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Teacher Perceptions of Electronic Curricula Implementation within an Elementary and Secondary Lutheran Setting

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TEACHER PERCEPTIONS OF ELECTRONIC CURRICULA IMPLEMENTATION WITHIN AN ELEMENTARY AND SECONDARY LUTHERAN SCHOOL SETTING

by

Bruce Gerard Kintz

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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.

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Abstract

The purpose of this qualitative research project was to investigate and understand elementary and secondary Lutheran Church – Missouri Synod (LCMS) school teachers' awareness of and attitudes toward the use of electronic curricula in the classroom. The research question was: Why is there a lack of mainstream LCMS grade schools and high schools asking for or using electronically-delivered curricula?

Interpretive inquiry was chosen as the methodology for this research and due to the nature of this researcher's focus on technology in the classroom, an electronic survey was used for gathering data which was effective in terms of cost and time efficiency.

The results summarized over 1000 LCMS teacher responses for each of fifteen primary survey questions. Twelve themes emerged from this study regarding electronic curricula that indicated LCMS teachers are concerned about (a) digital age requirements, (b) administrative encouragement and support, (c) affordability of technology, (d) accessibility of technology, (e) technical support of technology, (f) time for teachers, (g) training for teachers, (h) pedagogy impact on students, (i) safety of students, (j) copyrights and permissions, (k) descriptors of electronic curricula, and (l) learning from dissenters.

In general, teachers are familiar with the Internet and how to use it but have not used formalized electronic curricula. Funding is needed to secure basic infrastructure for schools, and administration support is necessary to identify and pursue the appropriate levels of training and technical support for teachers. Various media, hardware and software are being used by greater than 1,000 teachers who responded to the survey, but

no organizing structure was found to coordinate electronic curricula within many individual Lutheran schools or across LCMS grade schools and high schools.

To fill the void and provide an organizing structure for the LCMS, a four-phased process called the Advancing Student Performance with Electronic Curricula Tools (ASPECTs) program is proposed. The ASPECTs process recommends a systematic plan for the design of learner-centered electronic curricula by publishers such as Concordia Publishing House, making use of LCMS teacher input and feedback throughout the process. This research may also be beneficial to school systems outside the Lutheran Church – Missouri Synod.

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Key to Abbreviations

ASPECTs:	Advancing Student Performance with Electronic Curricula Tools
AYP:	Adequate Yearly Progress
CD/DVD:	Compact disk or digital video disk
CPH:	Concordia Publishing House
ICT:	Information and Communications Technologies
IEP:	Individualized Education Program
IT:	Information Technology
LCMS:	Lutheran Church – Missouri Synod
NCLB:	No Child Left Behind
PCPA:	Protestant Church-Owned Publishers' Association
PDF:	Portable Document Format
PLC:	Professional Learning Communities

Chapter I – Introduction

Background of Study

Education as a process in the United States should be capable of producing students who are ready for 21st century challenges, and in order to accomplish this, we should not be defined by the past in education, but rather by the needs of the future (Leu et al., 2008). Put differently, one can say that 21st century challenges should not be characterized by the statement, "We are what we have learned," but rather by the statement, "We are what we will continue to learn." The latter statement may be interpreted on two levels of understanding.

First, the learning process never seems to be complete. Today's workplace continues to increase in complexity, and as a result, may bring about the need to learn the latest in technology-driven processes within each industry or field. Society seems to project new learning demands and expectations on each generation as information and other technological advances occur in most vocations (Isenberg, 2007; Jamieson, 2007).

Second, as Schmoker (1999) advocated, the processes for educating tomorrow's students and their teachers should improve to keep pace with and make use of any technological advances. If education processes do not keep up with technological advances, students in the United States may run the risk of limiting their ability to easily explore and make use of the full body of knowledge in a particular area of study or discipline (Maina & Shaffer, 2006). If this happens, the learning process may stall creating potential future ramifications because as Isenberg (2007) stated, "Lifelong learning is a means for . . . keeping pace with society, regardless of age" (p. 2). Giving students full access to multiple methods of learning from traditional to digital, beginning

early in their learning career, may, as Clarke (2007) reflected, assist them to keep pace, improve employability skills, and compete globally in the workforce of the future.

The recent education documentary titled, *Two Million Minutes* by Compton (2007) brought to the forefront the fact that the United States trails behind India and China in time students spend in school each day and per year, in student interest and performance in critical subjects such as mathematics and sciences, and in the amount of time spent studying at home in preparation for the next school day. Public awareness that student education is perhaps key to tomorrow's success on both an individual and systemic level for the United States may have been one cause for legislation aimed at driving school improvement nationwide via the No Child Left Behind Act (NCLB), which was signed into law in 2002. The present reality, Compton indicated, is that progress in education in the United States is already behind other growing countries like India and China, serving to create not only concern, but also a proactive response. There are so many success stories regarding proactive school improvement across the United States that Schmoker (1999) said, "Through such positive and proactive means, we can fill the air with hope and optimism about the results that are, in fact, within our reach" (p. 20).

