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# Teacher Perception of the Alignment of enhancing Missouri's Instructional Networked Teaching Strategies (eMINTS) with the National Staff Development Council (NSDC) Standards

by

Diana L. Stanfill
March 2010

A dissertation submitted to the Education Faculty of Lindenwood University
in partial fulfillment of the requirements for the
degree of

Doctor of Education

School of Education

Declaration of Originality

I do hereby declare and attest to the fact that this is an original study based solely upon my own scholarly work here at Lindenwood University and that I have not submitted it for any other college or university course or degree here or elsewhere.

Legal Full Name: Diana L. Stanfill

Signature: Diana L Stanfill Date: Feb 11, 2010

A Dissertation

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This Dissertation has been approved as partial fulfillment of the requirements for the degree of
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| | |
|---|---|
| Dr. Lynda Leavitt, Chairperson | Date 02/11/2010 |
| Dr. Dominic Soda, Committee Member | Date 02/11/2010 |
| Dr. Bryan Williams, Committee Member | Date 2/11/2010 |

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Abstract

This study used the National Staff Development Council (NSDC) standards for staff development as a framework for measuring specific aspects of the enhancing Missouri's Instructional Networked Teaching Strategies (eMINTS) educational technology professional development program, as perceived by eMINTS teachers. The Technology Integration Cycle supported the research design. The three-part cycle assumed a relationship existed between standards-based professional development, technology-rich classrooms, and students' acquisition of technology skills.

This study's hypothesis, research questions, and sub-questions were designed to examine the underlying premise of standards-based, high-quality professional development. These questions sought to examine eMINTS teacher perceptions as they related to the degree in which each of the 12 NSDC standards was embedded into the eMINTS practices, and the relationships and differences between various eMINTS demographic groups. To answer these questions, quantitative data were generated from an online survey.

The analysis of survey data indicated no significant association between the NSDC Standards and the eMINTS educational technology professional development program, as perceived by the eMINTS teachers. Data analysis using z-tests for proportions revealed that the variables of years in program completion, certification level, and type of training did not significantly affect the perception of the eMINTS survey respondents.

Ordinal ranking of the standards revealed the individual scale score mean varied significantly, from the Leadership standard (3.7) being reported as the most represented,

to the Data-Driven, Evaluation, and Collaboration standards (3.0) being the least. However, when comparing the scale score mean by the NSDC's categories of Context (3.3), Process (3.2) and Content (3.3), only a slight (.1) difference was found.

Because of the in-depth melding of the NSDC standards, educational technology, and the eMINTS program, this research may provide valuable insight to stakeholders involved at all levels: adoption, design, and implementation of educational technology professional development. Further research into eMINTS' strengths (use of coaches), as well as weaknesses (inability to customize training), could provide the organization with the information needed to strengthen the program and thus increase the number of teachers trained to integrate technology in the classroom.

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# CHAPTER ONE – INTRODUCTION

When teachers walk down the hallways of a school, they may hear students talk about updating tweets using Twiterific, contributing to a wiki, or being splogged. At the start of the 21st century, these are common technical terms, and it would be reasonable to assume that most young people know how to use the hardware and software associated with using them. However, having the ability to socialize online does not make a student technologically literate or proficient. To be considered technologically literate, students must move past the trivial, and instead acquire skills that will allow them to use information in analytic, evaluative, creative, and ethical ways (Cech, 2008; Culp, Honey, & Mandinach, 2003; Manzo, 2009). It is unlikely that students will reach these and other 21st century levels of proficiency until the teachers themselves employ the skills that will enable them to push students forward. In order to improve students' technical abilities, schools must first educate the teachers through targeted, effective educational technology professional development (Garry and Graham, 2004). Garry and Graham cited the teacher as the most important piece of equipment in the classroom. The challenge is that many teachers need assistance in reaching the level of technical skills Garry and Graham noted in their research. Educational technology professional development is a key component in the growth and sustainability of technology education (Culp et al.).

Teachers need to learn to incorporate technology into classrooms where the "chalk and talk" mode of instruction once dominated to the technology age of the Net Generation (Hasmemzadeh & Wilson, 2007), with podcasts and Web 2.0 tools.

Educational technology professional development that is collaborative, ongoing, multi-faceted, and reflective is one way to develop teachers who can reach today's digital learners (Gaglioll, 2008; Ornstein, Pajak, & Ornstein, 2007; Prensky, 2005-2006; Salpeter & Bray, 2003).

*Definition of Terms*

21st Century skills – For the purpose of this paper, "a new set of skills necessary to prepare students for life and work in a technological and digital age" (CEO Forum on Education and Technology, 2001, p. 10); "…the exploration of how digital tools (cameras, presentation software, computing equipment) and online resources can support and enhance traditional subjects, skills and teaching practices" (Thinkfinity, n.d.. para. 3).

Certified eMINTS teacher – To become certified, "eMINTS participants are required to submit a satisfactory electronic portfolio that shows mastery of eMINTS concepts and use of those concepts in teaching" (eMINTS, 2009c, para. 2). "Teachers whose classrooms are funded under the Title II.D competitive grant awards or eMINTS/METS grants are required to complete and submit a portfolio" to the eMINTS National Center (eMINTS, 2009g, para. 3).

Digital learner – A student who "utiliz[es] the power of modern technology to learn anything, anytime, anywhere. [In classrooms that] are no longer necessarily defined by rigid walls, as hybrid learning models blend the virtual with the physical into a truly engaged and collaborative educational experience" (Ligon, 2009).

Discussion list – A collection of names and addresses used by an organization to send e-mail or announcements to multiple recipients (Carvin, 2003).

Educational technology – "The study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological process and resources" (Richey, 2008, p. 24). Additionally, "[t]echnology is interpreted as process, not merely in terms of hardware (such as computers or television or projectors), but in terms of learners and their relationship to the people, events, places, and things through which they learn" (Association for Educational Communications and Technology, 2008, para. 1).

Educational technology professional development – According to Meltzer (2006), educational technology professional development "involves teaching teachers to plan for, utilize, and integrate technology into their instruction" (p. 9).

Facilitator or professional development facilitator – An individual such as a teacher, trained in a topic- or subject-specific area, who helps to bring about learning by providing assistance, guidance, coaching or supervision.

Non-Certified eMINTS teacher – An eMINTS teacher who has completed eMINTS educational technology professional development, but did not submit an electronic portfolio to the National Center.

Participant or professional development participant – A teacher or other adult learner who participates in any type of organized learning activity.

Post or posting – For the purpose of this paper, the action of sending a single e-mail to a discussion list to be disseminated to the list's members.

Professional development – According to authors Ornstein, Pajek, and Ornstein (2007), professional development consists of "those processes that improve the job-related knowledge, skills or attitudes of school employees" and has "the intent to improve student learning through enhanced teacher performance" (p. 304).

Respondent – For the purpose of this paper, a respondent refers to an eMINTS teacher who participated in the researcher's online survey.

Technology integration or instructional technology – The seamless infusion of technology into the *existing* classroom curriculum (Gura & Percy, 2005). The basis for integration is "using technology in such a way that it becomes part of the fabric of teaching and learning and not a technology course end unto itself" (Gura & Percy, p. 60). The terms *technology integration* and *instructional technology* are used interchangably in this paper.

Web 2.0 – A type of Web site found on the Internet that is interactive; allowing users to add to or change information. Social networking sites, wikis and blogs are examples of Web 2.0 websites (Daines & Nimer, 2009).

*Assumptions*

This study explored the relationship between the National Staff Development Council (NSDC) standards and the educational technology professional development model known as enhancing Missouri's Instructional Networked Teaching Strategies (eMINTS). However, when studying this relationship, the researcher ascertained that the cycle of technology use in the classroom reaches far beyond the standards-based professional development sessions. The researcher assumed relationships exist between

standards-based professional development, technology-rich classrooms, and students' acquisition of specific skills. Figure 1 illustrates the cycle proposed by the researcher.

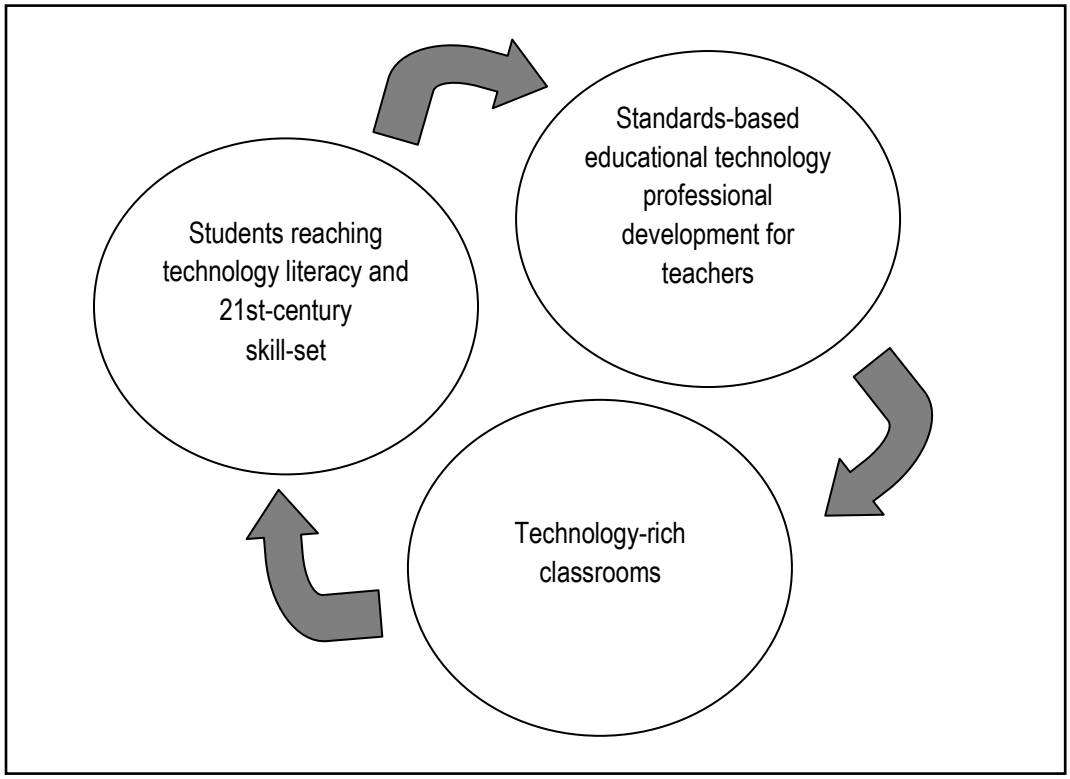


*Figure 1.* Technology Integration Cycle. The cycle created when integrating technology into classroom learning.

*Background of the Study*

In the past 40 years, education has experienced many changes; gone are the days when a teacher's gut feeling about students' learning was a satisfactory measurement tool (Mid-continent Research for Education and Learning, 2003). Instead, in 2001 state and federal policymakers began to demand proof that schools educate *all* students to specified standards, "regardless of the student's race, ethnicity, gender, family income…" (United States Department of Education, 2004, p. 1). Without assistance from professional development in the areas of curriculum and instructional strategies, the demand of teaching *all* students to identical standards often left teachers feeling inadequately

prepared. Teaching teachers, or providing high quality, standards-based professional development, was a way to fill the gap and help raise student achievement (Mizell, 2004).

*Professional development legislation.* In 2001, the enactment of the No Child Left Behind Act (NCLB), and more specifically, the Improving Teacher Quality (ITQ) Act (Title II), brought professional development to the forefront of the education field as this was the first time that such development had been federally mandated (University of the State of New York State Education Department, 2003). The authors of NCLB, which was designed to raise student achievement by creating high-performing schools, knew that participating in high-quality professional development was a practical tool that could help teachers "become 'highly qualified and effective classroom teachers'" (University of the State of New York State Education Department, p. 1). Furthermore, the creators of NCLB felt participation in quality professional development was so important, they further stated that all local education agencies receiving federal funds could spend more than 5% of those funds on professional development for teachers (University of the State of New York State Education Department). The amount increased to a mandatory 10% if the school was marked as "failing" (United States Department of Education, 2006; University of the State of New York State Education Department).

NCLB brought many changes to education, professional development, and educational technology. One such change was the merging of technology, classroom learning, and raising student achievement. The authors of the all-encompassing NCLB included provisions for educational technology through the reenactment and redesign of previous educational technology models. The Title II.D Enhancing Education Through Technology (EETT) Program was born from these changes. The EETT program had two

primary goals. The first was "to help districts improve student achievement (including technology literacy) through the integration of technology in curriculum, instruction, assessment, and professional development" (United States Department of Education, 2004, para. 2). The second goal was, "to make certain students and teachers in high poverty, high-need schools have access to educational technologies comparable with that of the students and teachers in other schools" (United States Department of Education, 2009, p. xiii).

To ensure teachers and students in high-needs areas of the United States received EETT grant funds, the government made sure these funds were made available only to districts that received Title I funding and had a long-term strategic educational technology plan filed with the state (Missouri Independent & Private Schools Education Technology Center, n.d.). The EETT documentation further stated that individual states may disperse Title II.D EETT funds through a state-determined competitive grant process. In the state of Missouri:

> competitive funds are earmarked to support schoolwide implementation of the research-based eMINTS instructional model, based on intensive professional development programs that inspire educators to use instructional strategies powered by technology to enrich teaching, engage students in the excitement of learning, and improve student performance. (Missouri Department of Elementary and Secondary Education, p. 2)

The EETT grants helped to create and fund the eMINTS National Center in Missouri and professional development programs in 12 states in the United States. Additionally, in 2006, personnel from the Western New South Wales Department of

Education in Australia viewed a presentation offered by the eMINTS director and became interested in offering similar technology training to teachers in Australia. Representatives of the Australian education system visited the United States in 2006 and 2007 to observe eMINTS classrooms. Following the visits, in February of 2008, eMINTS went international when two staff members traveled to New South Wales to train more than 20 Australian educators (University of Missouri, n.d.).

At the core of the eMINTS program is the educational technology professional development all teachers participate in and the support, both technical and instructional, the teachers receive. Both support systems are important components of the eMINTS program because "technology sits unused or underused in schools where there are no educators trained to use the technology and integrate it into their curriculum and instruction" (eMINTS, 2007, para. 6). Although the researcher is not an eMINTS teacher, as a certified teacher and degreed educational technologist, experience has shown both instructional and technical support must be in place if successful technology integration is expected. In the researcher's experience, even the most knowledgeabe, enthusiastic and dedicated classroom teacher will stop using technology altogether if the equipment is not dependable. All too often, this causes a trickle-down effect, where non-users in the school see the frustrations of those trying to integrate technology, and to avoid the stress, avoid technology integration completely.

As illustrated in Table 1, classroom teachers involved in the eMINTS program receive extensive training through a variety of comprehensive educational technology professional development opportunities. The 250-hour eMINTS Comprehensive PD immerses classroom teachers in the training and philosophies of the eMINTS program.

Additionally, "preparing students for entry into official eMINTS classrooms requires that teachers in the grade levels prior [and after] the eMINTS classrooms have a full understanding of the cognitive, social and technological skills that students will need to be successful in eMINTS" (eMINTS, 2008b, para. 5). Therefore, eMINST4All, a less intense 90-hour program, is designed for teachers whose students are entering or exiting eMINTS Comprehensive PD classrooms. The 2-year Train-the-Trainer model, also shown in Table 1, enables participants to provide eMINTS training to other educators within their own school or district (eMINTS, 2008b).

Table 1

*eMINTS Educational Technology Professional Development Programs*

| Program | Participants | Program Length and Approximate Cost |
|---|---|---|
| eMINTS Comprehensive PD | Classroom teachers grades 3 – 12 | 2 years; 250 hours $6,000 per teacher* |
| eMINTS4All | Classroom teachers grades 3-12 | 2 years; 90 hours $2,000 per teacher* |
| PD4ETS | Train-the-trainer | 2 years $17,500 |
| Veteran eMINTS Teachers | Past graduates of the program | Ongoing $25 – 200 per year** |

*Note*. Adapted from *Professional Development Programs.* Retrieved October 18, 2009, from http://www.emints.org/programs and http://www.emints.org/programs/costsummary.shtml.
*Cost as delivered by eMINTS National Center staff. **Cost dependent on option(s) selected by participating district.

*Educational technology policy.* With attention and funding focused on educational technology and educational technology professional development, in 2003, the United States Department of Education released a report summarizing the past 20 years of educational technology. The report, *A Retrospective on Twenty Years of Education Technology Policy*, compared and contrasted 28 educational technology documents written from 1983–2003 (Culp et al., 2003). The analysis of these reports focused on

seven areas: access, content, professional development, funding, stakeholders, research and regulations. While the areas of *access* and *content* were addressed in the majority of the reports, one topic, the need for more and better *professional development*, was addressed in 21 of the reports. In three such reports, educational technology professional development was identified as "a crucial element in any coordinated approach to improving technology use in schools", with the authors adding that "only with adequate professional development will all teachers be able to put technology to use in ways that will truly enhance student learning" (Culp et al., p. 17).

Also according to Culp, et al. (2003), the National Association of State Boards of Education (NASB) connected the importance of professional development and technology to enhanced student learning. After comparing, contrasting, and combining the NASB's report with other agency reports, the authors made three recommendations:

- Improve the preparation of new teachers, including their knowledge of how to use technology for effective teaching and learning.
- Increase the quantity, quality, and coherence of technology-focused activities aimed at the professional development of teachers.
- Improve real-time instructional support available to teachers who use technology. (As cited in Culp et al., p. 13)

*The move to standards-based professional development.* The need to evaluate the effectiveness and quality of professional development came with the realization that such development was one possible remedy for the unacceptable levels of student academic performance. The importance of standards-based professional development was

illustrated in the following statement by the Annenberg Institute for School Reform (AISR):

> Effective professional development to improve classroom teaching also concentrates on high learning standards and on evidence of students' learning. It mirrors the kinds of teaching and learning expected in classrooms. It is driven fundamentally by the needs and interests of participants themselves, enabling adult learners to expand on content knowledge and practice that is directly connected with the work of their student in the classroom. (As cited in Zepeda, 2008, p. 63)

Even though 46 states had professional development standards to assist them in the implementation and evaluation of their professional development programs (Hightower, 2009), the NSDC was cited as being "the standards-bearer for professional development" (Zepeda, 2008, p. 27). The NSDC, comprised of teachers, adminstrators, and policymakers, is driven by their mission of increasing student achievement through more effective professional development (National Staff Development Council, n.d. b).

It is worth noting that the NSCD professional development standards were not written to be subject or topic specific; instead the intention was to provide a general direction that could be adapted to any subject area. However, one of the main goals of any professional development program should always be that "every child is taught by a certified and quality teacher" (Salpeter & Bray, 2003, para. 1). Table 2 depicts the 12 NSDC professional development standards.

