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by

Kele Anyanwu

December 2012

TEACHERS' PERCEPTIONS CONCERNING USE OF WEB 2.0 APPLICATIONS
FOLLOWING PROFESSIONAL DEVELOPMENT

A Dissertation Presented to the
Faculty of the College of Education
University of Houston

In Partial Fulfilment
of the Requirements for the Degree

Doctor of Education

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Acknowledgement

This dissertation is dedicated to the memories of my late parents, Mark Chibueze Anyanwu and Hannah Uloma Anyanwu. May their souls rest in perfect peace.

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May the blessing be.

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Abstract

Web 2.0 technologies have recently gained prominence as having the potential to bring about transformative effects in education. Many school districts have embraced innovative technology applications by increasing accessibility of Web 2.0 applications from district networks. Web 2.0 applications have become a favorite workshop selection for professional development among in-service teachers who want to enhance their knowledge about these innovative tools for effective classroom integration.

Many research efforts using self-report instruments have examined in-service teachers' perceptions and attitudes about Web 2.0 tools. However, little research reports details of in-service teachers' lived experiences of these professional development sessions. As a result, there is a gap in understanding of the meaning in-service teachers place on Web 2.0 professional development workshops. Understanding first-hand accounts from in-service teachers, who attend these workshops, their experiences, and what meaning they take away from them, might help contribute to teachers' effectiveness in the classroom. Findings from this study suggest educational policy and practice changes in Web 2.0 professional development strategies that will enable teachers to perform more as curriculum makers rather than curriculum implementers. A qualitative research approach was used to explore teachers' perception of Web 2.0 instruction and integration in the classroom. Five participants were interviewed using semi-structured, open ended, in-depth face-to-face interviews that were digitally recorded. The recorded interviews were transcribed into textual data and analyzed using NVivo9.0 Qualitative

Analysis Software. Five themes that were established to understand participants' Web 2.0 workshop experiences included workshop experience, integration in classroom, hands-on experience, knowledge of Web 2.0 applications, and problems and benefits of Web 2.0 tools.

The research findings are aligned with supporting literature on the importance of integration of technology within the realm of Web 2.0 technologies instruction. Recommendations are made for restructuring Web 2.0 professional development workshops to make the face-to-face sessions focus more on modeling Web 2.0 integration in the classroom, with hands-on collaboration among teachers, while the basics are delivered online.

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Chapter I

Introduction and Literature Review

A top priority for teachers today is remaining current and successful in an ever changing global educational landscape mediated by innovative technology (Ashton & Newman, 2006; Clarke & Hollingsworth, 2002; Grundy & Robinson, 2004). One innovative technology that is changing instruction in our educational system, especially in our secondary schools, is Web 2.0 tools. A recent national survey of district technology directors conducted by Interactive Educational Systems Design (IESD) revealed district acceptance of Web 2.0 is on the rise. While 64% of technology directors reported that more than 25% of teachers used Web 2.0 tools in classroom instruction in 2009, the number reported by technology directors rose to 76% in 2010 (IESD, 2011).

To support teachers, school districts offer professional development programs that help teachers sharpen their skills regarding technology. The positive impact Web 2.0 tools is having on teachers was also noted in a national survey that indicated school districts are using or planning to use Web 2.0 tools in professional development. Seventy-six percent of respondents reported using Web 2.0 tools in professional development to show educators how to post content online. Examples include lesson plans, online communication and collaboration tools like blogs and wikis, online professional development enrollment, and district sharing of podcast, streaming video and examples of best practices (IESD, 2011). As interest in Web 2.0 tools continues to grow, there is need for examination of traditional professional development practices and policies with a view to improving professional development of new innovative technology tools like Web 2.0 tools.

More compelling for sustained professional development is the emergence of network-centric and innovative web technologies that are having an impact on instruction in today's classroom. This rapidly evolving techno-centric educational landscape has resulted in rethinking professional development of teachers, especially considering the majority of them graduated from college well before these innovative technologies became available. Professional development is expensive; most school districts spend the equivalent of \$200 per teacher to offer these programs (Dede, 2006). The International Society for Technology in Education (ISTE) provides teachers with a pedagogical model on which to base their professional practice. To support technology-enriched learning, ISTE has delineated five key concepts that should be implemented during instruction under an umbrella standard called National Educational Technology Standards for Teachers (NETS.T) (ISTE, 2008):

- a) Facilitate and inspire student learning and creativity
- b) Design and develop digital-age learning experiences and assessments
- c) Model digital-age work and learning
- d) Promote and model digital citizenship and responsibility
- e) Engage in professional growth and leadership

Professional development for in-service teachers must invariably be tailored according to this model to make a positive impact on teachers' professional practice.

Web 2.0 Applications

Web 2.0 technology based tools have made considerable inroads into our classrooms such that they can no longer be ignored in professional development for teachers. But what exactly are Web 2.0 applications? Technically, according to O'Reilly (2005), often credited as coining the term, Web 2.0 applications possess unique characteristics based on the way they are designed:

a) **The Web as Platform**

Web 2.0 applications are accessible on the web and need no additional software to operate.

b) **Harnessing Collective Intelligence**

The original web, called Web 1.0, was characteristically a read-only web application. A user had no means of creating or adding content. It was individualistic by nature. With Web 2.0 tools, a user can create and add content to other websites. For example, YouTube is the world's largest video sharing site because as a Web 2.0 application, it allows people to add and share video (Alexander, 2008). Wikis and blogs are examples of Web 2.0 applications that make it possible for individuals to add, edit, and update information on a web site (Ullrich et al., 2008).

c) **Data Is the Next Intel Inside**

The opportunity presented by Web 2.0 applications, whereby anyone can access these applications, and in the case of wikis and blogs, add, edit or update content, makes data management an important element in the design and success of Web 2.0.

d) End of the Software Release Cycle

Web 2.0 applications are not delivered in versions delineated by product cycles instead, they are services delivered over the web and constantly monitored and updated without the user being aware of it. As a result a user does not have to wait for new product releases.

e) Lightweight Programming Models

Programming models forming the backbone of Web 2.0 applications are a complete departure from older programming models used in development of desktop applications. Programming models for Web 2.0 applications make use of new web technologies such as Simple Object Access Protocol (SOAP), Asynchronous JavaScript and XML (AJAX), and Application Programmable Interface (API) that allow applications to be re-coupled or remixed easily with new functionalities.

f) Software Above the Level of a Single Device

Desktop software needed to be installed on a PC before it could be used; if one wanted to use that application on another PC, it had to be reinstalled on the second PC or networked to a server to serve the software to the PC. None of that is required in the case of Web 2.0 application. Web 2.0 applications can be accessed from multiple devices that may be running different operating system software as long as they have internet access.

g) Rich User Experiences

Multimedia and interactivity were severely limited in the old Web 1.0, often with dull interfaces. All that changed with Web 2.0 due to incorporation of new web

technologies like AJAX that took existing programming techniques to new heights, bringing about high level multimedia functions and interactivity.

From an educational perspective, the Consortium of School Networking (2011) defines Web 2.0 as online applications that elicit participation, collaboration, and interaction. Lemke and colleagues (2009) have noted that “creation and sharing of intellectual and social resources by end users” (p. 5) is an important characteristic of Web 2.0 applications. Web 2.0 applications are also described by Orr (2007) as a collection of tools that are user-centric. Web 2.0, being user-centric, implies some form of transformation of the original read-only web to a read-write web in which the power of creation and publishing of content on the web has been transferred to anyone with access to the internet (Richardson, 2007). Web 2.0 technologies have brought about innovative web-based applications that offer alternative platforms from which professional development could be offered to teachers so that learning can take place anytime and anywhere (Dalgarno & Lee, 2010). A professional development session in a school district often is made up of both old and young teachers and as a result of the generational difference, older teachers may experience difficulties when it comes to learning new technologies like Web 2.0 applications (Oberauer & Kliegl, 2001). To close this performance gap between older and younger attendees, Wolfson (2010) has found that advanced organizers which is a form of outline detailing in advance activities that will take place in a professional development session has proved very helpful (Wolfson, & Cavanagh, (2011, August). Training in Web 2.0 applications during professional development is like a simulation exercise since there is nothing to install or that can possibly go wrong. Training in a Web 2.0 professional development environment enables

engaging, experimentation and immersive learning activities to take place (Salas, Wildman, & Piccolo, (2009). As a result, we are beginning to see a lot of research focused on Web 2.0 applications (Anderson, 2007; Solomon & Schrum, 2007).

Professional Development

In recent years there have been increasing calls for school reform to improve schools, quality of student learning outcomes, and teacher quality. This has resulted in greater attention to professional development of teachers as a means of accomplishing these goals (Opfer & Pedder, 2011). Professional development, formal or informal in-service training to upgrade teachers' content knowledge and pedagogical skill, has evolved over the years as new research and technology emerge. The changing educational landscape that puts strong emphasis on teachers' continual professional learning has led to a redefinition of professional development. Wei, Darling-Hammond, and Adamson (2010) redefine professional development as meaning "a comprehensive, sustained, and intensive approach to improving teachers' and principals' effectiveness in raising student achievement" (p. 4). Professional development is regarded as highly effective if it culminates in improvement of a teacher's knowledge and instructional practice, and at the same time, leads to improved student outcomes (Wei, Darling-Hammond, ndree, Richardson & Orphanos, 2009).

However, research has shown that professional development has been ineffective and the outcomes disappointing (Hanushek, 2005; Sykes, 1996). Timperley and Alton-Lee (2008) assert that part of the problem is the overly simplistic view of teachers' professional learning that fails to account for teachers' professional lives and working conditions. Professional development within the teaching community follows the usual

pattern of external experts coming to hand down information and instructions to teachers on how best to teach in their classrooms. Teachers are looked upon as curriculum implementers without the intellectual capability to be curriculum creators. It is therefore not surprising that these types of professional development sessions fail to achieve the desired outcomes. Professional development programs are unsuccessful because they do not take into account teachers' abilities, how teachers learn in professional development, and other situational influences that are counterproductive to learning (Borko, 2004; Clarke & Hollingsworth, 2002). Other practices that have resulted in unsuccessful professional development outcomes have been noted by other researchers. Inadequate time spent in professional development does not allow enough time to model classroom practices or engage in meaningful hands-on activities that can bring about desired change in classroom instructional strategies (Loucks-Horsley, Hewson, Love, & Stiles, 1998; Garet, et al. 2001). Professional development are most effective where best practices in content and practices are modeled as close as possible to what obtains in the classroom and teachers work collectively in collaborative manner to address challenges they are facing (Darling-Hammond, Wei, Andree, Richardson, and Orphanos 2009). Another important fact that has emerged from research about teacher's participation in professional development borders on grade level differences. A study on collaborative learning shows that middle and elementary school teachers are more likely to collaborate among themselves to address instructional concerns than secondary school teachers (Metlife, 2010).

The National Center for Education Statistics, Schools and Staffing Survey (2009), in its latest report also noted that elementary school teachers participated in professional

development and rated their experiences higher than their secondary school counterparts. Knowles (1984) succinctly delineates important adult learner characteristics as being self-directed, ready to learn, experienced, task-centered, and intrinsically motivated. When viewed in this context, professional development, as currently implemented, fails to make use of any of these characteristics. Miles (1995) also observed that the pedagogical features of professional development are inadequate: under resourced, too brief, untargeted, coercive, lacking intellectual rigor, and mired in bureaucracy. Miles' view of professional development a decade and half ago still holds today, with a plethora of different models of professional development that still lack intellectual quality (Borko, 2004).

In the area of educational technology and professional development, Gray, Thomas, and Lewis' (2010) investigation of teachers' *Use of Educational Technology in US Public Schools* found that 78% of teachers considered independent learning activities as adequately preparing them to use educational technology in schools compared to 61% of teachers who considered formal professional development as having the same effect. Online professional development programs are being implemented to take advantage of innovative technologies, such as affordable broadband connections and internet connectivity that have recently become available to schools. The educational system has witnessed an explosion in online classes and online professional development as teachers seek ways to improve their knowledge and career. The online sites provide teachers with professional development resources and enhance collaborative participation among teachers in ways traditional professional development are unable to accomplish (Schlager, et al., 2003; Dede, et al., 2009). However, some of these online professional

development initiatives, in most cases, are not very different from traditional face-to-face programs. The major difference is that the course materials have been ported to a networked environment where participants can read what the instructor would have told them in a conference room. Some advantages of these online professional development courses are that they are available to teachers at their convenience and provide access to specialists and archival resources which otherwise would not have been possible (Dede, 2006).