NCLB mandated the measurement of Adequate Yearly Progress (AYP) for improvement in the quality of education in order to close the achievement gap among groups of students. While this measure of AYP was created to improve accountability in education at the local school and district levels, it did not wholly prescribe all modes or methods of education required in order to achieve any of the goals set (Miners & Pascopella, 2007). This may leave teachers, and those who support them directly, such as

publishers of curricula resources, with a question. Are traditional teaching methods and tools such as textbooks changing, as Dede (2008) said, to afford today's teachers the flexibility to make use of the latest technology to succeed in speeding education recovery and advancement in the United States for the 21st century?

The quandary of either continuing to buy printed textbooks for the classroom or teaching from digitally-delivered curricula, or both, may be pressing teachers and is the subject of myriads of studies, experiments and debates (Carlson, 2005; Sheppard, Grace, & Koch, 2008; Tucker, 2008). According to Canton (2007), "Traditionally, in providing new information and curriculum material to students, texts have always had a very prominent place in education. The written word is a historical standard in teaching and an accepted method of transmitting information" (p. 24). In his play *The Tempest*, Act 2, Scene 1, Shakespeare (2002) wrote, "What's past is prologue" (p. 746). For education, as Waters (2007) discussed, this could mean the current availability of electronic curricula only begins to introduce what is under development and being deployed to classrooms.

It seems logical that electronic curricula could be easily developed from the digital files that were necessary during the creation of the various textbooks already in print, but it may be more complex than simply transferring text to a CD or DVD format for presentation, and more may be required than just a Portable Document Format (PDF) of the print original. It perhaps becomes a matter of improved or transformed design for usability as an interactive presentation between teachers and students (Hughes, 2005).

In Texas, the documented definition of the word *textbook* now includes electronic or digital media and is spreading quickly across grades kindergarten – 12 (Waters, 2007). Multi-media insertions for textbook lessons, quizzes, and tests are seen as opportunities

for innovative and interesting display, as well as two-way teacher and student communication. One issue with moving toward the future state of technology more quickly is that teachers are increasingly finding themselves caught between the chalkboard era and the smartboard era in terms of teaching methods and are perhaps in need of further support to make use of available alternatives (Franklin, 2008). Teachers say they are unsure if they need to move toward digital teaching resources and do not know what technologically advanced curricula are available for classroom use. Bird and Rosaen (2005) found, "The challenge was to build on their [the teachers'] eagerness and avoid squelching it. Others were less convinced of technology's utility and/or their abilities to use it" (p. 220).

The questions teachers are asking publishers revolve around whether digital learning materials and curricula are superior means for delivery to students (Leatham, 2007) and also around the question of how soon digital learning materials and curricula can be made available so that these resources can be used in the classroom and at home seamlessly and flexibly (Fletcher, 2008; Ward & Riley, 2008). Levin and Hansen (2008) prescribed that "instructors should spend more time focusing on how the technology is relevant to the students rather than on how easy the technology is to use" (p. 672).

Schools and classrooms would need to be ready to accept, as Lessen and Sorensen (2006) supported, newly developed electronic curricula delivery, while simultaneously, teachers decide if they believe they need it and would use it (Pasco & Adcock, 2007). Aust, Newberry, O'Brien, and Thomas (2005) found that educational technology coursework for student teachers was a good start, but that a longer term plan was required for them to use it over a period of years. Purchasing and using digital curricula or

electronically delivered intellectual property might prompt at least three considerations that might be valuable to understand in advance. These three considerations might be that (a) classrooms should be properly configured with basic hardware such as computers, projectors and servers (McGrail, 2007); (b) teachers should be trained periodically and be comfortable in using computers, various calculating and presentation software, and the Internet (Franklin, 2008); and (c) changes in teacher and student roles should be understood (Wang, 2002). However, "The roles of [practicing] teachers and students are not the only roles to change. . .Teacher educators who take the responsibility of teaching effectively with technology are sending a clear message [to future teachers]" (Adcock, 2008, p. 37). For example, one message may be that teaching from the front of a classroom may be less important than the interactive learning achieved between students and teachers via computer (Bain & McNaught, 2006). Another message may be that computers allow learning to occur from anywhere, so classroom arrangements can be flexible or even be in different cities if required (Ward & Riley, 2008).