Table 2

*NSDC Standards for Staff Development by Category*

| Category | Standard |
|---|---|
| Context Standards | Learning Communities |
| | Leadership |
| | Resources |
| Process Standards | Data-Driven |
| | Evaluation |
| | Research-Based |
| | Design |
| | Learning |
| | Collaboration |
| Content Standards | Equity |
| | Quality Teaching |
| | Family Involvement |

*Note*. Adapted from NSDC's Standards for Staff Development (r 2001). Retrieved May 2, 2008, from http://www.nsdc.org

These 12 standards formed the organizational framework for the evaluation of educational technology professional development studied in this research project.

*Statement of the Problem*

The federally mandated No Child Left Behind Act of 2001 (NCLB) requires each student to be technologically literate by eighth grade through meeting technology standards (Learning Point Associates, 2007). However, despite the federal mandate, Cech wrote in a 2008 *Education Week* article that technology literacy in the schools was still in its initial stage.

In an effort to educate students to a level of high technical literacy, the education system invests valuable time and monetary resources on educational technology professional development. Research studies such as the *eMINTS 2009 Program Evaluation Report* and *Analysis of 2006 MAP Results for eMINTS and Non-eMINTS*

*Students* have linked the eMINTS professional development program and student achievement (eMINTS, 2009b). However, researchers have not yet explored the alignment of the eMINTS program with the 12 NSDC standards. Furthermore, a positive correlation between the NSDC standards and eMINTS could further validate the program by identifying areas of weakness within the program such as the organization's inability to customize program components. This study explored the alignment of the eMINTS educational technology professional development methodology with the NSDC standards. The alignment of the standards with educational technology practices would provide program organizers and other leaders with an instrument that could help them recognize high quality, standards-based educational technology professional development.

*Purpose of the Study*

The purpose of this study was to determine if the eMINTS educational technology professional development methodology aligned with the NSDC standards. The following hypothesis, research questions, and sub-questions were designed to provide stakeholders with such information.

The null hypothesis for this study: Less than 80% of eMINTS teachers reported that the eMINTS professional development model aligned with the NSDC Standards for Staff Development.

The alternate hypothesis: 80% or more of eMINTS teachers reported that the eMINTS professional development model aligned with the NSDC Standards for Staff Development.

The research questions for this study are as follows:

RQ1: What NSDC standards do all participants of eMINTS professional development identify as being most frequently represented in the program?

RQ1(a): What NSDC standards do all participants of eMINTS professional development identify as needing improvement?

RQ1(b): What are eMINTS participants' suggestions for improvement?

RQ2: What differences exist between participant and facilitator perception of the alignment of eMINTS professional development with NSDC standards?

RQ2(a): What differences exist between Certified and non-Certified eMINTS teacher perception of the alignment of eMINTS professional development with NSDC standards?

RQ2(b): What state-to-state differences exist in eMINTS teacher perception of the alignment of eMINTS professional development with NSDC standards?

RQ2(c): What differences exist between United States and Australian eMINTS teacher perception of the alignment of eMINTS professional development with NSDC standards?

*Importance of the Study*

Through advances in the area of communication technologies such as instant messaging, blogging, and e-mail, the Earth is now considered to be a flat world, which "empower[s] people to compete, connect, and collaborate" (Hersh, 2009, p. 51)

worldwide. Along with such easy access to anyone virtually anytime, a global economy has emerged. However, this new economy will require a user with an innovative and different skill set; abilities commonly referred to today as *21st-century skills* (Gura & Percy, 2005). Nonetheless, there remains "a profound gap between the knowledge and skills most students learn in school and the knowledge and skills they need in typical twenty-first century communities and workplaces" (Gura & Percy, p. 32).

Technology entrepreneur and Microsoft Corporation Chairman, Bill Gates, discussed this gap in his 2008 speech before the House of Representatives Committee on Science and Technology. Gates reported that the United States is currently not able to produce the type of skilled worker required by high-tech companies such as Microsoft, Google, Intel, and Hewlett-Packard. Gates testified that this country is at an economic crossroads, and if the United States chooses to do nothing, other nations more committed to the pursuit of technical excellence will surpass us (Gross, 2008).

In order to help students reach the technological level of which Gates spoke, educators, stakeholders, and policymakers will need to recognize that the integration of technology into the classroom may be one possible way of closing the gap. However, integration does not just happen; teachers are not "born" knowing how to integrate technology into the curriculum. The integration process will require schools to make an unwavering commitment to an educational technology professional development program.

*Barriers to technology integration.* One of the perceived barriers to technology integration in the classrooms, security and protection of the students, came to the forefront in early 2001. The educational technology realm of the 1990s was built around

the new and emerging technology of connectivity known as the Superhighway, or the Internet (Culp et al., 2003). The Internet, and the infinite amount of information it contained, was available to the masses, including possible predators, and this made student safety an issue. In response to this growing problem, Congress enacted the Children's Internet Protection Act (CIPA) in 2001. CIPA mandated specific security and privacy regulations and required some organizations to create and enforce rules and policies that governed the use of the Internet (Federal Communications Commission, 2008). One of the regulations required schools to "educat[e] minors about appropriate online behavior, including cyberbullying awareness and response and interacting with other individuals on social networking sites" (Federal Communications Commission, para. 4). The urgency of this problem led professional development and educational technology organizations to create curriculum and prepare K-12 educators as trainers.

Another barrier to technology integration in the classroom was the cost. In 2003, J. Guthrie of Vanderbilt University, wrote a controversial article titled "Instruction Technology and Education Policy Paradox," in which he outlined what he saw as the contradictions of educational technology's budget and what was actually produced. In a section of the paper titled "The Already Fulsome Supply Side of Education Technology," the author wrote about the monies spent on hardware to lower the student-to-computer ratio, and the billions of dollars spent to provide services such as the Internet. The article continued by stating that "the purchase of hardware is only half the story. Most contend that even recently prepared teachers are insufficiently informed regarding use of the computers and the Internet for purposes of classroom instruction" (p. 60). Guthrie

continued by stating that the teachers' lack of abilities "is not for lack of funding for teachers" (p. 60).

Guthrie (2003) stated that the U.S. education system spends a minimum of approximately $5 billion annually on professional development, and although an exact figure is not known for how much of that is applied directly to educational technology, he contended that "if school districts believed such professional preparation to be important, then literally all of it could be focused on preparing teachers to better use their classroom computers and Internet" (p. 60).

In the article's conclusion, Guthrie (2003) identified four behaviors that may motivate educators to put technology resources to work for them:

- Effectuate higher student achievement.
- Make a teacher's work life more comfortable.
- Vastly reduce the cost of providing instruction.
- Preserve one's employment when threatened by intense competition. (p. 64)

*Limitations of the Study*

When conducting survey research, it was important to be aware of possible limitations that may influence the effectiveness of the research. According to Fraenkel and Wallen (2006), the following areas of concern may have affected this type of research.

Location: To obtain the most valid results, Fraenkel and Wallen (2006) recommended all survey participants complete the survey in one common location. However, to reach an audience that spanned the United States and Australia, this research

utilized an online format. This format allowed participants to respond anytime and virtually from anywhere.

Participant Characteristics: Participants of the survey research were already members or graduates of the eMINTS educational technology professional development program, and perhaps were not able to be objective when asked to evaluate the program.

*Summary*

By providing monies and legislation, the federal and state governments, policymakers, and education systems are working to create high-quality teachers. Providing standards-based educational technology professional development opportunities can help teachers reach their full potential. However, the cycle should not stop there. An additional benefit to teachers learning and integrating technology into the classroom is the effect it has on their students. Technology-rich classrooms and teachers will help students reach the level of technology literacy demanded by NCLB.

In Chapter One, the researcher established the purpose and rationale for the study. The three-part thought process behind the study design as illustrated in Figure 1 appears again in Chapter Two, which is divided into these sections: technology-rich classrooms, standards-based educational technology professional development for teachers, and technology literacy and 21st-century skills.

# CHAPTER TWO – REVIEW OF THE LITERATURE

## *Technology-Rich Classrooms*

Technology education began its journey into the education world in the early 1980s when *A Nation at Risk*, a federal report about the state of the U.S. education system, "added computer science as one of the Five New Basics" (Culp et al., 2003, p. 1). The general belief of the period was "having enough technology infused in schools would be the first step toward the widespread and effective use of educational technology" (Culp et al., p. 11). However, this did not turn out to be the case, as evidenced in the 1999 National Center for Education Statistics report that only 33% of teachers felt they were adequately trained to use technology in the classroom (United States Department of Education, 2000, para. 12). Since the 1999 report, legislation through NCLB and EETT attempted to ensure that all teachers have access to standards-based educational technology professional development.

*Technology outside and inside the classroom.* Digital medias are creating a landscape that is very different than 20 years ago – both inside and outside the classroom. The digital ethnography department at Kansas State University reported that more than 100,000 videos are uploaded to YouTube every day, with 80% of the video clips being posted by users outside of school (Borthwick et al., 2008, p. 23). The enthnography department further reported the average student surveyed will read only 8 books this year, but almost 2,300 Web pages and over 1,281 Facebook profiles (Wesch, 2007). Outside of the school, students are engaged and motivated when they are able to use technology to communicate, learn, and share, while inside the classroom, education spends over

$9 billion on computer technologies that, for the most part, are under utilized (Picciano, 2006, p. 85). “If educators want to have relevancy in this century, it is crucial that we find ways to engage students in school” (Prensky, 2005-2006, para. 7). Bringing technology into the classroom can engage and empower students through the following:

1. Democratization of knowledge: virtually everyone has access to the vast amount of information available on the Internet.
2. Participatory learning: communication tools make global collaboration possible.
3. Authentic learning: using technology to connect with and solve real-world problems.
4. Multimodal learning: using multimedia tools such as video and interactive graphics to aid in learning (Lemke & Coughlin, 2009, pp. 56-58).

Educational technology professional development can help ensure that engaged learning is occuring inside the classroom by helping educators recognize the digital divide and showing them how to use technology to engage and motivate students (Lemke & Coughlin, 2009). The success of the educational technology professional development lies in educators’ abilities to identify the goals of the professional development and then match a model to the goal (Harris, 2008b). No longer is a one-size-fits-all educational technology professional development model acceptable. It has been replaced with professional development opportunities customized to the individual learning experience.

*Multiple intelligences and technology integration.* Integrating technology into the classroom is one way to teach students with different learning preferences because “one cannot help but meet a variety of learning styles, with experiential depth, if technology is

purposefully and wisely integrated into the regular day-to-day curriculum" (Kuhn, 2008, p. 19).

Prior to the 1983 introduction of Howard Gardner's ground-breaking research, intelligence was measured by a psychometric scale, or IQ test. During Gardner's landmark research, as he observed children and brain-damaged adults, he noted, "people have a wide range of capacities. A person's strength in one area of performance simply did not predict any comparable strength in other areas" (Baum, Viens, & Slatin, 2005, p. 10). Resulting from these observations, Gardner identified eight unique intelligences that combined the use of problem solving (what the previous IQ tested) with the new notion of product creation, producing what he referred to as Multiple Intelligence theory (MI). This theory challenged the traditional IQ test in-so-much as Gardner maintained that (a) several intelligences are at work, not just one (b) intelligence is expressed in our performances, products, and ideas, not through a test score and (c) how the intelligences are expressed is culturally defined (Baum, Viens, & Slatin, p. 10).

Table 3 lists the eight intelligences as identified by Gardner and as applied to technology:

Table 3

*Multiple Intelligences (MI) Theory and Possible Application*

| Intelligence[a] | Descriptor | Possible Application[b] |
|---|---|---|
| Linguistic Intelligence | The capacity to use language to express what's on your mind… and to understand other people. | Produce instruction manuals |
| Logical-Mathematical Intelligence | Understanding of the underlying principles of some kind of causal system…or can manipulate numbers. | Computer programmer |
| Musical Intelligence | The capacity to think in music … hear patterns, recognize them, remember them, and perhaps manipulate them. | Sound engineer |
| Spatial Intelligence | The ability to represent the spatial world internally in your mind. | Photographer |
| Bodily-Kinesthetic Intelligence | The capacity to use your whole body or parts of your body … to solve problems, make something, or put on some kind of a production. | Technical repairs |
| Interpersonal Intelligence | Understanding other people. | Researcher |
| Intrapersonal Intelligence | Having an understanding of yourself. | Self-expressive writer |
| Naturalist Intelligence | The human ability to discriminate among living things…as well as sensitivity to other features of the natural world. | Conduct experiments |

*Note*. Adapted from Multiple Intelligences in the Elementary School (Baum, Viens, & Slatin, 2005, p. 14-19). [a]The eight intelligences identified by Gardner through his research. [b]How the eight intelligences can be applied to different fields of t echnology.

Since MI are not inherent or genetic, and the intelligences work in concert with one another, students can be introduced to, and learn, a number of new intelligences through instruction (Baum, Viens, & Slatin, 2005). The teacher assumes the responsibility of developing lessons, experiences, and products which tap into MI theory. The multimedia and interactive capabilities of computers and communication software allow for the integration of technology and MI. Picciano (2006) argued that "education … is too linguistically orientated. Teacher talks, students listen; teacher writes, students read …" (p. 115). By incorporating MI into a technology-rich classroom, students can create products that go beyond lingustics to incorporate music, lighting and sound in the hope that a more effective teaching/learning process would evolve. Similarily, because of Web 2.0's interactive capabilities (game playing, real-time communication, programing) the platform can also be used to incorporate the unique talents of different learners (Kuhn, 2008).

*Professional development.* Prior to the NCLB mandates, professional development, in one format or another, had been a part of the educational setting for the past several decades. In states such as Kansas and Arizona, teachers can acculumate and use professional development hours toward renewing their teaching certificate, commonly referred to as recertification. Educators in these two states may use university credits, professional development credits, or a combination of both to recertify (Arizona Department of Education, 2009; Kansas Department of Education, 2008). For example, classroom teachers, administrators, guidance counselors and school psychologists in Arizona must complete 180 hours of professional development, 12 hours of coursework, or a combination of the two, within a given time frame, to renew their credentials

(Arizona Department of Education). In Missouri, professional development participation is mandated for teachers working toward Career certification. To acquire Career certification, Missouri teachers must have a professional development plan on file with their district and have completed 30 hours of "appropriate" professional development. It should be noted that teachers must meet additional requirements for Career certification (beginning teacher program, mentoring program); however, once Missouri educators reach this certification, they will not have to renew again (Missouri Department of Elementary and Secondary Education, 2009).

*Technology integration "The eMINTS Way."* eMINTS, or the Multimedia Interactive Networked Technologies (MINTs) project, as it was known at its inception in August, 1997, was piloted in six Missouri school districts with funds provided by the Southwest Bell Foundation (eMINTS, 2007). The program's goal was to provide technology at the classroom-level and to measure subsequent changes, if any, in the way teachers taught and students achieved. The preliminary results of the MINTs program showed an improvement in student scores, but moreso, the attitudes and teaching styles of the teacher changed:

> The technology encouraged a new way of educating students – a way that engages them in their education by making resources available in a learning environment that fosters cooperation, collaboration, problem solving and higher order thinking skills. The connections to parents were also strengthened as they showed more interest in the positive stories their children were bringing home.
> (eMINTS, 2007, para. 2)

The positive results experienced by the MINTs program prompted the Missouri Commissioner of Education to launch a statewide initiative to "change the way Missouri educates its K-12 students" (eMINTS, 2007, para. 4), and in 1999 the enhancing Missouri's Instructional Networked Teaching Strategies (eMINTS) project was formed. Table 4 highlights the transformation from the original MINTs program to the global eMINTS program of today.

Table 4

*Expansion of the MINTs and eMINTS Program from 1997-2009*

| Date | Event |
|---|---|
| 1997-1999 | MINTs began in Missouri |
| 1999 | Initiave continues as eMINTS |
| 2003 | Five Utah districts joined eMINTS; becoming the first out-of-state eMINTS schools |
| 2004 | eMINTS National Center opened its doors, offering nationwide support |
| 2005 | eMINTS received the ISTE Seal of Alignment and became the first professional development program in the world to demonstrate full compliance with the ISTE National Educational Technology Standards for Teachers (NETS•S) |
| 2005-2006 | eMINTS grew to six states, including 1,250 classrooms, with 22,500 students learning the eMINTS way |
| 2006 | With a state level funding boost of 2.9 million dollars, and a partnership with the Missouri Mathematics, Engineering, Technology and Science (METS) Coalition the eMINTS program began to serve as a "best-practice" model |
| 2009 | 35,000 students learning the eMINTS way in 3,850 classrooms in twelve states and two countries |

*Note.* Adapted from *eMINTS History*. Retrieved August 31, 2009 from http://www.emints.org/about /history.shtml. Additional information from Dr. Beglau (personal communication, September 28, 2009), executive director of the eMINTS National Center, Columbia, MO.

Instrumental in the growth of the eMINTS program is the tie it fosters between educational technology and the student. Evaluation of the eMINTS program has shown higher student attendance, fewer behavioral referrals, and increased state test scores (Reese, 2005). In a longitudinal study from 1999-2004, data from Peabody Elementary School, located in St. Louis, Missouri, showed improvement in both the third- and fourth-grade eMINTS classrooms. Missouri state communication arts test scores showed a 70% increase in third-grade students scoring in the proficient level, and a 57% increase in proficient-level fourth-grade math scores (Reese, p. 20).

On a broader scale, data from 31 districts was gathered and analyzed in an effort to discover the impact of an eMINTS teacher/classroom when compared to a non-eMINTS teacher/classroom. The 2006 study examined the fourth-grade Missouri state math test. Results revealed that more eMINTS students scored in the basic and proficient levels than did non-eMINTS students (Strother, Martin, & Dechaume, 2008, pp. 9-10). Similarly, eMINTS students in Utah, Maine, Missouri, and Iowa showed gains of more than 10 to 20 percentage points when compared with non-eMINTS classrooms (Nagel, 2007).

Dr. Beglau, Executive Director eMINTS National Center located at the University of Missouri in Columbia, attributed the eMINTS educational technology professional development program's success to several factors. First, the program remains focused on its philosophy of "transforming teaching using inquiry-based methods and strategies powered by technology" and by "help[ing] teachers use technology in ways that change student engagement and student products through high-quality professional development and in-classroom support" (Q&A: Director, 2005, para. 5). Beglau also stresses the

importance of the eMINTS project-based strategy. Research has shown that students gain a deeper understanding of a topic or skill and will retain the knowledge or skill longer when asked to apply it (Q&A: Director).

*Standards-Based Educational Technology Professional Development*

*A historical perspective.* The 1980s standards-based reform movement furnished K-12 educators with an accountability system and a means to measure student achievement (Dell'Olio & Donk, 2007). Also in the 1980s, the NSDC began working to assist educators with a method to ensure the quality of professional development programs. To this end, the founders of the NSDC established themselves as a legal entity and set about defining the field of professional development (Mizell, 2008). Then, in the mid-90s, after recognizing that "standards-based reform [would] rise or fall based on the quality of teaching," the members convened a task force to examine the role professional development played in creating quality teachers (Hirsch, 2001, para. 1). Using their own experiences and other research, the NSDC task force recommended and adopted 24 standards for measuring quality professional development. To understand the transition to standards-based professional development, and its application to educational technology, the growth of professional development should be examined first.