Statement of the Problem

As Web 2.0 applications continue to gain prominence in schools, school district professional development departments increasingly offer workshops to teachers. Although the majority of teachers have availed themselves of this opportunity, the effectiveness of these workshops remains questionable. The strong influence professional development has on how teachers integrate new technology into their classrooms is well documented (Chen, 2008; Wells & Lewis, 2006). Having personally participated in some of these Web 2.0 workshops, I am left to wonder if a teacher new to the world of Web 2.0 applications will benefit much from workshops of such short duration with little or no hands-on activity. Activity based professional development workshops, opportunities for teachers to experiment, make mistakes, and learn from the activity are preferable (Sparks, 1998). What little is known about best practices and design of the professional development offerings comes through self-report surveys or questionnaires by participants. Evaluating the effectiveness of professional development programs in this way yields an incomplete picture because it does not allow participants full reflection on their experiences at these workshops. According to Dewey (1933), critical reflection is a

powerful professional learning tool that brings about “a state of doubt, hesitation, perplexity, or mental difficulty, in which thinking originates” (p. 12).

Latest figures released by the U. S. Department of Education (2008) on participation in professional development involving computer use for instruction shows a generally modest increase in overall participation in professional development programs in the past 12 months among teachers, from 83% in 2004 to 88% in 2008. Participation in professional development on the use of computers for instruction changed only from 65% in 2004 to 67% in 2008. However, the number participating in more than 33 hours of professional development in this area has shown a steady decline in the intervening years: 2000 (8.0%), 2004 (6.8%) and 2008 (4.8%). Forty-one percent of teachers in the survey reported having had about eight hours of professional development in the past 12 months in classroom computer use. There is a large gap in hours of professional development that will enable teachers to have a positive impact on students (33 hours) compared to the more typical eight hours, which has been shown to be ineffective (Yoon, Duncan, Lee, Scarloss, & Shapley, 2007). In light of these facts, it would be helpful to understand in-service teachers’ own perspectives, and what meaning they make of their professional development workshop experiences on Web 2.0 applications.

Purpose of the Study

Research on professional development, with emerging and innovative technologies like Web 2.0 applications, has focused mainly on quantitative research designs. This study employed a qualitative research design to investigate lived experiences of teachers that participated in professional development of Web 2.0 applications for classroom integration. Recent surveys conducted by the National Staff

Development Council (NSDC) (2009) on in-service teacher professional development on Web 2.0 applications indicate that workshops are not having the desired impact on instruction in the classroom. Because previous quantitative analysis has provided limited benefit, this study employed a qualitative research method to investigate how beneficial in-service teachers considered their experience during the professional development workshops. This study also strived to find out the extent they are integrating their knowledge in the classroom.

Significance of the Study

Web 2.0 applications have unique characteristics that embody creativity, collaboration, and interaction. These characteristics are among the fundamental requirements of 21st century skills necessary to succeed in this digital age. Although there are many reports of teachers making strides in the use of Web 2.0 tools such as wikis, blogs, social bookmarking, and networking services (Choy & Ng, 2007), one question that remains unanswered is how successful teachers are in transferring knowledge acquired from professional development classes into the classroom, which should result in improved student performance. Assessing the effectiveness of professional development workshops has proven to be difficult due to the varied nature of the goals for which they are implemented. Teachers depend on district-wide professional development workshops for innovative teaching strategies most of the time. Districts spend about \$200 per teacher to offer these workshops (Dede, 2006), and this will constitute a sizeable portion of any district professional development budget. It is therefore important that professional development workshops are effective in providing the teacher the much needed resources to be effective in the classroom. These

professional development workshops have been fashioned according to an old philosophy of pedagogy where instruction was instructor-centered. This philosophy still persists in our schools, and teachers have yet to fully embrace the updated paradigm that prepares teachers for self-directed learning (Moore, 2007).

In light of the unique features of Web 2.0 applications, this study addressed how technology departments of school districts might re-evaluate and redesign professional development programs. They should be able to offer Web 2.0 learning opportunities in ways that meet expectations of the times and the aspirations of teachers. This research offers insights into teachers' use of Web 2.0 applications and how to address the challenges of 21st century learning styles (Solomon & Schrum, 2007). Finally, this research will illuminate the challenges in-service teachers confront daily in their respective classrooms regarding integration of Web 2.0 technologies, enabling them to become more open and collaborative in sharing best practices.

Research Questions

The following research questions guided the study:

1. What were teachers perceptions of being able to translate skills acquired in Web 2.0 professional development to the classroom?
2. What factors did participants perceive that impede or enhance their ability to integrate Web 2.0 applications in the classroom following professional development?
3. How beneficial was the professional development to the participants?

Theoretical Framework

The theoretical framework of this study was based on Edmund Husserl's (1859-1938) philosophy that "to arrive at certainty, anything outside immediate experience must be ignored, and in this way the external world is reduced to the contents of personal consciousness" (Groenewald, 2004). Husserl named his philosophical method phenomenology, the science of pure "phenomena" (Eagleton, 1983, p. 55), and it is considered the fountainhead of modern phenomenology (Vandenberg, 1997). Phenomenology has its roots in psychology, and over the years many variants of it have emerged that addresses diverse thinking about the way we make meaning of our everyday experiences. Transcendental phenomenology seeks to understand what meanings individuals make of their everyday experiences. Phenomenology, according to Van Manen (1990), is a "systematic attempt to uncover and describe the structures, the internal meaning structures, of lived experience" (p. 10).

This research took a phenomenological approach to professional development in a specific area of a teacher's work, including experience in a training workshop and its effects later. This approach can lead to a better understanding than would purely quantitative approaches, such as counting hours of training or numbers of teachers who follow up on training. Qualitative researchers using phenomenological research set aside preconceived notions of the phenomena under study. The research study examined the experiences of in-service teachers who attended technology professional development workshops on various Web 2.0 applications and how these tools can be integrated into the classroom. Understanding participants' lived experiences in these settings leads to

identification of shared themes and better understanding of impact of Web 2.0 professional development in instruction. (McDuffie & Scruggs, 2008).

Transcendental phenomenological research methods generally have been found to be effective in bringing to light individual experiences and perceptions of events from participants' own standpoints, which could be quite different from what is commonly assumed and could lead to positive changes in the way the training is done (Lester, 2012). This form of phenomenology provides the theoretical framework on which this study was carried out.

Chapter II

Methodology

The objective of this research study was to investigate the lived experiences of in-service teachers who attended Web 2.0 application professional development in their school district. This study illuminated common themes that reveal gaps in the learning process in professional development workshops. From this study, professional development program designers will be more informed of the needs of in-service teachers regarding a new innovative technology like Web 2.0 applications.

The qualitative approach used for this study is succinctly described by Mertens (2005) as naturalistic and interpretive in nature. In this form of research, the researcher is “the primary instrument of data collection and analysis,” characterized as adopting “an inductive investigation strategy, and the end product being richly descriptive” (Merriam, 2009, p. 39). Qualitative research strives to understand “human systems, be they small, such as a technology-using teacher and his or her students and classroom, or large, such as a cultural system” (Savenye & Robinson, 2011, p. 1046). This means qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of meanings people bring to them (Merriam, 2009). Qualitative research methods provide “thick description, experiential understanding, and multiple realities” (Stake, 1995, p. 43) that will “contribute to the development of empirical knowledge” (Corbin & Strauss, 2008, p. 16).

Research Method and Design Appropriateness

The qualitative research approach of this study is phenomenological: the lived experiences of participants were investigated to identify and offer a detailed account of the individual's perception and reactions to the experience (Merriam, 2009). This method attempts to discover how people interpret their experiences through more in-depth textual descriptions. Shank (2002) refers to such detailed description as *soft data* that gives insight regarding what meaning people make of an experience or phenomena. In such cases, a qualitative design is considered the desired approach (Cheek, Onslow, & Cream, 2004; Merriam, 2009; Shank, 2002).

The phenomenon of interest in this study was the lived experiences of in-service teachers that attended professional development training sessions about Web 2.0 applications offered in a school district or other settings. To uncover common themes of the experiences of these attendees, the research stated earlier guided this phenomenological research study. These research questions formed the basis of the protocols that was used for the semi-structured open ended in depth interview (see Appendix A).

Population and Sampling

Purposive sampling, a non-probability sampling method, was used to identify primary participants for the study (Onwuegbuzie & Leech, 2007; Patton, 2002). This study was carried out in a large K-12 urban school district in the Houston, Texas that serves a multicultural student population at an 87% E-Rate discount level. The E-rate discount program, known as the School and Libraries Universal Service Support Mechanism, offers discounts to assist most schools and libraries obtain affordable

telecommunication and internet access. Discounts range from 20% to 90% of the costs of eligible services, depending on the level of poverty and the urban or rural status of the population served. In order to get this assistance, school districts are required to prepare a technology plan which must include a professional development strategy to ensure staff knows how to use this new technology (Universal Services Administration Company, 2012). This is one of the reasons this school district was chosen for this study since it benefits from this program and has in place an elaborate technology plan that incorporates a technology driven professional development strategy. The district demographic profile is as follows: African-American, 6.13%; Asian, 2.69%; Hispanic, 81.48%; and White, 8.15%, with an overall economically disadvantaged population of 82%. The student-teacher ratio and student-computer ratio in this district are 19:1 and 4:1 respectively, and class sizes average between 19 and 23 students. All teachers serving in the district in the 2011-2012 school years were rated as highly qualified, meaning they hold a bachelor's degree or higher, are certified by the state board of education, and have demonstrated professional knowledge in their respective content areas (U. S. Department of Education, 2004).

Participants in this study were in-service teachers currently employed as school teachers in the district. They were selected using criterion sampling, a form of purposeful sampling from population of teachers that met certain criteria (See Appendix A).

The initial criteria for selection were:

- a) The participants in this study had at least three years teaching experience.
- b) The participants were currently employed as high school teachers in the district.

- c) The participants had attended two or more Web 2.0 application professional development workshops offered in the district or other informal professional development courses.
- d) The participants were using technology in the classroom.

Eduphoria is a professional development management system online software the district uses that streamlines staff course registration and portfolios. Courses are listed online and teachers can register with a click of the mouse. The staff member received an email a few days before the course reminding the registrant that a course is ready to go. After the course was completed, it was added to the teacher's portfolio along with teaching credentials, State Board of Education Certification (SBEC) credit hours, Gifted and Talented (GT) credit hours, and mandatory district hours. Course evaluations can be filled out online and staff members can even print their own certificates. Using Euphoria, the district administrator selected teachers meeting these criteria and coded them to insure confidentiality. The district administrator emailed the selected participants the link to the recruitment questionnaire and consent letter.

The district administrator in charge of research and evaluation informed me that twenty teachers met the criteria and she forwarded to them the recruitment letter, demographic form and letter of informed consent (see Appendix C) previously reviewed by the University of Houston Institutional Review Board (IRB).

After an unsuccessful attempt to recruit participants for the study, I made the decision to employ snowball sampling technique to get participants to be interviewed. This decision was made during the last week of the 2011-2012 academic school year ending in June of 2012. Snowball sampling assumes that the behavior or trait under study

can be conceived as a social activity, where the target sample members are involved in some kind of network with others who share the characteristic of interest. Faugier and Sargeam (1997) define snowball sampling as a “sampling technique used in situations where it is very difficult to find participants that meet the criteria chosen for a study” (p. 792). Snowball sampling involves finding a few participants who meet the criteria and asking them to suggest or refer others (Merriam, 2009; Onwuegbuzie & Leech, 2007; Patton, 2002). The first and only respondent to my questionnaire study effort became the source from whom I selected the other four participants who met criteria:

- a) The participants in this study must have at least three years teaching experience.
- b) The participants must be currently employed as a teacher in the district.
- c) The participants must have attended at least one Web 2.0 application professional development workshop offered in the district or by other informal professional development workshop.
- d) The participants are using technology in the classroom.

The selected participants represented the entire spectrum of the curriculum that includes the four main content areas: Math, English Language Arts, Science, and Social Studies. When the goal, as in this study, is to understand the essence of lived experience by participants, Morse (1994) suggests sample size of six participants; Creswell (2007) recommends interviews with up to 10 people; Dukes (1984) recommends studying 3 to 10 participants in phenomenological research for saturation to be achieved. Morrow (2005) noted that because the goal of qualitative analysis is transferability, rather than

statistical generalizability, a small sample of high quality informants will be adequate. Based on this line of thought, a semi-structured face-to-face in-depth interview was conducted with the five participants.

Data Collection

Semi-structured open ended in-depth face-to-face interview was used as the data collection procedure. Semi-structured interviews employ an interview guide containing a mix of more or less structured interview questions. The questions are of no predetermined order or wording and are flexible enough to be able to elicit elaborated responses from the participant (Merriam, 2008). Moustakas (1994) asserts that “phenomenology is concerned with wholeness, with examining entities from many sides, angles, and perspectives until a unified vision of the essence of a phenomenon or experienced is achieved” (p. 58). In-depth face-to face semi-structured interview with participants who have attended Web 2.0 workshops is not only acceptable, but is considered very important in understanding participants’ lived experiences (Creswell, 2007; Moustakas, 1994). Interviews describe the meaning of experiences several people share (Marshall & Rossman, 1999) and a revelation of the phenomenon from the participant to the researcher (Seidman, 1998).