Of the three considerations mentioned, the second, teacher training and comfort level with technology, seems to be a worthy priority (Lessen & Sorensen, 2006). Accordingly, it seems as if Professional Learning Community (PLC) topics are growing in number around the subject of technology usage in curriculum delivery, as can be seen in the online PLC network discussions hosted by Richards (2007). Additionally, Fitzpatrick (2007) said in the state of Ohio, for example, "Many of them [teachers] acknowledge the need for technology integration, but district leaders have struggled to make it happen" (p. 39). Training, as well as comfort level, may translate in part to teacher awareness of and attitudes toward using technology in the classroom (Errington,

2004). The focus of this study was on understanding teacher awareness of and attitudes toward the use of electronic curricula technology in the classroom through the use of a perceptions survey.

Title of Project

Publishers that seek to listen to teacher perceptions early in the curriculum development process perhaps not only serve teacher needs better, but may actually contribute to the advancement of the education cause (Ajayi, 2005). Fletcher (2008) found in a Texas study, teachers want instructional materials that "engage students in the digital age, are on-demand, flexible and adaptable, and are interactive and interdisciplinary embracing 21st century skills" (p. 26). Concordia Publishing House (CPH), the publisher for the LCMS, has received regular requests to investigate the broad topic of electronic curriculum delivery for schools in the Lutheran Church. This research project, titled *Teacher Perceptions of Electronic Curricula Implementation Within an Elementary and Secondary Lutheran School Setting,* allows the primary investigator to focus on understanding teacher awareness of and attitudes toward the subject.

Problem Statement

The perception of digital curriculum delivery within LCMS schools can be posed as a problem to be studied. The problem is perhaps best stated as follows: Why is there a lack of mainstream LCMS grade schools and high schools asking for or using electronically-delivered curricula? Evidence supporting the need to investigate this issue within the LCMS comes from news commentaries, letters, e-mail and phone inquiries from LCMS schools to their church's publisher. As well, the Lutheran Education Association has expressed interest in this topic of study. At present, Concordia Publishing

House is aware of the general interest in using technology to deliver curricula but is unaware of specific LCMS teacher perceptions and receptivity levels toward using technology to teach.

Rationale for the Study

Research on using technology to deliver curricula may have significant professional value to the Lutheran school system as a subset of the larger teaching community, as well as to Concordia Publishing House which supports them by creating curricula resources. After understanding the current environment in Lutheran schools, and teacher perceptions of electronic curricula for the classroom, the author will share the results of the study with the teachers. This research may help LCMS educators and policy makers make strategic decisions regarding training, school infrastructure, curriculum purchasing, and other budgetary matters for the future. Teachers who find social benefit from having contributed to this study may be drawn to read the research project report that will be made available. As a result, teachers may have a sense of vested ownership in providing direction for their publisher regarding electronic curriculum development and implementation for the future. The broader Protestant Church-Owned Publishers' Association (PCPA) may also be interested in this research as a source of benchmark data.

Hypothesis

The hypothesis for this study was formulated as a result of a discussion at a Lutheran schools forum on technology and the advancement of teaching methods. The qualitative hypothesis phrased in an affirmative manner is as follows: K–12 teachers' positive perceptions of electronic curricula increases the implementation. Phrased as a

null hypothesis, there is no relationship between teacher perceptions of electronic curricula and classroom implementation. Because of the general interest level and number of inquiries on the subject, one primary assumption in this study was that teachers believe they are capable of receiving and using electronic curriculum in the classroom. The questions examined and analyzed through a survey tool for emerging issues in this study included the following:

1. At what level (novice to expert) do teachers perceive their personal knowledge regarding the usage of electronic media, electronically or digitally-delivered curricula, the Internet, and high-tech teaching practices?
2. What electronic teaching media is currently being used in teachers' classrooms?
3. Do teachers believe there are advantages in teaching from technology-implemented electronic curricula in the classroom?
4. Do teachers believe there are disadvantages in teaching from technology-implemented electronic curricula in the classroom?
5. What factors influence teacher decisions to seek out and teach from technology-implemented electronic curricula?
6. What concerns, if any, do teachers have about teaching from technology-implemented electronic curricula in classrooms?
7. What are teacher perceptions of the key components needed for using instructional materials via technology?
8. What curricula design improvements do teachers believe would increase the effective use of technology to deliver curricula in their classrooms?

9. How would teachers prioritize electronic curricula needs in terms of subject (religion, math, history, etc.) and media (PowerPoint, DVD, interactive, other)?
10. How would teachers describe their interest level and perception (positive or negative) toward teaching from technology-implemented electronic curricula?

Limitations of the Study

The purpose of this research project was to understand a portion of the struggle for technology integration in the classroom by specifically targeting the population of LCMS school system teachers for their perceptions. Exploring LCMS teachers' perceptions regarding teaching from technology-implemented electronic curricula helped to discover what teaching tools they actually want and will use, so that assistance may be provided to help teachers reach their goals. Because this study was limited to the population of LCMS teachers on the roster at the time of this study, the research interpretation, summary and conclusions may be best suited to be generalized to address this specific population of teachers.