Throughout the 1960s, authors were beginning to think and write about the changing patterns taking place in the field of professional development, or what they referred to as in-service education. They noted that newer methods of in-service education had emerged from the realization that the world, through ease of travel and communication, was changing, and to keep up, teachers had to change the way they themselves learned and taught (Harris & Bessent, 1969; Moffitt, 1963). Educators at this

time were not just studying curriculum and teaching methods, but taking a new and critical look at human behavior and individual learning patterns. Authors noted the emphasis of in-service education shifting away from generic topics such as classroom management strategies and more towards the genuine needs of the participants addressing specific strategies like team teaching (Moffitt). The new focus was helping teachers identify individual areas of need and then allowing them the freedom to find their own answers by reading about and conducting action research (Harris & Bessent; Moffitt).

Because in-service providers remained focused on the single-day, group approach to professional development, authors writing during the 1970s were still calling for programs that would help meet teachers' individual needs (Bell & Peightel, 1976). A report titled *In-Service Education Alert*, published by the National Education Association (NEA), stated that some of the major criticisms of in-service education were still "'…[it] is of little value in my job,' and '…[it] focuses on school system needs rather than on teacher needs'" (National Education Association, 1978, p. 3). As Louis Rubin (1978) eloquently stated, "[a] need to interrupt this prolonged complacency has emerged" (p. 5). Rubin believed that teacher in-service, or as he referred to it, a teachers' retraining, played a vital role in the education system of the time. He also predicted that due to the declining need for new teachers in the '70s, the retraining of existing teachers would play an even larger role in the near future. Although Rubin's original prediction was unsubstantiated due to the accountability focus of NCLB, the retraining of teachers does play an important role in education today.

Starting in the late 1970s and continuing through the early 1980s, authors such as Lieberman and Miller (1979) began using the term *staff development* rather than

*in-service* or *training* to illustrate an improvement approach that took the focus away from the individual teacher and channeled it to the "whole school (the staff) and the necessity of long-term growth possibility (development)" (p. ix). Present in Lieberman and Miller's work was the new and emerging use of frameworks for designing and organizing staff development opportunities. They, and others, thought that a framework, built around a school-wide approach, rather than the previous teacher-centered approach, would better ensure the education of students as they went from grade to grade and teacher to teacher (Leiberman & Miller, 1991; Schiffer, 1979). Leiberman and Miller's framework construct is similar to that of the NSDC, as both were designed to provide teachers with a collegial and collaborative environment in which to learn.

In the 1990s, various researchers examined the role of the teacher in the teaching and learning process. This research, which concentrated on the development of teachers, found that by participating in various professional development experiences, a teacher became a part of many professional communities and informal networks: learner, leader and colleague. Researchers concluded that the relationships built within these communities played an important part in a school's culture, and furthermore, these bonds could strengthen and improve the general education and professional development systems (Leiberman & Miller, 1991; Nelson & Hammerman, 1996).

*The bearer of standards for staff development – the NSDC.* The NSDC revised its original 24 standards for delivering quality staff development in 2001 based on new philosophies and strategies they had learned in the intervening six years. "Standards provide direction for designing a professional development experience that ensures educators acquire the necessary knowledge and skills" (Hirsch, 2001, para. 6) and are

results-driven, standards-based, and job-embedded. Futhermore, the NSDC standards provide a serviceable framework to ensure fulfillment of the NSDC's mission of professional development being adult learning that leads to increased student achievement (Zepeda, 2008).

*Research, publishing and partnerships: Dissemination of information key to NSDC's purpose.* The NSDC's purpose is stated clearly at the top of their Web site's homepage: "Every educator engages in effective professional learning every day so every student achieves." To fulfill this purpose, and to reach the 13,000 registered organization members (C. Colclasure, personal communication, September 3, 2009), as well as the general public, the NSDC uses a variety of media, including print, electronic, and face-to-face communications. The *Journal of Staff Development* (*JSD*), published quarterly, is the NSDC's flagship publication. The professional journal "focuses on issues of leadership and learning relevant to all educators involved in professional learning. Articles are written primarily by practitioners who bring a real world to the challenges of school improvement and organizational change" (National Staff Development Council, n.d. a).

Vital to the NSDC's campaign for quality professional development is its commitment to dissemination of information. The NSDC believes that "…good policy promotes good practice" (Hirsh, Killion, Islas, & Hair, n.d., p. 4), therefore it publishes, in hardcopy and/or electronically, several newsletters for a variety of distinctive audiences from classroom teachers to congressmen.

- *Teachers Teaching Teachers*: "explores the challenges and rewards that teacher leaders face" (National Staff Development Council, n.d. a, para. 7).

- *The Learning System*: for central office personnel and administrators.
- *The Learning Principal*: focuses on issues concerning leadership and school improvement.
- *NSDC Policy Points*: created specifically for policymakers, it is "sent to members of Congress and their staffs to help them develop greater understanding of government's role in supporting teacher learning that directly affects student achievement" (National Staff Development Council, para. 8).
- *Tools for Schools*: intended to highlight "school improvement and features timeless 'tools' and resources that can be used in school improvement efforts now and in years to come" (National Staff Development Council, para. 6).

The NSDC demonstrated its understanding of the important role technology can play in communication through an online blogging community accessible through the organization's Web site. In May 2009, the NSDC also joined the online social networking community Facebook (C. Colclasure, personal communication, September 9, 2009). Online access allows members to learn about the latest NSDC research, read posts, and join in conversations with others who share the NSDC's mission of "[e]very educator engag[ing] in effective professional learning every day so every student achieves" (National Staff Development Council, n.d. b).

The NSDC partners with many organizations and individuals in support of research and publishing, not just in the area of professional development, but in areas that support the NSDC's mission of improving student achievement through quality teaching. This work includes partnerships with leading authories in the field of education such as

Linda Darling-Hammond and Micheal Fullan. The NSDC also partners with the Bill and Melinda Gates Foundation, MetLife Foundation, and Stanford University (National Staff Development Council, n.d. b).

*Standards-based professional development as characterized by the NSDC standards and applied to educational technology professional development.* A review of current literature has yielded only a modest number of studies on educational technology professional development and the integration of technology into the classroom. However, even more limited is the literature linking the NSDC standards to educational technology professional development or the eMINTS program. Due to the limited availability of literature, the researcher included studies conducted in the mid-1980s and the late 1990s. Because technology has undergone many changes in the past 25 years, critics could view the age of these studies as a liability. However, these research items provided a good measurement tool for judging how educational technology professional development has remained the same or changed over the years.

Working within the NSDC standards' categories of context, process and content (Table 2), each of the following sections will begin by citing the standard and providing a rationale for application to the classroom teacher. Next, through articles, research projects, and publications, the researcher will examine how the standard is applied in the field of educational technology professional development and finally, specifically to the eMINTS educational technology professional development program.

*Context Standards*

This first category consists of the three context standards: learning communities, leadership, and resources. These three context standards deal with the learning

environment surrounding the professional development program, including the organization, system and culture (Joyce & Showers, 2002).

*Learning Communities.* NSDC standard: "Staff development that improves the learning of all students organizes adults into learning communities whose goals are aligned with those of the school and district" (2001, para. 1).

The underlying principle of NSDC's learning communities standard is that "[t]he most powerful forms of staff development occur in ongoing teams that meet on a regular basis, preferably several times a week, for the purpose of learning, joint lesson planning and problem solving" (Roy & Hord, 2003, p. 13). In the researcher's experience, scheduling time for teams of teachers to focus on, discuss, and share ideas about student learning can be difficult. However, the culture created by collegiality can be worth the scheduling conflicts as a group of individuals devoted to a cause can create and drive vast change.

Studies have found that persons in the position of creating change in the classroom by incorporating educational technology into current practice also benefited from having a support system (Burns & Dimock, 2007). Membership in such a system can be especially helpful for teachers who are less technologically literate as they receive support from their more technologically literate peers (Garry & Graham, 2004).

Learning communities can also create safe environments for teachers. While studying the impact of educational technology professional development on teaching, Foulger (2004) discovered that within the safety zone, teachers may be more apt to become risk-takers and leaders. Similarly, teachers who experience stress as a result of technical problems or instructional barriers can receive emotional support from the

community (Foulger). On the other hand, it is also important to note that learning communities, as depicted by the NSDC, may be seen as more formal in nature (scheduled time, agendas, outcomes-based) and have been found to cause stress among some community members (Foulger).

The communities in Foulger's (2004) and Burns and Dimock's (2007) action research evolved to be less structured and more spontaneous in nature than those described by the NSDC standard. This may also be the case for the eMINTS online discussion list members since online communication is less formal. As of March 5, 2009, more than 1,000 past and present eMINTS educators were members of the eMINTS General Discussion List. Membership allows teachers to support one another in their daily teaching activities by "creat[ing] a learning community where teachers and students explore and create knowledge together" (eMINTS, 2009e, para. 7). In addition to the fostering of peer communities, eMINTS stresses the importance of building a classroom community. Students become aware of how "continuous life-long learning takes place in a community" (eMINTS, 2008a, para. 4) by experiencing the collegiality shared by the classroom teacher and the classroom-level eMINTS coach and mentor.

In the researcher's experience, there are advantages and disadvantages to online communities. One advantage can be found in ease of accessibility; the almost anywhere and anytime availability of computers and the Internet makes it possible for teachers to gain first-hand knowledge and perspective from colleagues of other regions or cultures. In addition, there are also disadvantages in that specific cultural and social nuances, such as disobeying the rules of online etiquette, may interfere with the exchange of

information. However, setting rules and policies that all members agree to abide by can help to eliminate problems before they start.

*Leadership.* NSDC standard: "Staff development that improves the learning of all students requires skillful school and district leaders who guide continuous instructional improvement" (2001, para. 1).

The term *leadership* often brings to mind the person at the top of the structural hierarchy. However, the NSDC describes a leader as any person who believes that quality professional development can increase student learning. Furthermore, in support of this belief, leaders serve as advocates, mentors, and lead teachers who continually remind others how classroom practices can impact student learning (Roy & Hord, 2003).

Leaders are at all levels of an organization. *Positive deviant*, a term coined by leading change-agent Jerry Sternin, embodies this notion (Positive Deviance Initiative, n.d.). When applied to a school setting, the Positive Deviance theory implies that a person within the school, despite all odds, consistently succeeds with the most difficult students or is able to find the perfect strategy for the most perplexing lesson (Sparks, 2005). These people already have the solutions to many school problems and can become powerful teacher leaders.

Teacher leaders in the field of educational technology are those who consistently and seamlessly integrate technology into their own classrooms. More importantly, these educators are teacher leaders because they do not stop there; they also influence other teachers. Others watch and follow the positive deviants and emergent teacher leaders. Their peers watch them successfully integrate technology into classrooms and are thereby influenced and led to do the same (Foulger, 2004).

Often teacher leaders are recruited or volunteer to become educational technology professional development facilitators themselves (Foulger, 2004). The strategy of homegrown facilitators can be important to the success of an educational technology professional development program. Participants view sessions with outsiders or consultants as more formal, while they often feel more comfortable with someone from within their own school or district (Foulger).

eMINTS embraces this philosophy in their Professional Development for Educational Technology Specialist (PD4ETS) model, more commonly referred to as the train-the-trainer model. The PD4ETS training includes a certification process designed to prepare individuals to deliver eMINTS educational technology professional development. The training, designed for teachers and school- or district-level specialists, is of hybrid design and combines "face-to-face, online, e-conferencing and video teleconferencing experiences" (eMINTS, 2008b, para. 1). Once they have completed this training, the educational technology specialists are able to provide eMINTS training to other educators within their own school or district (eMINTS). Perhaps the on-going success of the eMINTS General Discussion List is due to the strong use of communication technologies during the training sessions.

Although the eMINTS curriculum does not teach leadership skills explicitly, Roxanna Kerwood, professional development materials coordinator for eMINTS, reported that teachers are encouraged to "invite their state and federal representatives and local school board members to their classrooms to see how they use technology in their classrooms" (personal communication, September 29, 2009).

*Resources.* NSDC standard: "Staff development that improves the learning of all students requires resources to support adult learning and collaboration" (2001, para. 1).

> The NSDC's resources standard is rooted in the belief that professional learning may be viewed either as an investment that will pay future dividends in improved staff performance and student learning or as an expense that diminishes a school district's ability to meet its other financial obligations. While the latter view has been dominant in many school districts, the National Staff Development Council's position is that well designed and implemented professional development for school employees is an essential long-term investment in successfully teaching all students to high standards. (Roy & Hord, 2003, p. 21)

In the researcher's experience, the focus and intent of school- and district-level leadership is vital to the financial future of any professional development program. By participating in professional development, teachers are demonstrating a willingness to change. However, it is important for those in leadership roles to demonstrate their commitment by providing monies for stipends, conference fees, and travel as well as substitute teachers for release days.

Educational technology professional development is unlike the majority of other areas of professional development in that it requires purchasing computer hardware, software, infrastructures, maintenance agreements, and the latest computer upgrades, all of which can be costly. The eMINTS program does not provide funds or assistance with purchasing equipment, maintenance, or technical support; as of 2006, these items are the responsibility of the participating organizations (eMINTS, 2009d). However, because eMINTS believes that "instructional functionality is key in an eMINTS classroom"

(para. 1), there are specific resource (hardware and software) requirements that all participating schools and districts must meet (see Table 5). Because of its versatility, an interactive whiteboard and accompanying software is one such requirement. Use of an interactive whiteboard allows for more interaction between teacher and students, as it is positioned at the front of the classroom, allowing users to move away from the computer. Also, the "board meets visual and kinesthetic learner needs" (personal communication, M. Beglau, October 6, 2009) because the board is activated by touch and provides a large projection size.

In order to provide consistent educational technology professional development opportunities, eMINTS has a set installation schedule. Table 5 displays the installation schedule required by the eMINTS program.

Table 5

*Hardware, Software, and Installation Schedule Required for eMINTS Classrooms**

| Type | Product | Installation Schedule |
|---|---|---|
| Hardware | Teacher laptop and docking station with connections to an interactive whiteboard | Month 1 |
| | Internet and equipment connectivity | Month 3 |
| | Laptops for students (Grades 3-12) | Month 5 |
| Software | SMART™ Notebook | Month 1 |
| | Microsoft Office 2007 | Month 1 |
| | Concept-mapping software | Month 5 |

*Note.* *Partial listing of required hardware.
Retrieved on August 26, 2009, from eMINTS website: http://www.emints.org/equipment and http://www.emints.org/equipment/fy10/alternatives.shtml and http://www.emints.org/equipment/equipment-timeline10.pdf

Vojtek's 1997 study, which is still relevant 12 years later, explained possible drawbacks to installing large amounts of hardware and software in a relatively short period. The computers installed in such a short time frame will all be of the same model

and vintage and will probably need replacing or upgrading at the same time (Vojtek). Such a mass replacement or upgrade would be an expensive undertaking; therefore, districts might not replace computers or might find the replacement time frame to be unacceptable. From the classroom perspective, however, having identical student and teacher computers, screens, icons, keyboards, and software can make giving oral instructions easier since everyone is looking at the same items.

In addition, an exploration of several studies demonstrated that adequate technical support is imperative to the successful application and use of educational technology (Borthwick & Pierson, 2008; Buckingham, 2007; Foulger, 2004; Mizell, 2004; Wright & Lesisko, 2007). According to these authors, if technical problems and incompatibilities often arose, teachers complained more and then either did not use the technological tools or simply returned to their prior method of teaching. In an effort to keep technical frustrations to a minimum, the eMINTS program requires that participants take part in a 4-hour troubleshooting professional development session. In addition, the eMINTS National Center maintains a Web site titled *Technology: Computer Troubleshooting and End-of-Year Maintenance.* The Web site serves as a link to outside sources that can help the teacher complete tasks such as backing up the computer, updating Windows, and other basic computer maintenance functions (eMINTS, 2004).

Also critical to teachers in classrooms that integrate technology is long-term, ongoing follow-up support (Meltzer, 2006). eMINTS offers several options so graduates of the program can maintain skills, learn about new strategies, and keep apprised of new technologies. Veteran eMINTS teachers can subscribe to online collaborative discussion lists or attend eMINTS conferences or institutes. In addition, the eMINTS staff is also

available to provide the help veteran eMINTS teachers "need to sustain the teaching practices, instructional techniques and technology skills gained in eMINTS [professional development]" (eMINTS, 2009f, para. 8).

*Process Standards*

Process standards, the second category of NSDC standards, describe the design of the professional development program. The standards define the program's organization and implementation (Joyce & Showers, 2002) and ensure appropriate adult learning strategies are used (Roy & Hord, 2003). There are six process standards: data-driven, evaluation, research-based, design, learning, and collaboration.

*Data-driven.* NSDC standard: "Staff development that improves the learning of all students uses disaggregated student data to determine adult learning priorities, monitor progress, and help sustain continuous improvement" (2001, para. 2).

The NSDC suggests analysis of multiple data sources when building and maintaining professional development opportunities. When building a new program, individual student data can provide insight. Principals and teachers can disaggregate data such as student test scores, demographic information, and discipline reports to reveal areas in need of improvement (Roy & Hord, 2003). On the other hand, if the program is being maintained or adjusted, data can be collected from the classroom level. This data, drawn from classroom tests, assignments, and other materials, can determine the effectiveness of the program and guide adjustments and modifications (Roy & Hord, 2003).

In the ideal 21st century technology-rich learning environment, classroom teachers would analyze data from many sources. Teacher-generated data is useful in

solving and improving practices at the classroom- level (Harris, 2008a). In addition, bottom-line educational technology professional development data would concentrate on demonstrating that using technology in the classroom raises student achievement (Wenglinsky, 2005).

During their second year of training, eMINTS participants receive direct instruction in determining what types of student-level data are important in an evaluation process and how to collect that data. Once the teacher has identified needed data, typically an observer will help collect the data. The teacher and observer then use a critical friend protocol to discuss the results; the basis of this protocol is one of mutual respect and trust (personal communication, Kerwood, September 29, 2009).

The eMINTS program collects and disaggregates multiple sources of student data to demonstrate the effectiveness of the program in raising student achievement. All participating schools and districts submit state- or district-level quantitative student performance data. Evaluation teams analyze this data and use it to compare eMINTS classrooms to non-eMINTS classrooms (Beglau, 2007). In addition, eMINTS gathers qualitative data through teacher interviews, surveys, and observations. In support of the direct instruction eMINTS teachers received in data use, a research study conducted by J. Hutcheson in 2007 noted that eMINTS teachers agreed that the training model helped them use disaggregated student data. The results of the study showed 72% of the 274 eMINTS teachers surveyed felt eMINTS helped them to use disaggregated data in planning (p. 48).

*Evaluation.* NSDC standard: "Staff development that improves the learning of all students uses multiple sources of information to guide improvement and demonstrate its impact" (2001, para. 2).