The face-to-face interviews with participants lasted on average about 30 minutes and were based on the interview protocol composed of five main sections, with each section having three to four sub questions (see Appendix A). Follow up face-to face interviews with participants could not be carried out, since the participants had proceeded to summer vacation after the district-wide Activ Academy workshop held the week after school closed for the session. However, the participants agreed to respond to follow-up

emails and phone interviews to address some issues needing further clarification from the first interview and to comment upon salient themes that emerged from other participants.

Data Analysis

Data analysis involves thorough examination and search for patterns in textual data and why those patterns exist (Bernard, 2006). In this study, the content of transcribed audio text and field notes from face-to-face interviews with the participants was rigorously examined. The purpose of this was to be able to find a “word or short phrase that symbolically assigns a summative, salient, essence-capturing attribute” in a portion of the transcribed audio text which constitutes the code in qualitative research study (Saldana, 2009, p. 3). Many coding systems exist; what determines which system to use depends on its applicability to the study (Saldana, 2009). A coding system that is determined before examination of the data using researchers’ understanding of the phenomenon, from literature or from the research questions, can be used in qualitative analysis; such codes are known as a priori or pre-existing codes. Five a priori codes established for this study included workshop experience, integration in classroom, hands-on experience, knowledge of Web 2.0 applications, and problems and benefits of Web 2.0 tools.

In other instances, codes may be developed from the actual words spoken by participants as such as the computerized In Vivo method (Creswell, 2007; Saldana, 2009). Codes resulting from analysis of the text are aggregated to form categories or themes that depict a recurring pattern across the entire spectrum of the data (Merriam, 2009). Creswell (2007) cautioned that priori codes tend to limit analysis, failing to reflect the views of the participants, and advises that researchers be open and objective to codes

that may emerge during the analysis. This study therefore used a blended thematic analysis approach in analyzing qualitative data using the NVivo 9.0 software.

Qualitative Analytical Software

Transcribing oral interviews from words to text, followed by identification of themes, is very laborious and prone to mistakes and misrepresentations. In this study, I used qualitative analysis software, NVivo 9.0, to aid in analyzing transcribed textual data and field notes. NVivo 9.0 is a qualitative analysis software package that is used in the management and analysis of qualitative data. NVivo 9.0 uses various data indexing and coding analytical processes that make management of copious qualitative non-numerical and unstructured data more efficient. Using this software, the transcribed interviews of the participants were mined, interrogated, organized, and processed into categories or themes that maintained the integrity of the multiple constructions represented in the data which help to establish dependability and reliability through an obvious trail.

Three fundamental tenets of phenomenological investigation that were used in data analysis in this research study to identify themes and thereby ensure objectivity are bracketing, phenomenological reduction, and harmonization. Bracketing requires that researchers extricate themselves from preconceived assumption or prejudices about the phenomenon under investigation. Phenomenological reduction involves sieving through data and continually taking it apart for meaning. Harmonization is the process where all the data are accorded equal weighting at the onset of the data analytical process ((Merriam, 2009; Moustakas, 1994).

The phenomenological data analytical process that was used in this research study

is an adaptation of Stevick-Colaizzi-Keen method described by Moustakas (1994) as follows:

- 1) Obtain full experience of the phenomenon.
- 2) Using the verbatim transcript of the experience narrated by participants, complete the following steps:
 - a. Consider each statement with respect to significance for description of the experience.
 - b. Record all relevant statements.
 - c. List non-repetitive, non-overlapping statements. They are the meaning units of the experience.
 - d. Relate and cluster the meaning units into themes.
 - e. Synthesize the meaning units into a description of the textures of the experience with verbatim examples.
 - f. Reflect on your own textual description. Through imaginative variation, construct a description of the structure of the experience.
 - g. Construct a textual-structural description of the meanings and essences of the experience. (pp. 121-122)
- 3) From the individual textual-structural descriptions of participants' experiences, construct a composite textual-structural description of the meaning and essence of the experience, integrating all individual textual descriptions into a universal description of the experience representing the group as a whole.

Informed Consent

Before participating in the research study, each participant signed the informed consent document that guarantees the participant certain rights of voluntary participation, the right to know the purpose of the study, and to withdraw from participation in the study (Creswell, 2007).

The five participants that took part in the study signed the informed consent document thereby acknowledging their agreement to participate in the study as well as an understanding of their rights.

Confidentiality

The letter of recruitment and consent forms contained statements of privacy, guaranteed anonymity, and confidentiality of information provided by them during the in-depth face-to-face interviews. Each participant was assigned a codename which identified each participant all through the interview and study. Interviews were transcribed by a professional transcription company that signed a confidentiality agreement and all references to names and other demographic data on the interview transcripts were edited out and replaced with codenames before uploading to the qualitative analysis software NVivo 9.0. All research related materials such as interview digital recordings, field notes, and transcripts will be locked in a secured safe for a period of five years before they are shredded.

Validity and Reliability

A measure of the rigor or trustworthiness of a qualitative research study is determined by the validity and reliability of the methods used in the investigation.

Validity in qualitative studies requires actions taken by a researcher to ensure that data

collected represent what is being investigated. Reliability implies that the same study, if repeated over time, will yield consistent results (Frankel & Wallen, 2009). Lincoln and Guba (2000) described both as a measure of the trustworthiness of the research.

Different actions taken during data collection and analysis to ensure trustworthiness of this research study include:

- a) Triangulation involved cross verification of data from transcribed audio text, field notes and memory recall of what transpired during the interview.
- b) Member checking involved sharing all the information collected during the interview with the participant for accuracy.
- c) Audit trail entailed keeping a transparent description of all that was done in course of the research that will make it possible for future researchers to follow understand the study.

Internal Validity

Internal validity of a study is the degree to which the findings correctly map the phenomenon being investigated (Creswell, 2007). In this qualitative phenomenological study, the data reflect the lived experiences of school teachers who are participants in this study and have attended Web 2.0 tools professional development workshops in the district. To ensure conclusions drawn from the interview data are valid, member checking procedures were strictly adhered to. The member checking process involved providing the participants copies of their individual interviews and field notes to for review and check for accuracy. Informal telephone conversations and emails with

participants after the interviews further confirmed the accuracy of the conclusions reached regarding their lived experiences during the Web 2.0 workshops.

External Validity

External validity measures the degree of generalization applicable to a study. In qualitative research, it is the responsibility of the author to create an account that allows the reader to conclude whether the findings are transferable to his or her situation.

Measures taken to achieve this objective involved collection and development of thick description of data that allowed comparison of this context to other possible settings of intended use (Merriam, 2009).

Reliability

Reliability refers to the degree findings from this study can be replicated by another researcher. While it is not always possible in qualitative research, since human experiences are not static as to be reduced to numbers (Merriam, 2009), efforts were made in this study to leave an audit trail of the research study that will give insight so another researcher will understand the procedures that were followed. Using interview transcripts, field notes, informal conversations and email exchanges between researcher and participants assisted with triangulation of data sources to ensure reliability of this study.

Chapter III

Results

The purpose of the qualitative phenomenological study was to investigate lived experiences of teachers who participated in professional development of Web 2.0 applications for classroom integration. Recent surveys conducted by NSDC (2009) on in-service teacher professional development on Web 2.0 applications indicate that workshops are not having the desired impact on instruction in the classroom. Quantitative research in the past attests to the fact that teachers are not integrating technology in the teaching methods, and professional development strategies have not helped matters in this direction. This study, therefore, employed a qualitative research method to investigate how beneficial in-service teachers considered their experience during the professional development workshops (Buckenmeyer, 2010; Shriner, Clark, Nail, Schlee, & Libler, 2010). It also strived to find out to what extent they are integrating their knowledge in the classroom. Understanding the lived experiences of teachers in those workshops assists administrators and district professional development planners to design workshops for teachers in ways that not only would be meaningful to teachers, but might translate into improved student achievement in the classroom.

Five participants were interviewed and their responses to the interview questions were digitally recorded. The audio files were then transcribed and formatted in Microsoft word document by a professional transcriptionist that signed a confidentiality agreement. The word document was uploaded to NVivo 9.0 qualitative analysis software.

Coding system

Although themes could be used in a research study that developed from examination of the data with the aid of NVivo 9.0, they can also be pre-determined and used in data analysis. The use of pre-determined or a priori themes in qualitative analysis was predicated on researchers' knowledge of the subject matter or phenomenon under study, sources from literature, and research questions, as is the case in this study (Saldana, 2009; Creswell, 2007).

This study employed an a priori approach to establish themes used in analysis of the data which included interview transcripts, field notes, and memos. Using the interview questions and my own experience having attended a couple of these Web 2.0 application professional development workshops, I delineated five themes used in this data analysis. These themes reflected the five main foci of the interview questions and sub-questions (see Table 1). I was mindful of the fact that themes could emerge during actual data analysis and therefore made room to accommodate such situations by allowing for In Vivo coding during data analysis.

Table 1
Themes and Sub-Themes

| Themes | Sub-Themes |
|---|--|
| 1. Workshop experience | Duration Engagement Rigor and relevance Follow-up Participants' collaboration |
| 2. Integration in classroom | Parental concerns Communication with students and parents Collaboration among students |
| 3. Hands-on experience | Duration Engagement Show and tell |
| 4. Knowledge of Web 2.0 applications | Participants' knowledge Instructor knowledge Online workshop |
| 5. Problems and benefits | District policies Student achievement Culture of collaboration |

Demographic data

Participants were assigned codenames or pseudonyms: PS01, PD02, PP03, PT04 and PH05. The demographic profiles of the participants are depicted in Table 2 below.

Table 2
Participant Demographics

| Participants | PT04 | PS01 | PP03 | PH05 | PD02 |
|--------------|-------|--------|------------|-------|--------|
| Age | 36-40 | 26-30 | 26-30 | 41-45 | 46-50 |
| School | High | Middle | Elementary | High | High |
| Gender | Male | Male | Male | Male | Female |

Teaching and Technology Experience. Teaching and technology experience of participants is depicted in Table 3. Although these technology experiences were all not classroom or instruction related, it is striking to know that all the participants were very comfortable with technology and each participant had more than five years of general experience with technology (See Table 3).

Table 3

Participant Teaching and Technology Experience

| Participant | PT04 | PS01 | PP03 | PH05 | PD02 |
|--------------------------|-------|-------|------|-------|-------|
| Teaching experience | 11-15 | 0-5 | 6-10 | 16-20 | 6-10 |
| Technology experience | 6-10 | 26-30 | 6-10 | 16-20 | 21-25 |

Web 2.0 Knowledge. All the participants checked various Web 2.0 categories they claimed to have knowledge about and rated their experience using them as excellent or good except for one participant. However, during the interview what became very clear was that they did not know the categories of the particular Web 2.0 tools they used or how to categorize them in general. The female participant listed only one category she has knowledge about and was neutral in rating her experience using it (see Table 4).

Table 4
Participant Web 2.0 Knowledge

| Participants | PT04 | PS01 | PP03 | PH05 | PD02 |
|--------------------|--|---|--|---|--------------|
| Web 2.0 categories | Social networking, Video, Audio, Presentation, Collaboration, Screen capture, Productivity | Social networking, Video, Audio, Presentation, Collaboration, Screen capture, Animation | Social networking, Video, Audio, Presentation, Collaboration, Screen capture, Productivity, Concept mapping, Animation | Social networking, Video, Presentation, Collaboration, Screen capture, Productivity | Presentation |
| Web 2.0 experience | Excellent | Good | Good | Excellent | Neutral |

Web 2.0 Workshops Attendance & Duration. Four out of the five participants have attended 4 or more Web 2.0 tools workshops in different categories as organized by the district. Only one participant attended just one workshop in one Web 2.0 category.

The duration of the workshops they attended was between 1-2 hours (see Table 5).

Table 5
Participant's Web 2.0 Workshop Experience

| Participants | PT04 | PS01 | PP03 | PH05 | PD02 |
|-----------------------------|--|---|--------------------------------|---|--------------|
| Web 2.0 workshop attended | 7 | 6 | 4 | 4 | 1 |
| Web 2.0 workshop categories | Social networking, Video, Audio, Presentation, Collaboration, Screen capture, Productivity | Social networking, Video, Animation, Presentation, Collaboration, | Video, Presentation, Animation | Video, Audio, Presentation, Collaboration, Screen capture, Productivity | Presentation |
| Workshop duration (Hrs.) | 1-2 | 1-2 | 1-2 | 1-2 | 1-2 |

Description of Salient Participant Characteristics

Apart from the demographic data about participants detailed in the table above, there were other salient participant unique characteristics that need consideration to understand how some of their references in the interview transcript dominated some of the sub-themes.