Definition of Terms

Adequate Yearly Progress (AYP). A metric and a timeline defined by each state for its schools and school districts. The purpose is to measure improvement in student performance in key areas so that 12 years after the 2001-2002 school year, all districts will meet or exceed the requirements of their states' education standards (Illinois State Board of Education, n.d.).

Avatar. Conversational online images of people (Merriam-Webster, Incorporated, 2008).

Compact Disk (CD)/Digital Video Disc (DVD). Music and video data storage media which can be used for recording and playback (Merriam-Webster, Incorporated, 2008).

Concordia Publishing House (CPH). The 140-year-old publishing arm of the LCMS established in 1869 and headquartered in Saint Louis, Missouri. CPH serves the 2.6 million members of the church body, the 1,000 combined pre-schools and grade schools, 100 high schools, 10 universities and 2 seminaries within the system. This publishing company is noted for curriculum, periodicals, academic books and missional resources. The primary investigator, Bruce G. Kintz, is the current President and Chief Executive Officer (CEO).

Constructivism. In education, the theory of learner-centered interpretation of knowledge using the experience of searching for, assembling and then translating information on an individual basis. Objectivism theory is used as an opposite for comparison and is described as knowledge being simply conveyed from the teacher to the student (Chen, 2008; Cortese, 2007; Henson, 2003).

Download. Moving or transferring software, images, email or other files in order to copy the data from one computer on the network or on the Internet to another computer on the network or Internet (Merriam-Webster, Incorporated, 2008).

Electronic or Digital Curricula. Instructional materials designed and developed for customized delivery to the classroom via Internet or CD/DVD media. Usually highly interactive coursework between students and teachers, this form of curricula can be paperless, and can track student progress automatically (Ohio Arts Council, n.d.).

Hyperlink. A usually blue colored word or phrase, also called *hypertext*, within a document which when clicked on with the computer's mouse will move to a related definition or other information useful to understanding (Merriam-Webster, Incorporated, 2008).

Individualized Education Program (IEP). A legal document which details the goals, accommodations and transportation needs of a student who has at least one of 13 identified disabilities and is unable to progress in regular classes (U.S. Department of Education, 2006).

Information Technology (IT). The computer science area which focuses on the design of hardware, software and architecture processes necessary to enable the systematic flow of information within an organization. The analogous term, information and communications technologies (ICT), is used particularly outside the United States (Merriam-Webster Incorporated, 2008).

Intellectual Property. Written works and art considered as owned by the author or publisher and legally protected by patents, trademarks and copyrights (World Intellectual Property Organization, n.d.).

Lutheran Church –Missouri Synod (LCMS). The second largest Lutheran Church body formed in 1847 by German immigrants.

No Child Left Behind Act (NCLB). Law signed into effect in 2002 requiring all children to be assessed each year to show adequate yearly progress in reading and language and math according to state standards.

Portable Document Format (PDF). Viewing the text and images of documents independent of the originating software and hardware (Brailsford, 1994).

Protestant Church-Owned Publishers' Association (PCPA). Formed in 1949, an organization made up of the publishing companies representing each Protestant church body's theological stance and missional objectives. At the time of this study, the primary investigator, Bruce G. Kintz of Concordia Publishing House in Saint Louis, Missouri, was the President of the association.

Professional Learning Communities (PLC's). Groups of teachers who meet and collaborate on matters of curriculum development, teaching methods and common assessment of students (DuFour, 2004).

Smartboard. A whiteboard with electronic capability to be written on, to save content and to print as students and teachers interact.

WebCT–Blackboard. Internet-based course management software application for schools with features that include syllabi, assignments, course content, calendar, chat and discussion boards, testing and grading.

Wiki. The addition or modification of data directly on a website (Merriam-Webster, Incorporated, 2008).

Summary

The personal possession of a book long ago may have designated wealth, prominence, stature and perhaps even wisdom. This is because, according to Wikipedia the online encyclopedia, before the invention of the printing press, books had to be copied by hand which made them time-consuming and expensive to reproduce, and subsequently, only those who could afford books owned them. We now take books for granted and in education, teachers have traditionally chosen and taught from textbooks, which most students carry each day to and from school.

Today, alternative means of reading intellectual property from textbooks, magazines and the like are being created for convenience purposes (Carlson, 2005). The age of digital books has arrived and is growing (Tucker, 2008). Teachers may be making decisions at this moment based on factors important to them, as to whether electronic forms of reading, teaching and interacting on lessons and homework with students are more suited for the 21st century demands the students and workforce of the future will face (Franklin, 2008).

This study examined the population of LCMS teachers and their schools and sought to investigate whether they perceived they were ready and capable to accept digital delivery of instructional materials and what priorities in terms of subject and media they needed and wanted for their classrooms.