The NSDC believes that without systematic evaluation of a professional development program, it is difficult to determine the quality of the professional development or if lasting changes have occurred. The progress of a program toward its goals is key in measuring the worth of professional development. However, evaluation should not stop there. In addition, leaders must also consider the amount and extent of the change that has taken place when determining the success of the professional development (Zepeda, 2008).

In the field of educational technology professional development, past programs did not normally use data to establish professional development needs and guide improvement (Vojtek, 1997). As reported, an occasional survey containing the "what would you like …" question or a conversation in the teacher lounge or hall made up the bulk of the data (Vojtek). Perhaps this attitude of years ago was due, in part, to the lack of an accountability system. Teachers and administration may have viewed professional development as a basic part of the education system, but aside from using the hours for recertification purposes, it was not closely monitored. However, due to the mandates in NCLB, this is in direct contrast to current practice and research on the topic. Current professional development coordinators know they must gather adequate data in order to determine needs and that lasting change requires continuous evaluation from multiple sources (Foulger, 2004; Zepeda, 2008). Both formative and summative evaluations in the

form of questionnaires, surveys, interviews, and observations can provide coordinators and facilitators with valuable insight.

The eMINTS program uses formative and summative evaluations, performed both in-house and externally, to gauge the program's effectiveness and to make adjustments. A key factor in the eMINTS evaluation process is maintaining program fidelity. To evaluate a program that spans 12 states and two countries, administrators and program designers must hold certain variables constant (Beglau, 2007). The first variable is the educational technology professional development curriculum. To ensure each participant would receive relatively the same training from any of the eMINTS staff and PD4ETS facilitators, eMINTS developed a curriculum scope and sequence that prescribed the session agenda and calendar (Beglau). Making sure each classroom had access to the same hardware and software was the second variable. To hold this variable static, as described earlier in this chapter, eMINTS developed a list of required hardware and software along with an installation schedule.

*Research-based.* NSDC standard: "Staff development that improves the learning of all students prepares educators to apply research to decision-making" (2001, para. 2).

The importance of teaching educators to read and evaluate current research materials is the crux of the NSDC research-based standard. However, the NSDC warns that there is often confusion in differentiating between works that are authentically research-based and those that are only poorly constructed ad hoc models of research (Roy & Hord, 2003). In order to judge the quality of the research, adequate time should be spent reading, analyzing, and questioning the quality of the claim. This time, which may extend over several months, should include talking with those involved in the study either

by telephone or face-to-face, or perhaps by visiting the schools involved in the study (Roy & Hord).

In Vojtek's 1997 study of five Ohio districts' technology integration programs, very little evidence was found of any implementation of research-based instruction strategies in the technology classrooms. The only exception he noted involved the use of cooperative learning in a few of the classrooms. However, because students had to share computers, in these situations the teachers used cooperative learning as a classroom management strategy rather than an instructional strategy (Vojtek). In addition, Vojtek reported that none of the educational technology professional development facilitators even thought to incorporate information about research-based practices into their programs (Vojtek). This admission contradicts the current philosophy of education where the enactment of NCLB has increased the awareness of using research-based practices.

Although eMINTS does not teach participants to read and interpret research (Kerwood, personal communication, September 29, 2009), much of the eMINTS program was modeled after researched-based practices. The eMINTS educational technology professional development program operates on the premise of "integrat[ing] technology with inquiry-based learning and high-quality lessons to bring about true learning" (eMINTS, 2008a, para. 5). While receiving eMINTS educational technology professional development, teachers learn about the following research-based instructional strategies: cooperative learning, learning communities, inquiry-based lessons, and collaboration. Furthermore, eMINTS teachers reported having positive perceptions about their training using research-based strategies, and noted that they "believed their training had

encouraged them to use many types of information when teaching" (Hutcheson, 2007, p. 45).

*Design.* NSDC standard: "Staff development that improves the learning of all students uses learning strategies appropriate to the intended goal" (2001, para. 2).

Teachers, like their students, have different learning styles. Therefore, the most beneficial professional development activities are those that combine different learning strategies. Designs can include chances for participants to attend training sessions, summer institutes, or classroom observations. In addition, strategies such as coaching, mentoring, or other forms of follow-up can also meet a wide range of learner needs (Roy & Hord).

The effectiveness of educational technology professional development depends largely on its design, and format. Erenben (2008) found that "fewer than 10 percent of teachers implement new ideas learned in traditional professional development workshops" (p. 15). In contrast, teachers who are actively engaged in job-embedded, hands-on educational technology professional development activities, with follow-up support from a coach or mentor, will be more successful in implementing and integrating the skills learned (DiLeo, 2008; Erenben; Meltzer, 2006).

Several studies examined in this literature review have revealed the importance of on-site training (Meltzer, 2006). One design, the Peer Mentor Model, a job-embedded educational technology professional development model, was very effective. This model called for coaches in the field and available to classroom teachers for one year. Following the year of training, the classroom teacher then becomes a mentor for another classroom teacher, thus "magnifying the effect of the original…trainer" (DiLeo, 2008, p. 114). This

strategy is similar to the eMINTS PD4ETS, or train-the-trainer, model. The intensive 2-year PD4ETS educational technology professional development program allowed school- or district-level professional development facilitators to return to their own buildings with the skills required to train other teachers in the eMINTS way (eMINTS, 2008b). As mentioned earlier in this review, eMINTS graduates can access on-going support from online sources such as the eMINTS General Discussion List and conference.

The NSDC advocates the use of technology to aid in designing effective professional development experiences by creating a networked learning environment. Through Facebook, blogs, and the Internet, NSDC members, as well as teachers from all over the world, can share materials and experiences with colleagues from other schools or other countries (Roy & Hord, 2003).

*Learning.* NSDC standard: "Staff development that improves the learning of all students applies knowledge about human learning and change" (2001, para. 2).

The NSDC believes that a balanced professional development model allows adults to learn in the same manner they will use to teach their students (Roy & Hord, 2003; Zepeda, 2008), while also adhering to the principles of adult learning strategies (Zepeda).

The infusion of technology into the classroom has changed teachers' pedagogic practices. Ornstein, Pajak, and Ornstein (2007) found "the digital media are causing educators and students alike to shift to new ways of thinking about teaching and learning" (p. 287). Technology-rich classrooms allow adults and students to learn side by side. This was demonstrated in 1985, when Apple Computer, Inc., began its landmark *Apple*

*Classrooms of Tomorrow* computer-based research project. An Apple classroom became a "living laboratory in which particpants explor[ed] and refin[ed] the innovative possibilities of technology for teaching and learning" (Baker, Gearhart, & Herman, 1990, p. 5). This is in direct concert with today's philosophy of the Missouri-based eMINTS educational technology professional development program which infuses technology into classrooms across Missouri and 11 other states "to determine whether eliminating technology barriers…could change teaching styles and strategies" (eMINTS, 2007, para. 1).

Vital to both the Apple project of the '80s and the eMINTS program of the 2000's is the high value placed on classroom coaching and mentoring (Baker, Gearhart, & Herman; Beglau, 2007). Constant contact and support from classroom-level coaches and mentors can make a difference by helping participants translate what they learned in the educational technology professional development sessions to the classroom (Salpeter & Bray, 2003). Also, as a direct result of having a coach or mentor, teachers appear to be more willing to change their teaching practices (Salpeter & Bray). In the researcher's experience, teachers who feel they are supported are more willing to change for two reasons. First, because they realize the coach or mentor has already been where they are; the coach has the knowledge, background, and experience to lead the teacher to success. Second, if for some reason the lesson, unit, or strategy does not go exactly as planned, the teacher knows someone will be there to lend a hand or give advice. In short, there is a bond, built on trust, between the teacher and the coach.

Both the 1985 Apple classrooms and current-day eMINTS classrooms approach to technology integration use the constructivist theories of teaching and learning (Baker,

Gearhart, & Herman, 1990; eMINTS, 2008a). The importance of experiences, experimentation and problem solving are fundamental to the constructivist theory of learning. The construction of one's own knowledge by formulating questions and searching for the answers is paramount in the constructivist model (Joyce, Calhoun, & Weil, 2004). In addition, when a classroom teacher transfers the constructivist theory into educational technology application, they must also have an understanding of "presenting problems and learning situations to which the learner can relate as well as providing the materials, media, and informational resources needed to solve the problems" (Picciano, 2006, p. 91).

Even though the Apple project began in 1985 and the eMINTS program followed many years later, the design of both projects was grounded in changing the way teachers and students learn together while immersed in technology. In both the Apple program and the eMINTS educational technology professional development program, constructivist theory plays an important role in helping students and teachers learn by constructing knowledge actively through hands-on, challenging activities and experiences (David, 1992). In addition, Apple also thought technology was best used when integrated into the curriculum and used as a powerful knowledge-building tool (Baker, Gearhart, & Herman, 1990). Similarly, Monica Beglau, executive director of eMINTS, described the constructivist theory of inquiry-based learning as being at the heart of the eMINTS program because inquiry-based learning causes students to be inquisitive and teaches them to think deeply, and to actively seek out solutions through hands-on, computer-based lessons (eMINTS, 2008).

As cited earlier in this paper, according to the AISR, "effective professional development should mirror the kinds of teaching and learning expected in classrooms" (as cited in Zepeda, 2008, p. 63). This is in direct correlation to the philosophy of eMINTS as the facilitors model the type of teaching they want teachers to use once they return to the classroom. In addition, occasionally teachers assume the student role so they can gain first-hand knowledge of learning from the student perspective (personal communication, Kerwood, September 29, 2009).

*Collaboration.* NSDC standard: "Staff development that improves the learning of all students provides educators with the knowledge and skills to collaborate" (2001, para. 2).

In the past, teachers were isolated; very seldom did they collaborate, share ideas, or seek advice. However, because effective professional development and problem solving often occurs in group settings, collaboration is a key component in many of the NSDC standards. A collaborative environment allows for "teamwork among teachers and administrators in designing lessons, critiquing student work, and analyzing various types of data… [therefore] it is imperative that professional learning be directed at improving the quality of collaborative work" (Roy & Hord, 2003, p. 41).

It is important for educators to be members of decision-making collaborative communities like school improvement and curriculum teams (Zepeda, 2008). In addition, members of collaborative teams need resources, including both organizational aids and instructional materials, to help them build and maintain a sustainable team environment (Zepeda). Organizational aids such as conflict-resolution training (Delehant, 2007) and instructional materials like technology and connectivity for online collaboration (Roy &

Hord, 2003) can help teams succeed. Although eMINTS does not teach specific peer- level collaboration skills, participants do learn to incorporate collaboration strategies at the classroom and student level. Although collaboration skills are not directly taught, eMINTS provides teachers a rubric to aid in their journey toward true collaboration. The rubric, or Hallmark document, allows the teacher to self-assess their level of collaboration in the areas of professional development, as well as school- and district-level committees (personal communication, Kerwood, September 29, 2009).

The use of virtual tools can encourage teachers to collaborate. Educators from different schools, districts, and regions can use the Internet to connect and form subject-specific consortiums (Roy & Hord, 2003). A consortium of teachers in the state of Washington embraced a shared vision of integrating technology into the math curriculum (Carney, 2008). The consortium used the Internet as a collaboration tool to develop an online coaching environment. Similar in design are the Missouri-based Branson and Joplin online tools. The *Branson eMINTS: Click, Think, Learn, Succeed* blog is hosted by a local educational technology specialist. Through this and other blogs, eMINTS teachers of all levels and subject areas are able to interact with one another, exchange information, and collaborate in groups to work on project ideas (Branson eMINTS, n.d.). In addition, the Joplin School District in Joplin, Missouri takes advantage of online electronic bulletin boards and learning management systems to collaborate and share ideas (O'Hanlon, 2007).

Both the Branson and Joplin online tools are indicative of the collaborative nature of the eMINTS educational technology professional development program. From the inception of eMINTS, its pioneers were careful to design the program so that there would

be at least two eMINTS classrooms in each school. This arrangement ensured that every eMINTS teacher "had a colleague with whom they could work and collaborate" (Beglau, 2007, p. 13).

The scheduling of eMINTS educational technology professional development provides further evidence of the importance of collaborative practices within the eMINTS model. eMINTS participants receive 8 hours of one-to-one collaboration with the educational technology professional development facilitator in their first year of training and 16 hours their second year. A 2007 research study conducted by J. Hutcheson supports the importance of collaborative practices within eMINTS. In the study, more than 89% of the 274 eMINTS teachers "indicated that their training had been strong in the area of collaboration" (Hutcheson, p. 61).

*Content Standards*

The final category includes three standards: equity, quality teaching, and family involvement. "Content refers to the actual skills and knowledge…the educators need to possess or acquire through staff development" (National Staff Development Council, 1995, p. 1).

*Equity.* NSDC standard: "Staff development that improves the learning of all students prepares educators to understand and appreciate all students, create safe, orderly, and supportive learning environments, and hold high expectations for their [student's] academic achievement" (2001, para. 3).

To allow educators to prepare classrooms in which all students are appreciated and understood, the NSDC recommends professional development opportunities that give teachers time to learn, listen, and talk about student differences. Professional

development opportunities that hold student achievement as the main goal also provide teachers with opportunities to learn research-based strategies that promote high achievement and expectations for all students (Roy & Hord, 2003).

Over the years, researchers and studies have highlighted the achievement gaps that are present in students of different gender, poverty, and race. Literature identifies a student's low socioeconomic status as being one of the greatest predictors of failure (Joyce, Calhoun, & Weil, 2004). In the past, educators of students in these categories watered down the curriculum with the assumption that doing so was helping the students learn. However, the opposite has proven true. Creating and delivering a "rigorous curriculum with challenging instructional strategies designed to improve the learning capacity of the students…" has proven to be the most effective means of raising student achievement (Joyce, Calhoun, & Weil, p. 360).

While some researchers argue about how to raise student achievement, hundreds of eMINTS classrooms are working to improve student scores. Reports have shown that eMINTS classrooms have fewer behavioral referrals, as well as higher test scores, and increased student attendance rates, than non-eMINTS classrooms (Reese, 2005). Although eMINTS cannot pinpoint with exact certainty why students in their classrooms achieve higher, eMINTS surmised it is due to the teacher's constructivist, inquiry-based pedagogical approach (Beglau, 2005). In support of high expectations for their students, eMINTS teachers learn to actively engage their students in higher order thinking by writing project-based lessons that build on students' culture, community, and personal interests (Reese). Paramount in the eMINTS program design is the focus on diverse

learner needs. Participants are reminded to select resources and strategies that will meet a wide variety of learner needs (personal communication, Kerwood, September 29, 2009).

*Quality teaching.* NSDC standard: "Staff development that improves the learning of all students deepens educators' content knowledge, provides them with research-based instructional strategies to assist students in meeting rigorous academic standards, and prepares them to use various types of classroom assessments appropriately" (2001, para. 3).

To address the requirements of the Quality Teaching standard, NSDC recommends that teachers be involved in intense, subject-specific learning that teaches a variety of instructional strategies. Learning can take on a variety of forms: participation in summer internships, extended institutes, or university coursework, involvement in educational organizations, or membership in subject-specific area networks. All learning experiences should provide teachers with a model of effective teaching. "[b]ecause teachers will teach as they themselves are taught, it is imperative that the instructional methods used with educators be congruent to … those they are expected to use in their classroom" (Roy & Hord, 2003, p. 49).

Legislators are striving to make sure students receive instruction from successful, highly-qualified teachers. NCLB ensures that having highly qualified teachers in every classroom is a priority for every state, district, and building. In addition, the Educational Technology State Grants Program stipulates that every district receiving grant monies must spend at least 25% of the monies on high-quality professional development in the integration of technology (U.S. Department of Education, 2004).

Successful teachers share common traits. First, they have a deep understanding of their subject (Roy & Hord, 2003). eMINTS classroom teachers, through an intensive 200-hour program of educational technology professional development, gain a deep understanding of how to integrate technology into their classrooms so that all students can achieve (eMINTS, 2008b). In addition, research demonstrates that successful teachers have the ability to choose appropriate instructional methods (Roy & Hord). In support of this ability, as stated previously in this literature review, eMINTS teachers receive direct instruction in research-based methodologies and strategies such as the constructivist theory of learning, inquiry-based learning, and cooperative learning. eMINTS further claims the hallmark of the program can be found in its commitment "to the improvement of student performance through high-quality teaching powered by technology" and that "high-quality professional development input results in high-quality teacher practice and increased student achievement" (Beglau, 2007, p. 4).

*Family involvement.* NSDC standard: "Staff development that improves the learning of all students provides educators with knowledge and skills to involve families and other stakeholders appropriately" (2001, para. 3).

According to the NSDC, professional development should teach educators how to form and strengthen bonds with parents. Technology can aid in this task by helping teachers reach out to families; school Web sites, e-mails or news postings can strengthen communication between teacher, school, and home (Roy & Hord, 2003).

Technology can help foster relationships between parents and schools. Benito Juarez Elementary School, located in the southern part of the United States, provides one example of such a relationship. This elementary school loaned computers to parents

(Burns & Dimock, 2007). To promote school and home involvement, the educators at Benito Juarez sponsored a Cyber Parents night. During this event, parents could come to the school to learn about their child's involvement with technology and to view classroom projects. The principal of Benito Juarez attributed the success of school and home involvement to open communication between the school and community (Burns & Dimock).

The eMINTS educational technology professional development program prepares teachers to communicate with parents and other stakeholders regarding the importance of integrating technology into the classroom. eMINTS accomplishes this through instruction that helps teachers design and implement various online communication sources. eMINTS teachers participate in several educational technology professional development sessions that give them the knowledge and skills to plan and create a classroom Web site. On the Web site, teachers can post newsletters or reminders for parents, or perhaps Web pages can host links to homework or other student-focused topics (Gaisford, 2006). In order to share eMINTS classroom and training information with parents and other stakeholders, some eMINTS training sites have set up district-level e-mail distribution lists as communication sources (Berg, 2005). In addition, the confidence and pride exhibited by eMINTS teachers compels them to want to share their skills and accomplishments with stakeholders (personal communication, Kerwood, September 29, 2009).

*Technology Literacy and 21st Century Skills*

In the early years of use, technology's role in education was centered on computer literacy, or basic knowledge of how the computer worked and operated (David, 1992).

Technology was simply seen as a group of tools and resources that could be used to combat existing classroom problems such as discipline and classroom management (Culp, et al., 2003). In direct contrast, the current view of technology's role in education must center on helping students attain 21st century skills and reach the level of technology literacy demanded by NCLB. The Partnership for 21st Century Skills (2006) suggests 21st century learning should include not only technical skills, but also "global awareness, financial, economic, business and entrepreneurial literacy" and "[l]earning and thinking skills such as critical thinking and problem solving skills, communications skills, creativity and innovation skills, collaboration skills, contextual learning skills and information and media literacy skills" (p. 1).

However, changing the way education and educators operate and teach is not new. In the beginning of the 20th century, John Dewey advised educators to change the struture of the school setting to accomodate the new industrial-age learner (Lesch, 2008). Dewey went on to report that the ease of communication and travel brought about by technologies like the telephone, radio, and airplanes and the growth of an international marketplace began to create interdependence among people and countries. Previously isolated, persons and students of the 20th century needed to learn skills that would teach them how to relate to others both inside and outside their areas and classrooms (Lesch).