- a) PS01: Participant is a 5th grade science teacher in a middle school and also is the technology liaison teacher for the school. Technology liaison teachers are teachers who are savvy with technology and appointed to assist other less savvy teachers in using technology in their school. The participant agreed to be interviewed after lunch break during district Activ Academy workshop held first week into summer vacation. The setting for the interview was one of the classrooms used for the workshop, and the interview lasted for about 25 minutes before participants started coming in for the next academy workshop.
- b) PD02: Participant teaches accountancy in high school and is an adjunct faculty member at a community college. Participant agreed to be interviewed after lunch break during district Activ Academy workshop held first week into summer vacation. The setting for the interview was one of the classrooms used for the workshop, and the interview lasted for about 15 minutes before participants started coming in for the next academy workshop. Because the participant attended only one Web 2.0 workshop in the past, most of the interview questions requiring in-depth

knowledge of Web 2.0 workshop sessions were omitted. Participant later responded to further interview questions posed by email.

- c) PP03: Participant PP03 is a 4th grade elementary school teacher who teaches all subjects except science and social studies. He teaches in the dual language program where monolingual English speaking students and monolingual Spanish speaking students are mixed. He is responsible for the mathematics portion of the program. This participant agreed to be interviewed after lunch break during the district Activ Academy workshop held first week into summer vacation. The setting for the interview was one of the classrooms used for the workshop and the interview lasted for about 30 minutes before participants started coming in for the next academy workshop. The participant was one of the instructors in the Activ Academy workshop being held and had previously participated in teaching other teachers in such workshops.
- d) PT04: Participant is an audio/video production high school teacher who has considerable experience with technology and says, “It’s like I live and breathe technology.” The participant agreed to be interviewed during the summer school session which was held the same time the Activ Academy was taking place. The setting was his classroom, and there was no constraint of time. The participant responded with passion on most of the interview questions, and the interview lasted for 52 minutes.
- e) PH05: This participant teaches applications of technology and currently is Technology Liaison officer in a high school. Participant has a wealth of

experience in technology and has witnessed the adoption of various forms of technology in the educational system. Participant agreed to be interviewed on the last day of school after attending to school closure procedures. The setting was his classroom, there was no time constraint and interview lasted for 54 minutes.

Themes

Five themes used in the data analysis were delineated to address the research questions. The transcribed data of each participant's interview was read several times, and NVivo 9.0 software was used to code and manage verbal data. The number of references and coverage (that is, percentage of source text coded as a particular theme or node by each participant) are aggregated to generate sub-themes in the related priori main theme (see Table 6).

I was mindful of the fact that themes could emerge during actual data analysis and therefore made room to accommodate such situations by allowing for In Vivo type of coding during data analysis. In Vivo coding implies using terms or words used by participants themselves to code for patterns or themes (Creswell, 2007). The main themes and their overall coverage and number of references of participants are detailed below (see Table 6), followed by a discussion of participants' interview responses organized by themes.

Table 6

Participants' Theme References & Coverage

| | Hands-on experience | Workshop experience | Problems and benefits | Knowledge of Web 2.0 | Integration in classroom |
|-------------------------|------------------------|------------------------|--------------------------|-------------------------|-----------------------------|
| Coverage (%) | 41.10 | 58.71 | 24.95 | 22.16 | 87.35 |
| Number of references | 56.00 | 59.00 | 24.00 | 21.00 | 56.00 |

Workshop experience. The interview question required them to narrate their experiences in the Web 2.0 workshops they attended. As participants responded to the questions asked, digitally recorded, I also took field notes, noting participants' confidence level and emphasis about things that were narrated.

a) Rigor and relevance

The sub-theme rigor and relevance addressed how challenging and relevant the workshop was to them and the expectation that they will be able to transfer their knowledge to the classroom. Some of the participants opined that there was no rigor in the workshops they attended. A participant had this to say,

Technology staff developments that I've been to, I'm not expected to think creatively, and I'm not expected to problem solve in those developments. I'm expected to go in there and sit and learn what they want to show me. I think we need to change it. We don't do that to our kids. We don't expect our kids to just go in and learn formulas, we want them to learn the formulas, and then apply the formulas in problems and real life situations. (PT04)

Another participant offered a contrasting perspective,

In fact, that does leave plenty of time just to play around with the program whatever they're showing you. (PS01)

How relevant were the workshops? One participant commented,

I think most definitely the workshops need to be catered as much as they can be, to subject and grade level. I'm a secondary teacher, and sometimes the workshops are too much at the elementary level, and I cannot see the application of it at the secondary level. (PD02)

Another participant was of the view that if some rigor were introduced into workshop, it would make them more relevant. The participant commented,

But I think we do need to make our stuff more rigorous. If you make it more rigorous, it will make it more relevant. It will all tie together. With more rigor, it's going to force you to have a relationship with your instructor because you don't understand it. If you would understand it, you wouldn't need to be there. It's all tied together. (PT04)

The high school teacher participants in the study complained about relevance of Web 2.0 workshop because the tools presented at those workshops were not relevant to the grade level they teach.

b) Collaboration

Collaboration has become an important concept as a 21st century instructional strategy among teachers and students. In this sub-theme, collaboration referred specifically to teachers' collaboration during the workshop. How much of this took place during Web 2.0 workshops? From participants' comments, this is a missing link to the success of these workshops. Two participants summed their expectations this way,

I would say at this point there are many more teachers who are engaged in the classroom type of scenario where they can come and interact with not just their teacher but with their colleagues so that they can actually see some of the products that are being generated by others, because inevitably, people come to class that already have some of the skills being offered and they either want to fine-tune them or find out how others are using them.”(PH05); and, . . . then when we meet as, face to face, we're not covering “all right, everybody click here, everybody click here.” We're creating, we're collaborating. We're working together on making a product, and coaching more than demonstrating; more coaching, coaching teachers on the problems. (PT04)

c) Follow-ups

One of the things that makes workshops successful involves organizers or instructors establishing a feedback mechanism to find out if the participants are implementing the knowledge they acquired. This is very important, as research has shown that timely and constructive feedback bring the best out of a learning process (Canon & Witherspoon, 2005).

A participant highlighted the lack of follow-up in the workshop he attended and commented,

Email them like three or four weeks later, saying, “Hey, have you tried anything?” Just to follow up with them. I don't feel like our staff in development does anything like that for technology. They don't follow up with me to find out, “Hey, are you using it, how can we help you use it, what have you used?” (PT04)

d) Duration of workshops

This sub-theme looked at the length of time participants were in the workshop and whether they considered the time adequate for meaningful learning to take place. The majority agreed that it is not the duration of the workshop that important, but the learning that occurred. A participant put it this way,

So duration is important only to the effect—and we know this as teachers, right?

It's only important if the outcome is what you're looking for. (PH05)

This participant stated that while one hour may be considered too short if you are to create a product by way of hands-on activity, but that two hours or more was too long.

One of the participants confirmed this and stated that,

I do think that one hour is not enough time to do true, to really go over the concept of this new tool that you're teaching, right, and then developing the content. I don't think an hour's enough time. However, two hours is too long. (PT04)

e) Delivery strategies

This sub-theme addressed issues related to times the workshops were offered, the setting, and presentation. These comments by participants give insight into the delivery strategies employed during the workshops.

Just basically, they just introduce it to everybody and tell them about it and show the examples.(PP03); and,

Model. I want them to model how I'm supposed to use it in a class. Because that's not how they're doing it. The workshops that I've been to, they just go and they tell you “all right, you click here, you sign in, you click here”—they're

telling me all the technical aspects, but they weren't modeling how I could use it with my class. (PT04)

Regarding when the workshops were offered, at the beginning of summer vacation, this participant had this to say,

It's good because they're kind of putting ideas in your mind and you have all summer to germinate. You just got finished with the year, so you're going there. You're not thinking about "Oh, I've got to do this, I've got to do that in my classroom, I've got to do this," right? You're able to think all summer, kind of absorb and just kind of let it bounce around in your mind about what you want to do. (PT04)

On readiness to adopt Web 2.0 tools assuming some of them become mandatory, a participant had commented that

So teachers who are engaged in Web 2.0 tools now will be much more ready to embrace those types of educational tools when it becomes mandated, much like grade books are now, electronically, than those who are opposed to using them for whatever reason. (PH05)

When to conduct the workshop, how convenient, and other teacher responsibilities were talked about by participants. In this regard this is what a participant said,

They're not offered at a convenient time for teachers. The biggest problem in training teachers is the timing. So often, we request that teachers do these things after school, and I can tell you right now, there's not a teacher around who can concentrate after school on much. They're tired. Additionally, we offer teachers the ability to train during conference periods. Again, teachers have a lot going on.

They have papers to grade, they have students to meet with, and they have parents to engage. That's not a good situation when the teacher only has one conference period and they are forced to determine whether or not they use that for their professional development or to get the day-to-day stuff done. So time crunches on teachers are the biggest limitation to when we train them. (PH05)

And another thing is, I don't know my class next year, so if this was, you know, at the beginning of school we get all those days of working in the classroom. (PP03)

A participant compared the district Web 2.0 tool workshop with those in other districts, as told him by his friends, and came to the conclusion that his district is not doing badly after all:

Well, I do want to say that our district does a lot with workshops and preparing teachers. I've talked to other teachers about their workshops and seriously, they cannot compare to what we have. (PP03)

f) Engagement

Training can take place for any length of time without learning taking place, and one of the reasons is lack of engagement of the participants. Web 2.0 tools by nature are considered engaging because as one of the participants put it,

Web 2.0 tools have taken the technicalities out of applications and replaced it with content. (PT04)

Content creation is engaging, and the following comments reveal the extent this took place in the Web 2.0 workshops. A participant commented about teachers' reactions when they are introduced to things they can do with the tools in their classroom this way,

Well, I can see even in the teacher's reaction, they're excited about it, they want to do it. As a matter of fact, when I'm in those workshops, you hear them, you hear the buzz, "Oh, I could use this," "I could do this." (PP03)

Another participant described how the engagement level can wane after a while,

I have seldom attended one regarding 2.0 tools that wasn't seen as—how to put it? Engaging. Teachers like these type of tools in the workshops. There's an "ooh" and "ahh" factor, like "wow, I could really do that?" And so they generally grasp attention very well. Because of the nature of the way we run workshops in our district, it's rare that you get a class that has a breakout of similar achievements, so much like in anybody's math class; you might have teachers who are at a low level of using tools and those who are accelerated. So because of that, your level of engagement after the initial "ooh, ahh" can fade, or be enhanced, depending on who's in the class itself. (PH05)

However, another participant saw engagement differently from the others and had this to say,

"I go to a workshop, and when I go to a workshop, my expectation is to just sit there and feed me. Feed me, right? And it's because there's no expectation from the training aspect to hold me accountable to actually learn, think creatively and to problem solve. And I think we need to change our staff development in doing that, change the expectations of our participants. (PT04)

Theme Summary. Motivation in adults to learn is closely associated to how relevant it is to the task at hand (Knowles, Holton, & Swanson, 2005). Participants who rated their Web 2.0 tool workshop experience low were participants who are high school teachers. They felt that the Web 2.0 tools presented at the workshops were too elementary, lacking both in rigor and relevance to be impactful in their instruction. The elementary and middle school participants in the study saw these tools as very useful but were more concerned about the times and settings of these workshops. Apart from the usual completion of survey forms after a workshop, no attempts are made by the organizers to get feedback from participants regarding implementation of what they learned from the workshop in the classroom. In other words there is no follow-up on the part of instructors to create a relationship with workshop participants that could sustain the interest of participants in Web 2.0 tools.

Table 7

Workshop Sub-Themes

| Sub-Themes | Participants | | | | |
|---------------------|--------------|------------|-----------|-----------|-----------|
| | PT04 | PS01 | PP03 | PH05 | PD02 |
| Rigor and Relevance | 7 (3.94%) | 1(0.60%) | - | - | 1 (2.52%) |
| Collaboration | 3 (1.16%) | - | - | 1 (1.85%) | - |
| Follow-up | 1 (1.16%) | - | - | - | - |
| Workshop Duration | 2 (1.16%) | 1 (0.46%) | 1 (1.17%) | 4 (2.31%) | - |
| Delivery Strategies | 9 (6.98%) | 5 (11.60%) | 4 (5.07%) | 7 (7.78%) | 3 (1.77%) |
| Engagement | 4 (1.76%) | - | 2 (2.2%) | 3 (5.23%) | - |

Note. The numbers represent coded references and the numbers in bracket the percentage coverage of the references by participants for each sub-theme.

