et al., 2009, p. 48). Educators who are not familiar enough with Web 2.0 to redesign classroom curriculum need continuing and high-quality professional development for effective Web 2.0 use and increased awareness

of how Web 2.0 can be used (Lemke et al.). Further barriers may be created by technical issues such as a lack of appropriate technology or unreliable Internet access (Lemke et al.).

Preparing Teachers to Use the Web 2.0 tools

Based on prior nation-wide survey reports and studies (Bakia et al., 2008; Lemke et al., 2009; Farris-Berg, 2005; Gray, Thomas, & Lewis, 2010b; Project Tomorrow, 2009a; 2009b; 2010a; 2010b; U.S. Department of Education, 2004), the results suggest that there is a great gap between the use of computer technologies by teachers and students. Teachers need further help to catch up the expertise of these digital native students in order to meet their needs (Project Tomorrow, 2008; 2009a; U.S. Department of Education). Experiencing what learners might encounter when using Web 2.0 may assist teachers to implement these tools in classroom practice (Norton & Hathaway, 2008; Oliver, 2007). Norton and Hathaway investigated 30 teacher-learners using blogs, wikis and podcasts during a graduate course. They found that this authentic learning experience promoted teacher-learners' understanding of and becoming familiar with the integration of Web 2.0 tools in K-12 classrooms.

A similar study agreed with the results observed by Norton and Hathaway (2008). Oliver (2007) reported on in-service teachers who used Web 2.0 tools such as blogs, Google docs and spreadsheets, social bookmarking, RSS feed and a CMS for graduate-level technology applications courses. Mixed results were reported; some teacher-learners enjoyed the blogs very much, while others reported the blog as the least enjoyable aspect of the course (Oliver).

Time

Time is an essential constraint on the integration and implementation of computer technology in practical instruction (Delacruz, 2004). Teachers have often identified time as the primary reason they are unable to integrate new technologies into their routine teaching work (Delacruz). Lack of time is one of the most troublesome issues surrounding the utilization of computer technology in schools (Littrell et al., 2005; Frederick, Schweizer, & Lowe, 2006).

Based on the study of Vannatta and Fordham (2004), three factors are suggested as the best predictors for technology use in classrooms: the amount of time teachers spends in professional technology training; the amount of time teachers contributes to constructing curriculum outside of school time; and an open mind. Vannatta and Fordham explained that the time teachers dedicate to using technology not only includes the time they spend in professional development but the time spent in practicing and exploring technology use. This study suggested that professional technology training is one of the most important issues in improving and increasing the use of technology in educational settings; in addition, the willingness to commit time for technology practice is an essential factor for the success of technology integration among these K-12 teachers.

Community of Practice

A group named Art Ed 2.0 created a global community, Ning (http://arted20.ning.com/), for art educators to use new technologies in their classrooms (Buffington, 2008; Ning, 2009). This social networking site is a community of practice (CoPs) for technology, professional development, projects and activities, and it

encourages members to blog, share images and videos, and add RSS feeds for updating information (Ning, 2009). Similar online professional communities are growing thanks to increased use of Web 2.0 tools (Drexler et al., 2008; Gunawardena et al., 2009; Tu et al., 2008a).

Due to time limitations on inservice teachers' professional development, online learning is becoming a way for them to enhance their professional skills (James & Bailey, 2002). A nationwide survey reported that about half (51%) of U.S. public schools use the Internet to provide online professional development for their teachers (Wells & Lewis, 2006). Communities of practice (CoPs) provide teachers great opportunities to communicate, interact and connect with like-minded peers anywhere at any time (Hanson-Smith, 2006). From a study of 156 public senior high school teachers, Ciani, Summers and Easter (2008) suggest that teacher communities should be used to support instructional practice for student learning and idea sharing. Drexler et al. (2008) claimed an urgent need to establish a community for technology evaluators as part of their essential work to magnify and integrate the best use of Web 2.0 tools in schools.

CoPs provide "just-in-time" support for in-service teachers in developing their professional knowledge and skills (Hanson-Smith, 2006, p. 304). Wenger (2003) argues that "participating in [the] 'community of practice' is essential to [human] learning" because CoPs are the base of a social learning system (p. 80). CoPs allow participants to contribute, negotiate and practice their competence through sharing their experience with one another and gaining knowledge through this social networking and learning system. According to Wenger, the three core elements of CoPs are *enterprise*, during which

members get together to share their goals, understandings, and accountability; *mutuality*, when members interact with each other and set up community norms and relationships; and *shared repertoire,* as CoPs offer a resource center for members to access and use. The most important and effective aspect of a CoP is that teachers can find peers who share similar experiences and know of the joys and problems they encounter in their classrooms (Hanson-Smith; Hur & Brush, 2009; Meskill et al., 2006). With Web 2.0 tools, a worldwide and cross-cultural CoP can be formed with international members, which was previously impossible (Wisker, Robinson, & Shacham, 2007). This social network offers an economical method for professional development because teachers save time and money by accessing the Internet to join their professional communities instead of physically traveling to in-person professional development training sessions.

The current trend of adopting online CoPs is prevalent among different subject areas and educational settings (Drexler et al., 2008; Gómez & Rico, 2008; Gunawardena et al., 2009; Tu et al., 2008a; Wisker et al., 2007; Wright, 2007). The reasons for K-12 teachers to participate in online CoPs may be found in a study by Hur and Brush (2009), who cited reasons such as opportunities to "share emotions, use the online environment advantage, get teachers together, explore ideas, and experience a sense of camaraderie" (p. 279). Drexler et al. reported on building a mixed CoP, with both face-to-face and online participants, for Pre K-12 school teachers, which was a successful experience in introducing Web 2.0 tools to school classrooms. According to this study, traditional participants gradually dropped from this Teach Web 2.0 Consortium, but the online participants remained in stable numbers. Notably, Drexler et al. reported that their

community was recognized by the members “as a user community” that not only effectively facilitated the evaluation of technological tools but also successfully brought people together with a common purpose (p. 282). The participants used Web 2.0 tools, such as blogs, wikis, voice thread, Skype, de.licio.us, and Twitter, to collaborate and communicate with other members. After participating in this community, many teachers started using Web 2.0 tools for personal or professional purpose, and some reported that these tools were useful for their students’ learning, such as improving writing skills.

In language learning and teaching, Hanson-Smith (2006) reported that some CALL CoPs focus on experiential collaboration in different domains and display discussion lists through virtual community space, live chat, web sites and blogs. There, teachers would periodically receive messages, ask for mentor assistance, collaborate with other teachers for a project, and have regular online or face-to-face meetings. At Hamline University, Schramm and Mabbott (2007) reported on a program that was developed to reconstruct the English as Second Language (ESL) licensure program from traditional face-to-face (f2f) instruction to a hybrid combination of f2f and online training to help in-service language teachers gain an ESL certificate in Minnesota. This study found that learners were able to learn online as well as in the traditional classroom setting and enjoyed their online learning experience.

The promise of CoPs to improve and update teachers’ knowledge base is supported by positive feedback from research studies. Indeed, CoPs offer an alternative to traditional face-to-face professional development programs or training for in-service teachers with just-in-time support. Personal needs should be noted and accommodated.

Hur and Brush (2009) concluded that "emotion sharing increase[s] teacher's self-esteem and support[s] teacher's confidence" and should be taken into consideration when designing professional development programs (p. 299). Furthermore, obstacles like "lack of knowledge or skill using Web 2.0 tools" (Drexler et al., 2008) might prevent teachers from engaging with online CoPs for their professional development training. The adoption of Web 2.0 tools would speed teacher engagement in these communities, which is now easier than ever before.

Factors Influencing Teachers to Use Web 2.0 Tools

Beyond personal preferences, time constraints, and lack of knowledge, several additional factors influence whether teachers will use Web 2.0 tools or not. These factors include sourcing of Web 2.0 tools, infrastructure, and access.

Free – Open Sources

Thanks to the open source movement, many of the Web 2.0 tools are open source, free download or free for online use. End-users are welcomed to download and try such open source software as well as to contribute their ideas, comments, user experience and professional knowledge to improve quality, fix bugs, or upgrade such software. The community of users provides a cross-cultural, limitless boundary as well as an ethnically diversity platform for 24/7 information and technology skills and knowledge exchange.

According to the Open Source Initiative (OSI), open source should include the following criteria: it should be freely redistributable (including the source code) and offer the free distribution of the source code; the license should allow users to modify and should not restrict other software; and there should be no discrimination against any

person or groups (The open source definition, n.d., http://www.opensource.org/docs/osd, para. 1-5). Essentially, the open source software is free and transparent for all users and the modifications should be redistributed back to the community (The open source definition, n.d., para. 3-4). This trend offers end-users freedom and alternative opportunities to try new technology applications or even become involved with the design and development of new software. It opens a door for public end-users to explore a world of advanced technology software exhibiting that is open, free, democratic, participatory, cross-cultural, global, and unlimited by time zones, just like Web 2.0.

In fact, this Open Source movement has attracted multiple users or programmers to dedicate themselves to the improvement and debugging of upcoming software technology (Harvey & Han, 2002). Simultaneously, it often reduces the time lag for improving, fixing or debugging software by traditional software companies who might need to wait until a certain amount of customers report problems, then file the work to their engineers or programmers (Harvey & Han). Because all users can post or contribute feedback on the user community site, the software becomes more user-friendly and practical applications are periodically updated. The downside is that there some software may only have a short life; it could vanish quickly if it ceases to attract attention or is acquired by a company (Oliver, 2007).

One of the main concerns about adopting open source software for educational applications is the stability of technological support. If schools use the traditional licensed software, they are able to request technology training for professional development or regular support for their application use. Some administrators might

doubt that they could find technology support for open source software, especially when there is no direct access for help. In fact, quite a few different opinions can be found on how to best solve this problem. Proponents of open sources argue that the user community provides 24/7 support with worldwide membership and diverse technical skills. Unlike commercial software companies, which might take a long time to go through the documentation process for technological support, opens source software can yield much more rapid responses. Opponents argue that the virtual community is not stable and is unreliable because answers to questions may come from undisclosed locations from people who are unknown, whose expertise is uncertain and who may take a long time to respond to questions or problems.

With the current budget cuts, the use of free, open software is an alternative way for schools to acquire technology applications (Kennedy, 2005). When considering the use of open source software, educators need to investigate the pros and cons for each software application before choosing one for their classrooms (Oliver, 2007). Adopting open source software with a high reputation and many users might be a factor for consideration. Another screening method might be to use educator-friendly sites, such as Google educator, which offers training and support.

Infrastructure and Access

The ubiquitous nature of the Internet offers rich opportunities for students and teachers alike when approaching Web 2.0 tools for school use. Increased connectivity provides opportunities for the convenient use of web services to access data anywhere and anytime (Bull & Garofalo, 2006). With web-based data, since it is stored online

teachers and students are able to access the Internet according to their schedule and locations without worrying about whether their data has been stored in a specific physical place. They are relieved of concerns over issues such as the resetting of computer settings whenever they use a different computer at various school locations, such as in a computer lab, classroom, library or at home. In fact, with everything online, data are easily accessed using the Internet.

According to the national survey report of U.S. public schools, almost 100 percent had access to the Internet by the fall of 2005, which differs from the mere 35% that had access in 1994 (Wells & Lewis, 2006). Even more remarkable is the immense change that has occurred with Internet access in instructional rooms. Whereas only 3% of classrooms had access in 1994, by 2005 that percentage had climbed to 94% (Wells & Lewis) and reached 100% by the fall of 2008 (Gray et al., 2010a)

The one-to-one initiative, according to which schools provided a wireless laptop for every student, has offered individual students greater computer access than ever before (Penuel, 2006). Varying according to school policies, the initiative allowed schools to offer their students the opportunity to check-out a laptop for school or home use, lease the computer for personal use, or rent the computers (with the option to buy – rent-to-own) (Penuel). According to Wells and Lewis (2006), all U.S. public schools had access to the Internet by the year 2000, and evidence confirms that this ubiquitous access to computers has yielded progress in student use of technology in classrooms (Bakia et al., 2008). Penuel reported that students now have more opportunity to practice computer

technologies, and resulting improvements can be seen not only in students' technology literacy and skill but also in stronger writing skills.

Internet access is available at school as well as very common in U.S. homes today. According to a study conducted by the Leichtman Research Group (2009), in the first quarter of 2009, there were up to 69.3 million U.S. households that subscribed to an Internet service, a number including 1.6 million new subscribers. These results indicate that the majority (85%) of American families have a computer at home and that most (75%) subscribe to broadband Internet Service either through a telephone- or a cable company.

A similar study conducted 2002 by the Corporation for Public Broadcasting (CPB) reported that American children had more access to the Internet than the previous two years through home, school and library. This report specified that until 2000, more than half (64%) of American families with at least one child within the ages of 2 and 17 owned a computer. The percentage of computer ownership increased to 83% by 2002. This trend indicates that an Internet connection, either at schools or at home, offers convenient, ubiquitous access for teachers and students to access Web 2.0 tools more easily than ever before.

Regarding students, the Corporation for Public Broadcasting (CPB) reported an increase in student Internet use from 3.1 hours weekly in 2000 to 5.9 hours weekly by 2002. Many student online activities focused on diverse tasks such as exploration, communication, entertainment, and learning (Corporation for Public Broadcasting, 2002). This digital generation, aged 6 to 17, spends time on school work as one of their daily

activities requiring Internet access at home (Corporation for Public Broadcasting). Students continue to be frustrated and dissatisfied with the adoption of filters and firewalls for Internet security and chafe at technology usage rules at their schools. According to the Project Tomorrow (2008) online survey, almost half (45%) of middle school students complained about these problems. Similar complaints are increasing yearly, and students have even accused these protections of being obstacles for their learning (Project Tomorrow). In fact, students reported regular use of other technology devices or tools outside of school.

Although nationwide investigations on access and use of computers and the Internet in U.S public school classrooms have been conducted periodically since 1994 by the Department of Education (Wells & Lewis, 2006), little has been available regarding the perspectives of teachers in using these technologies in their classroom (National Center for Education Statistics, 2005b). A report from a 2000-2001 Teacher Follow-up Survey (TFS) addressed the types of technologies teachers believe are essential to have in their classrooms (National Center for Education Statistics). The top five sufficiently available technologies include “a teacher’s computer station with access to electronic mail (68%), World Wide Web access (61%), a telephone (56%), encyclopedias and other reference materials on CD-ROM (51%), and at least one computer for every four students (49%)” (National Center for Education Statistics, p. 1). These results imply that the majority of teachers believe the access to their e-mail is a very important aspect of integrating technology in their classrooms. A similar nationwide survey conducted in the winter and spring of 2009 agreed with the above finding. Gray et al. (2010b) reported that

the majority (94%) of public school teachers responded that they “sometimes or often” used the Internet for instructional or administrative purpose (p. 12). This report suggested that the Internet is the main platform for teachers in preparing instructions or administrator tasks.

According to a qualitative study conducted by scholars at Stanford University (Cuban, Kirkpatrick, & Peck, 2001), two high-tech high schools in Silicon Valley, California reported the issue of “high access but low use of computer technologies” in practical classroom settings (p. 813). Cuban et al. found that teachers reported using computer technologies to facilitate their teaching and instruction more efficiently than ever before; nevertheless, the majority had adopted technologies to meet familiar teacher-centered instruction. Reasons cited for slow adoption or factors preventing wide application of technologies into practical instruction included “lack of time to find and evaluate software” (p. 826), the impracticability of software training offered, and the uncertain reliability of technologies. Cuban et al. concluded that to simply build up infrastructure, such as computer hardware and software, at schools is not enough. The most important aspect is to schedule time for teachers to work on technology integration and receive appropriate technology training in order to meet the needs of individual teachers in using technologies at their classrooms.

The ubiquitous nature of computer technologies at schools and homes is one of the important features facilitating the utilization of Web 2.0 tools. Problems and obstacles related to this ubiquitous access and infrastructure among students and teachers require further attention in order to modify Web 2.0 tools for better use in the future.

Role of Administrative and Parental Involvement

In order for Web 2.0 tools to have a positive and effective impact on school classrooms, administrators and parents need to combine their efforts with those of teachers to implement these technologies. Beckstrom (2008) suggested that parents should discuss the usage policy for the Internet and other electronic communication devices with children. Meanwhile, parents need to be aware of these new technology tools to better understand the online world their children are using.

e-Safety

With increased Internet use, parents, educators, policymakers, and stockholders all worry that young people will explore inappropriate materials, such as sexual content, interact with unknown strangers, such as online predators or online child molesters, give out personal information, or fall prey to cyberbullying, all of which could result in harmful risks and negative behaviors (Byron, 2008; Lemke et al., 2009; Sharples, Graber, Harrison, & Logan, 2009; Villano, 2008; Wolak, Finkelhor, Mitchell, & Ybarra, 2008). These adults are seeking the best solutions, policies, or regulations to protect young people and shield them from any risks they might encounter in the online world (Byron; Villano, 2008). Fueled by the wide and speedy spread of modern mass communication and multimedia, the online world may sound much more dangerous than the offline, face-to-face world. These concerns trigger related stakeholders to involve themselves in making decisions that will protect teens from being hurt (Villano; Wolak et al.).

Passed in 2000 by the US Congress, the Children's Internet Protection Act (CIPA) requires all schools and libraries that receive federal funding "to implement and

adopt an Internet safety policy" which "must include blocking or filtering" of web sites containing materials that are "obscene, [show] child pornography, or [are] harmful" (Federal Communications Commission, http://www.fcc.gov/cgb/consumerfacts/cipa.pdf, 2008, para. 2). The CIPA aims to monitor minors' online activities and evidence indicates that most schools and public libraries do have a certain level of filtering software in place to block inappropriate or unwanted web sites (Jonassen et al., 2008; Villano, 2008; Wells & Lewis, 2006). Kleiner and Lewis (2003) conducted a survey of 1,206 public schools in 50 states, which found that the majority (96%) of respondent public schools used blocking or filtering software in their schools as part of their online safety policy. Wells and Lewis reported that almost all (99%) public schools used blocking or filtering software. Lemke et al. (2009) further revealed that not only do school districts adopt filtering systems but that more than half of technology director respondents reported that their Web filtering systems were more restrictive than the CIPA requirement. Nonetheless, a high rate of respondents (67%) conceded that "although their filtering systems were effective, things slip through" (p. 27), which means that some unwanted information could still be accessed via the Internet in schools (Lemke et al.).

One of the advantages to adopting filtering software in schools is the convenience and efficiency of preventing exposure to offensive or unwanted Internet materials. Another advantage is that school districts have better control over what is happening in their schools (Villano, 2008). Unfortunately, many filtering programs might not correctly identify academic and non-academic words or phrases, resulting in inadvertent blocking of certain web sites that might contain valuable academic information (Jonassen et al.,

2008; Villano). A well-known example would be the word “breast”, which may be blocked as ‘pornographic’ (Jonassen et al., p. 23); unfortunately, related topics such as ‘breast cancer’ would be blocked as well, frustrating teachers and students who are seeking this information for educational purposes (Villano, p. 50).

Another issue associated with e-safety regards interactions with strangers. In the United Kingdom, Sharples et al. (2009) investigated online safety attitudes among 8th grade- and 10th grade students for their Internet use at school and home. From a national sample of 15 schools in England with an enrollment of 2,611 students, they found that the majority (74%) of respondents used social networking sites and 78% shared files on those sites occasionally or frequently (Sharples et al.). It further asked about interactions with unknown strangers. Almost half (42%) of the respondents reported that they interact with people they have not met face-to-face (Sharples et al.). The study indicated a high rate of contact with strangers (Sharples et al.), which reinforces concerns expressed by adults that this contact is “one of the greatest risks” of online networking (Byron, 2008, p. 55). Wolak et al. (2008) contend that reports and media stories about online predators or child molesters in the United States are exaggerated. Their study finds that “Internet-initiated sex crimes” are, in fact, “more different, more complex, and serious but less archetypically frightening than the publicity about these crimes suggests” (p. 111-112).

The study by Wolak et al. (2008) indicated that Internet-initiated sex victims have a profile range from 13 to 17 years old, which is more restricted than conventional offline child molestation. Although the Internet does increase the opportunities for young people to interact with possible offenders or child molesters, no empirical evidence confirms that

the posting of personal information or involvement in social networking sites would increase “the risk of victimization by online molesters” (Wolak et al., p. 117). It is the online interaction behaviors of young people that trigger vulnerability. Wolak et al. reported that certain types of online behaviors might increase the risk of vulnerability, such as “interacting online with unknown people, having unknown people on a buddy list, talking online to unknown people about sex, seeking pornography online, [and] being rude or nasty online” (p. 118).

Due to the prevalence of electronic communication, cyberbullying is another concerning issue of concern related to e-safety. The use of electronic communication to attack, harass or bully other people is defined as cyberbullying and has become the digital age form of bullying among young children, both in and out of school, around the world (Beckstrom, 2008; Juvonen & Gross, 2008; Li, 2006; Li, 2007; Maher, 2008; Smith, Mahdavi, Carvalho, & Tippett, 2006). Cyberbullying is takes various forms, such as threatening e-mails, instant messages, text messages, phone calls, or the posting of unwelcomed pictures or video clips online. Research studies have found that phone calls and text messages were the more prevalent forms of cyberbullying but that pictures or videos carried greater negative impact (Slonje & Smith, 2008; Smith et al., 2006; Smith et al., 2008). Students felt more uncomfortable having unwanted pictures or video clips posted online, and victims are very often informed of incidents by their peers, friends or adult guardians (Smith et al., 2006). Schools frequently respond by deleting bullying materials right after being informed the incidents (Smith et al., 2006).

Cyberbullying research is still in its initial stages and some common issues, such as differences in gender-specific behaviors, yield conflicting findings (Aricak et al.,2008; Dehue, Bolman, & Völlink, 2008; Hinduja & Patchin, 2008; Maher, 2008; Slonje & Smith, 2008; Smith et al., 2008). Worthy of note is that research studies found that victims rarely took any action to prevent cyberbullying nor did they learn coping mechanisms to deal with such incidents (Aricak et al.; Juvonen & Gross, 2008; Li, 2006; Li, 2007; Sharples et al., 2009; Slonje & Smith; Smith et al., 2006; Smith et al., 2008). Moreover, one of the greatest recurring concerns is that the majority of cyberbullying victims chose not to report incidents to adults or anybody at all (Aricak et al.; Beckstrom, 2008; Dehue et al.; Juvonen & Gross; Li, 2006; Li, 2007; Sharples et al.; Slonje & Smith; Smith et al., 2006; Smith et al., 2008). This implies that there might be a significant negative impact (Hinduja & Patchin, 2007) without the awareness of guardian adults, such as parents or teachers (Slonje & Smith). The study of Hinduja and Patchin agreed with prior research regarding the negative implications of cyberbullying on adolescent development, and the researchers call on teachers, parents, administrators and stakeholders to give the issue of cyberbullying appropriate attention to prevent a negative long-term impact on our youth.

According to Beckstrom (2008), there are nine states in the U.S. requiring school districts to tailor policies to prevent cyberbullying problems, and more states are currently considering adding this requirement for their school districts. Beckstrom reported that already prior to 2006 “South Carolina State had enacted the Safe School Climate Act, which required a policy for preventing harassment, intimidation, or bullying

at school" (p. 295). The law included electronic communication bullying and cyberbullying in the legislation. In 2007, more states, such as Arkansas, Delaware, Iowa, Minnesota, New Jersey, and Washington, passed laws requiring the embedding of cyberbullying prevention into the usage policy in their school districts. Some states, like Arkansas, Delaware, and New Jersey even included off-campus behaviors for cyberbullying punishment, which aroused considerable controversy over whether such policies violated students' right to free speech (Beckstrom). Other States, like Iowa, Nebraska and South Carolina, have specified punishments for cyberbullying behavior that occur on school property, during related school activities, or school-sponsored off-campus events. While Minnesota, Oregon and Washington do not explicitly prohibit schools from punishing cyberbullying behavior during off-campus time, similar off-campus cyberbullying behaviors might cause students to be punished depending on the discretion of school officials and according to state law (Beckstrom).

Use Policy

Many schools are in the early stages of adopting Web 2.0 policies; the majority of schools require students and their parents to sign an acceptable use policy to access the Internet (Lemke et al., 2009). A nation-wide survey report indicated that school districts disseminated information on policies and rules to students who use the Internet (92%), e-mail (84%), social networking sites (76%), and wikis and/or blogs (52%) (Gray & Lewis, 2009, p. 3). Although most schools have adopted technology usage policies to prevent student contact with inappropriate online materials, social networking sites (70%) and chat room activities were banned at the majority of schools related with other Web 2.0

tools (Lemke et al.). In Ohio, teachers were even warned to not participate in social networking sites (Kist, 2008). In fact, the CIPA allows exceptions for unblocking web sites, but it requires schools to set a reasonable review policy or process before doing so (Imperatore, 2009). The adoption of Web 2.0 tools for schools will require school administrators, teachers and parents to spend more time on setting policies.

Schools and parents generally believe that setting up use policies will prevent students from being hurt or harmed online, but some teachers believe that teaching and guiding students through Internet security issues is an additional important approach to protect students from being hurt (Hinduja & Patchin, 2007; Mustacchi, 2009). Mustacchi, a middle-school teacher, reported his experience in teaching students to talk about their cyber experience and how to deal with cyberbullying. These 8th grade students worked together to list a guide that included the definition of cyberbullying and tips to deal with it. According to Mustacchi's study, students learned better from helping each other with online safety, which is supported by Juvonen and Gross (2008). Another research study conducted by Hinduja and Patchin suggested that administrators, teachers, and parents should not only renew their use policy related to electronic harassment but also inform students of the importance of reporting victims or peer incidents.