In the past, only persons with higher education degrees had access and were privy to knowledge and information; this elevated status created and empowered the educated elite. However, in today's networked climate, as the masses gain access to vast amounts of knowledge and information through the Internet, the playing field is leveled. However, simply having access to the information will not suffice for long. Persons who can use

creativity and innovatation to repackage the knowledge to solve new problems will become the elite (Lesch, 2008).

*Learning about learning*. The theories of metacognition and experiential learning can aid educational technology in changing the classroom. While metacognition is broadly defined as "thinking about thinking," experiential learning focuses on the learning process for the individual. Wenden (1998) described metacognitive knowledge as the "facts learners acquire about their own cognitive processes as they are applied and used to gain knowledge and acquire skills in varied situations" (p. 34). The self-aware process of metacognition will enable the 21st- century learner to identify patterns and relationships between seemingly unrelated information. This skill, according to Lesch (2008), leading change agent and author of *How to Prepare Students for the Information Age and Global Marketplace*, will be paramount in the success of a 21st century learner.

*Summary*

The National Center for Educational Statistics reported in the year 2006 that public schools in the United States spent almost $22 million on staff development for teachers. However, Harris (2008a) found 19% of the teachers surveyed received no educational technology professional development, with the majority participating in slightly more than two days per year. Educational technology professional development has fallen short, based on the fact that "research evidence indicates that 30 hours of focused professional development, on average, is required to change teachers' professional practice" (Harris, p. 22). Therefore, innovative approaches to change teaching practices, and to sustain those changes, are needed (Borthwick & Pierson, 2008).

In the Literature Review, the researcher connected the NSDC standards, educational technology, and the eMINTS program. Chapter Three, the Methodology chapter, will demonstrate how the researcher used the knowledge gained from that process to create the survey that served as the backbone for this research project. In addition, the Methodology chapter serves as an outline for anyone wanting to replicate the research in the future. To that end, the chapter also includes detailed information about the recruitment of participants and the unique process involved in building and disseminating an online survey. For assistance in research design, organization, and content, the researcher consulted Fraenkel and Wallen's (2006) research text, *How to Design and Evaluate Research in Education.*

# CHAPTER THREE – METHODOLOGY

The study focused on using the NSDC standards for staff development as a framework for measuring specific aspects of the eMINTS educational technology professional development program. The researcher created an online survey to determine the strength of each standard within the eMINTS program, as perceived by eMINTS teachers. In this chapter, the researcher presented the purpose of the study, hypothesis, and research questions. The researcher also discussed the design of the research, survey respondents, test instrument, and data collection and analysis.

## *Purpose of the Study*

The purpose of this study was to determine the extent of the alignment between the eMINTS educational technology professional development methodology and the NSDC standards and to provide recommendations concerning strengths and weaknesses. The researcher designed the study's research questions and sub-questions to provide stakeholders with information about the program's effectiveness as viewed through the perspective of the eMINTS program participants.

### *Hypotheses and Research Questions*

The null hypothesis for this study: Less than 80% of eMINTS teachers reported that the eMINTS professional development model aligned with the NSDC Standards for Staff Development.

The alternate hypothesis: 80% or more of eMINTS teachers reported that the eMINTS professional development model aligned with the NSDC Standards for Staff Development.

The research questions for this study:

RQ1: What NSDC standards do all participants of eMINTS professional development identify as being most frequently represented in the program?

RQ1(a): What NSDC standards do all participants of eMINTS professional development identify as needing improvement?

RQ1(b): What are eMINTS participants' suggestions for improvement?

RQ2: What differences exist between participant and facilitator perception of the alignment of eMINTS professional development with NSDC standards?

RQ2(a): What differences exist between Certified and non-Certified eMINTS teacher perception of the alignment of eMINTS professional development with NSDC standards?

RQ2(b): What state-to-state differences exist in eMINTS teacher perception of the alignment of eMINTS professional development with NSDC standards?

RQ2(c): What differences exist between United States and Australian eMINTS teacher perception of the alignment of eMINTS professional development with NSDC standards?

*Research Design*

Given the focus of this investigation, the researcher adopted a quantitative approach that used cross-sectional survey research to investigate the research questions. This type of research is most appropriate because it determines whether the majority of

eMINTS participants perceived the program to be aligned with the NSDC standards, according to Fraenkel and Wallen (2006), "The major purpose of surveys is to describe the characteristics of a population" (p. 398). The researcher collected data generated from an online, self-administered Likert-type survey. The online format allowed the researcher to reach a large sample population at a relatively low cost.

The eMINTS National Center, located at the University of Missouri in Columbia, Missouri, provided assistance in locating respondents for the research. Dr. Beglau, executive director of the National Center, suggested that the best way to reach possible survey respondents was via a discussion list (personal communication, January 21, 2009). In addition, Dr. Beglau suggested using an online format to distribute the survey because eMINTS members were familiar with the format. The researcher also anticipated that the familiarity factor could possibly increase the number of respondents and completed surveys. To this end, the study used a self-administered online survey hosted through SurveyMonkey.com. The online survey remained open for a 5-month period, from May 26, 2009, to October 15, 2009.

*Survey Respondents*

The target population for the research was eMINTS teachers who were members of the eMINTS General Discussion List. To be a member, the teacher must be an eMINTS graduate. The researcher asked eMINTS Discussion List members from all states who had received educational technology professional development from August of 1997 until October of 2009 to complete the survey. The population included an estimated 75% of all eMINTS graduates (M. Beglau, personal communication December

21, 2009) or approximately 1,000 active List members (M. Beglau, personal communication, January 21, 2009). The eMINTS General Discussion List embodies:

> eMINTS teachers, eMINTS staff, and library media specialists in eMINTS schools, in several states and countries… These lists are tools for supporting eMINTS educators in their daily work with students, in supporting one another as we learn to use the power of technology to achieve higher performance levels for our students and ourselves. (eMINTS, 2009a)

Additionally, the Discussion List population is representative of all eMINTS teachers because, even though membership is not mandatory, the majority of eMINTS graduates join the Discussion List. Members find this link allows them to easily communicate with each other, the eMINTS trainers and the eMINTS National Center (M. Beglau, personal communication, December 6, 2009).

*Instrumentation*

*Online post design.* In order to recruit respondents for the study, the researcher created an online post. In the design of this research, the post served the same purpose as a cover letter in a traditional survey. The researcher made every attempt to integrate Fraenkel and Wallen's (2006) advice, which recommended that an introduction should

> explain the purpose of the survey, emphasize the importance of the topic...and engage the respondent's cooperation. If possible, it should indicate the researcher's willingness to share the results of the study once it is completed. Confidentiality and anonymity of the respondents should be assured. (p. 406)

To ensure the protection of the survey respondents, the researcher followed the guidelines of the Lindenwood University Institutional Review Board (IRB). In addition,

the researcher took steps to safeguard the eMINTS General Discussion List members. First, because the eMINTS General Discussion List was for members only, the researcher, not an eMINTS teacher, channeled all posts through the director, who posted the messages on the researcher's behalf. Second, within the text of the post, the researcher reassured perspective respondent that

- involvement was voluntary and was not linked to job performance in any way
- information would remain confidential
- information used in presentations or publications would be presented in a manner that would not allow for the identification of any individuals
- the researcher was available via e-mail or phone to answer any questions or address any concerns (contact information was provided).

A copy of the post is available in Appendix A.

Although posting to the list requires membership, nonmembers may search and view archived eMINTS General Discussion List postings (eMINTS, n.d.).

*Online survey design.* In order to gather information for the study, the researcher created a 27-question online survey. In the researcher's experience, protecting the anonymity of the respondents was important because doing so could lead to an increase in honest and open answers. To reassure respondents of their anonymity, the confidentiality statement was repeated when they accessed the online survey. Before members could continue with the survey, they were required to give consent via the online format.

To allow for disaggregation of information, the survey design allowed for the collection of general demographic information, quantitative data, as well as respondent

suggestions about the eMINTS educational technology professional development and the NSDC standards. To this end, the survey included three sections:

Section One: The questions in this section of the survey gathered demographic data from teachers, including the state in which the teacher worked, which eMINTS program the teacher had participated in, number of years since completion of eMINTS program, and status of eMINTS certification. The demographic questions allowed the researcher to disaggregate and examine the differences between specific groups of eMINTS teachers.

Section Two: The researcher designed this section to address the eMINTS educational technology professional development and the NSDC standards. This portion of the self-assessment survey consisted of 24 multiple-choice items, grouped in pairs and organized according to the standards listed in Table 2. Survey respondents were asked to indicate their strength of agreement or disagreement by placing a checkmark in one of the five choices on a Likert scale: 0 = N/A, 1 = Strongly Disagree, 2 = Disagree, 3 = Agree, and 4 = Strongly Agree. Respondents could choose to skip any of the questions they did not wish to answer. The researcher used a Likert scale in this research because the researcher believed that quantitative data collection and analysis techniques would increase validity.

Section Three: The last section of the survey was comprised of opened-ended questions. However, as discussed by Fraenkel and Wallen (2006), respondents prefer closed-ended questions. With this in mind, the researcher kept the number of open-ended questions to a minimum by grouping them into the three NSDC Standards categories of Context, Content, and Process (see Table 2 for category details). As with the

multiple-choice questions, respondents could decline to answer any or all of the four open-ended questions. If they did choose to reply, their responses were not limited to a specific number of characters. Appendix A contains a copy of the online survey.

Content Validity Testing: After the survey design and questions were complete, Kay Murphy, educational technology services coordinator and 15-year veteran in the field of educational technology and educational technology professional development, reviewed the questions. Murphy checked the alignment of each survey question, NSDC standard, and its application to the field of educational technology. With Murphy's recommendations in mind, questions 6, 19, and 24 were revised. After the revision, Murphy felt each question was clearly aligned with the standard, and further changes would not be necessary.

Pretesting: The next step, as suggested by Fraenkel and Wallen (2006), was to have the survey and instructions pretested. To accomplish this, on April 1, 2009, the researcher sent 18 educators an e-mail copy of the survey and instructions for pretesting (see Appendix A). The educators, who were advocates of educational technology and technology integration, assessed the online survey instructions, questions, and navigation for clarity. In addition, members of the pilot group reported on the aesthetical formatting of the survey. Six teachers responded; the pilot group made no corrections or suggestions.

*Data Collection and Analysis*

On Tuesday, May 26, 2009, the director of the eMINTS National Center posted the researcher's request for respondents on the eMINTS General Discussion List and thus distributed the request to all the members of the desired population. After receiving a low response rate, the researcher contacted the supervisor of graduate research at Lindenwood

University, to ask the permissibility of extending the original deadline of July 31, 2009. The graduate research supervisor agreed to the extension, provided the researcher honored the original dissemination methods. Therefore, the eMINTS National Center posted the researcher's call for respondents on June 15, July 13, and again on September 28, 2009. The survey remained open until October 15, 2009, when the researcher closed the survey and downloaded the data.

The researcher downloaded the responses to the survey instrument from the SurveyMonkey.com Web site as a Microsoft Excel spreadsheet. Using Excel, the researcher sorted, filtered, and analyzed the responses to the 24 Likert-type and 4 open-ended questions to test the hypothesis and answer each of the study's research questions.

The researcher used a z-test for proportions to investigate the study's hypothesis. This particular test was most suitable because the null hypothesis for the study compares the proportion of respondents answering positively to 80%.

The researcher used descriptive analyses for research question 1 and sub-question a. Mean scores and ordinal ranking determined which standards the survey respondents identified as being most frequently represented in the eMINTS program and which standards they identified as being represented the least. Research sub-question 1b listed members' suggestions for improvement.

Research question 2 and sub-questions a, b, and c investigated possible differences between specific groups of eMINTS teachers (Certified, non-Certified, Comprehensive PD, eMINTS4All, PD4ETS) and specific locations of those groups

(different states and countries). The researcher performed a z-test to check for differences in means to determine if the discrepancy between the groups was statistically significant.

*Summary*

The design of this study employed a quantitative method and utilized a survey to gather data. The intent of the study was to examine how many eMINTS teachers perceived that the eMINTS professional development model aligned with the NSDC Standards for Staff Development. Seven additional research and sub-questions allowed for disaggregation of the data into specific eMINTS educational technology professional development groups such as eMINTS4All and PD4ETS respondents. Chapter Four will present results from the data analysis.

# CHAPTER FOUR – PRESENTATION OF DATA

As stated in Chapter One, this study explored the alignment of the eMINTS educational technology professional development methodology with the NSDC standards. The purpose of this chapter is to disclose the quantitative data gathered for this research, to outline the data analysis process, and to describe the test results.

Teacher members of the eMINTS General Discussion List served as the population for this study. The researcher designed the hypothesis, research questions and sub-questions to examine the underlying premise of standards-based high-quality professional development. These questions sought to examine eMINTS teacher perceptions as they related to the degree in which each of the standards were embedded into the eMINTS educational technology professional development practices, and the relationships and differences between various eMINTS demographic groups.

## *Respondents*

Using an online format, members of the eMINTS General Discussion List completed a self-assessment survey hosted on the Web site SurveyMonkey.com. Although eMINTS did not know an exact member count, the site administrator estimated the General Discussion List to have approximately 1,000 members (M. Beglau, personal communication, January 21, 2009). According to an online tabulation tool provided by the SurveyMonkey Web site, 67 respondents started the survey, with 49 actually completing the survey (73%).

Table 6 provides a graphic display of the demographic data reported by the respondents. This data included the number of years of teaching since completion of the

eMINTS program, the types of eMINTS educational technology professional development received, whether the teacher was certified, and each respondent's location.

Years of teaching since completion of eMINTS ranged from 1 to 2 years up to 7 or more years. The largest percentage of respondents indicated that they had finished the eMINTS program 1 to 2 years prior to completing the survey (45%); the smallest percentage had finished the program 7 or more years ago (12%). 47% of respondents reported receiving the eMINTS Comprehensive PD training (the most frequently reported training), while 4% received the eMINTS4All training (the least frequently reported training). In addition, the survey requested demographic information about the respondents' eMINTS Certification status. To achieve certification in the eMINTS program, a teacher voluntarily submits a portfolio of artifacts to the eMINTS National Center; the center's personnel grade the portfolio using a rubric, and the teacher becomes certified if the portfolio receives a passing score. Of the 49 total respondents, the majority were non-certified (63%), with the minority being certified (37%).

Table 6

*Demographics: Survey Respondents*

| | | Frequency N = 49 | Percent of Sample |
|---|---|---|---|
| Years of Teaching Since Completion of eMINTS | 1-2 yrs | 22 | 45 |
| | 3-4 yrs | 11 | 22 |
| | 5-6 yrs | 10 | 20 |
| | 7 or more yrs | 6 | 12 |
| eMINTS Training | Comprehensive PD | 23 | 47 |
| | eMINTS4All | 2 | 4 |
| | Veteran eMINTS | 14 | 29 |
| | PD4ETS | 10 | 20 |
| eMINTS Certified | Yes | 18 | 37 |
| | No | 31 | 63 |
| Location | Missouri | 45 | 92 |
| | Alabama | 1 | .02 |
| | Arkansas | 0 | 0 |
| | Delaware | 0 | 0 |
| | Illinois | 0 | 0 |
| | Maine | 0 | 0 |
| | Minnesota | 0 | 0 |
| | Nevada | 0 | 0 |
| | New Jersey | 0 | 0 |
| | Oklahoma | 0 | 0 |
| | Texas | 0 | 0 |
| | Utah | 3 | .06 |
| | New South Wales, Australia | 0 | 0 |

The final component in the collected demographic data was the respondent's location (state or country). An overwhelming majority of the teachers were from the state of Missouri (92%), with only one respondent located in Alabama (.02%), and three respondents in Utah (.06%). All respondents were from the United States (100%).

*Data Analysis*

The self-assessment survey consisted of 24 multiple-choice items, grouped in pairs and organized according to the standards listed in Table 2. The researcher asked the

survey respondents to respond to each question in a manner that most accurately reflected their personal experiences during their eMINTS educational technology professional development experience. The survey responses were recorded using a Likert scale with the following values: 0 = N/A, 1 = Strongly Disagree, 2 = Disagree, 3 = Agree, and 4 = Strongly Agree. The researcher analyzed the data for testing the hypothesis using a hypothesis test for proportion to determine what percentage of the population reported the eMINTS program to be aligned to the NSDC standards. In order to analyze the research questions, first the scale score mean for each standard was calculated. The researcher compared the mean values using a z-test to determine the changes between the eMINTS groups.

*Hypotheses and Research Questions*

*Null hypothesis*: Less than 80% of eMINTS teachers reported that the eMINTS professional development model aligned with the NSDC Standards for Staff Development.

*Alternative hypothesis*: 80% or more of eMINTS teachers reported that the eMINTS professional development model aligned with the NSDC Standards for Staff Development.

A z-test for proportions was conducted to investigate the percentage of survey respondents who reported that the eMINTS program was aligned (answer of 3 or 4 on survey), or not aligned (answer of 1 or 2) with the NSDC standards. When preparing the data, the researcher noted that 83% of the respondents answered with a score of 3 or 4. However, as depicted in Table 7, when comparing the p-value of .32 with an alpha value of .05, the researcher decided not to reject the null hypothesis. Eighty percent or more of

the survey respondents did not report that the eMINTS program was aligned with the NSDC standards. However, Table 7 also shows, with 95% confidence, that the true proportion for the population does fall in the range of .7198 and .9321 (see Appendix B for a complete data set).

Table 7

*Z-Test for Proportions*

| *Observed* | *Hypothesized* | |
|---|---|---|
| 0.8259 | 0.8 | p (as decimal) |
| 40/49 | 39/49 | p (as fraction) |
| 40.471 | 39.2 | X |
| 49 | 49 | n |
| | 0.0571 | std. error |
| | 0.45 | z |
| | .3249 | p-value (one-tailed, upper) |
| | 0.7198 | confidence interval 95% lower |
| | 0.9321 | confidence interval 95% upper |
| | 0.1062 | margin of error |

*Note*. Alpha value equals .05.

The remaining portion of this chapter presents data in research question order.

*Research question one.*

RQ1: What NSDC standards do all participants of eMINTS professional development identify as being most frequently represented in the program?

To identify which standards the respondents perceived as being most frequently represented in the eMINTS educational technology professional development program, the scale score means were ordinal ranked from highest to lowest. When examining the top standards, as indicated in Table 8, the NSDC Leadership standard (3.7) was reported as being the most represented in the program. Respondents reported two standards,

Design and Quality Teaching (3.5), as being the second most represented in the eMINTS program.