Chapter II – Review of Literature

Introduction to Technology-Implemented Electronic Curricula

There is a plethora of research available on the general topic of electronic or digitally-delivered curricula (Adcock, 2008; Bradshaw & Crutcher, 2006; Cavanaugh, 2006; Dede, 2008; Dillon, 2008; Lessen & Sorensen, 2006; Levin & Hansen, 2008). For the purposes of this research, the word *curricula* is defined by the Ohio Arts Council (n.d.) online web dictionary as "instructional materials, related to a unit of teaching and learning within a particular subject area. These [instructional materials] may include lesson plans, audio-visual materials, teacher guides, textbooks, etc" (¶7). Electronic curricula consisting of any or all of these elements can be delivered via CD and DVD or as a download available to any student or school with a computer and Internet access (Cavanaugh). The purpose for creating electronic curricula is to allow e-learning to take place, which, according to Qvortrup (2008), the European Commission described as "the use of multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchanges and collaboration" (p. 132).

The ubiquitous computer and Internet are becoming the focus of learning according to Leu et al. (2008), and seem to be available to nearly 99–100% of K–12 schools in the United States today (National Center for Education Statistics, n.d.). Given this assumption, and the aforementioned abundance of research on technology-implemented electronic curricula, the question could be asked why, as Ferdig (2006) argued, is there a lack of teachers assessing electronically-delivered curricula or educational technology in the classroom?

Research indicated that proper assessment of educational technology must take into consideration elements of pedagogy, the efficacy of the technology deployment process, and input from the teachers (Ferdig, 2006). In addition, "A deeper awareness of how technology impacts learning [and] . . . . a more comprehensive approach to measuring intended as well as unintended [educational] goals" (Ferdig, p. 757) is necessary.

To study the reasons why electronic curricula may not be in more broad-based demand by teachers, several topics were examined from a research-based literature review. The four topics reviewed progressed from general toward specific in the following manner. First, technology-based teaching and 21st century skills, electronic resources versus standard printed texts, basic infrastructure requirements for schools, and obstacles to the establishment of e-learning in today's schools were examined. Second, the theoretical impact of teachers' beliefs on their actions was explored. Third, teacher perceptions of current electronic curricula were investigated along with the role of self-examination and changing the mindset of teachers. Fourth, becoming more definite and detailed, the many factors teachers examine for classroom technology usage, specific classroom technology integration strategies and plans or models and their features were reviewed. Fifth, possible future expectations and next actions were delineated based on this literature review.

Technology-based teaching and 21st century skills. The No Child Left Behind Act (2002), which was signed into law in 2002, has a clause built in under the Enhancing Education through Technology section requiring every graduating eighth grade student to be knowledgeable about today's computer technology. The law does not prescribe

exactly how this should be carried out and according to Miners and Pascopella (2007), "Few, if any, of the new [technological] literacies have found their way into the American classroom" (p. 28). There is a dichotomy exemplified here between what technological teaching tools are perceived to be widely available to teachers per the National Center for Education Statistics, (n.d.), and the actual usage of any of those tools in classrooms (Miners & Pascopella).

Other countries in the world are ahead of the United States in focusing teacher and student effort toward using technology to teach and learn, according to research conducted by the New Literacies Research Lab at the University of Connecticut (Leu et al., 2008). Large countries such as China and India identified in Compton's (2007) work are focused on computer intensive math and science courses and are outperforming American students in test scores.

Miners and Pascopella's (2007) research further indicated that Ireland is now importing workers to design and manufacture software because of how early and how integrated technology has become in their students' classrooms. Ireland's trained workforce has overtaken the United States in software production and many companies are looking to establish their headquarters there. Finland, as another example, sets the benchmark high in allowing five weeks of paid professional development release time for teachers to learn how to successfully inculcate technology into teaching practices.

Finland's ICT training model instructs teachers across the country how to assimilate the Internet and other technology tools into their classrooms. Miners and Pascopella's (2007) research indicated that the United Kingdom has created a technology skills assessment tool for use in schools and further indicated that Mexico has created a

plan for Internet access in all homes and classrooms within 15 years. Singapore high schools, as another example from this research, are already using online learning and, Japan's government pays for some portion of home-based Internet service for families because students spend more time on the computer at home than at school (Miners & Pascopella). Noticeably absent from this research was any focus on how much individual teachers' positive or negative perceptions or beliefs regarding the usage of technology influence their decisions to make use of available technology in teaching.

According to studies conducted by Dede (2008), ICTs are changing education in the knowledge and skills society wants from future graduates, in methods of teaching, learning and conducting research, and in students' usage of technology outside the classroom, which then influences learning preferences inside the classroom. Furthermore, Dede found that "education should prepare students for a world in which computers do almost all types of routine cognitive tasks and in which expert thinking and complex communications are the core intellectual skills for prosperity" (p. 13). Teachers' perceptions of routine tasks appropriate for the computer or delving into teacher perceptions or beliefs about the larger subject of technology-implemented electronic curricula was not part of this research.