Finally, to increase awareness among parents and teachers, teachers should be trained how to deal with, perhaps as a part of the curriculum, online security. Parents should be taken into consideration and informed about the Internet use policy (Hinduja & Patchin, 2007; Maher, 2008; Smith et al, 2008). It is important to request and create usage policies that aim to prevent students from being hurt or harmed online. The use of

filters to block web sites or prevent student access to certain web sites is not the core ideal for protecting them from harm in this digital world. The most important thing is 'know how', which is gained by teaching and guiding students toward safe use so that they can protect themselves from being hurt and will benefit from the great resources online for their own learning.

Technology Literacy

Today, our children spend a significant amount of time online – both at home and at school – and some even spend more time online than watching TV (Corporation for Public Broadcasting, 2002). These digital generations are computer technology and Internet consumers. They believe they are technologically savvy, and many live in this web world on a daily basis (Project Tomorrow, 2009a). Even though there is abundant online information available for upload and update 24/7, some information might not be as authentic as students believe or think (Miners & Pascopella, 2007). For example, Miners and Pascopella conducted a research study on high school students' abilities to seek and identify authentic information online. Their results revealed that high school students have problems telling the difference between truth and fiction with online resources. The "Pacific Northwest tree octopus" study reminds educators that youth need further help in distinguishing whether what they see is true or not as well as to learn how to find trustworthy resources online (Miners & Pascopella, p. 26). With the overload of online information, it takes time to process and identify authentic sources to meet personal usage needs (Miners & Pascopella). The most important issue is that these technology savvy students might not know as much as they believe in transferring their

technology skills to academic learning (Heun, 2006). Heun reported how David DeBarr, an instructional technology coordinator in Arizona, mentioned how students who know how to send a text message through a phone have problems typing and formatting a research paper. In the report, DeBarr notes that "technology literacy has to be technology as a tool" which means to "teach technology as a goal. [Technology] becomes infused in every classroom and becomes part of life" (Heun, p. 19). Students need help to become aware of how technology literacy prepares them for the 21st Century (Dow, 2007; Heun; Miners & Pascopella). For example, students should be shown how to find information efficiently, evaluate the credibility of web sites, and develop questions and problem-inquiring strategies (Miners & Pascopella).

According to Thomas and Knezek (1995), the definition of technology literacy includes not only the understanding and capability of using technology tools to achieve an assigned final outcome but also the ability to apply technology to learn core subjects, to evaluate and use common technology applications and systems, to solve problems and to be aware of social concerns associated with technology. In brief, students need to use technology appropriately for problem solving, critical thinking, communication, collaboration and innovation for their learning. Although helping our students obtain technology literacy is an important work in this digital age, it is challenging for both schools and students because we are living in a time where new information is renewed or posted online more frequently than ever before (Miners & Pascopella, 2007).

With today's Web 2.0 tools, Penrod (2008) argues that technology literacy is ubiquitous and on-demand, more so than traditional academic literacy, and requires

multiple intelligences to engage lifelong learning. Because Web 2.0 provides a ubiquitous 24/7 platform for information sharing, end-users are able to access data and communicate with others according to their own schedule and demand. This new Web 2.0 is a mixed visual, audio, geographic, technological, and global environment that requires end-users to rely on multiple intelligences to successfully navigate (Penrod). Furthermore, as Penrod argues, it offers all participants the opportunity to cultivate lifelong learning goals due to the characteristics of self-directed learning, instant interaction and communication with others, diverse cross-cultural users, and multiple skills gained by users for updating or ongoing information pursuit. Many new skills and technology literacy training need to be adopted into school systems instantly and periodically (Penrod).

Although many states in the U.S. have their own requirements and technology standards for school districts to follow, when integrating a technology literacy curriculum into classrooms, administrators, educators and teachers might take the ISTE technology standard as a reference (C.S. Chang, 2008; Miners & Pascopella, 2007). In conclusion, technology literacy is an essential skill for youth to acquire in order to compete in the 21st century. Students need to learn the use and applications of technology and transfer this knowledge into their life and learning.

Copyright

The use of Web 2.0 tools creates an alternative opportunity to offer all end-users the ability to create with rich forms of online media or multimedia presentations. These Web 2.0 tools allow end-users to become technology presentation producers instead of mere reviewers as was once standard. Ethical considerations of media use and concerns

regarding authenticity of final presentations and copyright infringement are serious considerations (Anderson, 2007; Bull et al., 2008; Collis & Moonen, 2008; Franklin & Consulting, 2007). This issue of copyrights involves all possible users, such as teachers and students, the materials to be used and created, and the final products to be shared or posted online (Albion, 2008; Bull et al.; Collis & Moonen; Franklin & Consulting). Copyright law is not only complicated, it extends to all different fields and subjects and involves Internet use policies and law infringements (Anderson; Franklin & Consulting).

When involved with a minor, teachers need to ask for a consent form from students as well as from their parents (Oliver, 2007). Parents may choose for their children's work, such as a writing piece or a work of art, to be posted online for public review, for school peer review, or only for peers in the same class to review. When teaching students how to search online for information for specific projects, teachers must emphasize that the use of other people's images/ photos, downloaded music or videos, and links to external web sites involve copyright issues of ownership. The best way to avoid copyright infringement is to always cite the resources used out of respect for other people's work and encourage an understanding of copyright ownership and law among students. Students need guidance and education regarding acceptable use policy to avoid copyright violations and plagiarism (Solomon & Schrum, 2007).

Creative Commons attribution provides a great opportunity for using digital resources without violating the rules of copyright (Garcelon, 2009). In 2002, Creative Commons, a nonprofit corporation, was founded online to protect and encourage the re-creation of other people's work within the legal framework of copyright laws (About

History, 2010, http://creativecommons.org/about/history/, para. 1-2). Creative Commons allows teachers and learners to “access, adapt, interoperate and discover” rich digital educational resources, thereby avoiding the restrictions of copyright laws (Creative Commons and Open Educational Resources, 2010, http://wiki.creativecommons.org/Creative_Commons_and_Open_Educational_Resource, para. 1). Teachers can customize and adopt resources to meet their classroom needs and then share their work with the world by adopting the Creative Commons Licenses (Creative Commons and Open Educational Resources, para. 2-5). Creative Commons Licenses provide teachers and students the opportunity to translate certain self-distributing educational resources into the language they need (para. 3), to become involved in the development and improvement of open educational resources (para. 4) and to find educational resources online easily (para. 5).

Mentioned in the section on collaborative tools, the Web 2.0 platform provides a great opportunity for collaborative and cooperative learning. These tools, such as Blog and Wiki, allow end-users to add, edit, remove, or revise online information. When course tasks involve team or group work, the issue of copyright ownership comes up (Collis & Moonen, 2008; Franklin & Consulting, 2007). Questions of, ‘Who owns the copyright of the final products?’ and ‘How are the contributions of individual students distributed?’ may arise and can become important issues of copyright ownership.

When teachers integrate Web 2.0 tools in their classrooms, they need to plan how to deal with problems before they start their work (Albion, 2008). Another approach might include joining certain professional communities to gain experience from other

peers as reference. Most importantly, schools must have a policy regarding the use of Web 2.0 tools and have a good understanding among students and parents about what constitutes acceptable use.

Summary

It is exceedingly likely that the utilization of Web 2.0 tools in K-12 classrooms will benefit digital natives in gaining proficiency in the skills they need to survive in this 21st century. Web 2.0 tools will not only help them in practicing the skills of critical thinking, problem solving, communication, collaboration, creativity, innovation and self-direction, but also lead them to approach global villagers worldwide, simultaneously cultivating abilities of leadership, responsibility, technology and information literacy (Lemke et al., 2009). Digital natives grew up surrounded with rich technology and electronic communication devices, such as computers and Internet (Prensky, 2001) both at school and at home. They are technology savvy consumers whose needs may not be understood by the adults in their life. Teens request technology for both learning and entertainment (Farris-Berg, 2005; Project Tomorrow, 2008; 2009a) as they enjoy living in this digital world (Farris-Berg; Lenhart et al.; Project Tomorrow, 2008). Still, although the digital natives believe that they already know about the use of technologies, they are not as good in transferring these technology skills into academics or learning (Heun, 2006). In fact, they will need further help from teachers and parents to cultivate technology literacy for both school and lifelong learning (Dow, 2007; Heun; Miners & Pascopella, 2007).

The ubiquity of technology infrastructures and Internet access has prepared public K-12 schools for the implementation of Web 2.0 tools into classrooms (Wells & Lewis, 2006). Teachers and students are able to access the Internet easier than ever before. Still, the adoption of filters or firewalls at school systems to block web sites has aroused complaints and problems when using Web 2.0 tools (Farris-Berg, 2005; Project Tomorrow, 2008). The frustration of being unable to access certain web sites and time limitations for Internet access has caused youth to turn away from Internet access at school in favor of home access (Project Tomorrow). As a result, usage policies for schools and homes are needed to guide our youth in e-safety.

Digital immigrants (Prensky, 2001), such as administrators, educators, and parents, are still far behind these younger digital natives who, as students, embrace computer technologies (U.S. Department of Education, 2004; Project Tomorrow, 2009a). There is an urgent need to bridge the gap between these digital immigrants and digital natives. Evidence indicates that teachers need professional development to implement and integrate technology in their teaching, and the more confident teachers are, the more likely they are to apply technologies to their teaching (Chen, 2008; King, 2002; Lumpe & Chambers, 2001; Project Tomorrow; Wells & Lewis, 2006). Teachers can use Web 2.0 tools to participate in online professional communities of practice and cultivate their professional knowledge and skills, and to practice Web 2.0 tools for future classroom use (Drexler et al., 2008; Hanson-Smith, 2006; Hur & Brush, 2009; Meskill et al., 2006; Wisker et al., 2007).

Prior research indicated that professional development enhanced teachers' beliefs of self-efficacy to integrate technologies into practical classrooms (Albion, 2001; Chen, 2008; Curts et al., 2008; Vannatta & Fordham, 2004; Ropp, 1999; Wang et al., 2004). This is of consequence as teachers' beliefs of self-efficacy influence student learning (Martin & Marsh, 2006; Siegle & McCoach, 2007). Based on prior research, self-efficacy is a reliable predictor for persisting behavior change (Faseyitan et al., 1996; Lumpe & Chambers, 2001; Pajares, 2002) and would be a valuable measure to learn how inservice teachers perceive the implementation of Web 2.0 tools in their classrooms.

CHAPTER 3: METHODOLOGY

The focus of this study is to investigate the current use of Web 2.0 tools in American public K-12 schools and the prediction factors that influence the use of these tools. Issues concerning teachers' self-efficacy in the use of Web 2.0 tools, length of time of professional development, availability of Web 2.0 tools, and school administration support were examined in this research study. The implementations and integration of computer technology are the core issue in K-12 education as presented in the review of literature in Chapter 2. Knowledge regarding the current use of Web 2.0 tools is required to fully understand relevant professional development design and schools administrative support for inservice teachers in K-12 public schools.

The research design sought to find the relationship between the dependent variables and the predictors in facilitating future policy-making in regards to the integration of computer technology. For example, a predictor, such as *Web 2.0 Tools Integration Self-Efficacy*, predicts the use of these Web 2.0 tools in the classrooms. The research question of this study is: "What factors predict teachers' using Web 2.0 tools in K-12 classrooms?" A multiple regression equation was built to predict the most influential factors in the use of Web 2.0 tools.

The quantitative data of this research study was collected through a web survey that was hosted by Survey Monkey (http://www.surveymonkey.com/MySurveys.aspx) (Appendix A). One concern in conducting a web survey was the issue of low response rates and the resulting sample representativeness of the target population. Prior studies in comparing survey response rates between the use of traditional mail surveys and web

surveys were controversial, although the meta-analysis study by Shih and Fan (2008) suggested that the web survey attained a generally lower response rate. Hayslett and Wildemuth (2004) argue that the relative degree of response rates between paper/mailed surveys and Internet-based surveys still remains unsolved. Prior research has found that mail surveys attained more accurate data within lower response rates than did the telephone survey (Krosnick, 1999). Krosnick argues that the high response rates "do not necessarily translate into more accurate results" (p. 540). Meanwhile, according to Curtin, Presser and Singer (2005), survey response rates have been dropping for all kinds of survey types. It seems that the issue of low response rate may be expected regardless of the type of survey being conducted.

One reason for adopting the web survey was the topic of this research, as it is concerned with Web 2.0 tools. In addition, the ease of distributing the survey, the lower cost, the well-documented results and the speed of data collection were further reasons for the selection of the web survey (Shannon & Bradshaw, 2002). The issue of sampling bias due to the respondents likely being veteran Internet users (Hayslett & Wildemuth, 2004) is an unavoidable issue of this research study.

Prior research studies have indicated that personal contact increases the response rates (Cook, Heath, Thompson, 2000; Heerwegh, 2005; Mitra, Jain-Shukla, Robbins, Champion, & Durant, 2008). Based on the research study of Heerwegh (2005), the personalizing of e-mail invitations increased the response rate by up to 7.8 %. The use of the recipient's name "in the salutation of the e-mail message" is better than the use of just "dear [educators]" for a group of recipients (Heerwegheh, p. 590). This research study

adopted the above approach by titling the individual participants with their first and last names in the invitation e-mail and follow-up reminders in an effort to overcome the issue of low response rate (Appendix B-C).

This chapter reviews the variables and research design in an attempt to answer the research question.

Population and Sample

The target population of this study was limited to inservice teachers currently working in K-12 public schools in the United States. A stratified sample was used to randomly select from the American K-12 schools' websites due to the possibility of acquiring teachers' e-mail addresses online. According to the nationwide survey research of Kleiner and Lewis (2003), in 2002 almost all (99 percent) public schools in the USA were connected to the Internet and were able to connect with parents and students through e-mail or a web site. The same study indicated that "86% of public schools had a web site or web page in 2002" (Kleiner & Lewis, p. 19). Participants' names and e-mail addresses were found on the web sites of school districts or individual schools.

In considering the "issues of generalizability" (Light, Singer, & Wilett, 1990, p. 42), a large and nationwide sample was selected for this study. Three subgroups were used for the stratified random sample. First, the samples were stratified by the regional classification, such as Northeast, South, Midwest, and West that is based on the U.S. Census Bureau, census regions and divisions of the United States (U.S. Census Bureau, 2009a). These groups of samples included a total of twelve states, with three states from each of the four regional areas. Based on the U.S. population census on April 1st, 2000

(U.S. Census Bureau, 2009b), the states with the largest, median and smallest population were selected from each region (Appendix D). Second, from the first group of the target sample, the school districts were used for random sample selection by using the Statistical Package for Social Science (SPSS) program version 17.0 software random samples procedure. Finally, the participants were randomly selected from the schools on the list of the second group.

The desired sample size was determined by these factors: expected significance level, statistical power, the effect size, variables and the design of the research study. (Hinkle, Wiersma, & Jurs, 2003; Meyers, Gamst, & Guarino, 2006). The level of significance chosen for this research study is $\alpha = .05$, which is commonly used for behavioral science (Hinkle et al.). According to Light et al. (1990), a power between .70 to .90 is recommended as a strong power. Based on the review of literature, there is no agreement about the use of power in similar research studies, resulting in the power of .90 being chosen for this study due to the flexibility of managing sample size (Light et al.). Since this research study is an initial attempt, lack of prior research or literature was found as reference for the effect size for sampling. A medium effect size is assumed for seeking the balance between the large and small effects (Light et al.). Based on the above factors, the sample size was calculated using the computer software SamplePower 2.0 (under the following assumptions: medium effect size (.15) at $\alpha = .05$ significant level; power $(1-\beta) = .90$; and five predictors), resulting in an estimate of 116.

Based on the literature review, the survey response rate for both web surveys and paper-based surveys is low and has been decreasing in recent years (Curtin et al., 2005).

Shih and Fan (2008) found population types contribute statistically to the response rate, and their research found that teachers as a population exhibit one of the lowest response rates on web surveys. This research study sought a nationwide large sample size, 3,288, in order to overcome the low response rate issue.

Instrumentation

The measure instruments were constructed according to the literature review and by consulting with professional experts. Due to the lack of prior research on the use of Web 2.0 tools, two measure instruments: *Web 2.0 Tools Integration* and *Web 2.0 Tools Integration Self-efficacy* and a demographic collection survey were developed and modified from prior research studies (Curts et al., 2008; Milbrath & Kinzie, 2000; Morales et al., 2008; Niederhauser & Perkmen, 2008; Ropp, 1999; Vannatta & Fordham, 2004; Wang et al., 2004; Wozney et al., 2006).

Development of the Measurements

The *Web 2.0 Tools Integration* instrument consisted of six items designed to investigate the use of Web 2.0 tools in current classroom practices. It attempted to seek the answer of how often each Web 2.0 tool is used by the participants with a five-point Likert scale rating. The scale ranged from ‘daily’, ‘at least once a week’, ‘at least once a month’, ‘at least once a year’ to ‘never’ and were coded from five points to one point for continuity statistics data analysis. This measure instrument was modified from the similar research studies by Milbrath et al. (2000), who had examined preservice teachers’ ‘computer technology survey’, and Vannnatta and Fordham (2004), who investigated K-12 schools’ ‘teacher technology use’ in Ohio. A short open-ended question was included

at the end of each item to ask participants to report what types of individual Web tools they were using currently. This is an option choice for the eliciting of volunteer answers for qualitative data collection. The data collected from the instrument of using Web 2.0 tools is the dependent variable.

The *Web 2.0 Tools Integration Self-efficacy* instrument was developed by modifying similar relevant prior research on computer technology applications (Curts et al., 2008; Milbrath & Kinzie, 2000; Morales et al., 2008; Niederhauser & Perkmen, 2008; Ropp, 1999; Wang et al., 2004). Ropp (1999) initially created the 'Technology Proficiency Self-Assessment', with a high reliability of Cronbach alpha .96, to investigate the computer self-efficacy among preservice teachers. This instrument was modified and used by other researchers, who reported a high reliability of Cronbach alpha of .90 (Niederhauser & Perkmen), .93 (Morales et al.) and .975 (Curts et al.). The use of a five-point Likert scale rating and wording in statements were adopted from previous research studies for instrument construction (Curts et al.; Milbrath & Kinzie; Morales et al.; Niederhauser & Perkmen; Ropp; Wang et al.) as well as referred to the guideline for constructing self-efficacy scales by Bandura (2006).

Web 2.0 Integration Tools Self-Efficacy instrument consists of 30 items, with five items for each Web 2.0 tool. Equal items for each tool were selected for the design, not only to "avoid single numbers representing opinion in [each tool] but to seek the contingency and qualification of the instrument" (Converse & Presser, 1986, p. 47). The scale ranged from strongly agree, agree, neutral, disagree, to strongly disagree and coded from five points to one point for continuity statistics data analysis. The participants

responded to rate their agreement according to statements describing their skill in operating Web 2.0 tools. For example, ‘when using Web 2.0 tools in teaching, I feel confident that I can create my own blog (to be accessed by my students as part of a lesson)’.

Content Validity

According to Light et al. (1990), two types of content validity, face validity and sampling-content validity, are used to measure the validity of instruments. All the questionnaire items were reviewed and revised by experts in the field of computer technology and education research, including Dr. Franklin, professor in Educational Studies at Ohio University, Dr. Johanson, professor in Educational Studies at Ohio University and Dr. Kessler, assistant professor in Linguistics at Ohio University. In addition, a pilot study was used to achieve the measure of content validity (Light et al., 1990). While the face validity achieved by expert review is imperfect (Light et al., 1990) due to the “lack of statistical index of content validity” (Mueller, 1986, p. 63), it does support the content validity to a certain degree. In addition, a pilot study was used to test the validity of the instruments and revealed that the respondents did not report confusing wording or unclear statements for the understanding and answering of the instruments.

Pilot Study

A pilot study was conducted throughout the USA in early September 2009. Participants were students of the College of Education currently enrolled in the course of technology application in education in a Midwestern university. Although the participants of the pilot study were not exactly the same target sample of this research study, they

were teacher candidates representing the potential target population that would use Web 2.0 tools in K-12 classrooms. The participants of this pilot study shared common perceptions and provided helpful feedback for the modification of the survey instruments.

This pilot study was conducted during the first week of the fall quarter in a face-to-face course. The instructor provided the active URL of the web survey hosted by Survey Monkey and asked participants to fill out the survey during the class break time, but this action was not required. For the 23 students that took this course, 19 completed the survey, and 16 valid data were collected (a response rate of 84%)

The internal reliability of the pilot study was .78 (Cronbach $\alpha = .78, N = 16$) for *Web 2.0 Tools Integration* (how often teachers use the Web 2.0 tools with their students) and .98 (Cronbach $\alpha = .98, N = 16$) for *Web 2.0 Integration Self- efficacy* respectively. According to Mueller (1986), "a well constructed attitude scale may have a reliability coefficient of .80 or even .90" (p. 58). This pilot study within a small sample size of 16 participants provided evidence of the internal reliability of the *Web 2.0 Integration Self-efficacy* instrument.

Result of Pilot Study

The results of the pilot study revealed that participants only rarely used Web 2.0 tools. This is similar to the final results of this study. Regarding frequency of use, a high percentage of the participants reported 'none' when asked what kind of Web 2.0 tools they used currently (Table 1). Some participants stated 'I do not know about these' in the open-ended question section. The result suggested that a majority of the participants are not familiar with Web 2.0 tools. Many of the participants reported using YouTube (15 of

16, 93.8%) and Facebook (14 of 16, 87.5%), which is consistent with prior research in reporting the high use of social network sites and the uploading/downloading of multimedia among youth (Lenhart et al., 2005; Lenhart et al., 2007).

Results indicated that the majority of the participants almost never use Web 2.0 tools (Table 2). Social network sites with a mean of 3.56 were the most frequently used Web 2.0 tools, which implies weekly use. The use of course management systems with a mean of 3.0 ranks second, which may be due to the need for Blackboard to accomplish school work at the university.

Table 1

Kinds of Web 2.0 tools Used

Web 2.0 Tools		*N*=16
	Numbers	Percentage
Blog	4	25.0
Wiki	3	18.7
Podcast	6	37.5
Upload/ download video	15	83.7
Social network sites	14	87.5
Image sharing/ editing	12	75.0
Digital story telling	7	43.7
Course Management System	13	81.2
Instant Message	10	62.5
Google Education	8	56.2

Table 2

Frequency of 2.0 Tools are Used in Classrooms

Web 2.0 Tools	Mean	Mode	Std. Deviation
			N=16
Blog	1.25	1	0.58
Wiki	1.56	1	1.10
Podcast	1.50	1	0.97
Upload/ download video	2.94	4	1.44
Social network sites	3.56	5	1.63
Image sharing/ editing	1.88	1	1.26
Digital Storytelling	1.5	1	0.90
Course Management System	3.0	1, 4 (equal)	1.83
Instant message	2.94	1	1.77
Google Education	1.88	1	1.26

Revision of Instruments

A revision of the instruments was constructed based on the results of the pilot study and suggestions of two professors on the dissertation committee. A section of the first instrument *Web 2.0 Tools Integration* and 20 items of the second instrument *Web 2.0 Tools Integration Self-Efficacy* were removed.

The first section, *Kinds of Web 2.0 is Used with Students*, of the first instrument was removed to avoid setting choice limitations for certain types of Web 2.0 tools. This change reduced the non-respondent rate and kept participants from failing to complete the survey due to unfamiliar items at the beginning. Further revisions included the addition of a short open-ended question asking participants to provide types of Web 2.0 tools they were using with their students currently, an optional choice for volunteer answers.

Regarding the second instrument, four Web 2.0 tools (Upload or Download Video, Digital Story Telling, Instant Message, and Google Education) were removed in order to narrow the focus of the topic. In addition, the survey was shortened by 20 items to counteract the possibility that the low response rate had been caused by weariness caused by the survey's length.

Data Collection Procedures

The data were collected over a three-week period (January 25 to February 14, 2010). This research study recruited potential participants by sending out an invitation e-mail letter on January 25, 2010 (Appendix B). The e-mail invitation included information about the purpose of the study as well as the link to the web-based survey (http://www.surveymonkey.com/s/77Y2C9T) and requested the participants who were

not interested in this study to reply to the invitation with a blank message. Once the participants clicked on the link, they were connected to the survey introduction page, which instructed them gave them an overview of the survey. After this, they were directed to click the 'next' button to start the survey. Participants were requested to provide their e-mail addresses on the consent form to show that they agreed to data collection as well as to identify and trace the response rate.

After one week, on February 1, 2010, those participants who had not yet responded to the invitation by filling out the survey online or replying with a message as being not interested in the study received an e-mail reminder (Appendix C). Considering the high rate of spam prevalent at present, it was assumed that many teachers in the target sample might not respond to the invitation e-mail or first reminder. After another week, a second reminder e-mail was sent out on February 8, 2010 to encourage participants to participate in the study. The data collection process was ended on February 14, 2010, and data were downloaded from the Survey Web site.