Table 8

*NSDC Standards Identified as being Most Represented in the eMINTS Program*

| NSDC Standard | Scale Score Mean Likert scale 0 – 4* |
|---|---|
| Leadership | 3.7 |
| Quality Teaching | 3.5 |
| Design | 3.5 |
| Learning | 3.4 |
| Equity | 3.2 |
| Research-Based | 3.2 |
| Resources | 3.2 |
| Family Involvement | 3.1 |
| Learning Communities | 3.1 |
| Data-Driven | 3.0 |
| Collaboration | 3.0 |
| Evaluation | 3.0 |

*Note*. 0 represents the lowest possible scale score, with 4 being the highest.

RQ1(a): What NSDC standards do all participants of eMINTS professional development identify as needing improvement?

Research sub-question 1(a) sought to identify which standards respondents perceived as being least represented, or in need of improvement, in the eMINTS educational technology professional development program. Following the same process used in question 1, the scale score means were ordinal ranked; however, in this instance the standards were ranked from lowest to highest. Table 9 illustrates the standards respondents reported as being the least represented in the eMINTS program. The NSDC

standards of Data-Driven, Evaluation, and Collaboration (3.0) were the standards reported as being the least represented, or in need of improvement, within the program.

Table 9

*NSDC Standards Identified as Being Least Represented in the eMINTS Program*

| NSDC Standard | Scale Score Mean Likert scale 0 – 4* |
|---|---|
| Evaluation | 3.0 |
| Collaboration | 3.0 |
| Data-Driven | 3.0 |
| Learning Communities | 3.1 |
| Family Involvement | 3.1 |
| Resources | 3.2 |
| Research-Based | 3.2 |
| Equity | 3.2 |
| Learning | 3.4 |
| Design | 3.5 |
| Quality Teaching | 3.5 |
| Leadership | 3.7 |

*Note.* 0 represents the lowest possible scale score, with 4 being the highest.

RQ1(b): What are eMINTS participants' suggestions for improvement?

The researcher used the survey respondents' comments to the four open-ended survey questions to answer this research question. In addition, although survey respondents reported five standards as needing improvement (Data-Driven, Evaluation, Collaboration, Learning Communities, and Family Involvement), in the open-ended remarks, only one respondent offered a suggestion for improvement. The respondent stated, "I am able to work with parents but I could use some more [training] on how to help parents support their students' learning."

The Resources standard open-ended question received these submissions from survey respondents:

- The support was adequate but we needed more time to practice the skills we learned rather than many of the classroom exercises in which we participated.
- Train[ing] should stress effective uses of process (word processing) rather than products (Microsoft Office).
- In the science area, I'd like to see more lab technology.
- [I] would have liked continuing help with all the new technology out now.
- I would have liked to [see] a requirement to make a presentation…part of the program requirements.

The Research standard received one subject-specific suggestion:

- I would like to see or participate in specific research to determine whether skills practiced on a computer have the same impact as students using manipulatives focusing [*sic*] on the same skill (i.e., – using algebra tiles, or does typing notes have the same impact as writing notes).

Although the survey data contained many comments, suggestions were limited to those mentioned.

*Research question two.*

RQ2: What differences exist between participant and facilitator perception of the alignment of eMINTS professional development with NSDC standards?

H02: There will be no difference between participant perception and facilitator perception of the alignment of eMINTS professional development with NSDC standards, as measured by a 4-point Likert scale attached to an opinion survey.

The researcher used the two groups previously established based upon their response to survey demographic question two, pertaining to the type of eMINTS training received, to answer this question. The first group, the participants, consisted of the Comprehensive PD, eMINTS4All, and Veteran eMINTS teachers. The second group, the facilitators, was the PD4ETS trainers. The researcher calculated the scale score means for both groups. A cursory look at Figure 2 suggests that the two groups were in general agreement about the level at which the eMINTS methodologies aligned with the NSDC standards. The majority (83%) of both the participants and the eMINTS facilitators reported scale scores between 3 and 4 (with 4 being the highest possible scale score), for all of the NSDC standard areas.

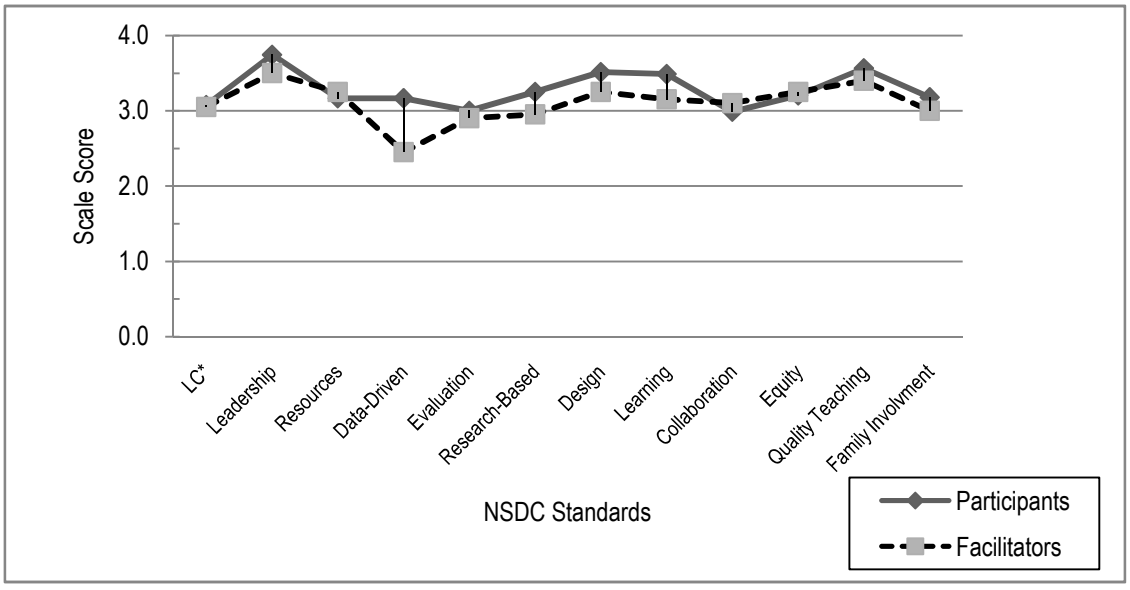


*Figure 2.* Comparison of eMINTS Participants and Facilitators by Standard.
Note. *LC = Learning Communities.

However, as evidenced in Figure 2, a slight visual difference between the eMINTS program participants and the facilitators did exist. Therefore, the researcher used a two-tailed z-test for differences to determine if the disparity in the mean scores could be considered statistically significant. As shown in Table 10, the participants and facilitators did not show a significant difference in their perceptions of the alignment of the program with the NSDC standards. Therefore, the researcher did not reject the null due to a comparison of the z-test value of 1.65 to the critical value of 1.95.

Table 10

*Z-test for Differences: eMINTS Participants and Facilitators*

| | *Participants* | *Facilitators* |
|---|---|---|
| Mean | 3.278311966 | 3.104166667 |
| Known Variance | 0.058219 | 0.074299 |
| Observations | 12 | 12 |
| Hypothesized Mean Difference | 0 | |
| z | 1.657161909 | |
| P(Z<=z) two-tail | 0.097486745 | |
| z Critical two-tail | 1.959963985 | |

*Note.* Alpha value of .05.

Although the participants and facilitators were in general agreement as to the alignment of the eMINTS program with the standards, the Data-Driven standard received a reported .07 score difference. The researcher conducted a second two-tailed z-test for differences to determine if the discrepancy between the two scores was statistically significant. As Table 11 illustrates, a z-test value of 1.96 as compared with a critical value of 1.95 does show a significant difference in their perception of the Data-Driven standard. Based on the significance level, the researcher rejected the null hypothesis.

Table 11

*Z-test for Differences: eMINTS Participants and Facilitators – Data-Driven Standard*

| | *Participants* | *Facilitators* |
|---|---|---|
| Mean | 3.166666667 | 2.45 |
| Known Variance | 0.058219 | 0.074299 |
| Observations | 1 | 1 |
| Hypothesized Mean Difference | 0 | |
| z | 1.968701031 | |
| P(Z<=z) two-tail | 0.048987433 | |
| z Critical two-tail | 1.959963985 | |

*Note.* Alpha value of .05.

RQ2(a): What differences exist between Certified and non-Certified eMINTS teacher perception of the alignment of eMINTS professional development with NSDC standards?

H02(a): There will be no difference between the Certified eMINTS teacher perception and the non-Certified eMINTS teacher perception of the alignment of eMINTS professional development with NSDC standards, as measured by a 4-point Likert scale attached to an opinion survey.

The researcher used the two groups, the Certified and non-Certified eMINTS teachers, to answer this question. These groups were established based upon the responses to survey demographic question three, pertaining to the submission of a portfolio. The researcher calculated the standard scale score mean for both groups. Figure 3 provides an overall view of the eMINTS training experience as reported by the certified and non-certified teachers.

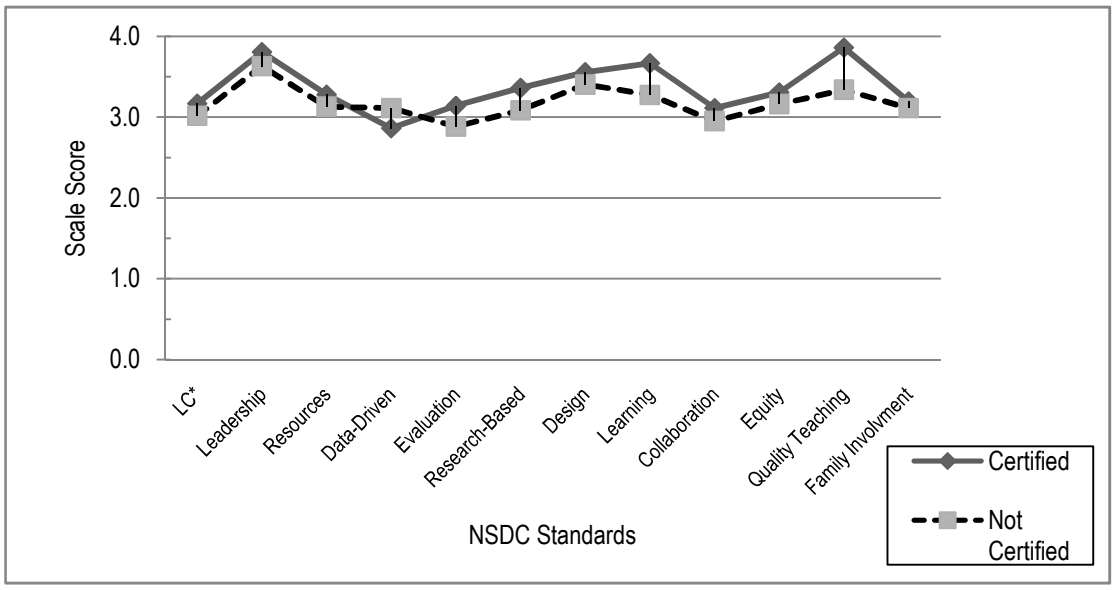


*Figure 3.* Comparison of eMINTS Certified and Non-Certified Teacher by Standard.
*Note*. *LC = Learning Communities

As with the testing process established for question two, the researcher used a two-tailed z-test for differences to compare changes in mean scores between the two groups. The test results, displayed in Table 12, indicated no statistically significant difference between the responses of Certified and non-Certified eMINTS teachers; z = 1.73, CV = 1.95. After conducting a comparison of the z-score and the critical value, the researcher did not reject the null; there was no significant difference between the scores of the Certified and non-Certified eMINTS teachers.

Table 12

*Z-test for Differences: Certified and Non-Certified eMINTS Teachers*

| | *Certified* | *Non-Certified* |
|---|---|---|
| Mean | 3.358796296 | 3.174641577 |
| Known Variance | 0.092376 | 0.043045 |
| Observations | 12 | 12 |
| Hypothesized Mean Difference | 0 | |
| z | 1.73352643 | |
| P(Z<=z) two-tail | 0.083002144 | |
| z Critical two-tail | 1.959963985 | |

*Note*. Alpha equal to .05.

A discrepancy in scores between the Certified and non-Certified eMINTS teachers appeared in the area of Quality Teaching. The researcher used a two-tailed z-test for differences to determine if the difference between the two groups could be considered statistically significant. The test revealed a z-test score of 1.41 and a critical value of 1.95 (see Table 13). The comparison of these two values reveals that there is no significant difference between the mean score of the certified and non-certified teacher within the Quality Teaching standard. Therefore, the researcher did not reject the null.

Table 13

*Z-test for Differences: Certified and Non-Certified eMINTS Teachers – Quality Teaching Standard*

| | *Certified* | *Non-Certified* |
|---|---|---|
| Mean | 3.861111111 | 3.338709677 |
| Known Variance | 0.092376 | 0.043045 |
| Observations | 1 | 1 |
| Hypothesized Mean Difference | 0 | |
| z | 1.419584837 | |
| P(Z<=z) two-tail | 0.155728582 | |
| z Critical two-tail | 1.959963985 | |

*Note*. Alpha equal to .05.

RQ2(b): What state-to-state differences exist in eMINTS teacher perception of the alignment of eMINTS professional development with NSDC standards?

H02(b): There will be no state-to-state difference in eMINTS teacher perception of the alignment of eMINTS professional development with NSDC standards, as measured by a 4-point Likert scale attached to an opinion survey.

RQ2(c): What differences exist between United States and Australian eMINTS teacher perception of the alignment of eMINTS professional development with NSDC standards?

H02(c): There will be no difference between United States perception and Australian eMINTS teacher perception of the alignment of eMINTS professional development with NSDC standards, as measured by a 4-point Likert scale attached to an opinion survey.

As evidenced in Table 6, the majority (98%) of the data came from respondents in one state (Missouri) within the United States. The sample size did not provide adequate data for analysis of research sub-questions 2(b) and 2(c); therefore, no inferences or statistical results were drawn. However, Table 14 presents the scale score mean data desegregated by teacher location (Alabama, Missouri, and Utah).

Table 14

*Scale Score Mean: Comparison by State*

| | Learning Communities | Leadership | Resources | Data-Driven | Evaluation | Research-Based | Design | Learning | Collaboration | Equity | Quality Teaching | Family Involvement |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alabama | 1.5 | 4 | 2 | 4 | 3.5 | 3 | 3.5 | 4 | 3 | 4 | 4 | 3 |
| Missouri | 3.1 | 3.7 | 3.2 | 3.0 | 2.9 | 3.2 | 3.5 | 3.4 | 3.0 | 3.2 | 3.5 | 3.1 |
| Utah | 3.2 | 3.8 | 3.5 | 2.7 | 3.5 | 3.7 | 3.3 | 3.8 | 3.2 | 3.3 | 4.0 | 3.2 |

*Note*. N = 49; Alabama, n = 1, Missouri, n = 45, Utah, n = 3.

*Summary*

This chapter presented the findings generated by analysis of the quantitative data collected in a cross-sectional survey research study. The survey focused on using the NSDC standards for staff development as a framework for measuring specific aspects of the eMINTS educational technology professional development program. The data derived from the survey provided a clear picture of the current level of implementation of the NSDC staff development standards for high-quality professional development in the eMINTS program. Chapter Five provides conclusions drawn from the data and provides recommendations for future consideration by researchers, policymakers, and districts attempting to integrate technology into their schools.

# CHAPTER FIVE

# DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

Educational technology is not new to the schools and classrooms of the 21st-century. However, today's schools and teachers are still struggling with the *effective* use of technology and classroom integration. Throughout this study, as illustrated in the Integrating Technology Cycle (see Figure 1), the researcher assumed a relationship existed between standards-based educational technology professional development, technology-rich classrooms, and students reaching technology literacy. Although education seemed to remain idle in step one of the cycle, through the enactment of the No Child Left Behind Act (NCLB), the Improving Teacher Quality (ITQ) Act (Title II), and the Title II.D Enhancing Education Through Technology (EETT) Program, legislators have provided mandates, programs and funds to increase standards-based, high-quality educational technology professional development opportunities for teachers. The eMINTS educational technology professional development program, funded primarily by these programs, is teaching educators to integrate technology into the classrooms.

## *Discussion of Results*

The purpose of this study was to determine if the eMINTS educational technology program provided high quality, standards-based professional development as aligned with the NSDC standards (see Table 2). The study focused on using the NSDC standards for staff development as a framework for measuring specific aspects of the eMINTS educational technology professional development program. In order to gather information

for the study, the researcher created a 27-question online survey. The survey instrument determined the strength of each of the 12 standards within the eMINTS program, as perceived by eMINTS teachers. This section, arranged in hypothesis and research question order, provides a discussion of the data analysis.

The null hypothesis for this study stated: Less than 80% of eMINTS teachers reported that the eMINTS professional development model aligned with the NSDC Standards for Staff Development. After analyzing the data using a hypothesis test for proportions that result in a p-value of .32 with an alpha value of .05, the researcher did not reject the null hypothesis; eighty percent or more of the survey respondents did not report that the eMINTS program aligned with the NSDC standards. As shown in Figure 4, the respondents perceived the Data-Driven (3.0), Evaluation (3.0) and Collaboration (3.0) standards to be the least represented in the eMINTS program. eMINTS administrators should address these deficits if the eMINTS program is to continue to expand. One possible solution would be to incorporate customizable elements into the eMINTS educational technology professional development program. As supported by the literature review, one-size-fits-all educational technology professional development models are no longer acceptable. Rather, they should be replaced with opportunities customized to the individual learning experience (Harris, 2008b).

Adding customizable elements to the eMINTS program would allow schools, districts, and teacher cohorts to determine their own needs, and receive appropriate assistance from the eMINTS program facilitators. For example, if a group of eMINTS teachers in training identified the Data-Driven standard (3.0; ranked as one of the lowest standards according to the survey) as an important need, the training could be changed to

incorporate more strategies to meet that need. Customization could be accomplished in ways that tend to feed off one another. First, introduce the topic of using data to drive instruction in year 1 rather than in year 2, and then expand the data from student-level to include classroom-, school-, and/or district-level data. This customization would allow teachers more time to gather and analyze data specializied to their precise needs. Second, the data resulting from this change could lead to change in another area of need, Collaboration (3.0); timely data is a valuable resource that can lead to in-depth, shared discussion and brainstorming opportunities.

The literature review supports the customization of the eMINTS program, and the following message from a survey respondent echoes that view: "I do not believe eMINTS was aware nor did it meet my particular needs. I often found it frustrating that the classes that I attended did not match nor correlate to my classroom."