Electronic teaching resources versus standard printed text. The environment may be ripe for evaluating the movement toward electronic curricula and digital textbooks while eliminating traditional paper texts according to Sheppard, Grace, and Koch, 2008. Dillon (2008) cited, as evidence supporting this statement, the 2006 scientific decision that Pluto was no longer to be defined as or considered a major planet in the solar system and what this ruling meant to science textbook publishers. The year after this discovery,

science textbooks needed to be updated to include the new fact about Pluto in order for the text to reflect the latest in science knowledge (Dillon, 2008). As a result, the remaining older science books were deemed out of date and inadequate for sale and as Dillon inferred, have been possibly removed from the publisher's stock and discarded. Yet, if the digital version of science textbooks had been adopted first, then only those curricula elements where print served best would have been produced and the discarding of out-of-date textbooks may not have been necessary (Tucker, 2008). For example, if electronic instructional materials were formatted onto a CD/DVD or downloaded from the Internet, all the latest updates could be incorporated and viewed in real-time, because "online e-textbooks can be continually upgraded, revised and be available to the learner for a lifetime" (Rossman, 2005, p. 3).

Any digital textbooks and associated pictures and charts can be created to have convenience and cost advantages over paper texts helping students displeased with the growing expense of textbooks (Carlson, 2005; Cavanaugh, 2006). Research by Inglis, Ling, and Joosten (2002), however, showed that digital multimedia design, development and usage can increase costs, unless found free on the Internet, and should be used to augment curricula where the most benefit is to be gained. As an example of convenience playing a role in print versus digital preferences, the primary investigator found that while the literature review was being conducted for this dissertation, it seemed appropriate to print out all the articles, even though most were found in online libraries and could have been saved electronically. The convenience of the tangible paper copies for highlighting, note-taking and reference may be an individual preference based on personal experience or as Carlson said, "old–fashioned tastes" (p. A35).

In a study that Sheppard et al. (2008) conducted, student preferences for electronic textbooks versus printed, traditional textbooks were examined to see if these two choices produced any differences in the amount of study time or in final grades. The findings from this study showed there was a slight difference in time spent studying, but there was not a significant difference in final grades for the students, according to the respective teachers. This study concluded that teachers should be careful in adopting electronic textbooks as those students who used them did not give them a positive rating overall despite any cost advantage. Perceptions of poor convenience in jotting notes in margins were cited as a reason not to recommend electronic curricula to others, even though the electronic text was priced less expensively than the paper version.

In contrast to the digital versus printed text school-based education findings of Sheppard et al. (2008), the opposite cost/price perception was found in business-based training practices, as Ward and Riley (2008) asserted that

> After an initial startup investment, maintaining a well-designed online learning program is simple because changes are all made to one centralized location. With traditional [paper-based] training programs, updating and maintaining courseware can be expensive and time-consuming due to the many materials involved. Running a paperless training [or education] operation is much more cost-effective. (p. 12)

Ward and Riley's (2008) research made other comparisons between print and electronic teaching resources by showing that virtual libraries of materials develop and grow over time less expensively and are perceived to be easier and faster to access than

with traditional paper alternatives. Perceptions that digital libraries are less expensive may have led to Qvortrup's (2008) statement that

> In a limited period of ecstasy it was believed that . . . digital books or virtual classrooms were identical to printed books or physical classrooms. This indeed is not the case: They are imitations of the book and the classroom. (p. 139)

Younger students and employees of the future see the electronic world of learning and training as very instinct-oriented, according to Ward and Riley (2008), because of constant exposure to electronic devices such as personal digital assistants (PDAs), cell-phones and iPods. Ward and Riley also found that asynchronous virtual learning is a key characteristic of online learning because students have the full responsibility to start, progress through and finish electronic curricula at their own pace, with or without the instructor. This has been uncharacteristic of traditional print-based classrooms where textbooks are used. Interactive chat between the students and instructor, online assignments and assessments and message boards such as those WebCT and Blackboard programs have to offer are examples of what Ward and Riley called *flexible online learning*, which can be real-time, or live, and where anyone can participate in classes from any city, at school or at home. Whether online or classroom-based, or electronic curricula versus print, Ward and Riley's research concluded that education and training need to provide options for students and be blended in teaching approach to allow for individual learning preferences.

Educators' interest in the subject of digitally published curricula has grown to the point where some states, like Texas, have approved electronic media for use just the same

as textbooks. Waters' (2007) research said that electronic printed material goes by many names such as digital, virtual and e-books, and some academic subjects are better or more easily suited for migration to digital media than others. Pearson Scott Foresman, an example Waters provided, is a textbook publisher attempting to move toward digital curricula by beginning with social studies. The curriculum is not inexpensive, according to Dillon (2008), who found that $50 million was spent on its development.