Data Analysis Procedures

The main focus of this research study was to investigate the current use of Web 2.0 tools in public K-12 schools in the United States. The research question is: What factors predict teachers' use of Web 2.0 tools in K-12 classrooms? To what extent do the independent variables, *Web 2.0 tools integration self-efficacy*, *professional development*, *access into Web 2.0 tools at school*, *access into Web 2.0 tools at home*, and *school administrative support for using Web 2.0 tools* predict the dependent variable, *Web 2.0 tools integration in K-12 classrooms*. Multiple regression was utilized to answer the

research question and indicate the relationship between the dependent variable and independent variables.

The statistical hypothesis for the research question of this study is stated as:

H_0: R=0 (overall test of the regression)

$H_{A:}$ R≠0

H_0: R^2=0, βj=0, j=1,2,3,4,5

H_A: at least one coefficient is not zero.

H_0: R^2_{inc}=0 (hierarchical regression analysis), change of R^2 is significant when independent variable, *Web 2.0 tools integration self-efficacy* is added

The dependent variable of this study is the use of Web 2.0 tools in K-12 school classrooms.

The independent variables of this study are:

β_1: Web 2.0 tools integration self-efficacy

β_2: The length of hours of professional development teachers attended in the past school year

β_3: Teachers access into Web 2.0 tools at school

β_4: Teachers access into Web 2.0 tools at school at home

β_5: School administrative supports the use of Web 2.0 tools in the school classrooms

The research hypotheses are:

Null hypothesis: The independent variables, Web 2.0 tools integration self-efficacy, the length of hours of professional development, availability of accessing Web 2.0 tools at schools, availability of accessing Web 2.0 tools at home, and administrative support from the school are not significant predictors of the dependent variable, the use of the Web 2.0 tools in the K-12 classrooms.

Alternative Hypothesis: At least one of the independent variables, Web 2.0 tools integration self-efficacy, the length of hours of professional development, availability of accessing Web 2.0 tools at schools, availability of accessing Web 2.0 tools at home, and administrative support from the school is a significant predictor of the dependent variable, the use of the Web 2.0 tools in the K-12 classrooms.

Summary

This research study utilized a quantitative approach to collect data through a web survey and a multiple regression analysis to predict the most influential factors in using Web 2.0 tools at K-12 school classrooms. The target samples were inservice teachers in K-12 public schools in the United States. The measure instruments of this study included *Web 2.0 Tools Integration* and *Web 2.0 Integration Self-efficacy* and a demographic survey. The internal reliability of these instruments was tested by a pilot study and attained .78 (Cronbach $\alpha = .78, N = 16$) for *Web 2.0 Tools Integration* Part B (how often teachers use the Web 2.0 tools with their students) and .98 (Cronbach $\alpha = .98, N = 16$) for *Web 2.0 Integration Self- efficacy* respectively. Data were collected by sending out an invitation through e-mail to gain the agreement from participants for this study in January 2010.

CHAPTER 4: RESULTS

This study sought to provide information concerning the integration of Web 2.0 tools in K-12 public schools in the United States. It investigated the current use of Web 2.0 tools and the factors affecting the adopting of these tools into classrooms. The Statistical Package for Social Science (SPSS) program version 17.0 software was used to analyze the data of this study. Research methods and descriptive statistics were used to analyze demographic information, to calculate the frequency of use of Web 2.0 tools, and to determine teachers' self-efficacy in using Web 2.0 tools. Multiple regression was utilized to answer the previously defined research question.

This chapter presents the results of this study. It included five sections: the description of participants, reliabilities of instruments, multiple regression analysis, supplement analysis of open-ended questions, and a summary.

Description of Participants

Among the target samples were 3,288 participants of whom a total of 464 clicked the hotlink of the Web survey. 464 participants provided their e-mail addresses for the consent form information; three would-be participants provided e-mail addresses that were not able to be identified from the target sample frame. These three participants were removed from the samples because even with a further search of the IP addresses, they were not included in the states of the target sample frame. There were 98 participants who replied to the invitation e-mail or reminders to indicate that they were not interested in participating in this research study. The response rate was 17% (559/3288).

A general distribution of samples and response rates by regions is displayed in Table 3. The response rate in regions is between a low of 13.48% (South) and a high of 18.78% (West). Detailed information of the response rate in each state is presented in Appendix D.

Table 3

Samples and Response Rate by Regions

Regions	Target Sample	Sent Sample	Survey Response Rate	No Interest Response Rate	All Response Rate
	Numbers		Percentage		
Midwest	552	562	15.48%	1.96%	17.44%
Northeast	690	760	14.08%	3.68%	17.76%
South	780	816	10.42%	3.06%	13.48%
West	1,092	1,150	15.83%	2.96%	18.78%
Total	3,114	3,288	14.02%	2.98%	17.00%

Web 2.0 Tools Integration and Web 2.0 Tools Integration Self-Efficacy

Out of the 461 participants, there were 27 participants who only provided e-mail addresses without filling out the survey and 41 participants who filled out only the first section, *Web 2.0 Tools Integration*. There were 434 valid samples in reporting the use of Web 2.0 tools in school classrooms.

The majority of the participants do not use any of these Web 2.0 tools in their classrooms (Table 4). In reporting 'never' used these Web 2.0 tools, the maximum was 383 (88.2%) participants regarding blogs,, and the minimum was 296 (68.2%) participants regarding a course management system (CMS) (Table 5). Few participants reported using Web 2.0 tools on a 'daily' basis; the minimum was only 4 (0.9%) participants regarding podcasts and the maximum was 52 (12%) participants regarding a CMS.

Table 4

Web 2.0 Tools Integration: Statistic Description

	Web 2.0 Tools *N*=434						
	Blog	Wiki	Podcast	Social Networking Sites	Image/ Photo Sharing Sites	Course Manage Systems	Average Web 2.0 Tools
Mean	1.25	1.44	1.31	1.37	1.61	1.89	1.47
Std. Deviation	.77	.98	.75	1.0	1.01	1.45	.62

Note: Daily=5, At least once/ week=4, At least once/ month=3, At least once/ year=2, Never=1

Table 5

Web 2.0 Tools Integration: Frequency of Use

	Web 2.0 Tools (*N*=434)											
Frequency of Use	Blog		Wiki		Podcast		Social Networking Sites		Image/ Photo Sharing Sites		Course Management Systems	
	N	%	N	%	N	%	N	%	N	%	N	%
Daily	6	1.4%	11	2.5%	4	0.9%	14	3.2%	8	1.8%	52	12%
At least once/ week	12	2.8%	20	4.6%	9	2.1%	21	4.8%	36	8.2%	31	7.1%
At least once/ month	16	3.7%	28	6.5%	24	5.5%	16	3.7%	43	9.8%	29	6.7%
At least once/ year	17	3.9%	32	7.4%	42	9.7%	10	2.3%	39	8.9%	26	6%
Never	383	88.2%	343	79.9%	355	81.8%	373	85.9%	308	71 %	296	68.2%

The second section of the survey, *Web 2.0 Tools Integration Self-Efficacy*, included 5 items in each Web 2.0 tool for a total of 30 items. Perhaps because there were many items in this section, 48 participants either missed one or a few items in responding to this section, but they were still included in the samples in reporting the results.

The overall mean and standard deviation of the average *Web 2.0 Tools Integration Self-Efficacy* were 3.13 and 1.11 respectively (Table 6) , indicating that teachers' self-efficacy in using Web 2.0 tools is neutral. Regarding their belief in how they were using these Web 2.0 tools, teachers were unsure if they had enough confidence to do it.

The results of the *Web 2.0 Tools Integration Self-Efficacy* regarding individual Web 2.0 tools (Appendix F) resemble the average of all Web 2.0 tools. Participants reported the highest confidence (mean= 3.46) when using image/photo sharing sites in contrast to the lowest confidence (mean= 2.77) when using a wiki. Participants with lowest self-efficacy in using a wiki displayed a mean of 2.77, below the average mean of 3.13. This result indicates teachers were more likely to 'disagree' when asked about their confidence in using a wiki.

The other tools are, ranked in the order of less confidence to more confidence, podcasts, blogs, CMSs, and social networking sites. A majority of participants reported a lack of confidence in using a blog, wiki and podcast, indicated by the mode of 1, which means 'strongly disagree' in the context of the survey. More participants had a high confidence level in using social networking sites and image/photo sharing sites, indicated by the mode of 5, which means 'strongly agree' for both tools.

Table 6

The Average of Web 2.0 Tools Integration Self-Efficacy

	Web2.0 Tools						
	Average of Blog	Average of Wiki	Average of Podcast	Average of Social Networking Sites	Average of Image/ Photo Sharing Sites	Average of Course Manage Systems	Average of All Web 2.0 Tools
Mean	3.08	2.77	2.81	3.38	3.46	3.32	3.13
Median	3	3	3	3.6	4	3.4	3.25
Mode	1	1	1	5	5	4	1
Std. Deviation	1.35	1.29	1.28	1.32	1.34	1.25	1.11
Case Number	395	395	394	392	392	393	396

Note: Strongly Agree=5, Agree=4, Neutral=3, Disagree=2, Strongly Disagree=1

The comparison of the mean of *Web 2.0 Tools Integration Self-Efficacy* and *Web Tools 2.0 Integration* indicates that teachers reported similar self-efficacy as well as their real use of these Web 2.0 tools. The mean of the average *Web 2.0 Tools Integration Self-Efficacy* is 3.13, which indicates teachers are generally unsure if they are able to operate these tools (Figure 1). The result is reflected by the mean of average use of these tools (=1.47), indicating that teachers used these tools between 'never' and 'once a year,' i.e., they rarely use these Web 2.0 tools in general. Figure 1 indicates the curve of the lines of *Web Tools 2.0 Integration* and *Web 2.0 Tools Integration Self-Efficacy* in a similar direction. This finding suggests that the teachers' uncertainty in their abilities to operating Web 2.0 tools is highly associated with the rare use of Web 2.0 tools in school classrooms.

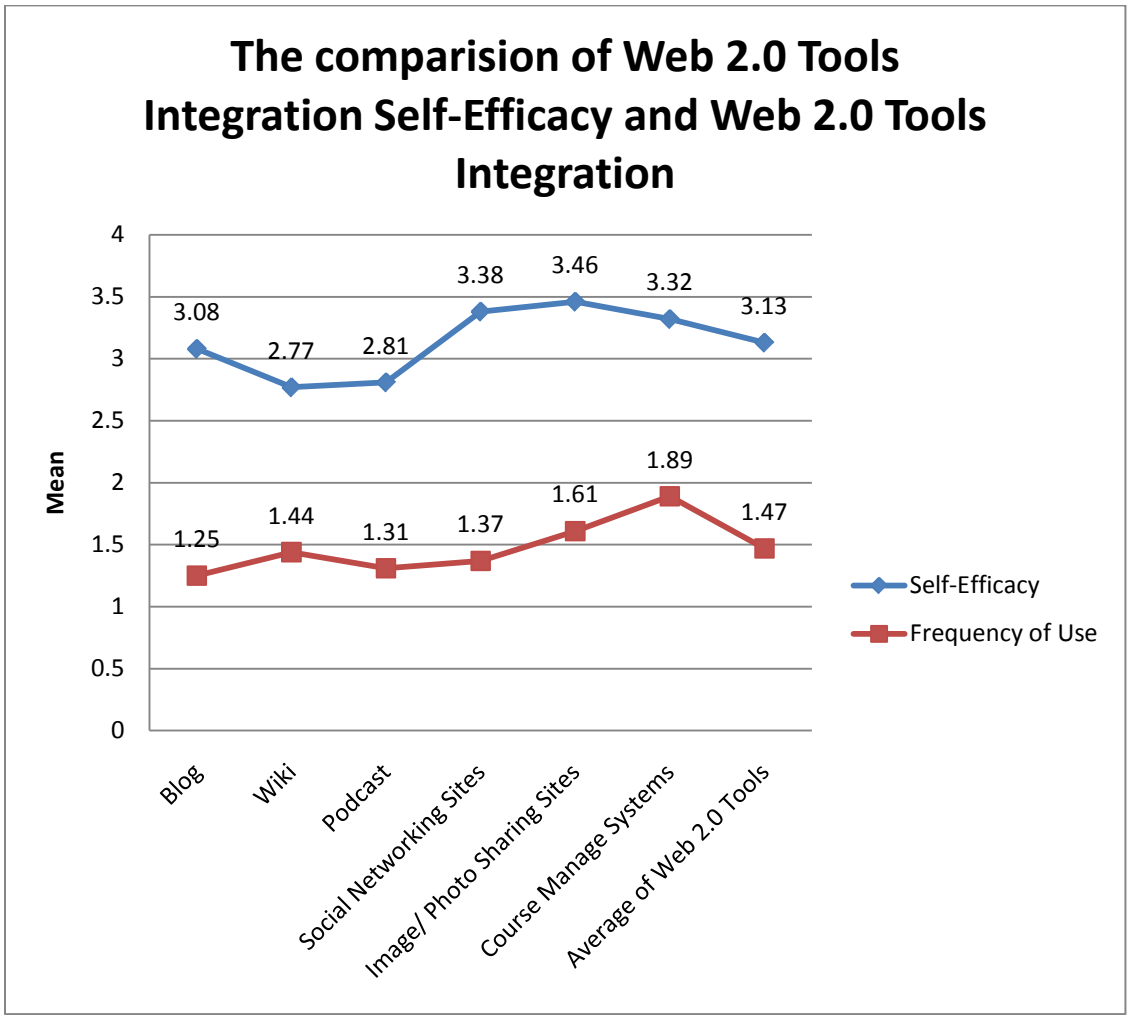


Figure 1. The comparison of self-efficacy and frequency of use in using Web 2.0 tools. Note: The mean of self-efficacy is calculated by the scale of 'Strongly Agree=5, Agree=4, Neutral=3, Disagree=2, Strongly Disagree=1' and the mean of frequency of use is calculated by the scale of 'Daily=5, At least once/ week=4, At least once/ month=3, At least once/ year=2, Never=1'.

Demographic Information

There were 379 valid samples who responded to the section of demographic information of this survey. It included 137 (36.1%) male participants and 242 (63.9%) female participants. The age of participants ranged from 22 years old to 73 years old, with an average age of 42.64 years old (Table 7), with a majority in their middle 40s (see Figure 2). Participants reported the average teaching experience is 13.32 years, with a range from less than one year of teaching experience to 50 years (Table 7). The variance of teaching experience, age, and rate of technology use in classroom settings is high among the participants. The results suggest participants have been using technology to teach for a few years (mean= 8.04 years), with a range from 0 years to 38 years of use.

Table 7

Demographic Information: Age, Teaching Experience, Using Technology to Teach in Classrooms

	Age	Teaching Experience	Using Technology to Teach in Classrooms
Mean	42.64	13.32	8.04
Median	43	11.0	6.0
Mode	52	2.0	10.0
Std. Deviation	11.35	9.47	6.67
Max	73	50.0	38.0
Min	22	0	0
Case Number	377	379	379

Note: Two participants reported their age as 0, so that the case number of age is 377, two less than the other items of the demographic information.

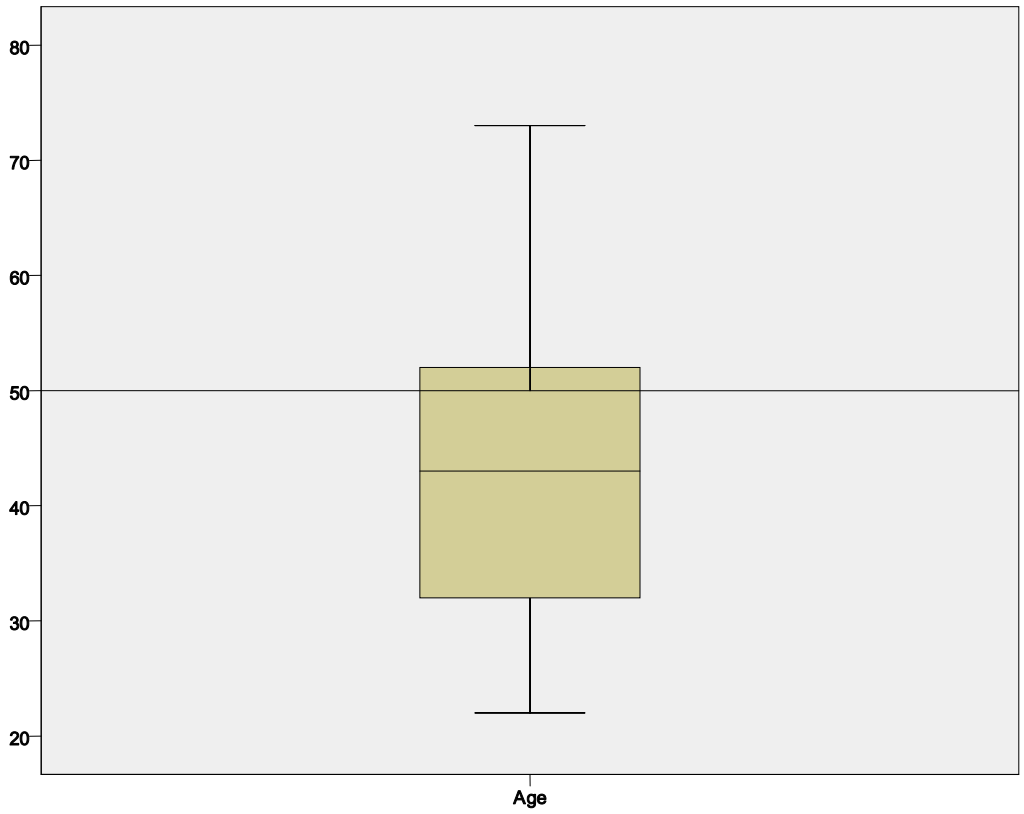


Figure 2. Demographic information: Age Distribution

The educational status is displayed in Table 8. It indicates more than half of (*N*=225, 59.4%) the participants had gone to graduate school, an additional one-third (*N*=138, 36.4%) had finished their undergraduate, only a few (*N*=11, 2.9%) had finished a doctorate; there were very few (*N*=5, 1.3%) participants who reported 'other', which included a certificate in teaching and reading/language arts consultant.

Table 8

Demographic Information: Educational Status

	Educational Status (*N*=379)			
	Bachelor	Master	Doctorate	Other
Frequency	138	225	11	5
Percentage	36.4%	59.4%	2.9%	1.3%

Table 9 presents the grade level that participants taught at their schools. The results indicate that the majority (*N*=203, 53.6%) of the participants teach grades 9-12, around one-third (*N*=117, 30.9%) teach grades 6-8, and a few (*N*=17, 4.5%) teach K-5.

Table 9

Demographic Information: Grade Level of Teaching

	Grade Level (*N*=379)			
	K-5	6-8	9-12	Other
Frequency	17	117	203	42
Percentage	4.5%	30.9%	53.6%	11.1%

Among the 379 participants, almost all (*N*=375, 98.9%) could access the Internet at school but less than half (*N*=185, 48.8%) could access Web 2.0 tools at school (Table 10). Limitation on the accessing of Web 2.0 tools at school were echoed by the qualitative data as some teachers reported that their schools blocked Web 2.0 tools, such as social networking sites, blogs, and photo and video sharing sites. Participants reported almost all (*N*=363, 95.8%) could access to the Internet at home, but only around half (*N*=211, 55.7%) of the participants did access to Web 2.0 tools at home. At this stage, not many participants reported using mobile devices to access into the Internet (*N*=158, 41.7%) or Web 2.0 tools (*N*=122, 32.2%).

Table 10

Demographic Information: Access to Web 2.0 Tools and Internet

N=379

	Web 2.0 Tools						Internet					
	At School		At Home		Through Mobile		At School		At Home		Through Mobile	
	N	%	N	%	N	%	N	%	N	%	N	%
Yes	185	48.8%	211	55.7%	122	32.2%	375	98.9%	363	95.8%	158	41.7%
No	194	51.2%	168	44.3%	257	67.8%	4	1.1%	16	4.2%	221	58.3%

Table 11 shows the total hours of professional development from the last school year. The average professional development participants reported is 11.79 hours, with a range from the highest of 150 hours to the lowest of zero. The variance between the participants is very large (Figure 3). Only 37 (0.8%) participants attended professional development courses, workshops, or training for more than 32 hours per year, which is the threshold for teachers to feel well-prepared for integrating computer technology or the Internet into their classrooms (National Center for Education Statistics, 2000).

Table 11

Demographic Information: Professional Development

N=379

	Hours
Mean	11.79
Median	5.0
Mode	.0
Std. Deviation	18.42
Max	150.0
Min	0.0

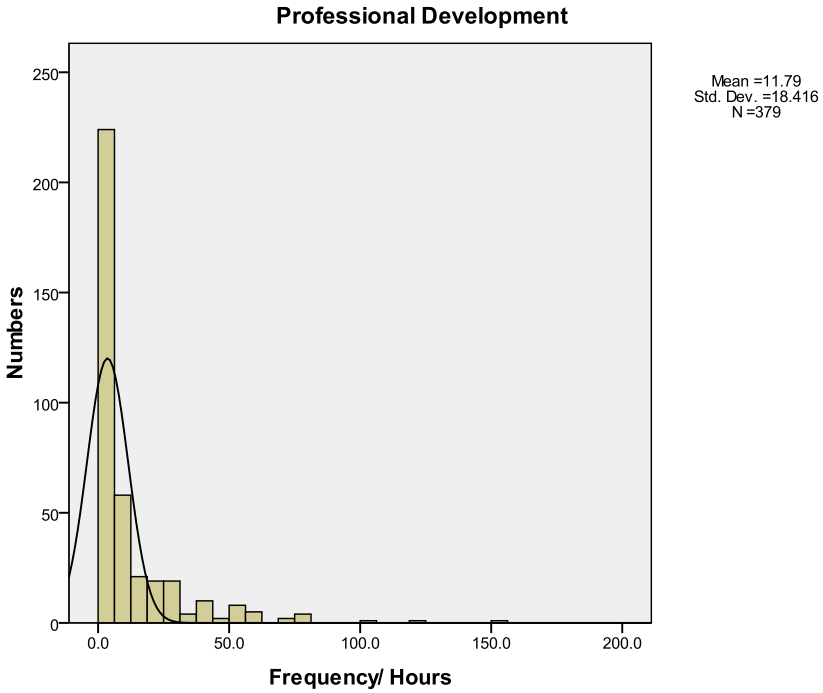


Figure 3. Distribution of professional development from the last school year in total hours

Figure 4 presents the distribution of administrative school support in using Web 2.0 tools. Of the 379 participants, more than half (*N*=212, 55.9%) of have no knowledge of or do not use Web 2.0 tools (Figure 4). Only some (*N*=60, 15.8%) participants indicated that they ‘already use’ Web 2.0 tools.

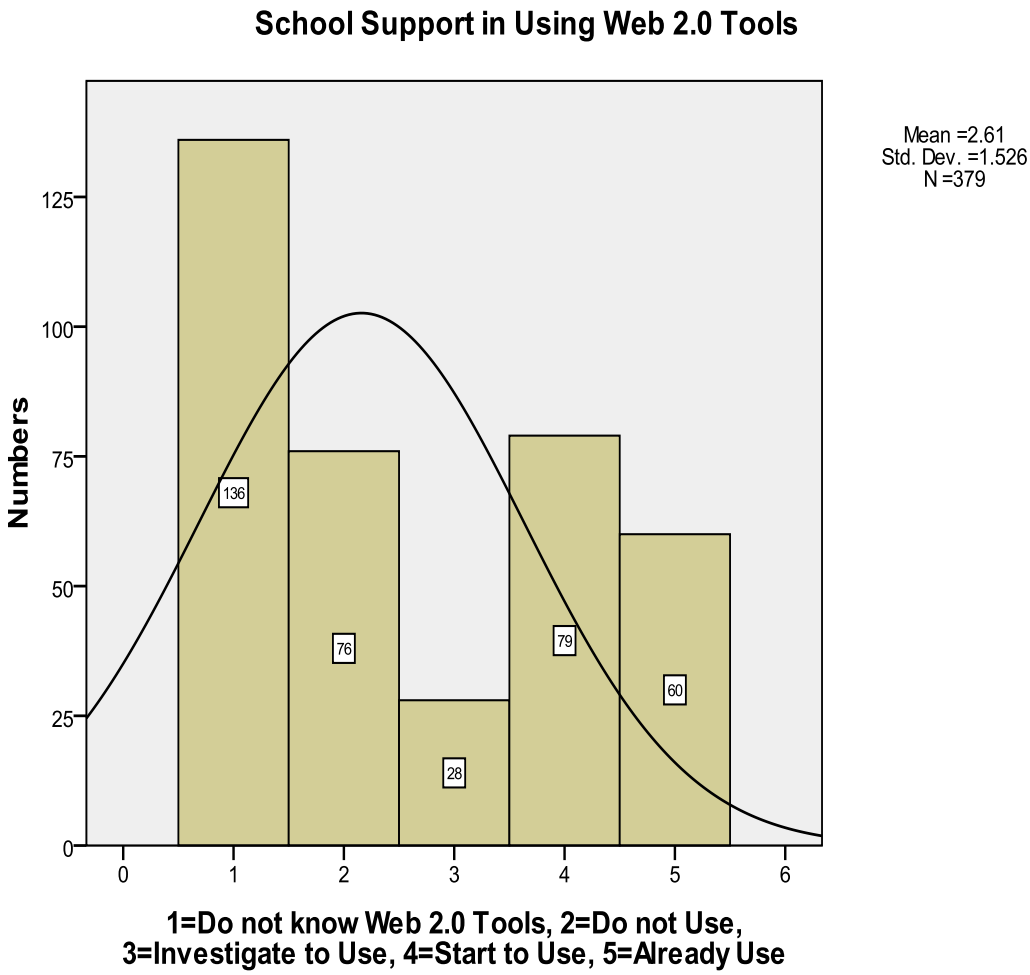


Figure 4. School support in using Web 2.0 tools

Table 12 presents the subject areas taught by the respondents. 110 (29.0%) participants reported teaching language arts (the highest population among the sample), followed by 83 (21.9%) participants who taught mathematics, 83 (21.9%) participants who taught social studies, and 71 (18.7%) participants who taught science. There were only 40 (10.6%) participants reporting that they taught computer classes, and mere two (0.5%) participants reported that they taught technology education.