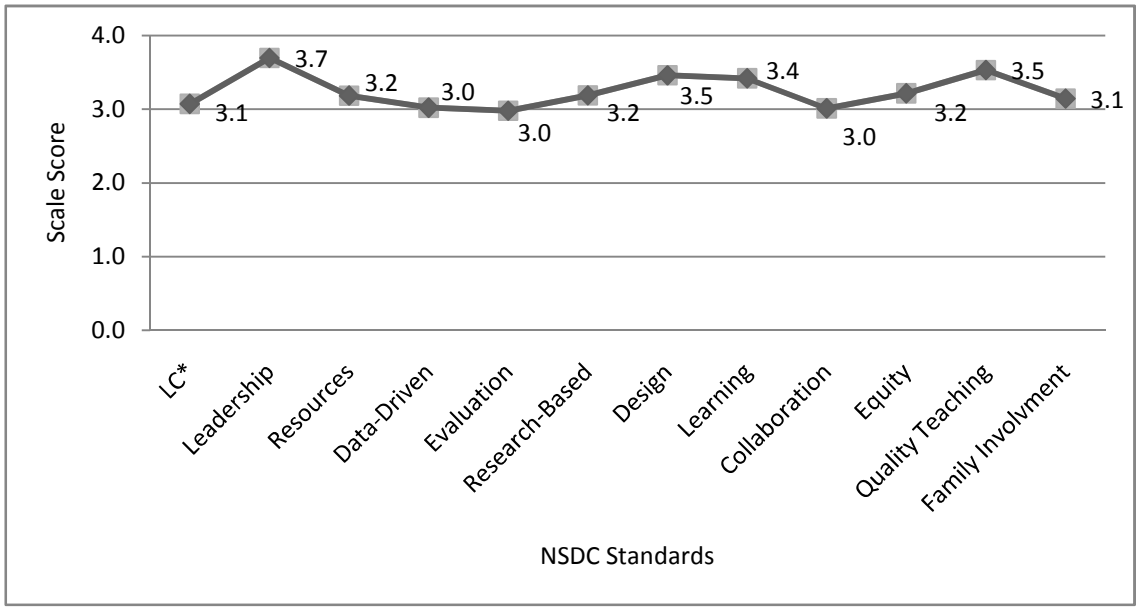


*Figure 4.* Scale Score Mean by Standard.
*Note.* *LC = Learning Communities

Research question one and sub-questions a and b examined the extent to which the teachers perceived the standards to be embedded into the eMINTS program. The scale

score means varied from 3.7 (Leadership standard) to 3.0 (Data-Driven, Evaluation, and Collaboration standards). However, as shown in Table 15, when comparing the standards by category, there is surprisingly little difference in their category scale score means.

Table 15

*Survey Results: NSDC Category Scale Score Mean*

| Standard Category | NSDC Standard | Standard Scale Score Mean Likert scale 0 – 4* | Category Scale Score Mean Likert scale 0 – 4* |
|---|---|---|---|
| Context Standards | Learning Communities | 3.1 | |
| | Leadership | 3.7 | |
| | Resources | 3.2 | 3.3 |
| Process Standards | Data-Driven | 3.0 | |
| | Evaluation | 3.0 | |
| | Research-Based | 3.2 | |
| | Design | 3.5 | |
| | Learning | 3.4 | |
| | Collaboration | 3.0 | 3.2 |
| Content Standards | Equity | 3.2 | |
| | Quality Teaching | 3.5 | |
| | Family Involvement | 3.1 | 3.3 |

*Note.* 0 represents the lowest possible scale score, with 4 being the highest.

The Context standards, the first NSDC category reviewed in Table 15, received a collective scale score mean of 3.3. The Leadership standard (3.7) received the highest score both in the Context category, and over all 12 standards. As previously mentioned in the literature review, eMINTS does not directly teach leadership skills. However, in the researcher's experience, extensive use of a train-the-trainer model, such as that used by eMINTS, empowers teachers to assume leadership roles.

The following survey responses attest to the Leadership standard's role in the eMINTS program:

- eMINTS gave me a voice in my district to advocate for technology in education. I had research to back up my statements and requests to my administrative team.
- Success in the classroom using technology allows you to be an advocate for technology because of your enthusiasm.
- I would not use the phrase "advocate for tech in education". eMINTS is more about "advocating for students in education using 21st century literacy and tools".

The Learning Communities standard (3.1) received the lowest score in the Context category. However, in direct contrast, respondents recorded many positive comments about the Learning Communities standard in the open-ended portion of the survey:

- Cooperative work was an integral part of the training.
- Working with colleges in any platform helps to develop learning teams…
- [eMINTS] inspired me to work collaboratively within my [d]epartment and to reach across the curriculum and grade levels to collaborate.

The second category of standards reviewed were the Process standards (category scale score mean of 3.2). The common theme that developed from the literature review and the closed- and open-ended survey questions supported research by DiLeo (2008) in *The Peer Mentor Model for Promoting Expertise with Technology Among Teachers.* DiLeo's educational technology professional development model used classroom coaches as a bridge to help teachers use what was taught in the training sessions and apply it in the classroom. He further noted that classroom teachers would later become coaches or

mentors themselves. The following survey respondent comment supports the overall survey findings and the literature:

> I received a lot of support, both from eMINTS staff…[and] from establishing contacts with other schools during our eMINTS meetings. … I continue to use my new skills to teach other people in my building how to use certain technology and software introduced to me by eMINTS.

Also stated in the literature review, best practice did not often call for systematic evaluation of professional development programs. The literature review further revealed that this is no longer the case in most programs of today. Nor is it the case for eMINTS, which conducts extensive program evaluations, using both in-house and external evaluators. eMINTS teachers' responses to survey questions ranked the Evaluation standard as one of the three lowest standards (3.0). Comments varied in the open-ended portion of the Evaluation standard data:

- I'm not sure eMINTS knew of my particular needs. If I did require information, the discussion board was most helpful.
- eMINTS does not consider other's ideologies, abilities or talents.
- My eMINTS instructor worked to meet each of us in class on whatever level we were on; just as we do with students in the classroom.
- Ongoing teacher and peer evaluation is emphasized throughout the training process. eMINTS annual review of training materials and pacing schedules does a pretty good job of anticipating future needs.

The remaining category, Content, includes the NSDC standards of Equity, Quality Teaching, and Family Involvement. Of the three standards in this category, the Equity

standard, even though it ranked low (3.2), received many positive comments from the survey respondents. As cited in the literature review and backed by survey responses, the eMINTS program design promotes the selection and use of a diverse set of strategies to meet all learners. Survey responses support this statement:

- I was able to reach students with technology that I was not able to reach traditionally. The constructivist approach with inquiry questioning techniques helped both my student-teacher relationship as well as my parent-teacher relationship. By asking probing or inquiry questions, I was better able to understand the needs or concerns of the student and/or parent when communicating.
- Technology gave me an opportunity to more quickly access the needs of students which allowed for diversification. Observations taught me to appreciate my students and eMINTS helped me design multiple approaches to meet those needs.
- Training did emphasize the need to reach all students and the means to use technology to enhance their learning.
- Using technology I was able to more deeply involve all students in the learning process.

Research question two and sub-questions a, b, and c sought to identify perception differences between various eMINTS groups: participants and facilitators, certified and non-certified teachers, and teachers of various states and countries. A z-test for differences compared scale score means for various data sets. The z-test values did not

provide any major insights; however, graphs and visual comparisons of the scale score means of several eMINTS groups identified several key findings.

Figure 2 illustrates the scores for two eMINTS groups: the participants and the facilitators. In general, both groups had similar perceptions, though the participants consistently rated the eMINTS training slightly higher than did the facilitators. The researcher has often noted this difference through her own experience as a facilitator. Whether it is human nature or other unforeseen factors, people facilitating professional development sessions often evaluate themselves more harshly than do the participants.

Also evident in Figure 2, the Collaboration standard was the only standard rated higher by eMINTS facilitators than by participants. The literature review revealed the importance of providing multiple opportunities for collaboration in educational technology professional development programs. It is likely that the facilitators rated this standard higher because collaboration is an integral part of their educational technology specialist (PD4ETS) job. Although eMINTS classroom teachers collaborate, PD4ETS members are required to collaborate at many levels and in many different situations: peer-to-peer as coaches, mentors, and discussion list mediators.

A second graph, Figure 3, demonstrates the differences between the certified and non-certified eMINTS teachers. The certified eMINTS teacher rated the program higher than did the non-certified teacher in 11 standard areas, with the Quality Teaching standard showing the largest discrepancy. Possibly the difference in teacher perception can be attributed to the extra effort the certified teachers have undertaken to reach certification. The additional time spent in preparing the portfolio and the self-reflective

experience of the certification process might lead certified teachers to have a stronger perception of the Quality Teacher standard than do non-certified teachers.

The research sample size did not provide adequate data for analysis of research sub-questions 2(b) and 2(c); therefore, no inferences or statistical results were drawn. However, Table 14 presents the scale score mean data desegregated by teacher location.

*Conclusions*

The overall findings from this study contribute to the knowledge base in the areas of professional development, educational technology and standards-based educational technology professional development in two distinct ways. First, through the literature review, the study melded the NSDC standards, educational technology and the eMINTS program. To the researcher's knowledge, this is the first in-depth examination linking these three items.

Second, the findings from this study added insight into how eMINTS teachers perceive the effectiveness of their eMINTS training as aligned with the NSDC standards. Several NSDC standards were well represented within the eMINTS educational technology professional development program. On the other hand, the research also revealed three standards that survey respondents ranked low, suggesting that eMINTS should concentrate efforts to improve the design of elements within these areas.

Despite failure to reject the null hypotheses, in the researcher's opinion, the findings of this survey research support the adoption and implementation of the eMINTS educational technology professional development. Although some schools and districts may find the expense (see Table 1) and scheduling (see Appendix C) to be overwhelming, teacher perception of the eMINTS program, as reflected in this study,

ranked high. Testifying to the program's quality and effectiveness, the surveyed eMINTS teachers awarded a 24-question combined scale score mean of 3.2 (based on a maximum score of 4) to the program. For those districts that see cost as a deterrent, the researcher would recommend investing in the train-the-trainer model. This model allows district personnel to be eMINTS trained, grants them access to eMINTS resources, and then allows the district to set up and implement their own schedule (both time-wise and financially).

In addition, based on the high overall scale score mean, the researcher would also make a state-level recommendation in the 12 states where eMINTS training is available. The researcher would request that the state boards of education in these states recognize and add eMINTS Certification as an Educational Technology endorsement on their states' teaching licenses. In the researcher's experience, recognition at this level can provide the momentum needed to increase the number of teachers trained to integrate technology in the classroom.

*Recommendations for Future Research*

Recommendations for future research include replicating the study with a larger, more diverse sample. Researchers could accomplish this by distributing the survey in a format other than online. One suggestion would be to take advantage of eMINTS face-to-face opportunities such as conferences, seminars, and training sessions to distribute and collect surveys. Attendance at these meetings would also allow researchers to arrange opportunities to visit eMINTS teachers and classrooms to gather detailed feedback through observations, interviews, and focus groups.

Another recommendation for future research would be to gather additional detailed demographic data from respondents. Having access to additional and more specific demographic data would allow researchers to desegregate the data to explore specific information. For example, a future researcher might use such data to investigate what differences, if any, exist between eMINTS teachers working in different grade-levels (elementary, middle school, and high school) in terms of their perception of the alignment of eMINTS professional development with NSDC standards.

In this researcher's opinion, eMINTS teachers who had pre-service experience in technology would require less instruction in basic computer and software operations and could spend more time concentrating on student needs and quality integration. Therefore, a third recommendation also focuses on gathering additional demographic data. The additional data could allow future researchers to desegregate the data to study the differences that exist between eMINTS teachers who received technology training during their pre-service experiences and those who did not. This type of information would allow researchers to uncover the ramifications of eMINTS participants having prior technology training. Data gathered could provide insight into the importance of incorporating technology training into the pre-service experience.

*Critical Reflection*

In one fashion or another, I have been involved in educational technology and educational technology professional development for over 10 years. It is my desire that every student in the United States education system develop the skills necessary to be a technologically productive adult. Figure 1, the Technology Integration Cycle, exemplifies the three-part sequence of events that will lead students to be successful adults. My study

of standards-based educational technology professional development for teachers is only one section of the whole; it is my hope that this research will increase the stakeholders' awareness in the role they play regarding the cycle of technology integration.

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# APPENDIX A

*Survey Materials*

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*A1.* Post for eMINTS General Discussion List.

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Survey Opens: A survey to determine how you feel about the eMINTS staff development you participated in has been opened at

http://www.surveymonkey.com/s.aspx?sm=_2bct_2fq_2by8fV5GF835m3kXhA_3d_3d

You may have to copy and paste the URL into your browser instead of just clicking on the link to make sure you get to the survey.

Input is requested from all eMINTS and eMINTS4All teachers, PD4ETS participants and certified graduates of the program; and library media specialists from all states and countries involved in the eMINTS National Center. The survey consists of 27 questions and will take approximately 15 – 20 minutes to complete. The survey will remain open through July 31, 2009.

Your participation in this survey is voluntary and is not linked to your job performance in any way. All information obtained in this survey will remain confidential. You will not be identified by name nor will the data be presented in a manner that will allow for the identification of any participating individuals. The results of this evaluation may be presented at scientific meetings and in published reports for educational, policy and scientific purposes.

Please feel free to contact Diana at diana.stanfill@yahoo.com or (636) 240-9243 if you have any questions or concerns. Thank you for your time.

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NOTE: Diana Stanfill is currently enrolled in the Doctor of Instructional Leadership at Lindenwood University. This semester she begins work on her culminating research project. By participating in her research, you will be able to share your experiences and opinions about the program. Additionally, the eMINTS staff may gain information that can be used to identify the strengths and weaknesses of their professional development program, and possibly make changes where needed.

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## *A2.* Survey

Thank you for choosing to participate in this survey.

Confidentiality Statement: All information obtained in this survey will remain confidential. You will not be identified by name nor will the data be presented in a manner that will allow for the identification of any participating individuals. The results of this evaluation may be presented at scientific meetings and in published reports for educational, policy and scientific purposes.

Consent Statement: Marking the "Yes" to the "I agree to allow my responses to be used for research purposes" choice below indicates that you have read the information provided above and agree to participate in the evaluation of the eMINTS professional development program. If you have any questions or concerns, feel free to call Diana Stanfill at (636) 240-9243.

I agree to allow my responses to be used for research purposes.

O Yes
O No

Directions: The purpose of this survey is to determine how you feel about the eMINTS professional development you participated in. Please complete the demographic questions by selecting the appropriate answers.

Select your location:
O Missouri
O Alabama
O Arkansas
O Delaware
O Illinois
O Maine
O Minnesota
O Nevada
O New Jersey
O Oklahoma
O Texas
O Utah
O New South Wales, Australia

Select your eMINTS program:
O eMINTS Comprehensive
O eMINTS4All
O PD4ETS
O Veteran eMINTS teacher
O eMINTS Leadership Institute
O eMINTS4Administrators
O eMINTS4TeachnologyCoordinators
O eMINTS in Special Education
O Customized eMINTS PD

Have you completed the eMINTS certification Process by submitting an electronic portfolio that received a passing score?

O Yes
O No

Approximate number of years since you completed your most recent eMINTS program:

O 1 - 2
O 3 - 4
O 5 – 6
O 7 or more

For each statement below, indicate the strength of your agreement or disagreement by placing a checkmark in one of the five scales.

| | | Strongly Disagree | Disagree | Agree | Strongly Agree | NA |
|---|---|---|---|---|---|---|
| 1. | eMINTS encouraged me to participate in regional or national subject-matter networks and learning communities. | | | | | |
| 2. | As part of the eMINTS program, I was involved in local learning teams to plan instruction, examine student work, and improve communication through team connections. | | | | | |
| 3 | eMINTS helped me develop the knowledge and skills necessary to advocate for improved technology in my building. | | | | | |
| 4 | eMINTS helped me describe the significance of continuous learning of educational technology to enhance and support student learning outcomes in my school. | | | | | |
| 5 | eMINTS classroom hardware and software requirements met most of my teaching, management and communication needs. | | | | | |
| 6 | eMINTS continued to provided me with the support needed after I finished the program. | | | | | |
| 7 | In the eMINTS program, data on student learning provide focus for my future classroom technology projects. | | | | | |
| 8 | In the eMINTS program, I gathered evidence of improvements in student learning to determine the effects of my educational technology efforts. | | | | | |
| 9 | Through ongoing evaluations eMINTS was aware of my particular needs and attempted to meet them. | | | | | |
| 10 | eMINTS used multiple sources to evaluate the effectiveness of their program on student learning (classroom observations, conversations with principals, structured interviews). | | | | | |
| 11 | eMINTS prepared me to be a skillful user of educational research by teaching me to recognize quality research and interpret results. | | | | | |
| 12 | eMINTS provided multiple opportunities for me to participate in meaningful conversations concerning research-based teaching and learning. | | | | | |
| 13 | eMINTS provided multiple experiences with a classroom coach or mentor in which the use of new educational technologies (hardware, software, strategy) was the goal. | | | | | |
| 14 | eMINTS promoted the use of online formats to provide collegial exchange. | | | | | |
| 15 | eMINTS staff development learning methods mirrored, as closely as possible, the methods I am expected to use with my students. | | | | | |
| 16 | eMINTS helped me understand more about how students learn, so that I could reach and teach to all learners. | | | | | |
| 17 | eMINTS encouraged me to be a skillful member of various groups (for instance, school improvement committees, grade-level teams…). | | | | | |
| 18 | eMINTS provided me with the skills necessary to collaborate (manage conflict, to lead discussions). | | | | | |
| 19 | eMINTS prepared me to understand and appreciate all students (culturally diverse, economically disadvantaged…). | | | | | |
| 20 | eMINTS prepared me to establish learning environments that communicate high expectations for the academic achievement of all students. | | | | | |
| 21 | eMINTS provided many opportunities to develop a deeper understanding of how educational technology is to be integrated into the existing curriculum. | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 22 | eMINTS taught strategies that added to my personal portfolio of instructional methods. | | | | | |
| 23 | eMINTS prepared me to build consensus among educators and community members concerning the overall mission and goals for including educational technology in my school. | | | | | |
| 24 | eMINTS helped me develop skills to better communicate and create relationships with parents that support student learning. | | | | | |

Directions:

- Please read each of the following bulleted statements carefully.
- In the space provided, enter comments about how your eMINTS experience relates to the statements.
- You may comment on any or none of the items.

List 1 of 4:

- I learned to be a productive member of a learning team. (Learning Communities)
- I learned the skills to be an advocate for technology in education. (Leadership)
- I thought eMINTS provided adequate support, and the hardware and software requirements met most of my needs. (Resources)

Comments:

Please read the bulleted list carefully and enter your comments in the space provided:

List 2 of 4:

- I learned to use data on student learning when creating technology projects (Data-Driven)
- I felt that eMINTS was aware of my particular needs and attempted to meet them. (Evaluation)
- I learned to be a skillful user of research when making instructional decisions (Research-Based)

Comments:

Please read the bulleted list carefully and enter your comments in the space provided:

List 3 of 4:

- I was provided a classroom coach or mentor and online formats were used to promote collegiality (Design)
- I understand more about how students learn with technology. (Learning)
- I was taught collaboration skills to be a productive team member. (Collaboration)

Comments:

Please read the bulleted list carefully and enter your comments in the space provided:

List 4 of 4:

- I learned to understand and appreciate all students. (Equity)
- I now have a deeper understanding of how to integrate technology into the curriculum. (Quality Teaching)
- I learned to create relationships with parents that support student learning. (Family and Stakeholder Involvement)

Comments:

Thank you for completing the survey!