Integration in classroom. Integrating technology in the classroom has become a prominent topic, as study after study reports that not much of this is taking place in our classrooms.. Challenges of emerging technologies such as Web 2.0 tools make this even more compelling. Sub-themes that emerged from teachers' narratives, with the number of references and coverage of each sub-theme, appear in Table 8. A discussion of these sub-themes follows.

a) Technology

In this sub-theme were accounts of successes, mixed feelings, and constraints about using Web 2.0 tools in the classroom. One participant had this to say,

I consider them successful if I'm using them in a classroom right now. (PD02)

For participants who have integrated some web 2.0 in their teaching, they had this to say,

I think that's what Web 2.0 has done for my classroom. It's taken the technical aspect out of it, to where we're focusing less on technical stuff and more on content. I think that's the beauty of Web 2.0 . . . My kids are more productive.

My kids are more productive, because—that's tough, but they are. (PT04)

Anytime you use a computer in the classroom, the kids go crazy because they love working with computers. (PP03)

Whenever you say Web anything, you're talking about increased engagement because if it looks like a game and it has noises like a game, the kids think it's a game. Whether or not they learn anything in the process is incidental. But they are paying attention for that time. (PS01)

It's extremely effective to getting them engaged, to getting them to really like that stuff. It's a whole lot better than marbles and foam balls because it's live; it's animated. They love it. (PS01)

Integrating Web 2.0 tools is not without some constraints, such as the computer-student ratio and creating content to be used in the classroom, as evidenced by some of the comments by participants.

And so I think in the beginning it's very exciting, and "yeah, let's do it, let's try it out." But once you get into the classroom, everything seems to change for a reason. And a lot of these Web 2.0 tools, you have to create the material. You have to create the content. And that's the part that I know for me sometimes discourages me. (PP03)

Because I only have the one student computer in my room, the kids only get a chance to create something if I book computer lab time, which is occasional, getting access to computer lab time. (PS01)

b) Communication

Communications among teachers and students, teachers and parents, and student and student was the focus of this sub-theme. Some participants discussed how they have used Web 2.0 tools as communication tools in their classrooms, which gives some students a voice they would ordinarily not have heard in a classroom devoid of Web 2.0 tools:

I said—there was one student that was real popular and there was another student that wasn't real popular. And they started talking on Edmodo on the social wall, you know? And they would never talk and communicate out in the real—outside

the walls. Because their social circles didn't match; she didn't want her friends to know that she was friends with him, but on the wall, it was awesome to see them talk back and forth and really communicate. (PT04)

This year I really felt like I knew my kids and I knew the parents, because we were in that community of Edmodo. So it is really—I say that it has really helped my classroom. (PP03)

c) Collaboration

Participants made strong arguments for collaboration among teachers during professional development workshops. This will enhance integration in classroom, as teachers will be able to see how other teachers are using the technology and learn a few tricks that work in the classroom. Web 2.0 tools are emerging technologies, and teachers are yet to grasp the full potential of these tools. Most of the participants reported using Web 2.0 tools for collaboration among students in their classrooms as well.

The following responses by participants are representative of their need for collaboration among teachers at workshops to improve integration of Web 2.0 tools in the classroom.

I find the tools themselves, I'm not, I'm impressed by almost all of them, but they, it doesn't—the tools themselves are not what I'm looking for in a workshop. I'm looking for how people use them and what their reactions to the technologies are. (PH05)

And if there was a way that what they already made could be collaboratively shared to everybody, just like when we have those on the meeting board, we have the slides that a lot of people have already made, and that's time-saving. Because

I'm looking for something, there it is, boom, I'll bring it. And I can work with it.(PP03)

Using Web 2.0 tools as collaborative tool among students is also well represented by participants' comments like these:

And that is what Edmodo has done for me. It has engaged them; it has helped them collaborate when they have questions, and then helped them in the classroom to communicate. (PP03)

Theme Summary. What can be deduced from the account of participants regarding integration of Web 2.0 tools in the classroom is the need for collaboration among teachers. Teachers learn best classroom practice from those that have used the tools in the classroom. It is apparent from their account that only two Web 2.0 tools, Edmodo and Gagle, are used extensively in their classrooms as tools for collaboration and communication. Teachers can only integrate Web 2.0 tools they are aware of. Therefore, there is need to create awareness of the many categories of Web 2.0 tools that are available on the web with instructional implications. Professional development workshop organizers should consider encouraging this awareness on a continuing basis. Because Web 2.0 tool integration was not adequately covered in the workshops, participants emphasized the need of making classroom integration of Web 2.0 tools the central theme of future professional development workshops on Web 2.0 tools.

Table 8
Integration in Classroom Sub-themes

| Sub-themes | Participants | | | | |
|---------------|--------------|------------|-----------|----------|-----------|
| | PT04 | PS01 | PP03 | PH05 | PD02 |
| Technology | 9(5.95%) | 10(19.25%) | 8(16.78%) | 3(2.58%) | 1 (0.69%) |
| Communication | 4(1.57%) | 1(0.55%) | 5(12.27%) | - | 3(12.05%) |
| Collaboration | 2(0.48%) | 1(0.54%) | 2(3.27%) | 2(1.46%) | 2(4.75%) |

Note. The numbers represent coded references and the numbers in bracket the percentage coverage of the references by participants for each sub-theme.

Hands-on experience. Hands-on activities during workshops influence the quality of learning that occurs during any form of training. The following sub-theme addressed participants' view of the hands-on activities that occurred during the workshops they attended. This theme consisted of the following sub-themes, with the number of references and percentage coverage of each sub-theme represented in Table 9.

a) Show and tell

This sub-theme explored the degree of hands-on experience activities the participants had during the Web 2.0 tool workshops.

There were mixed accounts of the level of hands-on activities that took place in the workshops. Participants who are high school teachers considered the hands-on activities a show-and-tell event probably because of lack of relevance to their instructional goals as revealed in their work experience. One of the participants described the hands-on activities this way:

It was kind of like where I sat, I saw theory, I saw how somebody else was using it, and I would just take notes on my—I usually take notes on my Smartphone,

taking notes on what they were doing, and it was just kind of like show and tell.

So I have to say it was about half and half theory and hands-on. (PT04)

However, the elementary and middle school teachers saw the hands-on experience differently,

They're pretty good about running the gamut of showing you, having you make one and then talking about using it. (PS01)

b) Engagement

This sub-theme explored participants' assessment regarding the extent they were engaged and motivated during the hands-on activities. A participant had a suggestion regarding how to make the hands-on activities more engaging:

If people are allowed to bring a current problem they are having in the classroom, or something they want to do in the classroom, in mind when they attend the workshop, and allow time within the workshop to work on that individual problem or individual usage that they can see for that workshop tool, I think it would be better able to be implemented in the classroom. If people can be able to start the implementation of it within the workshop, that makes sense. (PD02)

Most Web 2.0 workshops were held in computer labs where each participant had the opportunity to use a computer:

It's almost always a hands-on lab, so I haven't been to any Web 2.0 tool presentations that were not, that you were not, you didn't have the ability to log in. They've always been in a situation where you could either bring a laptop or there was a desktop unit available. So it was always hands-on. (PH05)

The same participant further stated,

Most of the classes I have attended, it's very much an opportunity given, not always taken, but given to experiment with the tool you've been taught. (PH05)

Some participants were of the view that the hands-on activities should culminate in their producing some artifact they are going to use in the classroom as part of the engagement activity, but that did not happen. In this regard here is what one of them expressed:

“They let us play around. Most of the workshops I went to, it's just more play around, like experience this, try this, test this out. I would have liked to—well, for the half that was hands-on, OK? The other half, I just said, [inaudible] but for the half that was hands-on? We didn't have to produce a product, and I wish we would. We just kind of like “play around, click here.” I wish we would've. I think I would've gotten more out of it. (PT04)

But another participant had a different view and stated,

I don't view training as a way to get them to do a finished product. Far from that. It's much more about engaging them to see the benefit of something and to make it interesting, that they want to go and try to do something like that on their own with their class. (PH05)

Not to sound lazy but having a few pre-made ideas, a few examples of the utility of it for the classroom. Sometimes I look at it and it's a really neat tool and I can see it being extremely useful. But show me how it's been used and give me a jumping off point. (PS01)

c) Length of time

This sub-theme focused on what participants said about the length of time they were engaged in hands-on activities during Web 2.0 workshop they attended.

So the Web 2.0 tools that I've gone to, these are hands-on classes. This is not a lecture. This is sit at the machine and do it. And I find that within that hour, run by a good trainer, that's enough time. (PH05)

You could have the hands-on maybe the last 10 minutes or so. Well, there were others where there were hands-on through the whole workshop, but the ones particularly I've gone through have just been, you know, they show you how it is, kind of try it a little bit, but then you have to go to the next one, or the time runs out. (PP03)

Sub-Theme Summary. There were mixed reactions to the level of hands-on activities that took place during the workshop session arising from differing expectation among the participants. There appears to have been some hands-on activities which lasted anywhere from 10 minutes to the entire workshop session of about one hour; however, some participants did not consider them engaging because they could not produce a finished product or at least model something they could use in the classroom.

Table 9

Hand-On Experience Sub-Themes

| Sub-themes | Participants | | | | |
|----------------|--------------|----------|----------|----------|-----------|
| | PT04 | PS01 | PP03 | PH05 | PD02 |
| Show and tell | 1(0.70%) | 2(3.67%) | 1(0.32%) | 1(0.35%) | - |
| Engagement | 3(2.13%) | 2(3.17%) | 2(1.84%) | 6(4.24%) | 4(20.47%) |
| Length of time | 1(0.09%) | 2(1.07%) | 2(2.50%) | 1(0.54%) | - |

Note. The numbers represent coded references and the numbers in bracket the percentage coverage of the references by participants for each sub-theme.

Knowledge of Web 2.0 tools. In this theme, participants talked about how they became aware of emerging technologies such as Web 2.0 tools and assessed the experience of their instructors' knowledge of Web 2.0 tools during the workshops they attended. The following sub-themes and the number of references and percentage coverage of each sub-theme by participants are detailed below (see Table 10):

a) Participants

In this sub-theme, participants explained how they became aware of Web 2.0 tools and their experience with them. Attendance at technology conferences to a large extent was responsible in creating awareness of Web 2.0 tools among participants. When asked how they became aware of Web 2.0 tools, if the district Web 2.0 workshops played a significant role, a participant had this to say,

Apart from the district, in the past couple of years, I'd say no. I used to attend workshops at the technology conference, the TCEA conference in Austin. (PH05)

I heard about Web 2.0 tools through e-mail correspondence from our technology department. (PD02)

One of the classes was working with learning management systems, in my master's degree, and they mentioned several. (PP03)

It's in the industry; it's out in the real world. (PT04)

b) Online workshop

Some participants revealed preferences for or against using E-learning or online workshops for Web 2.0 tools. When asked to comment on the possibility of using online workshops to enhance their knowledge of Web 2.0 tools, here is what some of the participants had to say:

They actually took us to the web site, where we were introduced to many Web 2.0 tools such as Edmodo, but there are others, dealing with video, audio, and also animation. (PP03)

Just like Virtual School is not a good thing for all students, online classes are not good for all teachers. If we've learned anything through brain research, we know that kids—and this applies to adults just as well—learn differently. (PH05)

c) Instructor

Participants addressed how knowledgeable the instructors were with emerging technologies such as Web 2.0 tools. They also offered insights about whether instructors went the extra mile to help them with technical issues during workshop sessions. The participants had some positive things to say about how knowledgeable the instructors are and commented,

Rated on a scale of one to five, with five being the highest, I would rate the ability like a 4.5. (PD02)

And their knowledge of the topic has been excellent. Knowledge of the topic and ability to convey that to their audience, much like a teacher teaching any topic, regardless of if it's Shakespeare or Glogster, varies by the individual. (PH05)

I don't think I've ever had anybody who didn't know how to fix a problem that they've come across. (PS01)

Regarding categorizing Web 2.0 tools to make it easier for participants to get a particular one for what they want to do, a participant commented,

That sort of gets left off because I've never really thought to categorize. They're all pretty self-explanatory. But I've never heard anybody say, this is a Web 2.0

tool for social networking. This is a presentation Web 2.0 tool. I've never really heard that categorization. It's always just this is this, this is that. They don't even really say things are Web 2.0 tools. I don't really know why. It might be fear of intimidation. (PS01)

Sub-Theme Summary. From the participants' accounts, their knowledge of Web 2.0 tools before attending district workshops was essentially informal and self-propelled. They got to know about these tools mainly from technology magazines, discussion with colleagues, and attending conferences. Only one out of the five participants became aware of these tools through district sources. Their knowledge of Web 2.0 tools with instructional value are very limited to the four offered by the district, namely Gaggle, Edmodo, Glogster and Prezi. The participants were very impressed with the instructors at these workshops even though they did not learn the categories of Web 2.0 tools. Since Web

2.0 tools are Web-based tools, participants were not inclined to think they would be better served if they were all offered online since people learn differently. What was most important to them was modeling of the tools in the workshops, related to how to use them in the classroom.