According to Cavanaugh (2006), the Los Angeles Unified School District adopted the social studies curricula because of the mixture of video, print, interactive learning and assessment tools, and the fact that the curriculum is provided in other languages, particularly Spanish, which is important for California's population. The collection of electronic texts available from textbook publishers in many K–12 subject areas has grown, and while research shows there was a large amount of available electronic curricula already in existence, Cavanaugh (2006) and Dede (2008) agreed that teacher creativity and professional commitment are what will determine the successful integration of technology-implemented electronic curricula into teaching practices.

Another area of primary concern to most publishers as they consider leaving printed curricula to enter the world of digital curricula is copyrights and intellectual property protection research. The authors and publishers who write curricula desire assurance that what they write and then subsequently disseminate electronically over the web or on CD/DVD will not be duplicated by teachers without proper permission (Waters, 2007). Ludlow and Duff (2007) found from their research that teachers are concerned with copyright permissions for digital or electronic media use in their classroom because "the public as a whole and educators as a specific group, have copied materials for many

years, including digital media, without having to address the issue of digital rights management" (p. 99). This teacher concern translated into a possible negative perception toward using technology-implemented electronic curricula when, according to Ludow and Duff, managing digital intellectual property and copyright issues became more complicated.

Ward and Riley (2008) found that a blended print and digital curricula approach is prudent; this was the same strategy Waters (2007) and Carlson (2005) espoused as the proper one going forward. Use of a blended print and digital curricula approach may increase in demand as newly-trained teachers come out of the system ready to teach. As Waters said, "One development helping to motivate print-and-paper publishers into moving their products into the digital age is a new generation of teachers who are quite at home with the technology" (p. 6). Teacher perceptions of being at home with technology, as Waters inferred, appears to have relevance to teacher willingness to make use of technology in the classroom, thus, creating demand for publishers to create digital curricula.

The advantages of using electronic teaching resources versus using standard printed texts seem to be many. Table 1 shows what Cavanaugh (2006) cited as advantages along with a related disadvantages/considerations column provided by the primary investigator to aid a balanced evaluation.

Table 1

Advantages and Disadvantages/Considerations in Using Electronic Curricula

Advantages[a]	Disadvantages/Considerations
Cost of instructional material	Lack of ownership of text
Search capability within all resources	Ease of search reduces discovery
Carrying many e-books without weight	Purchase of e-book/computer needed
Materials updateable without reprinting	Mistakes immediately available to all
Easy accessibility from anywhere	Internet may be filtered or unfiltered
Materials never go out of print	Risk of outdated information
Hyperlinks to other resources	Resources must be valid and useable
Whole libraries available at no cost	Copyrights must be in place
Foreign language text-to-speech	Proper pronunciation required
Maps, charts, graphs construction	Too much time spent creating charts
Music and video integrated	Useful tool versus distracting toy
Ongoing assessment and feedback	Student progresses at own pace

[a]Advantages list from *The digital reader: Using e-books in K–12 education* (1st ed.), by T. W. Cavanaugh, 2006, Eugene, OR: International Society for Technology in Education.

Bradshaw and Crutcher (2006) validated Cavanaugh's (2006) assertions in their study by examining preferences of electronic textbooks over traditional printed texts. Twice as many students in their study indicated a strong preference for the electronic text because the multimedia insertions seemed fun and had well done explanations built in,

and teachers noticed the electronic text maintained the attention of the class through humor.

Dillon's (2004) research indicated that 40,000 new books were created per year in the 1970s compared to 120,000 per year today in the United States and that the libraries of schools were having a difficult time keeping up with the purchase of these books because of budgetary constraints. The cost advantages of electronic books played a role in Tucker's (2008) research which recommended that magazine, newspaper and book publishers move toward a web-focused business model.

Research conducted by Dillon (2004), found in support of Tucker (2008) that the ability to use many free online libraries, purchase annual subscriptions to other libraries and explore Amazon.com for specific or the latest electronic books was growing. Dillon's findings indicated that books will continue to be created and used despite the many electronic alternatives, whereas Tucker found the migration toward electronic or digital books will increase in the future. The process for acquiring the basic electronic intellectual property must be easy to manage, according to research by Ludlow and Duff (2007), and be financially affordable with the desired technology features perceived to be attractive to teachers and schools (Sewall, 2005).

Basic technology infrastructure requirements for schools. The term *technology infrastructure* is jargon and is not perfectly defined by the Merriam-Webster dictionary. The definition of technology infrastructure according to the Information Technology Infrastructure Act (2003) is, "The basic facilities, services and installations needed for the functioning of information technology." Cavanaugh (2006) agreed with Lessen and Sorensen (2006) that for schools, this includes the full system of computers, supporting

equipment, software, connecting networks, wiring and power sources necessary to make use of applications and the Internet in the classroom.