Please click "Done" to make sure your results are saved correctly.

A copy of the finished paper may be obtained by emailing diana.stanfill@yahoo.com

Done

*A3.* Pretest email.

Good Morning Fellow Educators,

You might better remember me as Diana Alvarez – an employee of the instructional technology department until 2004. I am now living in O'Fallon, Missouri and currently enrolled in the Doctor of Instructional Leadership at Lindenwood University. This semester I am working on my culminating research project and dissertation. Because you understand the need for technology in education, and are an advocate for its utilization, I am requesting your help. As part of my dissertation research I am sending a survey request to 1,000 teachers who completed the eMINTS program (a 2-year, educational technology staff development program). Before I release the "official" survey to the participants I would appreciate it if you would take a few minutes out of your busy schedule to "pretest" the survey.

You may access the survey by clicking on this link:
http://www.surveymonkey.com/s.aspx?sm=_2bct_2fq_2by8fV5GF835m3kXhA_3d_3d.

Please read the directions and questions, and as you do so, let me know if anything is unclear. I would appreciate comments on:

- Please time yourself, and let me know how long it takes you to complete the survey.
- Are the wording of the instructions and survey clear?
- Did any of the items require you to think too long or hard before responding? Which ones?
- Does the navigation of the survey flow smoothly?
- Are the survey colors, fonts and styles pleasing?

You may either write your responses as a reply to this email or attach them as a separate document; please return all responses by April 10th.

Thank you for your time!
-Diana

# APPENDIX B

*Survey Data Set*

| | | | | | Scale Score Mean by NDSC Standard | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Count | Location | Program | Certified | Yrs since completion | Learning Communities | Leadership | Resources | Data-Driven | Evaluation | Research-Based |
| 1 | Missouri | Comp | Y | 1-2 | 2.5 | 3.5 | 3 | 2.5 | 3 | 3.5 |
| 2 | Missouri | 4ETS | N | 7 or more | 2 | 4 | 3.5 | 3 | 3 | 3 |
| 3 | Missouri | Vet | N | 5-6 | 4 | 4 | 4 | 4 | | |
| 4 | Missouri | Comp | Y | 3-4 | 3 | 3 | 3 | 2 | 3 | 3 |
| 5 | Missouri | Comp | Y | 3-4 | 3 | 4 | 4 | 3 | 2 | 3.5 |
| 6 | Missouri | Comp | N | 5-6 | 2.5 | 4 | 3.5 | 3 | 4 | 3.5 |
| 7 | Missouri | Comp | N | 1-2 | 3.5 | 3 | 3.5 | 4 | 3.5 | 2.5 |
| 8 | Missouri | Vet | N | 5-6 | 1.5 | 3.5 | 2.5 | 4 | 3 | 3.5 |
| 9 | Utah | Vet | Y | 1-2 | 3 | 4 | 3.5 | 3 | 4 | 4 |
| 10 | Missouri | Comp | N | 1-2 | 3 | 4 | 3 | 3 | 3 | 3 |
| 11 | Missouri | Comp | N | 1-2 | 2.5 | 3.5 | 3 | 2 | 4 | 3.5 |
| 12 | Missouri | Comp | Y | 1-2 | 3 | 4 | 3 | 3 | 3 | 3 |
| 13 | Missouri | Comp | N | 1-2 | 2.5 | 3 | 3 | 3 | 1.5 | 3 |
| 14 | Utah | Comp | Y | 1-2 | 4 | 4 | 4 | 3 | 3 | 3.5 |
| 15 | Utah | 4All | Y | 1-2 | 2.5 | 3.5 | 3 | 2 | 3.5 | 3.5 |
| 16 | Missouri | Vet | N | 5-6 | 4 | 4 | 4 | 4 | 3.5 | 4 |
| 17 | Missouri | Comp | N | 1-2 | 2.5 | 3.5 | 1.5 | 3 | 3 | 3 |
| 18 | Missouri | Comp | Y | 1-2 | 3 | 4 | 3 | 3 | 3 | 3.5 |
| 19 | Missouri | Vet | N | 7 or more | 3 | 4 | 3 | 3 | 3 | 3 |
| 20 | Missouri | Comp | N | 3-4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 21 | Missouri | Vet | N | 3-4 | 4 | 4 | 3.5 | 3 | 3 | 3.5 |
| 22 | Missouri | Vet | N | 7 or more | 3.5 | 4 | 4 | 4 | 3.5 | 4 |
| 23 | Missouri | Vet | N | 3-4 | 3 | 3.5 | 4 | 3.5 | 0 | 3 |
| 24 | Missouri | Comp | Y | 1-2 | 3.5 | 4 | 3.5 | 3 | 4 | 4 |
| 25 | Missouri | Comp | N | 5-6 | 3 | 3 | 3.5 | 3.5 | 2 | 3.5 |
| 26 | Missouri | 4ETS | N | 3-4 | 2 | 2.5 | 2.5 | 2.5 | 1 | 2 |
| 27 | Missouri | Comp | N | 1-2 | 3.5 | 4 | 2 | 3.5 | 2 | 3 |
| 28 | Missouri | Vet | Y | 3-4 | 2.5 | 3 | 2.5 | 2 | 2 | 2.5 |
| 29 | Alabama | Comp | N | 1-2 | 1.5 | 4 | 2 | 4 | 3.5 | 3 |
| 30 | Missouri | Comp | Y | 1-2 | 3 | 4 | 3 | 3 | 3 | 2.5 |
| 31 | Missouri | Vet | N | 5-6 | 2.5 | 4 | 4 | 3 | 3 | 3 |
| 32 | Missouri | 4ETS | Y | 5-6 | 4 | 4 | 4 | 2 | 3.5 | 4 |
| 33 | Missouri | 4All | Y | 1-2 | 3 | 4 | 3 | 3 | 3 | 3 |
| 34 | Missouri | Comp | Y | 1-2 | 3 | 4 | 3 | 4 | 2.5 | 3.5 |
| 35 | Missouri | 4ETS | Y | 3-4 | 3.5 | 3.5 | 2.5 | 2.5 | 3 | 2.5 |
| 36 | Missouri | Comp | N | 1-2 | 4 | 4 | 3.5 | 3 | 4 | 3 |
| 37 | Missouri | Vet | N | 7 or more | 3.5 | 3 | 3.5 | 3.5 | 3.5 | 3.5 |
| 38 | Missouri | Comp | N | 1-2 | 4 | 4 | 2 | 4 | 4 | 4 |
| 39 | Missouri | 4ETS | N | 3-4 | 1 | 1 | 1 | 1 | 1 | 1 |
| 40 | Missouri | 4ETS | N | 3-4 | 4 | 4 | 4 | 3 | 4 | 4 |
| 41 | Missouri | 4ETS | N | 3-4 | 2 | 4 | 3.5 | 2.5 | 1.5 | 1 |
| 42 | Missouri | Comp | Y | 1-2 | 2.5 | 4 | 3 | 2.5 | 3 | 3 |
| 43 | Missouri | 4ETS | N | 1-2 | 4 | 4 | 3.5 | 0 | 4 | 4 |
| 44 | Missouri | 4ETS | Y | 5-6 | 4 | 4 | 4 | 4 | 4 | 4 |
| 45 | Missouri | 4ETS | Y | 5-6 | 4 | 4 | 4 | 4 | 4 | 4 |
| 46 | Missouri | Comp | N | 1-2 | 4 | 4 | 2 | 3.5 | 3 | 3 |
| 47 | Missouri | Vet | N | 7 or more | 2.5 | 3 | 2.5 | 2.5 | 1 | 1.5 |
| 48 | Missouri | Vet | N | 7 or more | 2.5 | 4 | 3.5 | 3 | 3 | 3 |
| 49 | Missouri | Vet | N | 5-6 | 4 | 4 | 4 | 3.5 | 4 | 3.5 |

| | Scale Score Mean by NSDC Standard | | | | | |
|---|---|---|---|---|---|---|
| Count | Design | Learning | Collaboration | Equity | Quality Teaching | Family |
| 1 | 4 | 4 | 3 | 1.5 | 4 | 3.5 |
| 2 | 3 | 3 | 2.5 | 3 | 3 | 3 |
| 3 | 3.5 | 4 | 3 | 3 | 4 | 4 |
| 4 | 3 | 3 | 2 | 3 | 3 | 2.5 |
| 5 | 4 | 3.5 | 3 | 3.5 | 4 | 2.5 |
| 6 | 3.5 | 3.5 | 3 | 4 | 4 | 3.5 |
| 7 | 4 | 3 | 2.5 | 3 | 3.5 | 3 |
| 8 | 3 | 4 | 3 | 3.5 | 3 | 3 |
| 9 | 3 | 3.5 | 3 | 3.5 | 4 | 3.5 |
| 10 | 3 | 3.5 | 4 | 4 | 3 | 3 |
| 11 | 3.5 | 3 | 2 | 3 | 3.5 | 3 |
| 12 | 3 | 3 | 3 | 3 | 3 | 3 |
| 13 | 3.5 | 2 | 2 | 2 | 3.5 | 2.5 |
| 14 | 3.5 | 4 | 3.5 | 3.5 | 4 | 3 |
| 15 | 3.5 | 4 | 3 | 3 | 4 | 3 |
| 16 | 4 | 4 | 4 | 4 | 4 | 4 |
| 17 | 3.5 | 3 | 3 | 2.5 | 3 | 2.5 |
| 18 | 4 | 4 | 4 | 4 | 4 | 3.5 |
| 19 | 3 | 3 | 3 | 3 | 1.5 | 3 |
| 20 | 4 | 4 | 4 | 4 | 4 | 4 |
| 21 | 4 | 4 | 3 | 3 | 3.5 | 3.5 |
| 22 | 3.5 | 3.5 | 3.5 | 3.5 | 2 | 3 |
| 23 | 3.5 | 3 | 3 | 3 | 3 | 3 |
| 24 | 4 | 4 | 3.5 | 3.5 | 4 | 3 |
| 25 | 3.5 | 3.5 | 2 | 2.5 | 3 | 4 |
| 26 | 2.5 | 2 | 1.5 | 3 | 2.5 | 1.5 |
| 27 | 4 | 3 | 2.5 | 3 | 4 | 3 |
| 28 | 3 | 3 | 2 | 3 | 4 | 2.5 |
| 29 | 3.5 | 4 | 3 | 4 | 4 | 3 |
| 30 | 4 | 3.5 | 3 | 3 | 4 | 3.5 |
| 31 | 3 | 4 | 3 | 3 | 4 | 3 |
| 32 | 4 | 4 | 4 | 3.5 | 4 | 4 |
| 33 | 2.5 | 3 | 3 | 3 | 3.5 | 3.5 |
| 34 | 3.5 | 3.5 | 3 | 3.5 | 4 | 3 |
| 35 | 3 | 4 | 3.5 | 4 | 4 | 2.5 |
| 36 | 4 | 3 | 3.5 | 3 | 4 | 3 |
| 37 | 3 | 3 | 3 | 3 | 3.5 | 3 |
| 38 | 4 | 4 | 3.5 | 3.5 | 4 | 4 |
| 39 | 1 | 1 | 1 | 1 | 1 | 1 |
| 40 | 4 | 4 | 4 | 4 | 4 | 4 |
| 41 | 3 | 1.5 | 2.5 | 2 | 3.5 | 2.5 |
| 42 | 4 | 4 | 1.5 | 3 | 4 | 3 |
| 43 | 4 | 4 | 4 | 4 | 4 | 3.5 |
| 44 | 4 | 4 | 4 | 4 | 4 | 4 |
| 45 | 4 | 4 | 4 | 4 | 4 | 4 |
| 46 | 4 | 4 | 3.5 | 4 | 4 | 3.5 |
| 47 | 3 | 3 | 3 | 3 | 2 | 2 |
| 48 | 3 | 3 | 3 | 3 | 3.5 | 3.5 |
| 49 | 3.5 | 4 | 3 | 3.5 | 4 | 4 |

APPENDIX C

*Schedule for eMINTS Comprehensive PD – Years 1 and 2*

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eMINTS NATIONAL CENTER

# Comprehensive Professional Development Schedule for FY10 cohort for Year 1 in 2009-2010

**Updated June 3, 2009**

| Topic | Hours | Meeting Dates |
|---|---|---|
| **Month 1/Month 2 (August/September)** | | |
| 01-Getting Started | 4 | |
| 02-Transforming Learning with Technology | 4 | |
| 03-Constructivism | 4 | |
| 04-Questioning Strategies | 4 | |
| 05-Cooperative Learning | 4 | |
| 06-Effective Uses of Productivity Tools | 4 | |
| 07-Peer Visit | 6.5 hours (contract time - includes 30 minute meal) | |
| **Month 3 (October)** | | |
| 08-Interactive White Boards | 4 | |
| 09-Finding and Organizing Internet Resources | 4 | |
| **Month 4 (November)** | | |
| 10-Evaluating and Using Internet Resources | 4 | |
| 11-Using Presentations in Inquiry-based Learning | 4 | |
| 12-Learning Communities and Technology | 4 | |
| **Month 5 (December)** | | |
| 13-Planning a Classroom Website | 4 | |
| 14-Inquiry-based Lessons | 6.5 hours (contract time - includes 30 minute meal) | |
| **Month 6 (January)** | | |
| 15-Introduction to WebQuests | 4 | |
| 16-Visual Literacy | 4 | |
| 17-Creating and Editing Digital Images | 4 | |
| **Month 7 (February)** | | |
| 18-Creating a Classroom Website | 6.5 hours (contract time - includes 30 minute meal) | |
| 19-Tools for Thinking | 4 | |
| 20-Website Work Session | 4 | |
| **Month 8 (March)** | | |
| 21-Modifying a WebQuest | 6.5 hours (contract time - includes 30 minute meal) | |
| 22-Collaboration Session/ Troubleshooting | 4 | |
| **Month 9 (April)** | | |
| 23-Classroom Communication | 4 | |
| 24-Collaboration Session | 4 | |
| **Month 10 (May)** | | |
| 25-Connections Between Inquiry-based Teaching and State Assessment | 4 | |
| 26-File Management | 4 | |
| **Month 11 (June)** | | |
| 27-Writing a WebQuest | 12 | |

eMINTS NATIONAL CENTER

# Comprehensive Professional Development Schedule for FY10 cohort for Year 2 in 2010-2011

**Updated June 3, 2009**

| Topic | Hours | Meeting Dates |
|---|---|---|
| **Month 1 (August)** | | |
| 01-Classroom Management | 4 | |
| **Month 2 (September)** | | |
| 02-Website Enhancement | 4 | |
| 03-Working with Authentic Data | 4 | |
| 04-Peer Visit | 6.5 hours (contract time – includes 30 minute meal) | |
| **Month 3 (October)** | | |
| 05- Assessment | 4 | |
| 06- Interdisciplinary Teaching and Learning | 4 | |
| 07-Collaboration Session 1 | 4 | |
| **Month 4 (November)** | | |
| 08-Revisiting WebQuests | 4 | |
| 09-Collaboration Session 2 | 4 | |
| **Month 5 (December)** | | |
| 10- Mapping a Multimedia Project | 4 | |
| 11-Creating Multimedia Products | 4 | |
| **Month 6 (January)** | | |
| 12-Assessing Student Technology Products | 4 | |
| 13-Lesson Design 1 | 4 | |
| **Month 7 (February) Website due 2/13** | | |
| 14-Lesson Design 2 | 4 | |
| 15-Collaboration Session 3 | 4 | |
| **Month 8 (March)** | | |
| 16-eMINTS Winter Conference March 3-5, 2010 | 6.5 hours (contract time - includes 30 minute meal) | |
| 17-Online Projects | 4 | |
| **Month 9 (April) WQ due 3/10** | | |
| 18-Lesson Design 3 | 4 | |
| 19-Collaboration Session 4 | 4 | |
| **Month 10 (May) LP due 5/15** | | |
| 20-Planning for Next Year | 7 | |

**Timelines:** The sequence of the eMINTS PD modules is very important. The PD and equipment installation schedules are listed by months (month 1, month 2, etc.) to accommodate eMINTS implementations that begin in any calendar month. However, please note that eMINTS PD modules are reviewed, revised and posted annually according to the U.S. fiscal year calendar dates (July, August, etc.) listed. For locations that do not follow the U.S. fiscal year schedule, archived modules are available.

Contact the eMINTS National Center at emints-info@emints.org for more information.

# APPENDIX D

*Approval Forms*

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09-84
IRB Project Number

## LINDENWOOD UNIVERSITY
Institutional Review Board Disposition Report

To: Diana Stanfill

CC: Dr. Lynda Leavitt

I reviewed this expedited proposal for research on 5/21/09 and saw no human subjects concerns. This is an exceptionally well-written proposal; thank you for the work that went into its creation. Good luck with your data collection.

Colleen Biri, Psy.D. 5/21/2009
Institutional Review Board Chair Date

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eMINTS NATIONAL CENTER www.emints.org

325 Clark Hall ▲ Columbia, MO 65211 ▲ Voice (573) 884-7202 ▲ Fax (573) 884-

February 27, 2009

Institutional Review Board

TO WHOM IT MAY CONCERN:

Please accept this letter as verification that the eMINTS National Center grants Diana Stanfill permission to use the eMINTS discussion list as a means of soliciting responses for the survey(s) associated with her study/research.

We will assist Ms. Stanfill in the posting of her survey(s). Please do not hesitate to contact me if additional information is needed.

Sincerely,

Monica M. Beglau, Ed.D, Director
eMINTS National Center
University of Missouri
325 Clark Hall
Columbia, MO 65211
573-884-7202
FAX: 573-884-7614
Email: beglaum@emints.org

# VITAE

## DIANA L. STANFILL

### EDUCATION

Ed.D., Instructional Leadership, Lindenwood University, 2010
L.M.S., Library Science and Information Management, Emporia State University, 1998
M.S., Educational Technology, Kansas State University, 1997
B.S., Elementary Education, Kansas State University, 1994

### ASSOCIATION MEMBERSHIPS

International Society for Technology in Education (ISTE)
National Staff Development Council (NSDC)
Association for Supervision and Curriculum Development (ASCD)

### PROFESSIONAL EXPERIENCE

*Adjunct Instructor,* Lindenwood University, January 2010 to present
*Consultant, Professional Development and Technology*, March 2005 to present
*Adjunct Instructor*, Kansas State University, August 2000 to December 2004
*District Instructional Technologist/Professional Developer*, USD475 Geary County Schools, August 1999 to November 2004
*Adjunct Instructor,* Cloud County Community College, August 1996 to December 2004
*Library Media Specialist*, USD 475 Geary County Schools, August 1997 to May 1999
*Library Media Specialist,* Rural Vista School District, August 1996 to May 1997
*Library Media Specialist*, Saint Xavier Catholic Schools, August 1995 to May 1996

### PROFESSIONAL CREDENTIALS

Missouri Teaching (Elementary/Middle) Certificate, 2005
Kansas Teaching (Elementary/Middle) Certificate, 1994