Table 10
Knowledge of Web 2.0 Tools Sub-Themes

| Sub-themes | Participants | | | | |
|-----------------|--------------|-----------|-----------|-----------|-----------|
| | PT04 | PS01 | PP03 | PH05 | PD02 |
| Participants | 4 (1.78%) | 2 (4.76%) | 2 (2.58%) | 3 (1.39%) | 1 (0.83%) |
| Online workshop | - | 2 (3089%) | - | 1 (0.61%) | - |
| Instructor | - | 3 (4.44%) | - | 2 (0.97%) | 1 (0.97%) |

Note. The numbers represent coded references and the numbers in bracket the percentage coverage of the references by participants for each sub-theme.

Problems and benefits. The sub-themes addressed by participants in this theme examined what benefits accrue to districts as a result of teachers becoming familiar with Web 2.0 tools. They also talked about what is impeding the utilization of these tools in schools in the district. The sub-themes and the number of references and percentage coverage of each sub-theme by participants are detailed in Table 11 and discussed below.

a) Student achievement

Participants talked about how Web 2.0 tools meet 21st century skill sets and promote student achievement in the digital age. Students' classwork is all digitally stored in the cloud, available both to teacher and student anytime anywhere. Instances of "the dog ate my homework" are a thing of the past when instruction is mediated using Web 2.0 tools. One of the benefits highlighted by the participants was the behind the scene database infrastructure of these tools:

I'm impressed that you have a record there, you have a paper trail that's electronic, and you have a record of data that you can go back and look at and review. (PD02)

Another participant looked at the benefit to the district from students' use of the tools:

We have to look at all technology that we use to engage students as a benefit to students. Benefits to students are how we measure benefits to the district, in my experience. You can have any kind of programs you want, be they software or hardware, for teachers, administrators, counselors—all of those things are helpful in moving students through the educational process, but until it's software and hardware that affects the individual learning of the student, it's not important to the student. (PH05)

The inevitable role Web 2.0 tools will play in classroom instructional strategies in the future is well articulated by comments made by some of the participants:

So the teachers who embrace those tools saw benefits when it became mandatory much faster than those who were starting from the perspective of, "I didn't need it them, I'm only being forced to use it now." How does that relate to today and Web 2.0 tools? We know it's not a matter of "if" but "when" regarding students' use of technology to take things such as standardized tests, to engage in a virtual classroom and most likely, in the events that I see, use 2.0 tools to engage their virtual online counterparts and instructors. That's not an 'if,' that's a 'when'. (PH05)

It's getting our kids to the network. The network is the future. And when I say "network," I'm not talking about the Internet and Google search, I'm talking about cloud stuff where they're keeping their data there. The network is the key. And whatever device, whatever we choose to put in kids' hands, it doesn't matter if it's an iPad, if it's an Android, if it's a Smartphone—it doesn't matter. It's got to get them to the network. Kids have to get to the network, and that's where the

Web 2.0 tools, we've talked about it kind of, it started five years ago with the iPhone. I think the iPhone and Web 2.0 tools were the start of this revolution that we are in. Technology is moving faster now than it has ever moved before in history. (PT04)

Some of the issues or problems noted by participants during the workshops have been articulated in the other themes and sub themes. One issue worth mentioning here noted by one participant deals with content creation, which is a feature of Web 2.0 tools. The participant had this to say,

You have to create the content. And that's the part that I know for me sometimes discourages me, trying to come up with things every week or so. (PP03)

b) District policies

District policies might in one way or the other affect implementation of Web 2.0 tools in schools. Fearful of the openness of the web, most school districts institute very restrictive policies that reduce accessibility to many instructionally enriching Web 2.0 tools, thereby stifling creativity. In this regard, the participants had this to say,

Of course the district has to approve, because a lot of times a district doesn't let certain things in because of all the security hassles. So I had to talk to my principal and let her know we needed more access. (PP03)

There are all the blocking issues, regardless of where you are. We are, of course, required by law, to filter for students. That makes those types of things difficult, by their very nature. There are some district-approved social networking types of things. (PH05)

I feel like we're fearful of opening things up, but that fear's got to change.

Because the best filter of the Internet is the teacher in the classroom. That's the best filter of the Internet, OK, right? Because the teacher in the classroom is the filter, but we're taking that to where we're "no, no, we don't trust our teachers, we don't trust that—we don't trust that kids are being monitored." (PT04)

The case was made by one of the participants why district policies should be less restrictive regarding the web so that many useful Web 2.0 tools could be accessible. The participant had this to say:

We need to be teaching teachers how to be proactive in their classrooms, how to deal with those situations. Because it's not if we start opening the Internet and if the Internet, if those bad things enter our classroom. It's not if, it's when; because those bad things are entering our classroom now because kids are not using our district Wi-Fi but using their own unrestricted ways of access. (PT04)

However, one of the participants said the fact that Web 2.0 tools used district-wide like Gaggle are monitored gives her the confidence to use it in the classroom:

So I like using it because it is monitored, and it is monitored by the district, and it lets me know when students are sending inappropriate things. (PD02)

c) Culture of collaboration

The importance of nurturing a culture of collaboration among teachers in the district was vigorously articulated by some participants and deserved to be included as a sub-theme. As one participant stated,

That's how professionals engage right now. They engage virtually, so that regardless of the distance, you can collaboratively work on research and projects.

(PH05)

Another participant noted lack of district-wide collaborative efforts as one of the problems facing professional development Web 2.0 tools in the districts and states,

I don't think the district has a true culture of collaboration. We have pockets of collaboration, like me and you are collaborating right now. Me and a teacher on my campus, we'll collaborate. Me and a teacher from Morrill are collaborating.

That's great because those are small pockets. I think we need to change the culture of the entire district to collaborate together as a whole, and we don't have anything like that. (PT04)

Sub-Theme Summary. Some of the benefits accruing to the district from Web 2.0 tools involve the leverage they bring to student achievement in the classroom. According to one of the participants, benefit to students is how benefit to the district is measured. Web 2.0 tools engage students in the classroom and thereby are a benefit to the student, teacher, and district. The Web's 24/7 accessibility, and the associated behind-the-scenes database infrastructure which the teacher does not have to worry about, makes it possible for the teacher to manage student data in ways that ensure a paper trail of students' activities. Participants made a case for less restrictive network security policies to increase accessibility to other instructionally useful Web 2.0 tools, asserting that the best security watchdog is the teacher in the classroom, who can redirect students when they go astray. It is the belief of this researcher that the case for collaboration among

teachers was made, and a district-wide collaborative effort regarding Web 2.0 tools needs to be instituted.

Table 11

Problems and Benefits Sub-Themes

| Sub-themes | Participants | | | | |
|--------------------------|--------------|------|----------|----------|----------|
| | PT04 | PS01 | PP03 | PH05 | PD02 |
| Student achievement | 2(2.27%) | - | 1(0.74%) | 3(4.00%) | 1(1.52%) |
| District policies | 4(3.57%) | - | 3(3.27%) | 3(2.69%) | 2(3.27%) |
| Culture of collaboration | 3(2.28%) | - | - | 2(2.28%) | - |

Note. The numbers represent coded references and the numbers in bracket the percentage coverage of the references by participants for each sub-theme.

Main Themes and Research Questions

The research questions and the core themes that illuminated each question are described in this section, showing some overlap of main themes across the research questions (see Table 12).

Table 12

Research Questions and Main Themes

| Research Questions | Main Themes |
|---|---|
| 1. What were teachers perceptions of being able to translate skills acquired in Web 2.0 professional development to the classroom? | Workshop experience Integration in classroom |
| 2. What factors did participants perceive that impede or enhance their ability to integrate Web 2.0 applications in the classroom following professional development? | Integration in classroom Problems and benefits Knowledge of Web 2.0 tools |
| 3. How beneficial was the professional development to the participants? | Workshop experience Problems and benefits Knowledge of Web 2.0 tools |

Research Question 1. What were teachers perceptions of being able to translate skills acquired in Web 2.0 professional development to the classroom?

A breakdown of the main themes indicate *integration in classroom* of Web 2.0 was the most talked about by participants, with 87.50% coverage and 56 references. The other most covered theme that addressed the research question was *workshop experience*, which received 58.71% coverage and 59 references, with most participants expressing the need for substantial parts of the workshop to be reserved for modeling how these tools could be used in the classroom. In both themes, findings from participants indicate *integration of Web 2.0 tools* in the classroom was very important to them. All the participants agreed that much greater portion of Web 2.0 professional development workshops should be devoted to showing or modeling to participations how these tools could be used effectively in the classroom rather than describing them.

Most of the participants wished they had the opportunity to collaborate with colleagues who are already using these tools in classrooms and learn their strategies. The participants felt that district-wide collaboration on Web 2.0 tools is non-existent in the district, compared with what obtains for the Prometheans interactive whiteboards. They consider developing what one participant called a culture of collaboration very crucial in transferring their skills to the classroom. Such a culture of collaboration would lead to establishment of an active repository of Web 2.0 tools knowledge and skills, which teachers in the district can always refer to when they need to investigate how to incorporate a particular Web 2.0 tool in their lesson plan.

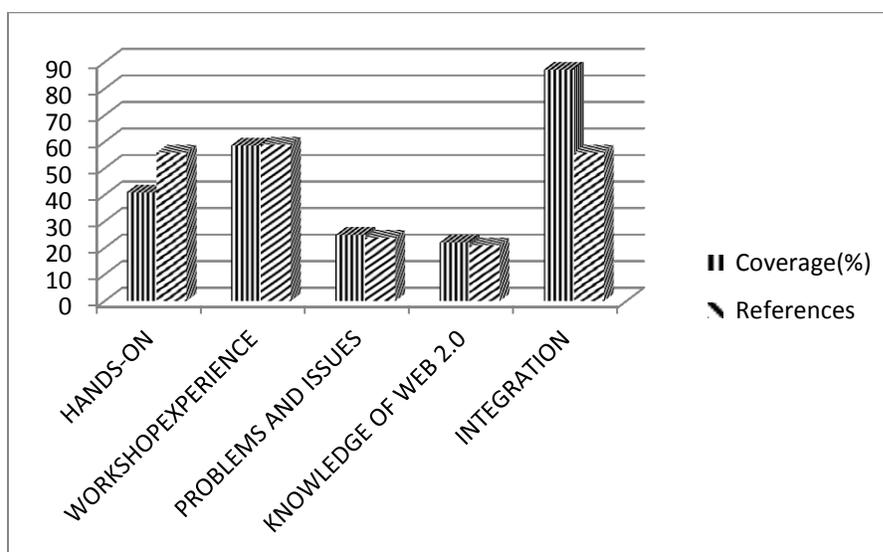


Figure 1. Participants' Theme References & Coverage

Participants also talked about rigor and relevance of the workshops as inspiring them about integration in the classroom. While two participants in the study who taught in elementary and middle school found the workshops relevant, three participants in the study who were high school teachers were very critical of the level of rigor and relevance of the workshops in meeting their instructional objectives in the classroom. They considered most of the tools and workshop delivery very basic, and because classroom integration strategies were not strongly emphasized, they were left to wonder what relevance the workshop had to them in a high school curriculum. Although the high school teachers among the participants have used some of the tools, primarily for

communication with students, they did not find Web 2.0 tools in the workshop addressing higher levels of instruction, referring to Bloom's taxonomy.

Participants were unanimous in acceptance that workshop duration of 1-2 hours, if properly taught, was adequate to effect improvement in knowledge about integration of Web 2.0 tools in the classroom. All the participants agreed that offering these workshops after school was not the best approach because many teachers are already tired and may not achieve much at that time of the day. Offering the workshops during the start of summer was also not the best alternative because the teachers have the earned summer vacation utmost in their minds. The possibility of skill decay over the summer is also a real drawback. Along this line of thought, one of the participants suggested holding the workshops about two or three weeks into the new academic session so that teachers can begin to implement them when the knowledge is still fresh.

Since the workshops do not take into consideration different skill levels of participants, one of the high school teachers suggested creating an eLearning site for the basics. At the eLearning workshop site, future workshop participants learn on their own time the basics of these tools, while in the face-to-face workshop, participants share in a collaborative way Web 2.0 tool integration strategies and intensive hands-on activities.

Research Question 2: What factors did participants perceive that impede or enhance their ability to integrate Web 2.0 applications in the classroom following professional development?

Participants shared their experiences on integration of Web 2.0 tools workshops in the classroom after attending such workshops, through comments gathered under the themes *integration in classroom, problems and benefits, and knowledge of Web 2.0 tools*. One of

the strong points made by one participant was the lack of follow-up on the part of instructors or the technology department to find out if teachers are using the tools in the classroom. Surveys conducted immediately after the workshops were not considered effective in assessing whether teachers are implementing what they learned in the workshop sessions. Because the hands-on experiences were moderately engaging, but seemed less rigorous and relevant to most of the participants that teach high school, the enthusiasm or motivation to try them in the classroom was not enhanced.