Table 12

Demographic Information: Subjects of Teaching

Subjects	Numbers	*N*=379 Percentage
Language Arts	110	29.0%
Mathematic	83	21.9%
Social Studies	71	18.7%
Science	69	18.2%
Computers	40	10.6%
Other	31	8.2%
Special Education	30	7.9%
Fine Arts	26	6.9%
Vocational Education	25	6.6%
Health	20	5.3%
Physical Education	19	5.0%
Music	17	4.5%
Second Language	12	3.2%
Library	9	2.4%
Business	6	1.6%
Reading	3	0.8%
Yearbook	3	0.8%
Journalism	2	0.5%
Technology Education	2	0.5%

Correlation

Age was negatively correlated with the *Web 2.0 tools integration, web 2.0 tools integration self-efficacy,* and *access into Web 2.0 tools at home*, yet it was positively correlated with *professional development*. The correlation coefficient does not indicate the direction of causality as it only shows the relationship among variables (Field, 2005).

Table 13 presents the correlation between age and *Web 2.0 tools integration*. The Pearson correlation coefficient between these two variables was $r = -.073$, indicating that age was not significantly related to the use of Web 2.0 tools at schools. Age was not one of the variables for multiple regression analysis. Furthermore, Figure 5 shows that there was no significant relationship between the variables of age and *Web 2.0 tools integration*. Age was negatively related to *Web 2.0 tools integration* in the south with a Pearson correlation coefficient of $r = -0.245$, $p = .046$ ($p < .05$) (Appendix G). The finding indicates that an increase in age was correlated with the decrease of using Web 2.0 tools at schools in the southern states.

Table 13

Correlations among Age and Web 2.0 Tools Integration

		Age
		N=373
Web 2.0 Tools Integration	Pearson	-.073
N=434	Correlation	
	Sig. (2- tailed)	.154

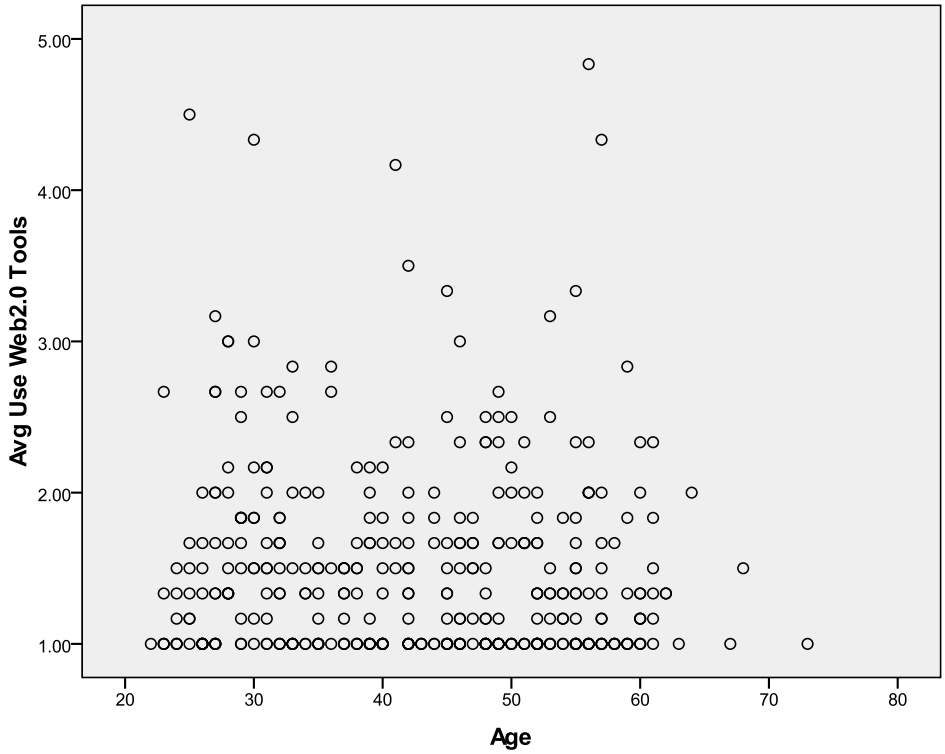


Figure 5. Scatterplot of average use of Web 2.0 tools against age.

Age was negative significantly related to *Web 2.0 tools integration self-efficacy* with a Pearson correlation coefficient of $r = -.263$, $p = .000$ ($p < .01$) (Table 14). This means that there is a less than .001 possibility that this could have occurred by chance in the sample of 377 participants. Overall, an increase in age was correlated with a decrease in self-efficacy regarding the use of Web 2.0 tools. By region, age was negative significantly related to *Web 2.0 tools integration self-efficacy* in the northeast and west with a Pearson correlation coefficient of $r = -.453$, $p = .000$ ($p < .01$), and $r = -.190$, $p = .022$ ($p < .05$), respectively (Appendix H). This means that in the northeast and west, as the participants' age increased, the self-efficacy regarding the use of Web 2.0 decreased.

Table 14

Correlations among Age and Web 2.0 Tools Integration Self-Efficacy

N= 377

		Age
Web 2.0 Tools Integration Self-Efficacy	Pearson Correlation	-.263**
	Sig. (2- tailed)	.000

Note. ** Correlation is significant at the 0.01 level (2-tailed).

In the south age was positive significantly correlated with *professional development*; the Pearson correlation coefficient between these two variables was r = .310, p = .011 (p < . 05) (Appendix I). This finding suggests that an increase in age was correlated with an increase in the time spent on professional development per year. In contrast, in the northeast and south, age and *access into Web 2.0 tools at home* were negative significantly related. The Pearson correlation coefficient of the northeast and south were r = --.221, p = .034 (p < .05), and r = -.279, p = .022 (p < .05), respectively (Appendix J). The results indicate that an increase in age is related to a decrease in time spent on accessing Web 2.0 tools at home.

Reliabilities of Instruments

The reliabilities of the instruments were measured with two subscale measurements, *Web 2.0 Tools Integration* and *Web 2.0 Tools Integration Self-Efficacy*, respectively (Table15).

Table 15

Reliabilities of the Instrument

Subscale	Survey Item Numbers	Cronbach's Alpha
Web 2.0 tool integration	1-6	.652
Web 2.0 integration self-efficacy	1-30	.983

Multiple Regression Analysis

A multiple regression was utilized to answer the research questions:

What factors predict teachers' use of Web 2.0 tools in the K-12 classrooms? To what extent do the independent variables, *Web 2.0 tools integration self-efficacy, professional development, access into Web 2.0 tools at school, access into Web 2.0 tools at home,* and *school administrative support for using Web 2.0 tools* predict the dependent variable, the *Web 2.0 tools integration in K-12 classrooms*.

Out of the 379 participants, only 243 participants were used to conduct the multiple regression equation. This difference is due to the fact that in answering the survey item 'school supports the use of Web 2.0 tools', 136 participants reported 'do not know Web 2.0 tools' (Figure 4). These 136 participants were treated as missing data and not included in the sample of regression analysis.

Diagnosis of Outliers and Influence Cases

The assessment of outliers was conducted using the value of (1) standardized residuals, (2) Cook's distance, and (3) leverage (Field, 2005; Stevens, 1999).

The casewise diagnostics (Table 16) from the SPSS printout indicates four cases have standardized residual with absolute values greater than 3, these were removed from the sample (Table 16). According to Stevens (1999), for a correct model 95% of the standardized residual should have the absolute value 2, and 99% of the standardized residual should have the absolute value 3. The above four cases are cause for concern because this is unusual in a normally distributed sample (Field, 2005; Stevens, 1999). In

rechecking with the original data, there were no missed recordings or typographical error problems among these cases. Ultimately, these four cases were removed from the sample.

Table 16

Casewise Diagnostics

Case Number	Std. Residual	Avg of Web 2.0 Tools Integration	Predicted Value	Residual
201	3.51	4.17	2.08	2.09
207	3.89	4.33	2.03	2.31
223	3.47	4.33	2.27	2.06
341	3.91	4.83	2.51	2.32

Note: Dependent variable: The Average of Web 2.0 Tools Integration

The assessment of influence cases was conducted by examining Cook's distance for the overall influence of one case on the model. Field (2005) and Stevens (1999) indicate that Cook and Weisberg (1982) that suggested the value of Cook's distance being greater than 1 is the influential point at which case should be taken into consideration. None of the cases had Cook's distance greater than 1 (Table 17) which suggests that no case had extreme influence on the model.

Table 17

Residuals Statistics

N=243

	Minimum	Maximum	Mean	Std. Deviation
Standardized Residual	-2.071	3.912	.000	.990
Cook's Distance	.000	.143	.005	.014
Centered Leverage Value	.003	.183	.021	.017

The leverage value is used to examine "the influence of the observed value of the outcome variable over the predicted values" (Field, 2005, p. 165). Stevens (1999) suggests using three times the average $(3(k+1)/n)$ as a cut-off point in identifying cases having excessive influence. In computing the three times average value as (3(5+1)/243) = .074, there were three cases (104, 248 and 403) exceeded this value. In rechecking the original data, there were no missed recording or typographical error problems among these cases. these three cases were removed by the researcher.

Examining Assumption Violation

There are primary assumptions that should be examined when using multiple regression analysis. All the predictors should be categorical and the dependent variable should be categorical and unbounded. In this research study, all the predictors were utilized as quantitative measurements or two categories. A five-item likert-scale, with degrees from Daily = 5 to Never = 1, was utilized to measure the dependent variable, the use of Web 2.0 tools, thereby meeting the assumption of dependent variable being categorical and unbounded.

The assumption of multicollinearly between predictors was examined. In screening the correlation matrix of all predictors, the highest correlation is .342 between the predictor, *Web 2.0 Tools Integration Self-Efficacy* and the dependent variable, *Web 2.0 Tools Integration*. None of the bivariate correlation between the predictors is .90 or higher, which means there is no need to delete any of the variables (Field, 2005 & Meyers, et al., 2006). The value of the variance inflation factor (VIF) was checked to determine whether there was a strong linear relationship between predictors. The SPSS printout indicates the VIF of this study is 1.812 which is smaller than 10, the problem of multicollinearly should not be a worry in this study (Field, 2005; Meyers, et al., 2006).

The graph of standardized residuals (*ZRESID) against regression standardized predicted value (*ZPRED) was examined to test the assumption of homoscedasticity and linearity (Figure 6). This scatterplot (Figure 6) indicates the points were dispread throughout the plot evenly, which means the assumption was met.

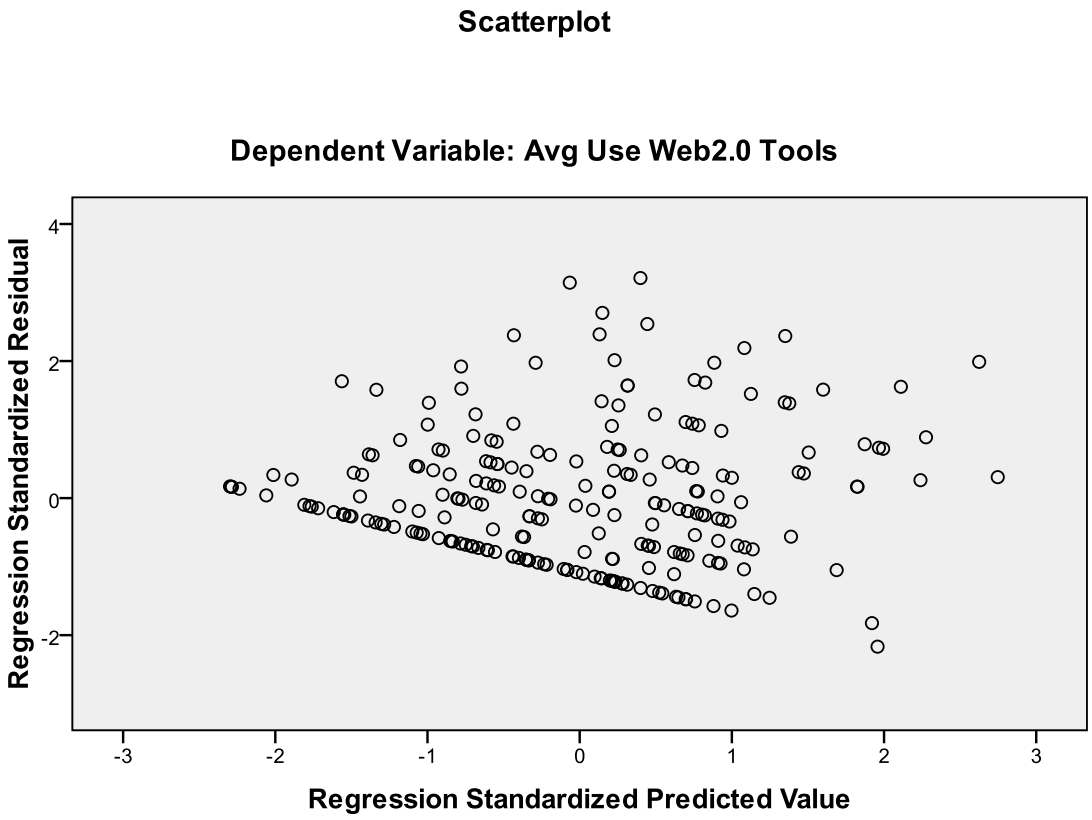


Figure 6. The graph of standardized residuals (*ZRESID) against regression standardized predicted value (*ZPRED).

Figure 7 presents the regression standardized residual histogram which indicates a normal distribution of the data.

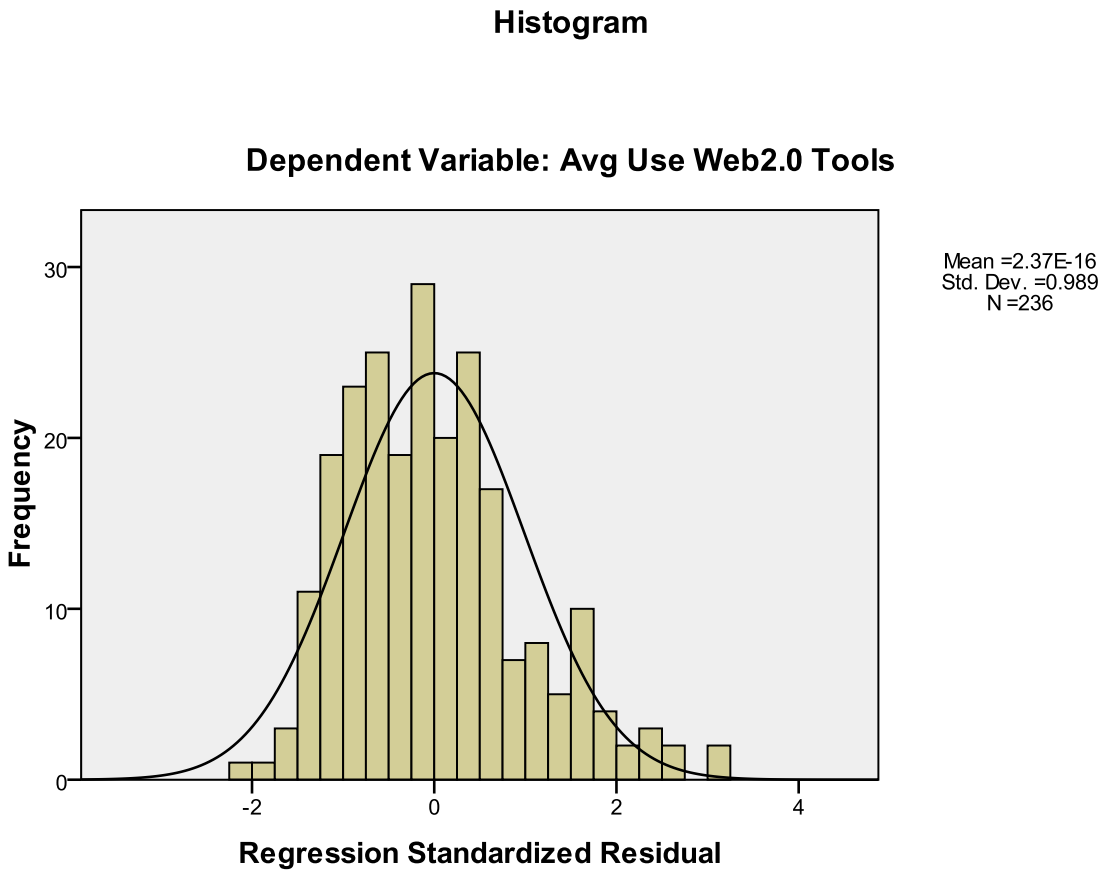


Figure 7. This histogram shows a normal distribution of the regression standardized residual.

The value of the Durbin-Waston test is 1.812, showing a positive correlation between adjust residuals (Field, 2005). This result indicates the residuals in this model are independent.

Summary of Model

After deleting outliers and influential cases, 236 cases were used for the multiple regression analysis. The researcher attempted to utilize a variety of models, all of which resulted in the same outcome and in no improvement to the power of the regression equation. In conducting multiple regression analysis, there are several procedures for the entering of the independent variables, including simultaneous, hierarchical, and data-driven (Warner, 2008). This dissertation uses hierarchical regression, for which "[independent] variables are entered in a series of steps, with the order of entry determined by the data analyst" (Warner, p. 550). The independent variables, *professional development*, *access into Web 2.0 tools at school*, *access into Web 2.0 tools at home*, and *school administrative support for using Web 2.0 tools* were entered together, followed by *Web 2.0 tools integration self-efficacy*. The reason for choosing the hierarchical regression in this study was to investigate whether the independent variables of, *Web 2.0 tools integration self-efficacy*, is the primary variable to predict the dependent variable, *Web 2.0 tools integration*. The literature review indicated the importance of professional development, access to computer technology tools and school support in adopting or integrating new tools into school classroom. These independent variables were entered together. The influence of self-efficacy for integrating or adopting new technology tools was unclear, and it was entered alone to investigate the significance of

variance. The results of this hierarchical multiple regression are presented in Table 18 and 19, while, the coefficients of the regression model are presented in appendix K.

The *F*-ratio value indicates whether the regression model overall is a good fit and whether independent variables were successful in predicting the dependent variable. Table 18 presents the F-ratio value. In step 1, the *F*-ratio is 10.426, which could have occurred by chance ($p < .05$). In step 2, the *F*-ratio is 14.196, which is higher than step 1; both steps have significant results. This result suggests that the first model, with four independent variables, significantly predicts the dependent variable. Adding an additional independent variable in step 2 predicts the dependent variable even better and is still significant. Overall, this regression model, with the variables, *professional development*, *access into Web 2.0 tools at school*, *access into Web 2.0 tools at home*, *school administrative support for using Web 2.0 tools*, and *Web 2.0 tools integration self-efficacy*, predicts the dependent variable, *Web 2.0 Tools Integration* significantly.

The *R* is .49 which means the probability that $R = .49$ would have occurred by chance is less than .05 assuming the null hypothesis is true. The Sig.= .000 implies that the probability is actually less than .0001. This result indicates there is a nonzero relationship in the population between the dependent variable and the linear combination of the independent variables.

The R^2 "is the proportion of the variation in the criterion variable that can be attributed to the variation of the combined predictor variables" (Hinkle, et al., 2003, p. 467). The R^2 indicates approximately 24 percent of the variability of the dependent variable is accounted for by the combined independent variables (Table 18). This result

suggests that the independent variables, *professional development, access into web 2.0 tools at school, access into web 2.0 tools at home, school administrative support for using web 2.0 tools,* and *web 2.0 tools integration self-efficacy,* explain 24 percent of the dependent variable, *Web 2.0 Tools integration*. Note that in step 2, the R^2 increase (.236 - .153=.083) indicates the independent variable *web 2.0 tools integration self-efficacy* contributes an additional 8.3 percent in explaining the dependent variable, *Web 2.0 Tools integration*. It suggests the independent variable *web 2.0 tools integration self-efficacy* is a strong predictor for the dependent variable, *Web 2.0 Tools integration*.

The adjusted R^2 (.219) is only slightly different from the unadjusted R^2 (.236) with the value of .017 (.236 - .219=.017). This shrinkage indicates there is approximately 1.7% “less variance if the model were derived from the population rather than a sample” (Field, 2005, p. 188).

Table 18

Summary of R^2 Values and R^2 Changes at Each Step in the Hierarchical Multiple Regression

Predictors Included	R^2 for Model	Adjusted R^2	F for Model	R^2 Change	F for R^2 Change
Step 1	0.153	.138	F(4, 231)= 10.426*	0.153	F(4, 231)= 10.426*
Step 2	0.236	.219	F(1, 230)= 14.196*	0.083	F(1, 230)= 24.950*

Note: Dependent Variable: Web 2.0 Tools Integration, * p <.05. Step 1: Professional Development, Access Web 2.0 Tools at School, Access Web 2.0 Tools at Home, School Administrative Support for Using Web 2.0 Tools. Step 2: Professional Development, Access Web 2.0 Tools at School, Access Web 2.0 Tools at Home, School Administrative Support for Using Web 2.0 Tools, Web 2.0 Tools Integration Self-Efficacy.

The results suggest that three out of five predictor variables made significant contributions to the multiple regression equation (Table 19). In step 1, two significant predictors are *professional development* ($t(231)=3.196$, $p<.05$) and *school administrative support for using web 2.0 tools*($t(231)=2.869$, $p<.05$). The predictor *Web 2.0 tools integration self-efficacy* significantly increases the R^2 when entered in step 2, $t(230)=4.995$, $R^2=0.083$, $p<.05$. The same results as in step 1, *professional development* ($t(230)=2.349$, $p<.05$) and *school administrative support for using web 2.0 tools*($t(230)=2.969$, $p<.05$) are still significant predictors in step 2.

Regression Equation

The regression equation is:

$Zy' = 0.302Z_{\text{self-efficacy}} + 0.142Z_{PD} + 0.108Z_{\text{Web2.0/school}} - 0.098Z_{\text{Web2.0/home}} + 0.224Z_{\text{SchoolSupport}}$

Zy': the use of Web 2.0 tools in K-12 school classrooms

$Z_{\text{self-efficacy}}$: Web 2.0 tools integration self-efficacy

$Z_{PD:}$ The length of hours of professional development teachers attended in the past school year

$Z_{\text{Web2.0/school}}$: Teachers access into Web 2.0 tools at school

$Z_{\text{Web2.0/home}}$: Teachers access into Web 2.0 tools at home

$Z_{\text{SchoolSupport}}$: School administrative supports the use of Web 2.0 tools in the school classrooms

Table 19

Results of Hierarchical Multiple Regression.

	B	SE B	β	t	Sig.
Step 1					
Constant	1.144	0.093		12.313	.000
Professional Development	0.007	0.002	0.200*	3.196	.002
Access Web 2.0 Tools at School	0.127	0.097	0.103	1.303	.194
Access Web 2.0 Tools at Home	-0.043	0.086	-0.033	-0.506	.613
School Administrative Support for Using Web 2.0 Tools	0.113	0.039	0.228*	2.869	.004
Step 2					
Constant	0.628	0.136		4.614	.000
Professional Development	0.005	0.002	0.142*	2.349	.020
Access Web 2.0 Tools at School	0.132	0.093	0.108	1.427	.155
Access Web 2.0 Tools at Home	-0.131	0.083	-0.098	-1.569	.118
School Administrative Support for Using Web 2.0 Tools	0.111	0.037	0.224*	2.969	.003
Web 2.0 Tools Integration Self-Efficacy	0.176	0.035	0.302*	4.995	.000

Note: R^2=0.153 for Step 1, R^2=0.083 for Step 2, Dependent Variable: Web 2.0 Tools Integration, * p<.05

Effect Size and Post Hoc Power

The effect size of this multiple regression model is .31, calculated by computing the equation of $f^2 = R^2/(1- R^2)$ (Warner, 2008, p. 449). The independent variables of this multiple regression equation explained the outcome to a medium degree. This finding suggests that factors such as *web 2.0 tools integration self-efficacy, professional development, access into web 2.0 tools at school, access into web 2.0 tools at home,* and *school administrative support for using web 2.0 tools* had a medium effect on the integration of Web 2.0 tools in K-12 public school classrooms.

The post hoc power of this research is 1, calculated by computer using the computer software SamplePower 2.0 under the factors of effect size (.31) at α=.05 significant level, and five predictors.

Supplement Analysis: Open-ended Questions

The quantitative data analysis provides valuable information and answers to the research question. The addition of qualitative data information might lead to some important findings that could not be gained from the quantitative data or might contribute to improvements in future research design. This research study encouraged participants to indicate the Web 2.0 tools they have used in their classrooms in the first section of the survey, *Web 2.0 Integration.* It provided the information about the types of Web 2.0 tools that are used in the schools now. At the end of the survey, the participants were encouraged to provide suggestions for using Web 2.0 tools.