Elementary and middle school teachers among the participants appeared to have a head start using Web 2.0 tools in the classroom. These teachers gave many accounts of how the tools have improved their classroom climate, especially in the areas of collaboration and communication between students and teachers as well as among students themselves. Because the general atmosphere was “play around” with these tools or “show and tell,” and not necessarily task oriented or very engaging, some participants stated they wished the overall workshop delivery strategy were like what obtains in the classrooms, where they hold students accountable for completing a given task. This approach would enable attendees to build relationships with the instructors or other attendees who are doing better with the tool to assist them in completing their task and perhaps to form sustainable enduring collaborative relationships long after the workshop ends.

Research Question 3: How beneficial was the professional development to the participants?

The participants were unanimous in their agreement that Web 2.0 tools, or cloud computing, is of immense benefit to students, teachers, and the district as a whole. They

envision a time in the near future when Web 2.0 tools will be mandatory in schools, and teachers who are using them now will be at an advantage, because it will no longer be a question of “if” but “when” it will happen. Popular desktop applications that are used in schools such as Microsoft Office Suite and Adobe Suite have now metamorphosed into cloud computing platforms much like Google Docs. Such popular desktop applications are very expensive, purchased through licensing and installed on school computers. This restricts accessibility of the applications to students after school hours and outside of school computer labs. But with Google docs, the same applications are available online and the majority of students, with their smart phones or home computers, are able to access these applications and complete their assignments in a timely manner.

Chapter IV

Discussion

This chapter includes discussion and interpretations of the findings described in Chapter 3, as well as recommendations and suggestions for future research in professional development for teachers in the era of emerging technologies.

Transcendental phenomenological research method was considered appropriate for this study because understanding participants' lived experiences in these settings leads to identification of shared themes (McDuffie & Scruggs, 2008). Furthermore, phenomenological research generally has been found effective in bringing to light individual experiences and perceptions of events from participants' own standpoints, which could be quite different from what is commonly assumed, and could lead to positive changes in the way the training is done (Lester, 2012).

This study took place in a school district in Houston, Texas, United States and the five participants that took part in the study were teachers in the district drawn from elementary, middle, and high school teachers working in the district. The research questions were designed to elicit from the five participants their experiences in those workshops, and data collection was through in-depth semi-structured and open-ended interview protocol.

Interpretation of Findings

Interpretations of these findings are based on participants' responses to interview questions relating to themes previously established. In cases where findings seem to be applicable to more than one question, they are interpreted within the context of each particular research question.

Research Question 1. Professional development can be evaluated by a desirable outcome--in this case, the extent to which participants in Web 2.0 tools workshops were able to implement what they learned in the classroom. Since technology assumed a pivotal role in education, the salient issue has not been about putting technology hardware and software in schools, but rather whether there is human capital to properly harness technology in this context (Swain & Pearson, 2002). All participants stressed the need for the workshop to be oriented to providing strategies for implementing Web 2.0 tools in the classroom. That is the reason the theme *integration of technology* recorded the highest coverage and number of references in participants' responses. Web 2.0 tools are new in the classroom, and the technologies involved touch all aspects of 21st century learning skills, dominated by creativity, critical thinking skills, and collaboration. Participants in this study stated they wanted to learn the relevant skills, but unfortunately not much of meaningful technology integration was shown to them or modeled for them.

What might account for the absence of meaningful technology integration in the classroom in these workshops could be limited understanding on the part of the organizers of the various types of technology integration workshops. Lawless and Pellegrino (2007) delineate clearly three types of technology and instruction workshops that can be implemented with very desirable pedagogical implications. These types of professional development workshops include

- a) Professional development focused on integration of technology into classrooms.

These are workshops that are targeted at ensuring participants acquire the requisite knowledge and skills to implement in the classroom. Such workshops are characterized by meaningful active engagement activities that model classroom

implementation. They emphasize collaboration among participants and sharing how tools are being implemented in their own classrooms.

- b) Professional development focused on learning about technology.

Workshops whose primary objective is to introduce new software or technology tools fall in this category, the purpose being merely to create awareness of the potentials of such tools, and where to find them. These type of professional development workshops are characterized by demonstrations on the part of the instructor and are largely show-and-tell events. There are little or no hands-on activities apart from the occasional click here or there to find resources or to follow a procedure to test some of functionalities of the software or tool.

- c) Professional development focused on how to use particular software.

A typical workshop of this nature is characterized by learning how to use a particular piece of software like learning Microsoft Word 2010 or how to use Google Docs.

In order for professional development workshops to achieve the desired result, the content focus has to be clearly examined and defined at initial stage of planning. Implementing professional development workshops without considering the intended outcomes constitutes a very simplistic approach to technology integration in the classroom (Lawless & Pellegrino, 2007). From the account of participants in the study, the type of workshop they experienced falls under the second category where the primary objective was to introduce new software or technology to create awareness of the potentials of such Web 2.0 tools. Participants did not feel their experiences in the Web 2.0 tools professional development workshops empowered them to be successful in integrating the tools in classroom instruction.

Research Question 2. Learning to integrate technology in the classrooms is a change process for teachers. Web 2.0 tools form part of the new emerging technologies that affect classroom instruction and take time as individuals undergoing the change process need a lot of sustained support (Bowe & Pierson, 2008; Newman, 2008). Various factors affect whether teachers successfully make these changes. From participants' accounts of their experiences during Web 2.0 tools workshops they attended, *hands-on* and *workshop experience* themes ranked high in the minds of the participants (see Figure 1). Although workshops purported to have had some hands-on activities, they were not considered adequate for sustained implementation in the classroom on the long run.

Web 2.0 tools workshops are implemented in a one-size-fits-all, including teachers of all levels in the school system with no distinction made among different curriculums. That was why two of the five participants who were high school teachers considered Web 2.0 tools workshops irrelevant and too elementary for them. Research shows that motivation to learn that will endure over time happens when participants can see direct relevance to their job as well as previous experiences of such training (Noe & Schmitt, 1986; Noe & Colquitt, 2002).

To sustain technology integration strategies learned during the workshop, the post-training climate has to be very supportive (Salas, Kraiger, & Smith-Jentsch, 2012). Some of the participants complained of not being able to use Web 2.0 tools that are blocked or filtered from the network, which does not make for a positive and supportive post training environment. The reasons behind such technology restrictive practices are all too familiar, but as one of the participants pointed out, the best filter in the classroom

is the teacher; moreover, with smartphones the students are able to access sites considered inappropriate anyway.

Tannernbaum and Yuki (1992) have noted that participants are more likely to view workshops as important if they are made mandatory or if attendees are made to see how relevant attendance is to their careers. All the participants in the study attended the Web 2.0 tools workshop out of sheer interest to discover what Web 2.0 is all about. They had no compulsion to attend; furthermore, Web 2.0 tools workshops recently are structured mostly around elementary and middle school curriculum.

Sustained effort on the part of workshop instructors and organizers to follow up with participants is pivotal in sustained success. This applies whether the workshop is mediated by on-line, face-to-face, or blended learning (Garet, Porter, Desimone, Birman, & Yoon, 2001; Richardson, 2003; Little & Housand, 2011). Participants reported no follow-up to find out if the participants are putting into practice what was learned.. Collaboration and communication features of Web 2.0 tools could assist in the follow-up effort. Web 2.0 tools such as wikis, blogs and social networking sites can be customized by instructors as avenues for keeping in touch with participants instead of emails, which is often what the instructors gave out. Emails do not offer the collaboration afforded by Web 2.0 tools. A participant could circulate a post-workshop problem he or she is facing through the collaborative tool; the solution suggested by instructors or other teachers is visible to others and serves as a repository of knowledge for the workshop. This is what one of the participants in the study referred to as culture of collaboration, which is lacking in the district with respect to Web 2.0 tools.

Research Question 3. Participants in the study were upbeat and proud of district professional development workshops despite the shortcomings of Web 2.0 workshops. The elementary and middle school teachers experienced higher level of satisfaction than high school teachers did. This fact supports what has already been noted about relevance of content of the workshops to high school curriculum. The elementary and middle school teachers among the participants found collaborative and communication Web 2.0 tools such as Edmodo and Gagle very beneficial in their classrooms. These Web 2.0 tools enable teachers and students to connect, collaborate, and share content, and access homework, grades, and school notices. However, there are other very useful Web 2.0 tools out there that go beyond communication and collaboration, that are useful for engaging students in critical thinking, problem-solving, and productivity skills. Riding on the general favorable perception of participants with the district's other professional development workshops, what is required now is to fine tune Web 2.0 tools workshop content to include more tools that utilize these higher order skills.

Directions for Further Research

This research study was carried out with five participants, composed of four male teachers and one female teacher. There was only one middle school science teacher, and there was no science teacher among the three high school teachers.

An aspect of this research that could be investigated further would be to increase the sample to include more female and science teachers both at high and low secondary school levels to see how Web 2.0 tools are being integrated in their classrooms. It is also important to find out facts regarding student achievement in classrooms where there is extensive integration of Web 2.0 tools in classroom instruction.

Another aspect of Web 2.0 tools that might benefit from further research would be to assess the level of engagement among students in classes where their teachers have attended Web 2.0 tool workshops. Of these future research possibilities, much has been done quantitatively, but what is not common is investigation from a qualitative perspective. As pointed out in the literature review, numbers and statistical inferences may not tell us all the subtle but important facts of the experiences in a Web 2.0-mediated classroom environment.

Limitations of the Study

The generalizability limitation of qualitative research applies to this study. This study investigated the lived experiences of a targeted population of five teachers. Whether the findings may be extrapolated to have wider implications to the broad population of teachers in the district or to draw general and far-reaching conclusions from the study is a judgment for each reader to make.

Another limitation has to do with reliability of the study, that is, reproducibility of the study. The coding system used for the themes and sub themes was based on literature and the experience of the researcher. Another researcher might code differently and arrive at themes not exactly the same as the ones used in this research study. In reality, most qualitative studies are exploratory in nature and point researchers in directions for more detailed studies on the phenomenon under investigation.

It is pertinent to offer some explanations for the poor response rate by the teachers in the district resulting from the original sampling method. School districts in the state of Texas as whole are undergoing phased transitional changes due to the introduction of the STAAR standardized testing which will replace TAKS standardized tests. This change

started in 2012 with the freshmen (9th grade class). Next year it will continue with sophomore (10th grade) class and so on until all the TAKS tests are replaced with STAAR testing in all classes in high school. During this transitional period, the teachers were engaged in conducting two standardized tests during same period. Coupled with preparing the students for these tests using after hours tutoring and even conference periods, there was hardly any time left to conduct in-depth face-to-face interviews with any teacher in the district between the months of April through May.

Conclusions and Recommendations

This research study was undertaken to investigate the lived experiences of five teachers in school district sponsored Web 2.0 tools professional development workshops and examine what factors determine how fully they integrate technology in their classrooms. The Web 2.0 tools professional development workshops constitute a very small percentage of total workshops offered in the district. When offered, though not on a consistent or sustained basis, their content focuses more on software or tool demonstrations than Web 2.0 tools being integrated in classroom instruction. The content also is more relevant to elementary and middle school teachers than to high school teachers. This is partly because restrictive network policies do not allow access to Web 2.0 tools that can be used and applied to higher order thinking skills, which may be more in tune with high school instruction. Web 2.0 tools such as Voice Thread, GE Imagination and others that can be used to transform media such as audio, video and texts into a collaborative space are seldom accessed from school district networks due to security and bandwidth concerns. They are the types of Web 2.0 tools needed in high schools but are not offered in professional development workshop sessions. As a result,

most high school teachers find the workshops too elementary to meet their instructional objectives.

Much still needs to be done to raise the level of engagement so that participants are inspired to integrate the technologies into their classrooms consistently.

Recommendations

A time when Web 2.0 tools will be the de-facto school applications of choice is almost at hand. Popular software companies like Microsoft and Adobe, whose software applications have been the traditional desktop software of choice in our public school system, are shifting their base to the cloud network, with Web 2.0 versions that are served from the cloud at very affordable prices. It is a matter of economic expediency that school districts will adopt cloud option to save costs on licensing and reduce the number of staff managing large district networks. School districts that make Web 2.0 tools an integral part of their overall technology policy now will be better prepared for this inevitable transition.

I make the following recommendations, having considered the issues raised by participants in the study. My recommendations will address four domains: a) workshop structure, b) pre-workshop, c) during workshop and d) post-workshop.