The short open-ended questions are as follows:

1. What are the Web 2.0 tools you use for teaching?

2. What are your suggestions for using Web 2.0 tools with your students? Please provide your comment below.

Types of Web 2.0 Tools are Used

Lists of Web 2.0 tools participants used for teaching are presented in Table 20 through 25.

Table 20

Blogs

Names	Numbers
ABC News Blog	1
angelweb	1
Blogspot	2
Edmodo	2
Google (Blog)	1
Moodle	2
No particular	2
School Web Sites	4
StudyWiz	2
Various Blogs	3

Table 21

Wikis

Names	Numbers
angelweb	1
Edmodo	1
Moodle	1
PB Wiki	3
School Web Sites	4
Various Blogs	3
Wikipedia	10
Wikispaces	11

Table 22

Podcasts

Names of Podcast Tools or Applications	Numbers
Audacity	2
Disney Podcast	1
iPod	1
iTunes	2
NPR Podcast	3
School Web Sites	4
TeacherTube	2

Table 23

Social Network Sites

Names	Numbers
Facebook	20
MySpace	2
Second Life	2
Twitter	2
Blocked by schools or school districts	7
Not allowed to use by schools or school districts	4

Table 24

Image/ Photo Sharing Sites

Names	Numbers
Flickr	15
Google images	11
Photobucket	5
Picasa	11
School Tube	1
School Web Sites	1
YouTube	2

Table 25

Course Management Systems

Names	Numbers
Angel	1
Blackboard	21
Eduphoria	2
Moodle	15
PowerSchool	3
PowerTeacher	3
StudyWiz	4
SynchronEyes	3
WebCT	3

Suggestions for Using Web 2.0 Tools with Students

56 participants provided suggestions for using Web 2.0 tools and reported a variety of themes, such as limits to Internet access, a lack of training in using Web 2.0 tools, technology resources and e-Safety.

Limits to Internet Access

One important issue for using Web 2.0 tools in the K-12 schools is that of limited Internet access at school. Participants reported schools either blocked or filtered out some Web 2.0 tools sites and that students had problems accessing the Internet from home.

Participant 170 stated, “We have very limited access to computers for our students…the district filtering system is too restrictive for robust use of the computer in the classroom. Much of what might be engaging to students is blocked.” Participant 278 stated, “Our biggest problem is most of [the Web 2.0] sites are BLOCKED by our school district.” Participant 373 stated “ My school district blocks many of the Web 2.0 tools such as social networking sites and many of the photo and video sharing sites such as Flickr… which makes it very difficult to use such tools within a class.” Participant 281 stated, “Our "internet filter" prevent[s] access to nearly all, if not all, Web 2.0 sites”.

Students faced problems accessing the Internet from home due to the lack of computers. Participant 170 stated, “I cannot effectively use Web tools for one laptop. Most of my students do not have computers at home.” Participant 467 stated, “Student access is more of a problem than teacher access, especially at home.”

Lack of Training in Using Web 2.0 Tools

The need for training to help teachers use Web 2.0 tools is just as important as for

students or, for that matter, school administrators.

These teacher participants reported a lack of confidence and training in adopting Web 2.0 tools in their teachings. Participant 73 stated, “I feel that as a computer teacher I should be offering my students more experience with Web 2.0 tools, but I am … not sure how to incorporate all the tools into my classes.” Participant 440 stated, “My students' use of Web 2.0 tools is definitely limited by my lack of knowledge, training, and experience. …I would definitely like to make use of [Web 2.0 tools] but do not feel confident in my own skills or knowledge in order to lead [my students].” Participant 194 stated, “I would really, really like to use more Web 2.0 tools in my classroom…[I] feel I need more support and instruction in their use.”

Students need training to use these tools effectively. Participant 129 stated, “The fallacy that kids today know how to use computers and [their] related uses is incorrect. They are simply trial and error learners… Very few students have the curiosity to persevere in their attempt to master a system if they perceive that it is "hard".” Participant 400 stated,” I’ve found it important to be able to first censor blog posts before they are viewable to my larger student body, thus helping students to [become] effective online learners, conscious of the correct way to contribute to a virtual learning community.”

To avoid being blocked from using certain Web 2.0 tools, support from the administrative level of schools is very important. Participant 157 stated, “School administrators and technology directors need to be educated about the possible pedagogical benefits of Web 2.0 tools so that they're not all automatically filtered out.”

Technology Resources and Environment

It was requested by the participants that the technology resources and environment should be taken into consideration in using Web 2.0 tools at schools. Participant 283 stated, “Have enough technology resources available for all teachers and all students particularly within the classroom.” Participant 385 stated, “Blocked sites make it very difficult as does old technology.” Participant 104 stated, “Create environments where personal technology tools can be used in the district.”

e-Safety

The issue of e-Safety is a concern involving the best use of integrating Web 2.0 tools into school classrooms. Participant 383 stated, “Make sure they are appropriate and relevant for the assigned task. Use safety protocols when posting and using online sources.” Participant 385 stated, “In order to encourage students to use it, security would be the deciding factor. I know [Web 2.0] is a place to collaborate and share ideas, but how could Web 2.0 manage security involving kids?”

Summary

This chapter reports the results of the multiple regression analysis of the research question. The description of the participants and two short open-ended questions were discussed.

The multiple regression analysis indicates three out of five independent variables, *professional development, school administrative support for using web 2.0 tools, web 2.0 tools integration self-efficacy*, significantly predict the dependent variables, *Web 2.0 tools integrations*. The independent predictor *web 2.0 tools integration self-efficacy* is the

primary predictor of the dependent variable. This multiple regression model with five predictors is a good model for explaining the dependent variables. These five predictors explain about 24 percent of the outcome, the *use of Web 2.0 Tools in K-12 Classrooms*. This model is medium effect size, .31, with power of 1.

The response rate of the survey was 17% (559/3288). Based on the reports of the participants, the majority of them do not use any of Web 2.0 tools in their classrooms. The results of teachers' self-efficacy suggest the participants were unsure if they have enough confidence to use Web 2.0 tools. The self-efficacy of Web 2.0 tools integration in consistent with the real use of Web 2.0 tools.

The two short open-ended questions indicate the Web 2.0 tools that teachers are using in their classrooms and their suggestions in using Web 2.0 tools. The participants reported that limits on accessing the Internet, a lack of training in using Web 2.0 tools, technology resources, and e-Safety are important issues in using Web 2.0 tools.

CHAPTER 5: DISCUSSIONS, CONCLUSIONS, AND RECOMMENDATIONS

This chapter presents a summary of the research findings, discusses problems and recommends further research studies (as indicated).

Discussions

Rare Use of Web 2.0 Tools in K-12 Schools

The frequency analysis of the *Web 2.0 Tools Integration* suggests that public K-12 school teachers rarely use Web 2.0 tools in their classrooms. The mean of the average use of these Web 2.0 tools is only 1.47 (Table 4), suggesting that teachers tended toward the response of 'never' in terms of using these tools. Concerning the respondents reporting the frequency of use for individual Web 2.0 tools (Table 5), a majority of (*N*=383, 88.2%) respondents reported they 'never' use a blog (the highest frequency); in addition, a somewhat smaller majority of the (*N*=296, 68.2%) respondents reported they 'never' use a CMS (the lowest frequency). The majority of the respondents had 'never' used Web 2.0 tools for their classroom instruction.

Among the six Web 2.0 tools, CMSs were used the most, follow by image/ photo sharing sites, wikis, social networking sites, podcasts, and blogs (based on the mean of each tool in Table 4). Even though CMSs had the highest mean (1.89), which tended toward the use of nearly 'at least once a year', only about one out of ten participants (*N*=52, 12%) reported they used a CMS on a daily basis, and more than half (*N*=296, 68.2%) had never used this tool (Table 5). The results suggest that the majority of teachers do not use any kind of CMS in their classroom. The use of CMSs has just begun to gain the attention of K-12 schools in recent years, although such systems have been

heavily adopted in higher education (Blair & Godsall, 2006). This finding implies that the use of CMSs in K-12 schools is increasing and that more teachers are becoming familiar with this Web 2.0 tool, perhaps due to teachers' use of CMSs while in graduate school to the prevalence of CMSs in K-12 schools today. In contrast, the least frequently used of the Web 2.0 tools were blogs, with a mean of 1.25. The majority of participants (*N*=383, 88.2%) reported they have never used a blog, and only very few of them (*N*=6, 1.4%) use blogs daily. The results reflect that more than 2/3s of teachers do not use blogs in their instruction (Table 5). This finding agreed with a recent nation-wide survey which was conducted by the National Center for Education Statistics (2010) with 2,005 full-time public school teachers started in January, 2009; Gravy, et al. (2010b) reported that teachers responded to questions about their use of blogs and/or wikis as 'rarely' (22%) and 'sometimes or often' (16%) for classroom preparation, instruction, or administrative tasks (p.12). The results suggest that blogs are rarely used among this group of the population. Although prior research has indicated that blogs can be used as paperless digital classroom (Aylward, 2004; Clyde, 2005; Downes, 2004; Du & Wanger, 2007; Ferdig & Trammell, 2004; Poling, 2005; Repman, Zinskie, & Carlson, 2005; Richardson, 2005; Skiba, 2006), to improve writing skills and to enhance collaborative learning (Blood, 2002; Clyde; Downes; Du & Wanger; Richardson; Skiba), this study suggests that teachers have not yet applied these features into their classrooms. There are still issues concerning privacy, security, content validity and usage policy (Richardson, 2006; Solomon & Schrum, 2007) that might serve to prevent the adoption of blogs in teachings; additional factors could include teachers' confidence and skills in using blogs

(Participants 73; 194; 440;) and the limitation of accessing blogs from school (Participants 208; 278; 281; 373).

Social networking sites are prevalent among teenagers (Lenhart & Madden, 2007; Project Tomorrow, 2008; 2010a), but as this study shows they are not used as often by teachers. A high number (*N*=373, 85.9%) of these K-12 teachers had never used any social networking sites. Only a few teachers (*N*=14, 3.2%) used social networking sites every day. This finding agreed with the survey report by Gray et al. (2010b) showing that public school teachers indicated a low use of social networking sites, such as 'rarely' (14%) and 'sometimes or often' (8%), for classroom instruction or school administrative tasks. Literature reviewed indicated that a high percent of American teens routinely use social networking sites to maintain their social life and academic work (Lenhart & Madden, 2007; Project Tomorrow, 2008; 2010a); 28% visited social networking sites weekly, with 22% reporting daily visits (Lenhart & Madden, p. 2). From the above evidence and prior research reviewed (Gray et al.,; Lenhart & Madden; Project Tomorrow), there seems to be a gap between teachers and their students in using social networking sites Qualitative data show that one of the main reasons why teachers do not integrate social networking sites into their classroom could be the difficulties in accessing these tools at schools. In this study, participants reported that schools blocked social networking sites due to security concerns surrounding these sites (Participants 170; 208; 278; 281; 355; 405).Overall, the above findings suggest that K-12 public teachers rarely use any Web 2.0 tools in their classrooms. The issues of concern about e-safety, Internet use policy and limits on accessing Web 2.0 tools might raise the barriers for teachers to

adopt these tools in their classrooms. As is discussed later in this chapter, school administrative support would benefit the adoption of Web 2.0 tools in K-12 classrooms.

Self-Efficacy Primarily Predicts Web 2.0 Tools Integration

Prior research studies have suggested that self-efficacy is a reliable predictor of behavior changes (Faseyitan et al., 1996; Lumpe & Chambers, 2001; Pajares, 2002). The integration of Web 2.0 tools could be interpreted as a behavior change regarding the adopting of new technology tools into school classrooms. This change requires teachers to update their skills in operating new technology tools, to make adjustments to their instructional plans and time, and to change their teaching methodology (e.g., from lecture-based to student-centered). In addition, teachers with a high or strong sense of self-efficacy tended to put exert greater efforts (Knoblauch & Hoy, 2008) and are more willing to integrate new implementations (Evers et al., 2002) into their teaching.

This research study investigated whether *Web 2.0 tools integration self-efficacy* predicts the *Web 2.0 tools integration* in K-12 schools. The results of the multiple regression equation suggest *Web 2.0 tools integration self-efficacy* is the primary predictor of Web 2.0 tools integration in school classrooms. This independent variable not only significantly predicts the dependent variable but also contributes one-third (8.3 %) in a total of 24 percent in explaining the outcome. This finding agrees with prior research studies showing that self-efficacy is a reliable predictor of behavior change for new technology integration.

In this study, participants reported a generally medium self-efficacy as the average of 3.13, which suggest teachers were tended to ‘neutral’ when responding

regarding their confidence in operating Web 2.0 tools. Among six of the Web 2.0 tools, teachers reported that their self-efficacy exceeded a mean of 3 in four cases (i.e., blogs, social networking sites, image/photo sharing sites and CMSs), whereas reported self-efficacy was below a mean of 3 in two cases (i.e., wikis and podcasts) (Table 6). This self-efficacy may reflect the uncertainty of personal abilities in utilizing Web 2.0 tools. These K-12 public teachers were unsure if they were capable of using Web 2.0 tools. They were in a condition of not having confidence in using these tools. Bandura (1977; 1982; 1994; 1997) has argued that self-efficacy is the judgment of one's own capabilities in executing tasks, assignments, projects or work. Beliefs regarding efficacy influence human actions (Bandura, 1982; 1984; 1989; 9994; Pajares, 2002; Pajares & Schunk, 2002), regardless of whether the judgment is right or wrong (Bandura, 1982; Pajares, 2002). According to Bandura (1982), people with high self-efficacy could accomplish tasks exceeding their capabilities, and those with low self-efficacy might underestimate their ability to cope with difficult tasks and fail to finish the work. The findings suggest these public teachers did not have confidence in using Web 2.0 tools.

In addition, *Web 2.0 tools integration self-efficacy* was positive significantly related to *Web 2.0 tools integration* with a Pearson correlation coefficient of $r = .302$, $p = .000$ ($p < .05$) (Appendix K). The results indicate that the increase in self-efficacy was correlated with an increase in use of Web 2.0 tools. As the study showed that teachers' uncertainly regarding their ability to implement Web 2.0 tools, this would seem to agree with the rare use of these 2.0 tools in K-12 public schools currently, which fit well with Bandura's assertion. It suggests that self-efficacy is highly associated with the integration

or implementation of new technology and that teachers with a high or strong sense of self-efficacy used Web 2.0 tools more than teachers with low self-efficacy.

Four sources, i.e., performance accomplishment, vicarious experience, verbal persuasion and physiological states, construct people's self-efficacy (Bandura, 1977; 1982; 1994; 1997).This research, only examined performance accomplishment, one of the most prominent sources of self-efficacy (Bandura, 1977; 1982; 1994; 1997; Pajares, 2002). Performance accomplishment, according to Bandura (1977; 1982; 1994; 1997), includes prior performance and mastery experience which provides authentic experience in facilitating the development of self-efficacy. The measurement of this study requested teachers to self-report their perception of operating Web 2.0 tools rather than examining it directly. This aroused the concern of the operational aspect in investigating self-efficacy, which is worth noting in this study.

Other self-efficacy sources, such as vicarious experience, verbal persuasion, and physiological states, were not investigated in this research but need to be considered for further research study. As this study only focused on performance accomplishment, it would be important to learn if any of the above sources might trigger the integration of Web 2.0 tools among school teachers.

The Importance of Professional Development

The findings of this research study agree with prior research (Albion, 2001; Chen, 2008, Curts et al., 2008; Faseyitan et al., 1996; Littrell, Zagumny, & Zagumny, 2005; Lumpe & Chambers, 2001; Milbrath & Kinzie, 2000; Niederhauser & Perkmen, 2008; Overbaugh & Lu, 2008; Yuen & Ma, 2008; Wang et al., 2004; Watson, 2006; Wozney,

Venkatesh, & Abrami, 2006), which suggests that *professional development* is one of the most important factors influencing whether school teachers use and implement classroom technology. The result of the multiple regression analysis indicates that the independent variable *professional development* significantly predicts the outcome. It suggests that professional development is an important factor influencing the integration of Web 2.0 tools in school classrooms. In addition, *professional development* was positive significantly related to *Web 2.0 tools integration*, with a Pearson correlation coefficient of $r = .142$, $p = .020$ ($p < .05$) (Appendix K). The result suggests that an increase in professional development was correlated with an increase in the use of Web 2.0 tools.

To review the demographic information, results indicated that participants attended an average of 11.79 hours of professional development courses, trainings or workshops in the last school year; only a very few (N=37, 0.8%) participants reported more than 32 hours. The average length of professional development reported by the participants is only approximately 1/3 of the threshold of 32 hours shown to be necessary to help teachers feel well-prepared to integrate computer technology or the Internet from prior research (National Center for Education Statistics Survey, 2000). In general the participants did not fill the requirement of having the suitable professional development that would aid them in integrating new technologies, suggesting that the inservice teachers would need to spend more time on attending professional development to update their skills in operating technology tools for the integration of Web 2.0 tools into their classrooms.

The World Wide Web has been available for 17 years since April 1993 for anyone to use. Demographic information shows that around seven out of ten (*N*=261, 69.1%) of the participants reported they had been teaching for more than 17 years. This finding suggests that the majority of the participants did not have training during their teaching training education regarding in how to use the World Wide Web. The qualitative data confirm the need for professional development as the participants stated that they lack training or confidence in using Web 2.0 tools. Teachers need appropriate professional development training to keep up their skills in technology applications.

The literature reviewed indicates that professional development enhances teachers' beliefs of self-efficacy (Faseyitan et al., 1996; Overbaugh & Lu, 2008; Ross, & Bruce, 2007; Shechtman et al., 2005), which assists teachers in implementing technology in their instructional settings. Evidence suggests that as teachers spend more time in professional development, they increase their confidence in using technology as well as their willingness to implement technologies in their instruction (Chen, 2008; King, 2002; Project Tomorrow, 2009a; Wells, & Lewis, 2006). In addition, the efficiency of professional development influences the adoption and integration of technology in classroom practice (Lawless, & Pellegrino, 2007; Meskill et al., 2006; Rickard et al., 2006; Zhao et al., 2002). Providing mentors or coaches and training for trainers were found to be useful approaches for the integration of technology in practical classrooms (Lawless, & Pellegrino, 2007; Meskill et al., 2006; Rickard et al., 2006; Wang et al., 2004). Hands-on workshops or training courses are valuable for the improvement of self-efficacy regarding operating technology (Faseyitan et al., 1996; Paraskea et al., 2008;

Overbaugh, & Lu, 2008; Watson, 2006). Furthermore, the adoption of online community of practice will assist teachers with *just-in-time* support, helping them improve professional knowledge and skills (Ciani et al., 2008; Drexler et al., 2008; Hanson-Smith, 2006; James & Bailey, 2002) as well as providing teachers with emotional- and information sharing (Hur & Brush, 2009; Ning, 2009) and an environment conducive to Web 2.0 tools practice (Drexler et al.; Hanson-Smith; Ning; Wisker et al., 2007). To facilitate teachers in updating their skills and knowledge in integrating Web 2.0 tools in their classrooms in the future, a well-designed professional development plan should consider meeting individual teacher's personal needs, providing different forms of training tasks, such as workshops, seminars and courses, with a variety of time length.

The Needs of School Supports

Both quantitative and qualitative data suggest the need for school support for the integration of Web 2.0 tools in instructional settings. Multiple regression analysis shows the independent variable *school administrative support for using Web 2.0 tools* has significantly predicted the outcome with a positive relationship. The Pearson correlation coefficient among *school administrative support for using Web 2.0 tools* and the outcome is $r = .224$, $p = .003$ ($p < .05$) (Appendix K). This finding suggests that an increase in school administration support is associated with increased of teachers' use of Web 2.0 tools in their classrooms.

More detailed information is confirmed by the qualitative data of the short open-ended question, *suggestions for using Web 2.0 tools with students*. Participants reflected on the need for school support when integrating Web 2.0 tools. At the school districts and

administrative level, participants reported the needs to be understood about the benefits of using Web 2.0 tools as well as the need for technology resources for the integrations of Web 2.0 tools (Participants, 39; 105; 157; 170; 278; 281; 283; 355). In addition, the re-evaluation of the use policy regarding the practice of blocking or filtering out certain Web 2.0 tools by schools is a concern (Participants, 45; 104; 170; 208; 278; 281; 355; 373 Limits to accessing Web 2.0 tools at school prevent teachers from adopting these tools in their classrooms. Connected to the prior issue, the blocking or filtering of Web 2.0 tools, is the concern of e-Safety (Participants; 383; 385; 405).

Educators, parents and policy makers are concerned about students' exploration of inappropriate materials through the Internet (Byron, 2008; Lemke et al., 2009; Sharples, Graber, Harrison, & Logan, 2009; Villano, 2008; Wolak, Finkelhor, Mitchell, & Ybarra, 2008). Based on the Children's Internet Protection Act (CIPA), schools receiving federal funding are required to set up an Internet safety policy to block or filter out specific web sites containing inappropriate or unwanted materials (see p. 82). A majority of American public schools have adapted to this policy by using filtering software or systems to block such materials (Kleiner & Lewis, 2003; Wells & Lewis, 2006; Lemke et al., 2009). Unfortunately, filtering systems cannot always accurately identify unwanted materials and may inadvertently block certain web sites that might contain valuable academic information (Jonassen et al., 2008; Villano). Actually, the CIPA allows exceptions for unblocking web sites, which requires schools to set a reasonable review policy or process before doing so (Imperatore, 2009). A policy in

regard to the use of Web 2.0 tools is required and needs to be understood by parents and students for the integration of Web 2.0 tools at schools.

The truth is that students spend a significant amount of time online today (Corporation for Public Broadcasting, 2002). Indeed, many of these students live in this web world on a daily basis (Project Tomorrow, 2009a), and they are consumers of Web 2.0 tools (Lenhart et al., 2007; Lenhart & Madden, 2007; Project Tomorrow, 2008; 2009b; 2010a). An initial (and periodically repeated) technology literacy education training (Penrod, 2008) should be considered to aid in the use of these Web 2.0 tools for both teachers and students. Armed with technology literacy, students could learn the use and applications of technology and transfer this knowledge into their life and learning to compete in the 21st century.

Access to Web 2.0 Tools

As mentioned above, the qualitative data gathered for this research shows that the limitation of access into Web 2.0 tools at schools has until now often kept participants from using these tools in their classrooms, but the multiple regression analysis found that access into Web 2.0 tools at school and home did not significantly predict the use of these tools in teachers' classrooms. These two independent variables, *access into Web 2.0 tools at home* and *access into Web 2.0 tools at school*, did not significantly predict the outcome. These results do not agree with prior research conducted by Curts et al. (2008), which suggested teachers who own a computer and are able to access the Internet at home would increase the possibility of using technology for classroom instructions. The population of this study is different from the above study of Curts et al., which focused

on elementary school teachers in Hispanic school districts in Texas. This might be due to characteristics of the specific population of the prior research study, requiring further study to clarify the difference.

The correlation coefficients among these two independent variables and the outcome tended in two different directions. The independent variable *access into Web 2.0 tools at home* is negatively associated with the outcome as revealed by the Pearson correlation coefficient is $r = -.098$, $p = .118$ ($p < .05$) (Appendix K). It suggests that the increase of access into Web 2.0 tools at home was associated with the decrease of using Web 2.0 tools at schools. In contrast, the Pearson correlation coefficient among the *access into Web 2.0 tools at school* and the outcome is $r = .108$, $p = .155$ ($p < .05$) (Appendix K). This suggests a positive association, which means the increase of access to Web 2.0 tools was associated with the increase of using Web 2.0 tools in teachers' classrooms.

Conclusions

This study reveals findings concerning the rare use of Web 2.0 tools in current K-12 public school classrooms in the United States. It shows that teachers are far behind their students in Web 2.0 tools integration, as was suggested by the literature review. Teachers' self-efficacy is the primary predictor for the use of Web 2.0 tools in classroom practice. The increase of teachers' self-efficacy is associated with an increase in using these in classroom instruction. Consequently, this suggests that a majority of teachers did not have confidence in operating these Web 2.0 tools.

In addition, findings suggest the importance of professional development training to enhance teachers' self-efficacy in integrating new technologies into classroom practice, which is in agreement with prior studies. A majority of the participants from this study were not trained to use the Web during their teaching education programs. Furthermore, in general they did not spend a sufficient amount of time in professional development situations that could increase their comfort regarding technology integration in their teaching. Appropriate professional development trainings is needed among these K-12 teachers, as it would maintain teachers' hands-on skills and academic knowledge in upgrading technology applications throughout their teaching career.

Beyond the control of teachers is school support. The qualitative data suggest that teachers believe that limited school access to Web 2.0 tools had prevented them from using Web 2.0 tools with their students, although statistical analyses did not suggest that access to Web 2.0 tools at home or at school significantly predicts the use of these tools. One reason for concern in adopting Web 2.0 tools at schools is the issue of e-safety. Literature reviewed indicated that a majority of public schools used blocking or filtering software in coping with the online safety issue. This use policy does not perfectly protect students from being hurt online and has aroused the issue of blocking out valuable academic information. Schools need a use policy is that is comprehensible to teachers, students and parents and that can avoid the problem of excluding Web 2.0 tools from access. Furthermore, adequate periodic technology literacy education training is needed for teachers as well as students.

Recommendations

The results attained both from quantitative data and qualitative data has inspired several recommendations for further research study. They are:

1. Table 3 (2.98%) of the participants reported that they were not interested in this research study by replying to the invitation letter with a blank message. This research approach helped the researcher to organize the sample list to avoid bothering potential participants with follow-up reminders. In addition, it reminded the researcher that there is a group of people uninterested in the topic of this research study among the samples. This approach is recommended to use in further research studies to improve data collection.
2. Potential participants were requested by the Web survey to provide their e-mail addresses for the purpose of consent as well as to track the response rate. Some participants responded to this requirement by submitting their personal e-mail addresses instead of their school e-mail address which was used by this research study. This reaction caused problems in identifying individual participants for follow-up reminders and in response rate recording. It is suggested to add detailed information at the introduction section of the Web survey so that the participants would know how to react in facilitating the research study.
3. Self-efficacy is a personal belief in an individual's ability to complete the required tasks or work. It is a perception, not real action. In this research study, participants were required to report self-efficacy in using Web 2.0 tools. The results indicate the majority of participants were uncertain if they were capable of using Web 2.0

tools. This research did not test the operationalized capability of the participants to reconfirm their real capability in using these tools. A research with pre-test and post-test to investigate improvements in operating these Web 2.0 tools might predict the result more accurately. It suggests that self-efficacy needs operation. In reality, the operation of Web 2.0 tools might differ from the self-reported perception due to the environment and related hardware and software resources, and this would be worth further research study to investigate in detail in order to better foment the integration of Web 2.0 tools in practical classrooms.

4. Professional development was investigated and found to significantly predict the use of Web 2.0 tools in school classrooms. Certain types of professional development, e.g., hands-on workshops, seminars, long-term or short-term courses, community of practices, providing mentors or coaches, and train-the-trainers, might be worth further study to learn the individual needs of teachers in different subject areas in facilitating further integration of Web 2.0 tools in school classrooms.
5. Further research into the integration of Web 2.0 tools is necessary. This study indicates the rare use of Web 2.0 tools, which is influenced by factors (e.g., a lack of school support) that have kept teachers from integrating Web 2.0 tools in their classrooms. Teachers need support and resources for integrating new technologies. Further research study should involve the school districts and administrators who make decision about school use policies.

REFERENCES

About Drupal. (July, 3, 2009). Retrieved November 4, 2009, from http://drupal.org/about

About Gaggle.Net. (2009). Retrieved November 4, 2009, from https://www.gaggle.net/about.html

About Picasa 3.6. (May, 18, 2010). Retrieved May 18, 2010 from http://picasa.google.com/features.html

Albion, P. R. (2001). Some factors in the development of self-efficacy beliefs for computer use among teacher education students. *Journal of Technology and Teacher Education, 9*(3), 321-347.

Albion, P. R. (2008). Web 2.0 in teacher education: Two imperatives for action. *Computers in the Schools*, *25*(3), 181-198.

All about Edublogs. (2009). Retrieved November 4, 2009, from http://edublogs.org/about/

Anderson, P. (2007). What is Web 2.0? Ideas, technologies and implications for Education. *JISC Technology & Standards Watch*. Retrieved February 24, 2009, from http://www.jisc.ac.uk/media/documents/techwatch/tsw0701b.pdf

Aricak, T., Siyahhan, S., Uzunhasanoglu, A., Saribeyoglu, S., Ciplak, S., Yilmaz, N., et al. (2008). Cyberbullying among Turkish adolescents. *CyberPsychology & Behavior, 11*(3), 253-261.

Aylward, M. (2004). Web logs as an independent study tool. *Journal of Interactive Instruction Development, 16*(4), 22-26.

Bakia, M., Yang, E., & Mitchell, K. (2008). National Educational Technology Trends Study: Local-level data summary. Retrieved July 1, 2009, from http://www.ed.gov/rschstat/eval/tech/netts/netts-local.pdf

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84,* 191-215.

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist, 37,* 122-147.

Bandura, A. (1984). Recycling misconceptions of perceived self-efficacy. *Cognitive Therapy and Research, 8*(3), 231-255.

Bandura, A. (1989). Human agency in social cognitive theory. *American Psychologist, 44,* 1175-1184.

Bandura, A. (1994). Self-efficacy. In V. S. Ramachaudran (Ed.), *Encyclopedia of human behavior* (Vol. 4, pp. 71-81). New York: Academic Press. (Reprinted in H. Friedman [Ed.], *Encyclopedia of mental health.* San Diego: Academic Press, 1998).

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.

Bandura, A. (2006). Guide for constructing self-efficacy scales. In F. Pajares & T. Urdan (Eds.), *Adolescence and education: Vol. 4. Self-efficacy beliefs of adolescents* (pp. 307-338). Greenwich, CT: Information Age.

Barnes, D G., Fluke, C. J., Jones, N. T., Maddison, S. T., Kilborn, V. A., & Bailes, M. (2008). Swinburne astronomy online: Migrating from "PowerPoint" on CD to a

Web 2.0 compliant delivery infrastructure. *Australasian Journal of Educational Technology, 24*(5), 505-520.

Beckstrom, D. C. (2008). State legislation mandating school *cyberbullying* policies and the potential threat to students' free speech rights. *Vermont Law Review, 33*(2), 283-321.

Berners-Lee, T**.** (1999). *Weaving the Web: The original design and ultimate destiny of the World Wide Web by its inventor*. San Francisco: Harper San Francisco.

Blair, R., & Godsall, L. (2006). One school's experience in implementing E-portfolios. *Quarterly Review of Distance Education, 7*(2), 145-153.

Blood, R. (2002). *The weblog handbook: Practical advice on creating and maintaining your blog*. Cambridge, MA: Perseus Publishing.

Brady, K., & Woolfson, L. (2008). What teacher factors influence their attributions for children's difficulties in learning? *British Journal of Educational Psychology, 78*(4), 527-544.

Buffington, L. M. (2008). Creating and consuming Web 2.0 in art education. *Computers in the Schools, 25*(3), 303-313.

Bull, G., & Garofalo, J. (2006). Commentary: Ubiquitous computing revisited: A new perspective. *Contemporary Issues in Technology and Teacher Education*, *6*(2), 271-274.

Bull, G., Hammond, T., & Ferster, B. (2008). Developing Web 2.0 tools for support of historical inquiry in social studies. *Computers in the Schools, 25*(3), 275-287.

Busch, T., Byer, D., Cator, K., Fadel, C., Fletcher, G., Fox, C., et al. (2007). Maximizing the impact the pivotal role of technology in a 21st century education system. Retrieved June 9, 2009 from http://www.setda.org/c/document_library/get_file?folderId=191&name=P21Book_complete.pdf

Byron, T. (2008). *Safer children in a digital world: The report of the Byron review*. Department for Children, Schools and Department for Culture, Media and Sport, London. Retrieved May 19, 2009, from http://www.dfes.gov.uk/byronreview/

Carter, C. A. (2008). The Panhellenic Project: Assessing learning engagement using Web 2.0 technologies. Doctoral dissertation, Pepperdine University, 2008.

Carvin, A. (2005). Tim Berners-Lee: Weaving a semantic web. Retrieved May 18, 2009, from http://www.digitaldivide.net/articles/view.php?ArticleID=20

Cavus, N. (2007). Assessing the success rate of students using a learning management system together with a collaborative tool in Web-Based teaching of programming languages. *Journal of educational computing research, 36*(3), 301-321.

Chang, C. (2008). Faculty perceptions and utilization of a learning management system in higher education. Doctoral dissertation, Ohio University, 2008.

Chang, C. S. (2008). Development and validation of the computer technology literacy self-assessment scale for Taiwanese elementary school students. *Adolescence*, *43*(171), 623-634.

Chen, Y. L. (2008). Modeling the determinants of Internet use. *Computer & Education, 51*(2), 545-558.

Ciani, K. D., Summers, J. J., & Easter, M. A. (2008). A "top-down" analysis of high school teacher motivation. *Contemporary Educational Psychology, 33*(4), 533-560.

Clyde, A. (2005). *Educational blogging. Teacher Librarian, 32*(3), 43-45.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Collis, B., & Moonen, J. (2008). Web 2.0 tools and processes in higher education: Quality perspectives. *Educational Media International, 45*(2), 93-106.

Converse, J. M., & Presser, S. (1986). *Survey questions: Handcrafting the standardized questionnaire*. Beverly Hills: Sage Publications.

Cook, C., Heath, F., & Thompson, R. L. (2000). A meta-analysis of response rates in Web- or Internet-based surveys. *Educational and Psychological Measurement, 60*(6), 821-36.

Cooke-Plagwitz, J. (2008). New directions in CALL: An objective introduction to Second Life. *CALICO Journal, 25*(3), 547-557.

Copeland, L. (1990). Developing student confidence: The post clinical conference. *Nurse Educator, 15*(1), 7.

Corporation for Public Broadcasting (2002). Connected to the future: A report on children's Internet use from the Corporation for Public Broadcasting. Retrieved June 22, 2009 from http://www.cpb.org/stations/reports/connected/connected_report.pdf

Cuban, L., Kirkpatrick, H., & Peck, C. (2001). High access and low use of technologies in high classrooms: Explaining an apparent paradox. *American Educational Research Journal, 38*(4), 813-834.

Culp, K. M., Honey, M., Mandinach, E., & Bailey, J. (2003). A Retrospective on twenty years of education technology policy. Retrieved July 14, 2009, from http://www.ed.gov/about/offices/list/os/technology/plan/2004/site/docs_and_pdf/20yearsdocrevised.pdf

Curtin, R., Presser, S., & Singer, E. (2005). Changes in telephone survey nonresponse over the past quarter century. *Public Opinion Quarterly, 69*(1), 87-98.

Curts, J., Tanguma, J., & Peña, C. M. (2008). Predictors of Hispanic school teachers' self-efficacy in the pedagogical uses of technology. *Computers in the Schools, 25*(1), 48-63.

Czarnecki, K., & Gullett, M. (2007). Meet the new you: in teen Second Life**,** librarians can leap tall buildings in a single bound and save kids from boring assignments--All before lunch. *School Library Journal, 53*(1), 36-39.

Davidhizar, R. (1993). Self-confidence: A requirement for collaborative practice. *Dimensions of Critical Care Nursing, 12*(4), 218-222.

De Lucia, A., Francese, R., Passero, I., & Tortora, G. (2009). Development and evaluation of a virtual campus on Second Life: The case of second DMI. *Computers & Education, 52*(1), 220-233.

Dehue, F., Bolman, C., & Völlink, T. (2008). Cyberbullying: Youngsters' experiences and parental perception. *CyberPsychology & Behavior, 11*(2), 217-223.

Delacruz, E. (2004). Teachers' working conditions and the unmet promise of technology. *Studies in Art Education, 46*(1), 6-19.

Dickey, M. (2004). The impact of web-logs (blogs) on student perceptions of isolation and alienation in a web-based distance-learning environment. *Open Learning, 19*(3), 279-291.

Dow, M. J. (2007). Assessing information and technology literacy: How do we know our students learn? *School Library Media Activities Monthly, 24*(4), 56-58.

Downes, S. (2004). Educational blogging. *Educause Review, 39*(5), 14-26.

Drexler, W., Baralt, A., & Dawson, K. (2008). The Teach Web 2.0 Consortium: A tool to promote educational social networking and Web 2.0 use among educators. *Educational Media International, 45*(4), 271-283.

Du, H., & Wanger, C. (2006). Weblog success: Exploring the role of technology. *International Journal of Human-Computer Studies, 64*(9), 789-798.

Du, H., & Wanger, C. (2007). Learning with weblogs: Enhancing cognitive and social knowledge construction. *IEEE Transactions on Professional Communication, 50*(1), 1-16.

Eash, E. K. (2006). Podcasting 101 for K-12 librarians. *Computers in Libraries, 26*(4), 16-20.

Evers, W. J. G., Brouwers, A., & Tomic, W. (2002). Burnout and self-efficacy: A study on teachers' beliefs when implementing an innovative educational system in the Netherlands. *British Journal of Educational Psychology, 72*(2), 227-243.

Facebook About. (2010). Retrived July, 1, 2010, from http://www.facebook.com/facebook.

Facebook Resources. (2010). Retrieved July, 1, 2010, from http://www.facebook.com/facebook#!/facebook?v=app_10531514314

Facebook Privacy. (2010). Retrived July, 1, 2010, from http://www.facebook.com/privacy/explanation.php.

Farris-Berg, K. (2005). *Listening to student voices on technology: Today's tech-savvy students are stuck in text-dominated schools.* Retrieved June 2, 2009, from http://www.educationevolving.org/pdf/tech_savy_students.pdf

Faseyitan, S., Libii, J., & Hirschbuhl, J. (1996). An inservice model for enhancing faculty computer self efficacy. *British Journal of Educational Technology*. 27(3), 214-226.

Federal Communications commission: Children's Internet protection act. (2008). Retrieved May 18, 2009, from http://www.fcc.gov/cgb/consumerfacts/cipa.pdf

Ferdig, R., & Trammell, K. (2004). Content delivery in the "blogosphere." *T H E Journal, 31*(7), 12-20.

Field, A. (2005). *Discovering statistics using SPSS: (and sex and drugs and rock'n' roll).* (2nd ed.). London: Sage.

Franklin, T., & Consulting, F. (2007). *Web 2.0 for content for learning and teaching in higher education*. Retrieved April 8, 2009, from: http://www.jisc.ac.uk/media/documents/programmes/digitalrepositories/web2-content-learning-and-teaching.pdf

Frederick, G. R., Schweizer, H., & Lowe, R. (2006). After the in-service course: Challenges of technology integration. *Computers in the Schools, 23*(1), 73-84.

Friedman, T. L. (2006). *The world is flat:* A *brief history of the twenty-first century [updated and expanded]*. New York: Farrar, Straus & Giroux.

Garcia, D. C. (2004). Exploring connections between the construct of teacher efficacy and family involvement practices. *Urban Education, 39*(3), 290-315.

Goddard. R. D., & Goddard, Y. L, (2001) A multilevel analysis of the relationship between teacher and collective efficacy in urban school. *Teaching and Teacher Education, 17*(7), 807-818.

Goddard. R. D. (2002). A theoretical and empirical analysis of the measurement of collective efficacy: The development of a short form. *Educational and Psychological Measurement, 62*(1), 97-110.

Gómez, P., & Rico, L. (2008). Learning within communities of practice in preservice secondary school teachers education. *PNA: Revista De Investigación En Didáctica De La Matemática, 2*(1), 17-28.

Good, J., Howland, K., & Thackray, L. (2008). Problem-Based learning spanning real and virtual words: A case study in Second Life (2008). *ALT-J: Research in Learning Technology, 16*(3), 163-172.

Gray, K., Thompson, C., Clerehan, R., Sheard, J., & Hamilton, M. (2008). Web 2.0 authorship: Issues of referencing and citation for academic integrity. *Internet and Higher Education, 11*(2), 112-118.

Gray, L., & Lewis, L. (2009). *Educational technology in public school districts: Fall 2008 (NCES 2010-003).* National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Washington, DC. Retrieved May 13, 2010, from http://nces.ed.gov/pubs2010/2010003.pdf

Gray, L., Thomas, N., & Lewis, L. (2010a). *Educational technology in U.S. public schools: Fall 2008 (NCES 2010-034).* U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office. Retrieved May 13, 2010 from http://nces.ed.gov/pubs2010/2010034.pdf

Gray, L., Thomas, N., & Lewis, L. (2010b). *Teachers' use of educational technology in U.S. public schools: 2009 (NCES 2010-040).* National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Washington, DC. Retrieved May 13, 2010, from http://nces.ed.gov/pubs2010/2010040.pdf

Gunawardena, C. N., Hermans, M. B., Sanchez, D., Richmond, C., Bohley, M., & Tuttle, R. (2009). A theoretical framework for building online communities of practice with social networking tools. *Educational Media International*, *46*(1), 3-16.

Guskey, T. R. (2000). *Evaluating professional development*. California: Corwin Press.

Hanson-Smith, E. (2006). Communities of practice for pre- and in-service teacher education. In P. Hubbard & M. Levy (Eds.), *Teacher education in CALL* (pp. 301-315). Amsterdam: John Benjamins.

Hanson-Smith, E. (2007). Critical issues: Places and spaces. In J. Egbert & E. Hanson-Smith (Eds.), *Call environments: Research, practice, and critical issues* (2nd ed, pp.42-58). Alexandria, VA: Teachers of English to Speakers of Other Languages.

Hargardon, S. (2007). A little help from my friends: Classroom 2.0 educators share their experiences. *School Library Journal, 53*(10), 44-48.

Harvey, H., & Han, D. (2002). The relevance of open source to hydroinformatics. *Journal of Hydroinformatics, 4*(4), 219-234.

Hayslett, M. M., & Wildemuth, B. M. (2004). Pixels or pencils? The relative effectiveness of Web-based versus paper surveys. *Library & Information Science Research, 26*(1), 73-79.

Heerwegh, D. (2005). Effects of personal salutations in e-mail invitations to participate in a web survey. *Public Opinion Quarterly, 69*(4), 588-598.

Hemmi, A., Bayne, S., & Land, R. (2009). The appropriation and repurposing of social technologies in higher education. *Journal of Computer Assisted Learning, 25*(1), 19-30.

Heun, C. (2006). Teaching tech literacy to the Myspace generation. *Technology & Learning, 27*(4), 19.

Hinduja, S., & Patchin, J. W. (2007). Offline consequences of online victimization: School violence and delinquency. *Journal of School Violence, 6*(3), 89-112.

Hinduja, S., & Patchin, J. W. (2008). Cyberbullying: An exploratory analysis of factors related to offending and victimization. *Deviant Behavior, 29*(2), 129-156.

Hinkle, D. E., Wiersma, W., & Jurs, S. G. (2003). *Applied statistics for the behavioral sciences*. (5th ed.). Boston: Houghton Mifflin.

Hoy, A.W., & Davis, H. A. (2006). Teacher self-efficacy and its influence on the achievement of adolescents. In F. Pajares & T. Urdan (Eds.), *Adolescence and education: Vol. 4. Self-efficacy beliefs of adolescents* (pp. 117-137). Greenwich, CT: Information Age.

Hsieh, P., Cho, Y., Liu, M., & Schallert, D. L. (2008). Examining the interplay between middle school students' achievement goals and self-efficacy in a technology-enhanced learning environment. *American Secondary Education, 36*(3), 33-50.

Huai, N., Braden, J. P., White, J. L., & Elliott, S. N. (2006). Effect of an internet-based professional development program on teachers' assessment literacy for all students. *Teacher Education and Special Education, 29*(4), 36-52.

Hur, J. W., & Brush, T. T. (2009). Teacher participation in online communities: Why do teachers want to participate in self-generated online communities of K-12 teachers? *Journal of Research on Technology in Education, 41*(3), 279-303.

Imperatore, C. (2009). What you need to know about web 2.0. *Techniques: Connecting Education & Careers, 83*(9), 20-23.

International Society for Technology in Education (ISTE). (2008). *National educational technology standards (NETS·T) and performance indicators for teachers*. Retrieved September 16, 2009, from http://www.iste.org/Content/NavigationMenu/NETS/ForTeachers/2008Standards/NETS_T_Standards_Final.pdf

James, J., & Bailey, G. (2002). *Online professional development: A customized approach for technology leaders*. Eugene, Or: International Society for Technology in Education.

Jonassen, D., Howland, J., Marra, R. M., & Crismond, D. (2008). *Meaningful learning with technology* (3rd ed.). Upper Saddle River, N.J. : Pearson/Merrill Prentice Hall.

Jones, S., & Madden, M. (2002). *The Internet goes to college: How students are living in the future with today's technology*. Retrieved July 01, 2009, from http://www.pewinternet.org/~/media/Files/Reports/2002/PIP_College_Report.pdf.pdf

Juvonen, J., & Gross, E. F. (2008). Extending the school grounds?—Bullying experiences in cyberspace. *Journal of School Health, 78*(9), 496-505.

Karaca, E. (2008). An investigation of primary and high school teachers' perception levels of efficacy of measurement and evaluation in education in turkey. *Social Behavior & Personality: An International Journal, 36*(8), 1111-1122.

Kennedy, D. M. (2005). *Challenges in evaluating Hong Kong students' perceptions of Moodle*. Retrieved April 3, 2008, from http://www.ascilite.org.au/conferences/brisbane05/blogs/proceedings/38_Kennedy.pdf

King, K. P. (2002). Educational technology professional development as transformative learning opportunities. *Computers & Education, 39*(3), 283-297.

Kist, W. (2008). “I gave up my space for lent”: New teachers and social networking sites. *Journal of Adolescent & Adult Literacy, 52*(3), 245-247.

Kleiner, A., & Lewis, L. (2003). *Internet access in U.S. public schools and classrooms: 1994-2002 (NCES 2004-11).* Washington, DC: U.S. Department of Education, National Center for Education Statistics.

Knoblauch, D., & Hoy, A. W. (2008). “Maybe I can teach those kids.” the influence of contextual factors on student teachers’ efficacy beliefs. *Teaching & Teacher Education*, *24*(1), 166-179.

Krosnick, J. A. (1999). Survey research. *Annual Review of Psychology, 50*, 537-567.

Lawless, K. A., & Pellegrino, J. W. (2007). Professional development in integrating technology into teaching and learning knowns, unknowns, and ways to pursue better questions and answers. *Review of Educational Research, 77*(4), 575-614.

Leichtman Research Group. (2009). *LRG Research Notes, 2Q 2009*. Retrieved July 10, 2009, from http://www.leichtmanresearch.com/research/notes06_2009.pdf

Lemke, C., Coughlin, E., Garcia, L., Reifsneider, D., & Baas, J. (2009). *Leadership for Web 2.0 in education: Promise and reality.* Culver City, CA: Metiri Group. Commissioned by CoSN through support from the John D. and Catherine T. MacArthur Foundation.

Lenhart, A., & Fox, S. (2006). *Bloggers: A portrait of the internet’s new storytellers*. Retrieved April 11, 2007, from http://www.pewinternet.org/pdfs/PIP%20Bloggers%20Report%20July%2019%202006.pdf

Lenhart, A., & Madden, M. (2007). *Social networking websites and teens: An overview*. Retrieved June 2, 2009, from http://www.pewinternet.org/~/media//Files/Reports/2007/PIP_SNS_Data_Memo_Jan_2007.pdf.pdf

Lenhart, A., Madden, M., & Hitlin, P. (2005). *Teens and Technology*. Retrieved June 2, 2009, from http://www.pewinternet.org/~/media//Files/Reports/2005/PIP_Teens_Tech_July2005web.pdf.pdf

Lenhart, A., Madden, M., Macgill, A. R., & Smith, A. (2007). *Teens and Social Media*. Retrieved June 2, 2009, from http://www.pewinternet.org/~/media//Files/Reports/2007/PIP_Teens_Social_Media_Final.pdf.pdf

Levy, M., & Stockwell, G. (2006). *CALL Dimensions: Options and issues in computer-assisted language learning*. Mahwah, NJ: Lawrence Erlbaum Associates.

Li, Q. (2006). Cyberbullying in schools: A research of gender differences. *School Psychology International*, *27*(2), 157-170.

Li, Q. (2007). New bottle but old wine: A research of cyberbullying in schools. *Computers in Human Behavior*, *23*(4), 1777-1791.

Light, R. J., Singer, J. D., & Willett, J. B. (1990). *By design: Planning reserach on higher education*. Cambridge, MA: Harvard University Press.

List of Wikipedia. (November, 4, 2009). Retrieved November 4, 2009, from http://meta.wikimedia.org/wiki/List_of_Wikipedias

Littrell, A. B., Zagumny, M. J., & Zagumny, L. L. (2005). Contextual and psychological predictors of instructional technology use in rural classrooms. *Educational Research Quarterly, 29*(2), 37-47.

Liu, L. (2008). Web 2.0 articles: content analysis and a statistical model to predict recognition of the need for new instructional design strategies. *Computers in the Schools, 25*(3), 314-328.

Long, J. E., & Moore, R., (2008). Motivating content: How interest and self-efficacy respond to subject matter taught in an alternative teacher education program. *of Catholic Education: A Journal of Inquiry and Practice, 11*(4), 442-464.

Lumpe, A. T., & Chambers, E. (2001). Assessing teachers' context beliefs about technology use. *Journal of Research on Technology in Education, 34*(1), 93-107.

Machado, M., & Tao, E. (2007). *Blackboard vs. Moodle: Comparing user experience of learning management systems*. This paper appears in: Frontiers in education conference - global engineering: knowledge without borders, opportunities without passports, 2007. FIE '07. 37th annual. Retrieved September 29, 2008, from http://collaboration.becta.org.uk/servlet/JiveServlet/previewBody/1240-102-11540/Blackboard%20versus%20Moodle,%20Comparing%20User%20Experience%20of%20LMS.pdf

Maher, D. (2008). Cyberbullying. *Youth Studies Australia, 27*(4), 50-57.

Mak, B., & Coniam, D. (2008). Using wikis to enhance and develop writing skills among secondary school students in Hong Kong. *System: An International Journal of Educational Technology and Applied Linguistics, 36*(3), 437-455.

Maloney, E. (2007).What Web 2.0 can teach us about learning. *The Chronicle of Higher Education, 53*(18), 26.

Margolis, H., & McCabe, P. P. (2006). Improving self-efficacy and motivation: What to do, what to say. *Intervention in School and Clinic, 41*(4), 218-227.

Martin, A. J., & Marsh, H. W. (2006). Academic resilience and its psychological and educational correlates: A construct validity approach. *Psychology in the Schools, 43*(3), 267-281.

McPherson, K. (2006). School library blogging. *Teacher Librarian, 33*(5), 67-69.