Web 2.0 workshops should be structured to take into account the varying needs of teachers, recognizing the different school levels, competencies, professional development needs and generational gap of the teachers regarding Web 2.0 tools (Schools and Staffing Survey, 2009; Metlife, 2010). Web 2.0 is an emerging technology, and all teachers do not have the same level of understanding and capabilities. With this in mind, the workshops should be offered in two modules: beginners and advanced. The beginner's module

should be offered as an online workshop that will cover the basics of Web 2.0 tools and provide resources where such basic Web 2.0 materials can be found. Since this workshop is available 24/7, it offers flexibility for those interested to familiarize themselves with tools of their choice before enrolling on the advanced modules of Web 2.0 tools. The advanced Web 2.0 tools workshop will be dedicated to Web 2.0 technology integration in the classroom. To enroll in the advanced module, a teacher would have completed the beginner's module and received a competency certificate. This background is important in order to make the advanced level course meaningful, relevant, and engaging to the participant. The advanced module should be dedicated to classroom integration of Web 2.0 tools and will be the place for collaborative works among teachers, where they will take turns explaining to other teachers what is working for them in the classroom. The advanced module engages teachers in rigorous and reflective hands-on activities; providing a simulation environment where teachers will be free to experiment and not afraid to make mistakes (Salas, Wildman, & Picocolo, (2009). It should be a place where teachers will collaborate, model and discuss applicability of what to do in the classroom with Web 2.0 tools as well as share individual experiences of their integration strategies for the benefit of all (Schlager, et al., 2003; Dede, et al., 2009).

The pre-workshop structures relate to those events that need to be done to prepare the intended participants for future Web 2.0 workshops. Currently, most participants attend these workshops completely oblivious of what to expect apart from the fact that a friend had told them about it or they happen to see it in Eduphoria (the district workshop registration website). The district department in charge of workshops generally does a good job of emailing teachers in the district to sign up for the course in the workshop

registration database, and in other cases they send out flyers a week or two in advance to the workshop. However, Web 2.0 is an emerging technology with new tools that have powerful pedagogical implications. The workshops need to be better explained to teachers regarding what they will accomplish and how it will help them in their career in the form of advanced guidelines (Wolfson, 2010). . Communications about workshops for Web 2.0 tools in the form of advanced guidelines needs to be comprehensive and frequent enough that newcomers as well as older teachers new in Web 2.0 technologies could read them and figure out which one is most appropriate and what to expect during such professional development sessions. Wolfson, and Cavanagh, (2011, August) as pointed out in chapter one also found that provision of advanced guidelines is especially helpful in closing the generational gap between younger and older teachers.

The advanced workshop will be strictly face-to-face dedicated to Web 2.0 tools' integration in the classroom. Participants need to be informed beforehand that each participant will make a presentation on how Web 2.0 is being implemented in the classroom. When a workshop participant is yet to implement Web 2.0 integration in the classroom, the advanced Web 2.0 face-to-face workshop will be the place to acquire valuable skills, practical know-how, and ask questions regarding what to do with Web 2.0 tools in the classroom. After the presentations, the rest of the time allotted will be for collaborative discussions running parallel with teachers showing each other what content was created by the teacher or the students. This will also be the time teachers can examine what other teachers have posted on the proposed district wide Web 2.0 collaborative tool website to see what other Web 2.0 resources teachers are using.

The post-workshop activities involve extensive feedback and follow-up between participants and teacher instructors. Teacher instructors are teachers who are savvy with technology, acting as technology liaison in schools. However, currently this arrangement is almost entirely focused on professional development with the Activ Academy interactive whiteboard. Such a program can be replicated for Web 2.0 tools and called Cloud Computing Academy. The amount of information an individual is subjected to in this digital age is so enormous that it is unlikely anyone would acquire all necessary knowledge in formal learning environments such as traditional professional development workshops. In a recent study by Gray, Thomas, & Lewis (2010) on teachers' *Use of Educational Technology in US Public Schools*, over 78% of teachers indicated they met their educational technology training needs by independent learning as against 61 % of teachers through formal professional development. Independent learning often mediated by online training are becoming increasingly popular with teachers. As a result, I highly recommend the setup of an online learning platform to teach the basics of Web 2.0 tools and Web 2.0 collaborative tools, where teachers in the district could share their insights and strategies on Web 2.0 tools or cloud computing (Salas, Wildman, & Picocolo, 2009; Dalgarno & Lee, 2010).

In conclusion, findings from this study indicate fact that teacher professional development is not in sync with the realities of 21st Century learning, which to a large extent is embodied in Web 2.0 applications. Students and learning environments have become techno-centric and the instructional landscape is constantly changing and offering many challenges and opportunities. As we move forward through the second decade of the 21st Century, the case for elevating professional development beyond the

traditional-stand-and deliver approach could not be made at a better time than as delineated in this study. Utilization of Web 2.0 applications in professional development offers a direct path to the realization of culture of collaboration essential in harnessing the power of the crowd for teacher empowerment.

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Appendix A

Interview Questionnaire

SUBJECT (Code #)

Interview Questions

Before commencement of the interview, Web 2.0 applications and categories will be discussed with the subject.

1. How did you begin using Web 2.0 applications?
 - a. What Web 2.0 applications or tools do you use in your instruction?
 - b. Why did you begin using Web 2.0 applications or tools for instruction?
 - c. Did you have experience using Web 2.0 applications or tools before you attended the workshop?
 - d. Describe the training you received regarding how to integrate Web 2.0 applications or tools in classroom instruction.
2. Describe the benefits you have experienced from using Web 2.0 applications or tools?
 - a. What do you believe are the most important benefits that Web 2.0 applications or tools provide to you as a teacher?
 - b. Is using Web 2.0 applications or tools by teachers beneficial to the district? If so, please explain.
3. How would you describe your experience, problems or issues using Web 2.0 applications or tools in your role as a teacher?
 - a. Describe problems or issues you experienced using Web 2.0 applications or tools for instruction.
 - b. How do your team members feel about Web 2.0 applications or tools for teaching?
 - c. Are there Web 2.0 applications or tools that you would like to use that you cannot use?
 - d. What is preventing you from using them?
 - e. Are there Web 2.0 applications or tools that you must use that you would prefer not to use?
 - f. Why are you not using them?
4. Did the workshop prepare you adequately to use Web 2.0 applications or tools?
 - a. What categories of Web 2.0 applications or tools did you learn in the workshop?
 - b. What areas during the workshop on Web 2.0 applications or tools did not work well?

- c. Would you consider the hands-on experiences during the workshop adequate?
 - d. Considering the integrative nature of Web 2.0 applications, would you have preferred to work alone?
5. Discuss other matters of concern about Web 2.0 applications or tools and integration in the classroom.

Text of the online interview will be provided to participants for their review before data analysis is commenced. Participants will be advised to continue thinking about the topic because they will be able to add written comments after they review the transcript.

Appendix B
Demographic Questionnaire

Dear Participant,

You have been identified as a teacher in the district that has attended a Web 2.0 professional development workshop in the past two years. I am a University of Houston student pursuing a doctoral degree in Education (Instructional Technology). I am conducting a research study entitled “TEACHERS’ PERCEPTIONS CONCERNING USE OF WEB 2.0 APPLICATIONS FOLLOWING PROFESSIONAL DEVELOPMENT”.

The purpose of this questionnaire is to collect some basic demographic information about you as a potential participant in this study. Those who meet the criteria for the study will be contacted within seven days and will be sent a consent form to complete.

Please check the appropriate box that applies to you.

1. Gender: Female Male
2. Name of high school: Dobie Memorial Pasadena Sam Rayburn South Houston
3. Age: 21- 25 26-30 31-35 36-40 41- 45 46-50 51-55 56-60 >60
4. Years of teaching experience: 0-5 6-10 11-15 16-20 21-25 26-30 31-35 >36
5. Years of general technology experience: 0-5 6-10 11-15 16-20 21-25 >26
6. How would you rate your familiarity with Web 2.0 applications?
Excellent Good Neutral Average Poor
7. What categories of Web 2.0 applications are you familiar with?
Social networking Video /editing/sharing Audio/editing and sharing Presentation Social bookmarking Collaboration Screen capture Concept mapping Animation Productivity
8. How many Web 2.0 application professional development workshops have you attended?
One Two Three Four Five Six Seven
9. What categories of Web 2.0 applications were used in the professional development workshops?
Social networking Video /editing/sharing Audio/editing and sharing Presentation Social bookmarking Collaboration Screen capture Concept mapping Animation Productivity
10. The workshops lasted for?
1-2hr 2-4hrs 5-8hrs > 8hrs

Thanks for completing the questionnaire.

Appendix C
Consent Form

Dear [Name]:

You have been identified as a teacher in the district who has attended a Web 2.0 professional development workshop in the past two years. I am a University of Houston student pursuing a doctorate degree in education. I am conducting a research study entitled “TEACHERS’ PERCEPTIONS CONCERNING USE OF WEB 2.0 APPLICATIONS FOLLOWING PROFESSIONAL DEVELOPMENT.”

The purpose of the qualitative research is to explore the experience of teachers who have attended Web 2.0 professional development workshops and find out how beneficial they considered their experiences during the workshop sessions and the extent to which they are integrating the knowledge in classroom instruction.

Your participation will involve completion of an online questionnaire consisting of unstructured open-ended questions about your experiences as a participant in one of those workshops and how you are applying or integrating your knowledge of Web 2.0 applications in the classroom.

You can expect completion of the open-ended questionnaire to last between 20 and 40 minutes. The data collected will be used for research purposes only and not for PDAS.

Your participation in the study is strictly voluntary, and if you choose to withdraw from the study, you can do so at any time. The results of the study may be published; however, no identifying information about you will be used. Your information will be maintained in strict confidence until it is destroyed in seven years.

The possible benefit of your participation in the research study is the identification of similarities and differences in how teachers perceive Web 2.0 application workshop

sessions and classroom integration strategies which might improve professional development delivery methods.

The research study poses no foreseeable risk to you. If you are interested participating, please respond by return e-mail and I will contact you with additional information and schedule a suitable time to meet with you.

Sincerely,

Kele Anyanwu M.S.

Appendix D

The District Permission Letters

December 16, 2011.

Mr. Anyanwu,

This correspondence is to inform you that Pasadena ISD has completed its review of your research proposal studying Web 2.0 professional development and classroom integration. The request has been approved provided that (1) participation is based on voluntary, active consent and (2) data is masked so that individually identifiable information is not included. When communicating with others about the study, please clarify that you are carrying out this study as a graduate student from the University of Houston.

Solicitation of participants will need to be conducted by a district administrator. If you can provide me with specific names and/or dates of the Web 2.0 trainings, we will send your information to those who were in attendance.

When the study is complete, please send a copy to:

Donna Summers

Research and Evaluation

1515 Cherry brook, Pasadena, TX 77502

Best wishes for a successful study,

Donna Summers

Director, Research and Evaluation

Pasadena ISD

Appendix E
IRB Approval

UNIVERSITY of HOUSTON

DIVISION OF RESEARCH

April 6, 2012

Mr. Kele Anyanwu
c/o Dr. Bernard R. Robin
Curriculum and Instruction

Dear Mr. Kele Anyanwu,

The University of Houston Committee for the Protection of Human Subjects (1) reviewed your research proposal entitled "IN-SERVICE TEACHERS' WEB 2.0 APPLICATION PROFESSIONAL DEVELOPMENT EXPERIENCE: A PHENOMENOLOGICAL STUDY." on February 3, 2012, according to institutional guidelines.

At that time, your project was granted approval contingent upon your agreement to modify your proposal protocol as stipulated by the Committee. The changes you have made adequately respond to those contingencies made by the Committee, and your project has been approved. However reapplication will be required:

1. Annually
2. Prior to any change in the approved protocol
3. Upon development of the unexpected problems or unusual complications

Thus, if you will be still collecting data under this project on **January 1, 2013**, you must reapply to this Committee for approval before this date if you wish to prevent an interruption of your data collection procedures.

If you have any questions, please contact Alicia Vargas at (713) 743-9215.

Sincerely yours,



for

Dr. Scott B. Stevenson, Chair
Committee for the Protection of Human Subjects (1)

PLEASE NOTE: (1) All subjects must receive a copy of the informed consent document. If you are using a consent document that requires subject signatures, remember that signed copies must be retained for a minimum of 3 years, or 5 years for externally supported projects. Signed consents from student projects will be retained by the faculty sponsor. Faculty is responsible for retaining signed consents for their own projects; however, if the faculty leaves the university, access must be possible for UH in the event of an agency audit. (2) Research investigators will promptly report to the IRB any injuries or other unanticipated problems involving risks to subjects and others.

Protocol Number: 12456-01

Full Review

Expedited Review

316 E. Cullen Building Houston, TX 77204-2015 (713) 743-9204 Fax: (713) 743-9577
COMMITTEES FOR THE PROTECTION OF HUMAN SUBJECTS