Merriam-Webster's Online Dictionary. (2010). s.v. "Self-confidence". Retrieved May 13, 2010 from http://www.merriam-webster.com/dictionary/self--confidence

Meskill, C., Anthony, N., Hilliker-VanStrander, S., Tseng, C., & You, J. (2006). Expert-novice teacher mentoring in language learning technology. In P. Hubbard & M. Levy (Eds.), *Teacher education in CALL* (pp. 284-298). Amsterdam: John Benjamins.

Metiri Group. (2009). *National trends report: Enhancing education through technology (EETT) Round 6, Fiscal Year 2007*. The State Educational Technology Directors Association (SETDA). Washington, DC. Retrieved May22, 2009 from http://www.setda.org/c/document_library/get_file?folderId=6&name=DLFE-329.pdf

Meyers, L. S., Gamst, G., & Guarino, A. J. (2006). *Applied multivariate research: Design and interpretation*. Thousand Oaks, CA: Sage Publications.

Milbrath, Y. C. L., & Kinzie, M. (2000). Computer technology training for prospective teachers: Computer attitudes and perceived self-efficacy. *Journal of Technology and Teacher Education, 8*(4), 373-396.

Milner, H. (2002). A case study of an experienced teacher's self-efficacy and persistence through crisis situations: Theoretical and practical considerations, *The High School Journal, 86*(1), 28-35.

Miners, Z., & Pascopella, A. (2007). The NEW Literacies. *District Administration, 43*(10), 26-34.

Mitra, A., Jain-Shukla, P., Robbins, A., Champion, H., & Durant, R. (2008). Differences in rate of response to web-based surveys among college students. *International Journal on E-Learning, 7*(2), 265-281.

Morales, C., Knezek, G., & Christensen, R. (2008). Self-efficacy ratings of technology proficiency among teachers in Mexico and Texas. *Computers in the Schools, 25*(1), 126-144. doi:10.1080/07380560802158004.

Mueller, D. J. (1986). *Measuring social attitudes*. New York, NY: Teachers Collee, Colubmia University.

Munroe-Chandler, K., Hall, C., & Fishburne, G. (2008). Playing with confidence: The relationship between imagery use and self-confidence and self-efficacy in youth soccer players. *Journal of Sports Sciences*, *26*(14), 1539-1546.

Mustacchi, J. (2009). R U Safe? *Educational Leadership*, *66*(6), 78-82.

MySpace.com Terms of Use Agreement. (June, 25, 2009). Retrieved November 4, 2009, from http://www.myspace.com/index.cfm?fuseaction=misc.terms

MySpace.com Fact Sheet. Retrieved July, 1, 2010, from http://www.myspace.com/pressroom?url=/fact+sheet/

National Center for Education Statistics (NCES). (2000). *Teacher use of computer and the Internet in public schools.* Retrieved May 26, 2009, from http://nces.ed.gov/pubs2000/2000090.pdf

National Center for Education Statistics (NCES). (2005a). *Characteristics of public teachers' professional development activities: 1999-2000.* Retrieved May 26, 2009, from http://nces.ed.gov/pubs2000/2000090.pdf

National Center for Education Statistics (NCES). (2005b). *Computer technology in the public school classroom: Teacher perspectives.* Retrieved May 22, 2009, from http://nces.ed.gov/pubs2005/2005083.pdf

National Educational Technology Standards (NETS). (2005). *NETS for teachers: Achievement rubric*. Retrieved September 16, 2009, from http://www.ncrel.org/tech/nets/nets-t-rubric.pdf

Niederhauser, D. S., & Perkmen, S. (2008). Validation of the Intrapersonal technology integration scale: Assessing the influence of intrapersonal factors that influence technology integration. *Computers in the Schools, 25*(1), 98-111.

Ning. (2009). Retrieved June 3, 2009, from http://arted20.ning.com/

Norton, P., & Hathaway, D. (2008). On its way to K-12 classrooms, Web 2.0 goes to graduate school. *Computers in the Schools, 25*(3), 163-180.

O'Reilly, T. (2005). *What is Web 2.0: Design Patterns and Business Models for the next generation of software*. Retrieved April 9, 2009, from

http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html

Oatman, E. (2005a). Blogomania! *School Library Journal, 51*(8), 36-39.

Oatman, E. (2005b). Make Way for wikis. *School Library Journal, 51*(11), 52-54.

Ohio University. (2009). Retrieved July 25, 2009, from http://www.ohio.edu

Oliver, K. (2007). Leveraging web 2.0 in the redesign of a graduate-level technology integration course. *TechTrends: Linking Research & Practice to Improve Learning, 51*(5), 55-61.

Overbaugh, R.; & Lu, R. (2008). The impact of a NCLB-EETT funded professional development program on teacher self-efficacy and resultant implementation. *Journal of Research on Technology in Education, 41*(1), 43-61.

Pajares, F., & Schunk, D. H. (2002). Self and self-belief psychology and education: A historical perspective. In J. Aronson (Ed.), Improving academic achievement: Impact of psychological factors on education (pp.3-21). San Diego, CA: Elsevier Science.

Pajares, F. (2002). *Overview of social cognitive theory and of self-efficacy*. Retrieved April 22, 2009, from http://www.emory.edu/EDUCATION/mfp/eff.html

Paraskea, F., Bouta, H., & Papagianni, A. (2008). Individual characteristics and computer self-efficacy in secondary education teachers to integrate technology in education practice, *Computers & Education, 50*(3), 1084-1091.

Partnership for 21st Century Skills. (2007). *Maximizing the impact: The pivotal role of technology in a 21st century system*. Retrieve June 9, 2009 from http://www.21stcenturyskills.org/documents/p21setdaistepaper.pdf.

Partnership for 21st Century Skills. (2008). *21st century skills, education and competitiveness Guide*. Retrieved June 9, 2009 from http://www.21stcenturyskills.org/documents/21st_century_skills_education_and_competitiveness_guide.pdf

PBWorks: Education features. (2010). Retrieved May 18, 2010 from http://pbworks.com/content/edu+features?utm_campaign=nav-tracking&utm_source=Top%20navigation

Pellegrino, J. W., Goldman, S. R., & Lawless, K. (2007). Teacher education and technology: Initial results from the "What works and why" project. *Yearbook of the National Society for the Study of Education, 106*(2), 52-68.

Penrod, D. (2008). Web 2.0, meet literacy 2.0. *Educational Technology Magazine: The Magazine for Managers of Change in Education*, *48(*1), 50-52.

Penuel, W. R. (2006). Implementation and effects of one-to-one computing initiatives: A research synthesis. *Journal of Research on Technology in Education, 38*(3), 329-348.

Perkins, M., & Pfaffman, J. (2006). Using a course management system to improve classroom communication. *The Science Teacher, 73*(3), 33-37.

Piecka, D., Studnicki, E., & Zuckerman-Parker, M. (2008). A proposal for ozone science podcasting in a middle science classroom. *Association for the Advancement of Computing In Education Journal, 16*(2), 203-233.

Poling, C. (2005). Blog on: Building communication and collaboration among staff and students. *Learning & Leading with Technology, 32*(6), 12-15.

Poulou, M., & Norwich, B. (2002). Cognitive, emotional and behavioral responses to students with emotional and behavioral difficulties: A model of decision making. *British Educational Research Journal, 28*(1), 111-138.

Poulou, M. (2005). Educational psychology within teacher education. *Teachers & Teaching, 11*(6), 555-574.

Prensky, M. (2001). Digital natives, digital immigrants. *On the Horizon, 9*(5), 1-6.

Project Tomorrow. (2008). *Speak up 2007 for students, teachers, parents & school leaders selected nationalfFindings - April 8, 2008*. Retrieved July 10, 2009, from http://www.tomorrow.org/docs/National%20Findings%20Speak%20Up%202007.pdf

Project Tomorrow. (2009a). *Learning in the 21st century: 2009 trends update*. Retrieved July 15, 2009, from http://www.blackboard.com/resources/k12/Bb_K12_09_TrendsUpdate.pdf

Project Tomorrow. (2009b). *Selected national findings: Speak up 2008 for students, teachers, parents and administrators*. March 24, 2009. Retrieved May 13, 2010, from

http://www.tomorrow.org/docs/SU08_selected%20national_findings_complete.pdf

Project Tomorrow. (2010a). *Creating our future: Students speak up about their vision for 21st century learning***.** Retrieved May 13, 2010, from http://www.tomorrow.org/speakup/pdfs/SU09NationalFindingsStudents&Parents.pdf

Project Tomorrow. (2010b). *Unleashing the future: Educators speak up about the use of emerging technologies for learning*. Retrieved May 13, 2010, from http://www.tomorrow.org/speakup/pdfs/SU09UnleashingTheFuture.pdf

Repman, J., Zinskie, C., & Carlson, R. (2005). Effective use of CMC tools in interactive online learning. *Digital Object Identifier, 25*(22), 57-69.

Richardson, W. (2005). New Jersey high school learns the ABCs of blogging. *T H E Journal, 32*(11), 40.

Richardson,W. (2006). *Blogs, wikis, podcasts, and other powerful Web tools for classrooms*. Thousand Oaks, CA, Corwin Press.

Rickard, A., Blin, F., & Appel, C. (2006). Training for trainers: Challenges, outcomes, and principles of in-service training across the Irish education system. In P. Hubbard & M. Levy (Eds.), *Teacher education in CALL* (pp. 203-218). Amsterdam: John Benjamins.

Ropp, M. (1999). Exploring individual characteristics associated with learning to use computers in preservice teacher preparation. *Journal of Research on Computing in Education, 31*(4), 402-425.

Rosen, D., & Nelson, C. (2008). Web 2.0: A new generation of learners and education. *Computers in the Schools, 25*(3), 211-225.

Rosenbloom, A. (2004). The blogosphere. *Communications of the ACM, 47*(12), 31-33.

Ross, J., & Bruce, C. (2007). Professional development effects on teacher efficacy: Results of a randomized field trial. *The Journal of Educational Research, 101*(1), 50–60.

Rymaszewski, M., Au, W.J., Wallace, M., Winters, C., Ondrejka, C., & Batstone-Cunningham, B. (2007). *Second life: The official guide*. Hoboken, NJ: John Wiley & Sons.

Schramm, A., & Mabbott, A. (2007). Implementing an online ESL teacher education program. In Hanson-Smith, E & Rilling, S. (Ed.), *Learning language through technology* (pp. 245-256). Alexandria, Boston: Teachers of English to Speakers of Other Languages.

Scott, S., & Baker, R. G. (2003). Determining the effectiveness of a teacher preparation course by exploring the transfer of complex teaching models by graduates. *Asia-Pacific Journal of Teacher Education, 31*(1), 67-85.

Selwyn, N. (2007). *Web 2.0 applications as alternative environments for informal learning – a critical review*. Paper for OCEDKERIS expert meeting. Session 6 – alternative learning environments in practice: using ICT to change impact and outcomes. Retrieved April 8, 2009 from http://www.oecd.org/dataoecd/32/3/39458556.pdf

Shaffer, S., Lackey, S., & Bolling, G. (2006). Blogging as a venue for nurse faculty development. *Nursing Education Perspectives, 27*(3), 126-128.

Shannon, D. M., & C. C. Bradshaw. (2002). A comparison of response rate, response time, and costs of mail and electronic surveys. *Journal of Experimental Education, 70*(2), 179-92.

Sharples, M., Graber, R., Harrison, C., & Logan, K. (2009). E-safety and web 2.0 for children aged 11-16. *Journal of Computer Assisted Learning, 25*(1), 70-84.

Shechtman, Z., Levy, M., & Leichtentritt, J. (2005). Impact of life skills training on teachers' perceived environment and self-efficacy. *The Journal of Education Research, 98*(3), 144-154.

Shih, T., & Fan, X. (2008). Comparing response rates from Web and mail surveys: A meta-analysis. *Field Methods, 20*(3), 249-271.

Siegle, D., & McCoach, D. B.(2007). Increasing student mathematics self-efficacy through teacher training. *Journal of Advanced Academics, 18*(2), 278-312.

Simonson, M. (2007). Course management systems. *The quarterly review of Distance Education, 8*(1), vii-ix.

Siwatu, K. O. (2007). Preservice teachers' culturally responsive teaching self-efficacy and outcome expectancy beliefs. *Teaching & Teacher Education, 23*(7), 1086-1101.

Skiba, D. (2006). WEB 2.0: Next great thing or just marketing hype? *Nursing Education Perspectives, 27*(4), 212-214.

Slonje, R., & smith, P. K. (2008). Cyberbullying: Another main type of bullying? *Scandinavian Journal of Psychology, 49*(2), 147-154.

Smith, P., Mahdavi J., Carvalho M., & Tippett N. (2006). *An investigation into cyberbullying, its forms, awareness and impact, and the relationship between age and gender in cyberbullying*. A Report to the Anti-Bullying Alliance. Retrieved May 19, 2009 from http://www.dcsf.gov.uk/research/data/uploadfiles/RBX03-06.pdf

Smith, P. K., Mahdavi, J., Carvalho, M., Fisher, S., Russell, S., & Tippett, N. (2008). Cyberbullying: Its nature and impact in secondary school pupils. *Journal of Child Psychology & Psychiatry, 49*(4), 376-385.

Solomon, G., & Schrum, L. (2007). *Web 2.0: New tools, new schools*. Eugene, OR: International Society for Technology in Education.

Statistic Facebook. (2010). Retrieved July, 1, 2010, from http://www.facebook.com/press/info.php?statistics

Stevens, J. P. (1999). *Intermediate statistics: A modern approach*. Mahwah, N.J.: Lawrence Erlbaum Associates.

Terms and Conditions (2009). Retrieved November 4, 2009, from http://classblogmeister.com/index.php

The open source definition (n.d.). Retrieved September 22, 2009, from http://www.opensource.org/docs/osd

Thomas, L. G., & Knezek, D. G. (1995). *Technology literacy for the Nation and for its Citizens*. Retrieved September 30, 2009 from

http://www.iste.org/Content/NavigationMenu/Research/Reports/Technology_Literacy_White_Paper_1995_/Technology_Literacy_for_the_Nation_and_for_Its_Citizens.htm

Trotter, A. (2008). Market for K-12 course-management systems expands. *Education Digest, 73*(9), 17-20.

Tschannen-Moran, M., & Hoy, A. W. (2007). The differential antecedents of self-efficacy beliefs of novice and experienced teachers. *Teaching and Teacher Education*, *23*(6), 944-956.

Tu, C., Blocher, M., & Ntoruru, J. (2008a). Integrate Web 2.0 technology to facilitate online professional community: EMI special editing experience. *Educational Media International*, *45*(4), 335-341.

Tu, C., Blocher, M., & Roberts, G. (2008b). Constructs for Web 2.0 learning environments: A theatrical metaphor. *Educational Media International, 45*(4), 253-269.

U.S. Census of Bureau. (2009a). *Census bureau regions and divisions with state FIPS codes*. Retrieved September 16, 2009, from http://www.census.gov/popest/geographic/codes02.html

U.S. Census of Bureau. (2009b). *National and state population estimates*. Retrieved September 16, 2009, from http://www.census.gov/popest/states/NST-ann-est.html

U.S. Department of Education. (2001). *No child left behind (Publication No. 107-110).* Retrieved November 19, 2009, from http://www.ed.gov/policy/elsec/leg/esea02/107-110.pdf

U.S. Department of Education. (2004). *Toward a new golden age in American education: How the Internet, the law and today's students are revolutionizing expectations*. Retrieved July 14, 2009, from http://www.ed.gov/about/offices/list/os/technology/plan/2004/plan.pdf

U.S. Department of Education. (2008). *National educational technology trends study: Local-level data summary*. Retrieved July 14, 2009, from http://www.ed.gov/rschstat/eval/tech/netts/netts-local.pdf

Vannatta, R. A., & Fordham, N. (2004). Teacher dispositions as predictors of classroom technology use. *Journal of Research on Technology in Education, 36*(3), 253-271.

Villano, M. (2008). What Are We Protecting Them From? *T.H.E. Journal, 35*(5), 48-54.

Vogel, T., & Goans, D. (2005). Delivering the news with blogs: the Georgia State University library experience. *Internet Reference Services Quarterly, 10*(1), 5-27.

Wang, L., Ertmer, P.A., & Newby, T. J. (2004). Increasing preservice teachers' self-efficacy beliefs for technology integration. *Journal of Research on Technology in Education. 36*(3), 231-250.

Warner, R. M. (2008). *Applied statistics: for bivariate through multivariate techniques.* Thousand Oaks, CA: Sage Publications.

Watson, G. (2006). Technology professional development: Long-term effects on teacher self-efficacy. *Journal o/Technology and Teacher Education, 14*(1), 151-165.

Watson, W. R., & Watson, S. L. (2007). An argument for clarity: What are learning management systems, what are they not, and what should they become? *TechTrends, 51*(2), 28-34.

Wells, J., & Lewis, L. (2006). *Internet Access in U.S. public schools and classrooms: 1994–2005.* (NCES 2007-020). U.S. Department of Education. Washington, DC: National Center for Education Statistics.

Wenger, E. (2003). Communities of practice and social learning systems. In D. Nicolini., S. Gherardi., & D. Yanow (Eds), *Knowing in organizations: A practice-based approach* (pp. 76-99). Armonk, N.Y.: M.E. Sharpe.

White, K. A. (2009). Self-confidence: A concept analysis. *Nursing Forum, 44*(2), 103-114.

Wikipedia. (May, 18, 2010). Retrieved May 18, 2010 from http://en.wikipedia.org/wiki/Wikipedia

Wikispaces: Private label. (May, 18, 2010). Retrieved May 18, 2010 from http://www.wikispaces.com/site/privatelabel

Williams, B. (2007). *Educator's podcast guide*. Eugene, Or.: International Society for Technology in Education.

Wisker, G., Robinson, G., & Shacham, M. (2007). Postgraduate research success: Communities of practice involving cohorts, guardian supervisors and online communities. *Innovations in Education & Teaching International, 44*(3), 301-320.

Wolak, J., Finkelhor, D., Mitchell, K. J., & Ybarra, M. L. (2008). Online 'predators' and their victims: myths, realities and implications for prevention and treatment. *American Psychologist, 63*(2), 111-128.

Wolters, C. A., & Daugherty, S. G. (2007). Goal structures and teachers' sense of efficacy: Their relation and association to teaching experience and academic level. *Journal of Educational Psychology, 99*(1), 181-193.

Wong, L., & Benson, P. (2006). In-service CALL education: What happens after the course is over? In P. Hubbard & M. Levy (Eds.), *Teacher education in CALL* (pp. 251-264). Amsterdam: John Benjamins.

Wozney, L., Venkatesh, V., & Abrami, P. C. (2006). Implementing computer technologies: Teachers' perceptions and practices. *Journal of Technology and Teacher Education, 14*(1), 173-207.

Wright, N. (2007). Building literacy communities of practice across subject disciplines in secondary schools. *Language & Education: An International Journal, 21*(5), 420-433.

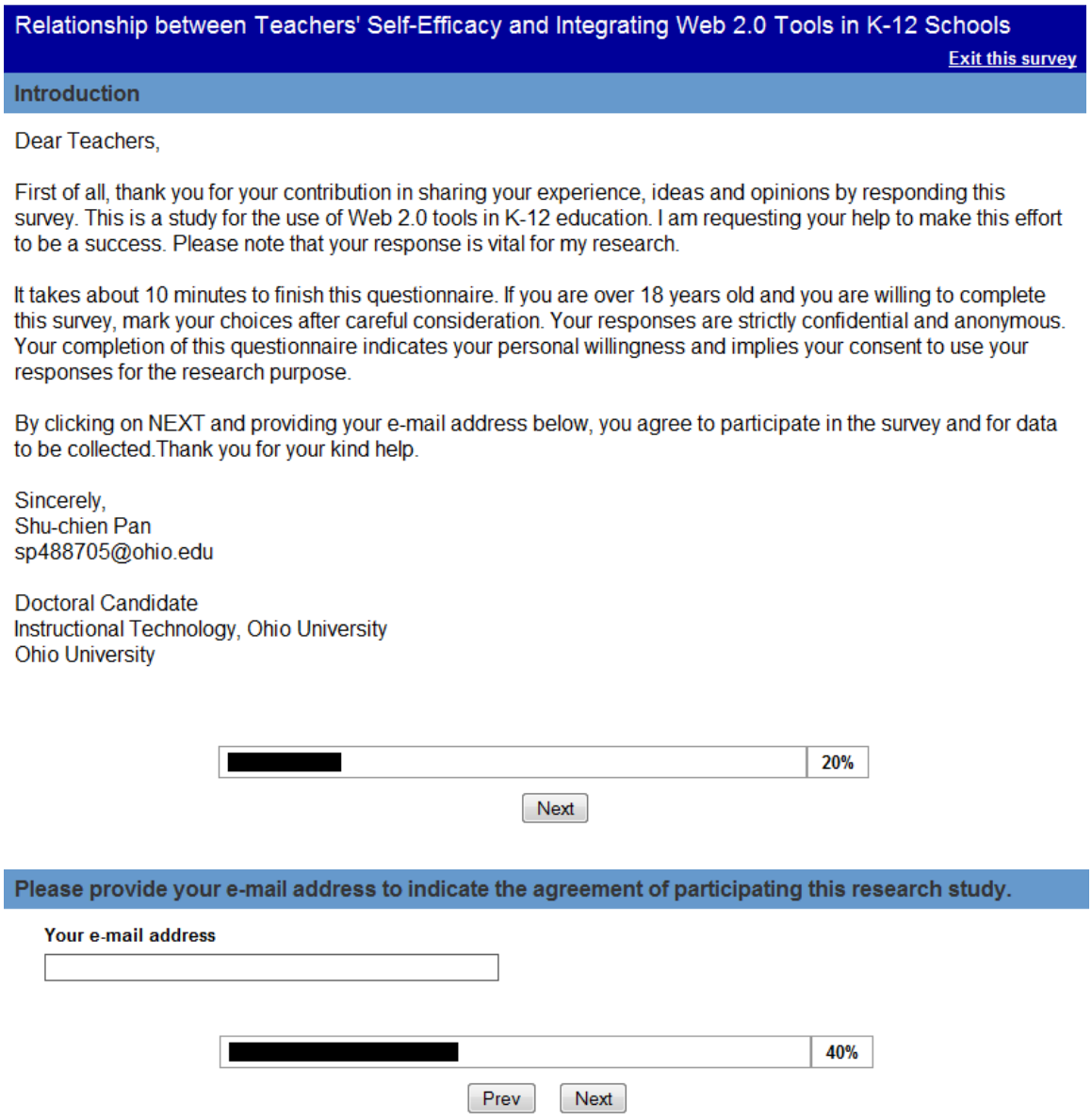
Yilmaz, A. (2009). Self-efficacy perceptions of prospective social studies teachers in relation to history teaching. *Education, 129*(3), 506-520.

Yuen, A. H. K., & Ma, W. W. K. (2008). Exploring teacher acceptance of e-learning technology. *Asia-Pacific Journal of Teacher Education, 36*(3), 229-243.

Zhao, Y., Pugb, K., Sheldon, S., & Byers, J. L. (2002). Conditions of classroom technology innovations. *Teachers College Record, 104*(3), 482-515.

Zulkosky, K. (2009). Self-Efficacy: A concept analysis. *Nursing Forum, 44*(2), 93-102.

APPENDIX A: SURVEY SCREEN SHOT



Relationship between Teachers' Self-Efficacy and Integrating Web 2.0 Tools in K-12 Schools

Exit this survey

Introduction

Dear Teachers,

First of all, thank you for your contribution in sharing your experience, ideas and opinions by responding this survey. This is a study for the use of Web 2.0 tools in K-12 education. I am requesting your help to make this effort to be a success. Please note that your response is vital for my research.

It takes about 10 minutes to finish this questionnaire. If you are over 18 years old and you are willing to complete this survey, mark your choices after careful consideration. Your responses are strictly confidential and anonymous. Your completion of this questionnaire indicates your personal willingness and implies your consent to use your responses for the research purpose.

By clicking on NEXT and providing your e-mail address below, you agree to participate in the survey and for data to be collected.Thank you for your kind help.

Sincerely,
Shu-chien Pan
sp488705@ohio.edu

Doctoral Candidate
Instructional Technology, Ohio University
Ohio University

20%

Next

Please provide your e-mail address to indicate the agreement of participating this research study.

Your e-mail address

40%

Prev Next

Web 2.0 Tools Integration

Please check how often do you use the following Web 2.0 tools with your students (check one for each category) and indicate what kinds of Web 2.0 tools do you use.

Please Check one for each category

	Daily	At least once /week	At least once/ month	At least once/ year	Never
Blog	○	○	○	○	○

List Blog you use for teaching

Please Check one for each category

	Daily	At least once /week	At least once/ month	At least once/ year	Never
Wiki	○	○	○	○	○

List Wiki you use for teaching

Please Check one for each category

	Daily	At least once /week	At least once/ month	At least once/ year	Never
Podcast	○	○	○	○	○

List Podcast you use for teaching

Please Check one for each category

	Daily	At least once /week	At least once/ month	At least once/ year	Never
Social Networking Sites(Ex: Facebook, MySpace, Second Life,...etc.)	○	○	○	○	○

List Social Networking Sites you use for teaching

Please Check one for each category

	Daily	At least once /week	At least once/ month	At least once/ year	Never
Image/Photo Sharing sites(Ex: Flickr, Picasa, ...etc.)	○	○	○	○	○

List Image/Photo Sharing sites you use for teaching

Please Check one for each category

	Daily	At least once /week	At least once/ month	At least once/ year	Never
Course Management Systems (Ex: Angel, Blackboard, Moodle, WebCT,...ect.)	○	○	○	○	○

List Course Management Systems you use for teaching

60%

Prev Next

Web 2.0 Integration Self-efficacy

Please rate your level of agreement using the follow scale: Strongly Agree(SA), Agree(A), Neutral(N), Disagree(D), Strongly Disagree(SD).

When using Web 2.0 tools in teaching, I feel confident that I can…

	Strongly Agree(SA)	Agree(A)	Neutral(N)	Disagree(D)	Strongly Disagree(SD)
create my own blog (to be accessed by my students as part of a lesson)					
post news or comment on a blog					
edit or delete information on a blog					
add links on a blog					
upload attached files on a blog					
add information on a wiki					
edit information on a wiki					
delete information on a wiki					
revise the information version for what I want on a wiki (use the history record tool to verify the version I want)					
upload files to wiki, such as pictures, PowerPoint, word documents, pdf files, …ect.					
use computers to create podcast, such as mp3 file					
use podcast software or applications to record, edit and convert audio file into mp3 file					
upload podcast files online					
download podcast files online					
use RSS feed to subscribe podcast files					
create my own social network site					
post information on social network sites					
maintain contact with my friends through social network sites					
invite friends to join my social network site					
set up profile security level of my social networking sites					
create an Image/Photo Sharing Site account					
use Image/Photo Sharing Sites to upload images/photos online					
use Image/Photo Sharing Sites to edit images/photos(such as add text, resize image, add tags)					
use Image/Photo Sharing Sites to create slideshow or video presentation					
post comment on Image/Photo Sharing Sites					
use a course management system to manage classroom materials, such as post syllabus and curriculum documents					
arrange the layout of my course management system site, such as display course material as weekly, topics or social issues					
use course management system embedded tools to communicate and interactive with my students, such as Blog, wiki, announcement, chat room					
use a course management system to create quizzes for my students online					
use a course management system to assess the progress of my students					

80%

Prev Next

Demographic information

Please check the answer most apply to you.

Gender

- ◯ Male
- ◯ Female

Age

[ ]

Education Status

- ◯ BA
- ◯ MA
- ◯ PHD
- ◯ Other (please specify)

[ ]

What grade level do you teach currently?

- ◯ K-5
- ◯ 6-8
- ◯ 9-12
- ◯ Other (please specify)

[ ]

Which subject areas do you teach? (check all that apply)

- ☐ Computers
- ☐ Mathematics
- ☐ Second Languages
- ☐ Fine Arts
- ☐ Music
- ☐ Social Studies
- ☐ Health
- ☐ Physical Education
- ☐ Special Education
- ☐ Language Arts
- ☐ Science
- ☐ Vocational education
- ☐ Other (please specify)

[ ]

Do you have access to Web 2.0 tools at school?

- ◯ Yes
- ◯ No

Do you have access to Web 2.0 tools at home?

- Yes
- No

Do you have access to Web 2.0 tools through mobile devices(Ex: iPhone, iPod,...etc)?

- Yes
- No

Do you access the Internet at school?

- Yes
- No

Do you access the Internet at home?

- Yes
- No

Do you access the Internet through mobile devices (Ex: iPhone, iPod,...etc)?

- Yes
- No

How many hours of professional development (such as workshops, computer courses, seminars, conferences) in related to technology did you take during past school year? (Please insert numbers of hours)

How many years have you taught as of the end of this past school year? (Please insert numbers of years)

How long have you been using technology for teaching in your classrooms as of the end of this past school year? (Please insert numbers of years)

How many hours do you use the computer to teach in your classrooms per week typically?(Please insert numbers of hours)

The school I am working at now supports (offers resources in) the use of Web 2.0 tools?

- We already used Web 2.0 tools for a while
- We are starting to use Web 2.0 tools
- We are investigating using Web 2.0 tools
- We do not use Web 2.0 tools
- Do not know what you are talking about - Web 2.0 tools

If you have any suggestions for using Web 2.0 tools with your students, please provide your comment below.

100%

Prev Done

APPENDIX B: INVITATION LETTER TO REQUEST PARTICIPATING FOR THIS STUDY

Subject: Requesting Participation in Research Study

Dear XX (first name last name)

Hello, I am Shu-chien Pan, a doctoral candidate in Instructional Technology at Ohio University. I would like to invite you to participate in my research study entitled "Relationship between Teachers' Self-Efficacy and the Integrating Web 2.0 Tools in K-12 Schools." It is online questionnaire and will take you approximately 10 minutes to complete. Please note the information you provide for this study is confidential.

The demand to use computer technology tools to enhance learning by digital learners has increased in recent years in K-12 schools. Your students are those who have grown up embracing a diversity of technology tools in their personal activities and academic school work.

The purpose of this study is to investigate the current use of the Web 2.0 tools in K-12 classrooms in the United States. Professional development is an important component in helping teachers learn to use technology in their classrooms. The data from my study will help to identify the professional development needs of teachers.

To participate, please click the following URL link to complete the survey online.
http://www.surveymonkey.com/s/77Y2C9T

If you are not interested in participating, please reply to this e-mail and leave the message area blank.

Thank you for helping me to complete my research to earn a doctoral degree.

Sincerely,

Shu-chien Pan

Doctoral Candidate

sp488705@ohio.edu

Instructional Technology

Ohio University

Advisor
Dr. Teresa Franklin
Associate Professor
Phone: (740) 593-4561
McCracken Hall 313 D
franklit@ohio.edu
Instructional Technology
Ohio University

APPENDIX C: FOLLOW-UP REMINDERS TO REQUEST PARTICIPATING FOR THIS STUDY

Subject: **Reminder**: Requesting Participating in a Research Study

Dear XX (first name last name)

Hello, I am Shu-chien Pan, a doctoral candidate in Instructional Technology at Ohio University. I am sorry to bother you again during your very busy schedule.

I'm sending you this note as a **reminder** to invite you to participate in my research study entitled "Relationship between Teachers' Self-Efficacy and the Integrating Web 2.0 Tools in K-12 Schools." It is online questionnaire and will take you approximately 10 minutes to complete. Please note the information you provide for this study is confidential.

The demand to use computer technology tools to enhance learning by digital learners has increased in recent years in K-12 schools. Your students are those who have grown up embracing a diversity of technology tools in their personal activities and academic school work.

The purpose of this study is to investigate the current use of the Web 2.0 tools in K-12 classrooms in the United States. Professional development is an important component in helping teachers learn to use technology in their classrooms. The data from my study will help to identify the professional development needs of teachers.

To participate, please click the following URL link to complete the survey online.

http://www.surveymonkey.com/s/77Y2C9T

If you are not interested in participating, please reply to this e-mail and leave the message area blank.

Thank you for helping me to complete my research to earn a doctoral degree.

Sincerely,

Shu-chien Pan

Doctoral Candidate

sp488705@ohio.edu

Instructional Technology

Ohio University

Advisor
Dr. Teresa Franklin
Associate Professor
Phone: (740) 593-4561
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Instructional Technology
Ohio University

APPENDIX D: SAMPLES AND RESPONSE RATE OF EACH STATE

Samples and Response Rate of Each State

Regions	States	Target Sample	Sent Sample	Survey Response	No Interest Response	All Response
Midwest	Illinois	372	368	17.12%	1.90%	19.02%
	Wisconsin	162	164	9.76%	1.83%	11.59%
	North Dakota	18	30	26.67%	3.33%	30.00%
Northeast	New York	570	605	13.39%	3.80%	17.19%
	Connecticut	102	102	18.63%	3.92%	22.55%
	Vermont	18	53	13.21%	1.89%	15.09%
South	Texas	627	632	10.13%	3.16%	13.29%
	Louisiana	132	155	10.97%	3.23%	14.19%
	Delaware	21	29	13.79%	0%	13.79%
West	California	1,017	1,018	14.93%	3.14%	18.07%
	Nevada	60	86	24.42%	0%	24.42%
	Wyoming	15	46	19.57%	4.35%	23.91%
Total		3,114	3,288	14.02%	2.55%	17.00%

APPENDIX E: SURVEY OF PILOT STUDY

Web 2.0 Tools Integration

Part A: Please check what kinds of Web 2.0 tools you use most often with your students? (Check one for each category)

1. Blog: ☐ Class Blomeister ☐ Drupal ☐ Edblogs ☐ Gaggle Blog
   ☐ others (please specify_____) ☐ None
2. Wiki: ☐ PBworks ☐ Wikispaces ☐ others (please specify_____)
3. Podcast : ☐ Audacity ☐ others (please specify_____)
4. Upload or download video: ☐ YouTube ☐ Teachertube
   ☐ others (please specify_____)
5. Social networking: ☐ Facebook ☐ MySpace ☐ Second Life
   ☐ others (please specify_____)
6. Image sharing/ editing: ☐ GIMP ☐ iPhoto ☐ PhotoStory 3 ☐ PhotoShop
   ☐ TuxPaint ☐ others (please specify_____)
7. Digital Story telling: ☐ Flicker ☐ iMovie ☐ Movie Maker
   ☐ others (please specify_____)
8. Learning Management System (LMS): ☐ Angel ☐ Blackboard
   ☐ Moodle ☐ WebCT ☐ others (please specify_____)
9. Instant message: ☐ Cell phone messaging ☐ MSN ☐ Yahoo Messenger
   ☐ Skype ☐ others (please specify_____)
10. Google education: ☐ Blogger ☐ Google Doc ☐ Google Earth
    ☐ Reader ☐ Sketch up ☐ others (please specify_____)

Please offer your comment about the above questionnaires (such as if wording of the statements are confusing or unclear, or some items need to be deleted or added)

_____

Part B: Please check how often do you use the following Web 2.0 tools with your students? (Check one for each category)

Web 2.0 tools/applications	Daily	At least once/ week	At least once/ month	At least once /year	Never
• Blog (Ex: Blogger, Class Blomeister, Drupal, Edblogs, Gaggle Blog)					

• Wiki (Ex: PBworks, Wikispaces) • Podcast (Ex: Audacity) • Upload or download video online (Ex: own websites, YouTube, Teachertube) • Social networking (Ex: Facebook, MySpace, Second Life) • Image sharing/ editing (Ex: GIMP, iPhoto, PhotoStory 3, TuxPaint) • Digital Story telling (Ex: Flicker, iMovie, MovieMaker) • Learning management system - LMS(Ex: Angel, Blackboard, Moodle, WebCT) • Instant message (Ex: Cell phone messaging, MSN, Yahoo Messenger, Skype) • Google Education (Ex: Google Doc, Google Earth, Picasa, Google Reader, Sketch Up)					

Please list any of Web 2.0 tools you have used with your students but are not included in the above list? _____

Please offer your comment about the above list (such as if wording of the statements are confusing or unclear, or some items need to be deleted or added)

_____

Web 2.0 Integration Self-efficacy

Please rate your level of agreement using the follow scale:

Strongly Agree(A) Neutral(N) Disagree(D) Strongly Disagree(SD)

When using Web 2.0 tools in teaching, I feel confident that I can…	SA	A	N	D	SD
1. create my own blog (to be accessed by my students as part of a lesson)					
2. post news or comment on a blog					
3. edit or delete information on a blog					
4. add links on a blog					
5. upload attached files on a blog					
6. add information on a wiki					
7. edit information on a wiki					
8. delete information on a wiki					

9. revise the information version for what I want on a wiki (use the history record tool to verify the version I want)
10. upload files to wiki, such as pictures, PowerPoint, word documents, pdf files
11. use computers to create podcast, such as mp3 file
12. use Audacity to record, edit and convert audio file into mp3 file
13. upload or download podcast files online
14. use RSS feed to subscribe podcast files
15. download and upload video clips/segments online
16. create my own social network site
17. post information on social network sites
18. maintain contact with my friends through social network sites
19. invite friends to join my social network site
20. access into Second Life to talk to other people
21. use image sharing/editing tools to upload images/ photos online
22. use image sharing/editing tools to edit images/ photos (such as add text, resize image, add tags)
23. use image sharing/editing tools to create graphics (such as logo, icon)
24. use image sharing/editing tools to create slideshow presentation
25. use image sharing/editing tools to add illustration or narrative on images/ photos
26. use still images/photos to create digital stories
27. use still images/photos to create movies
28. add up audio sound (such as background music or narrative) on my movies
29. edit video clip to create movie
30. publish my movies as common video files, such as wmv, mov, mp4 files so that others can review them easily (without using specific software, such as iMovie, MovieMaker)
31. manage classroom materials, such as post syllabus and curriculum documents
32. arrange the layout of my LMS site, such as display course material as weekly, topics or social issues
33. use embedded tools to communicate and interactive with my students, such as Blog, wiki, announcement, chat room
34. create quizzes for my students online
35. assess the progress of my students
36. send instant message through mobile phone
37. review instant message on mobile gadgets
38. chat with friends online by text message, such as use MNS, yahoo messenger
39. chat with friends online by audio voice, such as use Skype
40. chat with friends and see their video image online
41. use Google Doc to create documents

42. use Google Doc to share, edit, and create documents with other people
43. locate places from the Google Earth easily
44. use Google reader to keep and organize update information, such as e-mail, blog, and news
45. use Sketch up to design building

Please offer your comment about the above questionnaires (such as if wording of the statements are confusing or unclear, or some items need to be deleted or added)

_____

Demographic information

Please check the answer most apply to you.

1. Gender: ___ male ___ female
2. Age: ___ years old
3. Education Status: □ Undergraduate □ Graduate □ Doctoral
4. What grade level do you teach or do you hope to teach?
   □Kindergarten □K-3 □4-6 □7-9 □10-12 □undergraduate □graduate □adult
5. Which subject areas do you teach or do you hope to teach? (check all that apply)
6. ☐ Mathematics ☐ Science ☐ Physical Education
   ☐ Vocational education ☐ Social Studies ☐ Music
   ☐ Second Languages ☐ Special Education ☐ Language Arts
   ☐ Health ☐ Fine Arts ☐ Computers ☐ Other (please specify ___)
7. Do you have access to Web 2.0 tools at school?
   ☐ Yes ☐ No
8. Do you have access to Web 2.0 tools at home?
   ☐ Yes ☐ No
9. Do you access the Internet at school? ☐ Yes ☐ No
10. Do you access the Internet at home? ☐ Yes ☐ No
11. How many hours of professional development (such as workshops, computer courses, seminars, conferences) in related to technology did you take during past school year?
    ☐ 0 ☐ 1-5 ☐ 6-10 ☐ 11-15 ☐ 16-20 ☐ 21-25
    ☐ 26-30 ☐ 30+ ☐ Other (please specify _____)
12. How many years have you taught as of the end of this past school year?
    ☐ 0 ☐ 1-5 ☐ 6-10 ☐ 11-15 ☐ 16-20 ☐ 21-25
    ☐ 26-30 ☐ 30+ ☐ Other (please specify _____)
13. How long have you been using technology for teaching in your classrooms as of the end of this past school year?
    ☐ 0 ☐ 1-5 ☐ 6-10 ☐ 11-15 ☐ 16-20 ☐ 21-25
    ☐ 26-30 ☐ 30+ ☐ Other (please specify _____)

14. How many hours do you use the computer to teach in your classrooms per week typically?
    ☐ 0 ☐ 1-5 ☐ 6-10 ☐ 11-15 ☐ 16-20 ☐ 21-25
    ☐ 26-30 ☐ 30+ ☐ Other (please specify _____)
15. The school I am working at now supports (offers resources in) the use of Web 2.0 tools?
    ☐ Yes ☐ No

Please offer your comment about the above questionnaires (such as if wording of the statements are confusing or unclear, or some items need to be deleted or added)

_____

I would like to interview you concerning the use of Web 2.0 tools. If you are available, please provide your e-mail address so that I might contact you to schedule an interview.

_____

Appendix F: Results of Web 2.0 Tools Integration Self-Efficacy for Individual Item

Survey Items		Mean	Std Deviation	Case Numbers
1	create my own blog (to be accessed by my students as part of a lesson)	2.92	1.40	393
2	post news or comment on a blog	3.21	1.43	395
3	edit or delete information on a blog	3.15	1.38	394
4	add links on a blog	3.05	1.40	392
5	upload attached files on a blog	3.07	1.41	391
6	add information on a wiki	2.82	1.35	390
7	edit information on a wiki	2.80	1.35	391
8	delete information on a wiki	2.77	1.32	391
9	revise the information version for what I want on a wiki (use the history record tool to verify the version I want)	2.64	1.26	391
10	upload files to wiki, such as pictures, PowerPoint, word documents, pdf files	2.81	1.35	387
11	use computers to create podcast, such as mp3 file	2.86	1.37	390
12	use podcast software or applications to record, edit and convert audio file into mp3 file	2.76	1.38	390
13	upload podcast files online	2.85	1.37	390
14	download podcast files online	2.95	1.40	391
15	use RSS feed to subscribe podcast files	2.63	1.29	387
16	create my own social network site	2.93	1.44	387
17	post information on social network sites	3.43	1.44	389
18	maintain contact with my friends through social network sites	3.60	1.41	392
19	invite friends to join my social network site	3.55	1.43	391
20	set up profile security level of my social networking	3.41	1.47	390

	site			
21	create an image/photo sharing site account	3.36	1.44	388
22	use image/photo sharing sites to upload images/photos online	3.48	1.41	390
23	use image/photo sharing sites to edit images/photos (such as add text, resize image, add tags)	3.47	1.38	389
24	use image/photo sharing sites to create slideshow or video presentation	3.48	1.37	391
25	post comment on image/photo sharing sites	3.49	1.39	386
26	use a course management system to manage classroom materials, such as post syllabus and curriculum documents	3.53	1.34	390
27	arrange the layout of my course management system site, such as display course material as weekly, topics or social issues	3.38	1.34	391
28	use course management system embedded tools to communicate and interactive with my students, such as Blog, wiki, announcement, chat room	3.09	1.71	391
29	use a course management system to create quizzes for my students online	3.24	1.35	392
30	use a course management system to assess the progress of my students	3.38	1.34	390

APPENDIX G: CORRELATION AMONG AGE AND WEB 2.0 TOOLS INTEGRATION BY REGIONS

Correlations

Regions			Avg Use Web2.0 Tools	Age
Midwest	Avg Use Web2.0 Tools	Pearson Correlation	1	-.059
		Sig. (2-tailed)		.623
		N	83	72
	Age	Pearson Correlation	-.059	1
		Sig. (2-tailed)	.623	
		N	72	72
Northeast	Avg Use Web2.0 Tools	Pearson Correlation	1	.024
		Sig. (2-tailed)		.821
		N	107	92
	Age	Pearson Correlation	.024	1
		Sig. (2-tailed)	.821	
		N	92	92
South	Avg Use Web2.0 Tools	Pearson Correlation	1	-.245*
		Sig. (2-tailed)		.046
		N	81	67
	Age	Pearson Correlation	-.245*	1
		Sig. (2-tailed)	.046	
		N	67	67
West	Avg Use Web2.0 Tools	Pearson Correlation	1	-.063
		Sig. (2-tailed)		.447
		N	163	146
	Age	Pearson Correlation	-.063	1
		Sig. (2-tailed)	.447	
		N	146	146

*. Correlation is significant at the 0.05 level (2-tailed).

APPENDIX H: CORRELATION AMONG AGE AND WEB 2.0 TOOLS INTEGRATION SELF-EFFICACY BY REGIONS

Regions			Age	Avg Self-Efficacy Web 2.0 Tools
Midwest	Age	Pearson Correlation	1	-.229
		Sig. (2-tailed)		.053
		N	72	72
	Avg Self-Efficacy Web 2.0 Tools	Pearson Correlation	-.229	1
		Sig. (2-tailed)	.053	
		N	72	76
Northeast	Age	Pearson Correlation	1	-.453**
		Sig. (2-tailed)		.000
		N	92	92
	Avg Self-Efficacy Web 2.0 Tools	Pearson Correlation	-.453**	1
		Sig. (2-tailed)	.000	
		N	92	98
South	Age	Pearson Correlation	1	-.233
		Sig. (2-tailed)		.058
		N	67	67
	Avg Self-Efficacy Web 2.0 Tools	Pearson Correlation	-.233	1
		Sig. (2-tailed)	.058	
		N	67	72
West	Age	Pearson Correlation	1	-.190*
		Sig. (2-tailed)		.022

	N	146	146
Avg Self-Efficacy Web 2.0 Tools	Pearson Correlation	-.190*	1
	Sig. (2-tailed)	.022	
	N	146	150

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

APPENDIX I: CORRELATIONS AMONG AGE AND PROFESSIONAL DEVELOPMENT BY REGIONS

Correlations

Regions			Age	Professional Development/hs
Midwest	Age	Pearson Correlation	1	.148
		Sig. (2-tailed)		.216
		N	72	72
	Professional Development/hs	Pearson Correlation	.148	1
		Sig. (2-tailed)	.216	
		N	72	73
Northeast	Age	Pearson Correlation	1	-.023
		Sig. (2-tailed)		.828
		N	92	92
	Professional Development/hs	Pearson Correlation	-.023	1
		Sig. (2-tailed)	.828	
		N	92	92
South	Age	Pearson Correlation	1	.310*
		Sig. (2-tailed)		.011
		N	67	67
	Professional Development/hs	Pearson Correlation	.310*	1
		Sig. (2-tailed)	.011	
		N	67	67
West	Age	Pearson Correlation	1	-.143
		Sig. (2-tailed)		.085
		N	146	146
	Professional Development/hs	Pearson Correlation	-.143	1
		Sig. (2-tailed)	.085	
		N	146	147

*. Correlation is significant at the 0.05 level (2-tailed).

APPENDIX J: CORRELATIONS AMONG AGE AND ACCESS WEB 2.0 TOOLS AT HOME BY REGIONS

Correlations

Regions			Age	Access Web 2.0 tools at home
Midwest	Age	Pearson Correlation	1	-.009
		Sig. (2-tailed)		.940
		N	72	72
	Access Web 2.0 tools at home	Pearson Correlation	-.009	1
		Sig. (2-tailed)	.940	
		N	72	73
Northeast	Age	Pearson Correlation	1	-.221*
		Sig. (2-tailed)		.034
		N	92	92
	Access Web 2.0 tools at home	Pearson Correlation	-.221*	1
		Sig. (2-tailed)	.034	
		N	92	92
South	Age	Pearson Correlation	1	-.279*
		Sig. (2-tailed)		.022
		N	67	67
	Access Web 2.0 tools at home	Pearson Correlation	-.279*	1
		Sig. (2-tailed)	.022	
		N	67	67
West	Age	Pearson Correlation	1	-.060
		Sig. (2-tailed)		.472
		N	146	146
	Access Web 2.0 tools at home	Pearson Correlation	-.060	1
		Sig. (2-tailed)	.472	
		N	146	147

Correlations

Regions			Age	Access Web 2.0 tools at home
Midwest	Age	Pearson Correlation	1	-.009
		Sig. (2-tailed)		.940
		N	72	72
	Access Web 2.0 tools at home	Pearson Correlation	-.009	1
		Sig. (2-tailed)	.940	
		N	72	73
Northeast	Age	Pearson Correlation	1	-.221*
		Sig. (2-tailed)		.034
		N	92	92
	Access Web 2.0 tools at home	Pearson Correlation	-.221*	1
		Sig. (2-tailed)	.034	
		N	92	92
South	Age	Pearson Correlation	1	-.279*
		Sig. (2-tailed)		.022
		N	67	67
	Access Web 2.0 tools at home	Pearson Correlation	-.279*	1
		Sig. (2-tailed)	.022	
		N	67	67
West	Age	Pearson Correlation	1	-.060
		Sig. (2-tailed)		.472
		N	146	146
	Access Web 2.0 tools at home	Pearson Correlation	-.060	1
		Sig. (2-tailed)	.472	
		N	146	147

*. Correlation is significant at the 0.05 level (2-tailed).

APPENDIX K: COEFFICIENTS OF REGRESSION MODEL

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	1.144	.093		12.313	.000	.961	1.327					
	Professional Development	.007	.002	.200	3.196	.002	.003	.012	.266	.206	.194	.940	1.063
	Access Web 2.0 tools at school	.127	.097	.103	1.303	.194	-.065	.318	.260	.085	.079	.584	1.712
	Access Web 2.0 tools at home	-.043	.086	-.033	-.506	.613	-.212	.125	.075	-.033	-.031	.886	1.128
	School Administrative Support for Using Web 2.0 Tools	.113	.039	.228	2.869	.004	.035	.191	.332	.186	.174	.583	1.716
2	(Constant)	.628	.136		4.614	.000	.360	.896					
	Professional Development	.005	.002	.142	2.349	.020	.001	.009	.266	.153	.135	.907	1.103
	Access Web 2.0 tools at school	.132	.093	.108	1.427	.155	-.050	.314	.260	.094	.082	.584	1.712
	Access Web 2.0 tools at home	-.131	.083	-.098	-1.569	.118	-.295	.033	.075	-.103	-.090	.847	1.180

School Administrative Support for Using Web 2.0 Tools	.111	.037	.224	2.969	.003	.037	.185	.332	.192	.171	.583	1.716
Web 2.0 Tools Self-Efficacy Integration	.176	.035	.302	4.995	.000	.106	.245	.342	.313	.288	.911	1.098

a. Dependent Variable: Web2.0 Tools Integration, * p < .05