Research conducted by McGrail (2007) found that other facilities adaptations such as classroom layout and shape, student and teacher desks and computer workstations affected the interaction and collaboration between students and teachers. One key finding in this study was that teachers needed help to strategically plan the physical environment of the classroom because the technology infrastructure provides the foundation for teachers and students to make use of computers, and the Internet and has an impact on the quality of the classroom learning environment. McGrail's conclusion to this research was that administrators and teachers should focus on "pedagogy before technology rather than technology before pedagogy" (p. 81), so that teachers have a constructive visualization and positive perception of technology in their classrooms.

Lessen and Sorensen (2006) studied two particular schools' actions in promoting technology integration and infrastructure improvements and four key teacher and administrative leadership actions were identified as results. The first leadership action identified was to make technology a priority among faculty through collaborative planning efforts while using and modeling technology usage in the school. Making technology a focal point within a school's mission or vision statement was found to be helpful for faculty and staff in terms of expectations for the future.

McGrail (2007) agreed with Lessen and Sorensen's (2006) second leadership action finding which focused on the advancement of technology infrastructure in terms of remodeling classrooms as necessary to facilitate easier technology usage for teachers and students. Depending on the school, this was found to include new learning labs with

plenty of computers, carts, servers, smartboards and wireless Internet. A major piece found to be left unbudgeted in technology infrastructure considerations, according to Lessen and Sorensen's research, was maintenance for computers, networks and software already in use by students and teachers. Maintenance, McGrail also found, is a necessary part of ongoing infrastructure support.

Fund-raising and grants were the third leadership action Lessen and Sorensen (2006) found in the study as necessary specifically for technology purchases and upgrades. Sharing resources among schools was found in the study to be an effective way to show teachers the impact of just how far technology investment in infrastructure can be spread within a school district.

Training and support for students, faculty and staff so that they easily learn, pilot and inculcate technology into the classroom is the leadership function cited as the fourth key action in Lessen and Sorensen's (2006) study. The four leadership activities identified may be helpful in technology infrastructure and integration activities aiming toward improving learning and teaching opportunities for students and teachers.

Obstacles to the establishment of e-learning in today's schools. In an effort to better understand difficulties in setting up classroom technology environments, McGrail (2007) conducted a study and found that teachers' practices follow their beliefs about technology in teaching. The study specifically targeted the usage of laptops in the classroom, but McGrail inferred that the research may be applicable to all forms of technology integration in the classroom. Complications found in moving desks around to be near electrical outlets caused other types of classroom seating arrangement issues (McGrail). Space on student desks became problematic when laptops were in use by

students and the abundance of cords on the floor caused safety concerns. McGrail found that because teachers in the study were hindered in moving about the classroom, teacher-to-student relationships changed, and therefore teachers' beliefs and perceptions about learning and teaching the subject with technology changed. McGrail's research showed that teachers' perceptions of physical classroom layout obstacles have an impact on the establishment of e-learning in schools but did not prescribe anything specific.

Sims (2008) studied another potential obstacle to establishing e-learning in classrooms which is whether fascination with technologies can lead educators away from focusing on effective learning. The rationale for this study came from questioning if current models of learning and education outcomes were still applicable in this era of communicating with technology. Sims found that "online learning and e-learning . . . has now reached, at least in developed countries, what might be seen as infrastructure status" (p. 156) but questions whether technology significantly improves learning. The mere replacement of traditional teaching practices with technological alternatives should not be the goal, but rather mixing formal and informal teaching styles to create another value-added layer of teaching through technology. Sims inferred that teaching is easier in classrooms made up of students with similar backgrounds, but these are no longer the norm, and that e-learning can make a difference in meeting learning diversity needs. Sims' research concluded by building on Dunn and Dunn's (1978) learning styles research and Gardner's (1983) multiple intelligences research recommending that technology and media preferences for students should be considered in teaching but not assumed based on teacher perceptions of what students want or need.

Technology's progression into schools has been slow and has not yet brought sweeping changes in learning for schools. Smolin and Lawless (2007) argued that school policy issues have thwarted the allocation of resources for preparation of teachers to help students reach the No Child Left Behind Act requirement for proficiency by the end of eighth grade. It was concluded that while teachers know they must be prepared to teach technology to students, teacher preparation needs have not been fully assessed and understood. In addition, students who may not have access to technologies outside of school present a potential obstacle if work cannot be entirely completed in class, according to Smolin and Lawless.

Teacher reluctance or deferral in the use of learning technologies was studied by Dillenbourg (2008). The research questioned whether the value of technology in education has been exaggerated and that a good reason to use technology in schools has not been effectively presented to teachers. From the research, Dillenbourg classified three issues hampering the establishment of e-learning in schools. The first issue was that learning technologies are no longer thought to be a panacea for education by teachers and the expected gains in efficiency have not been realized. The second issue was the transformational effect that computers and other media were supposed to have on teaching which has not yet materialized. It was found in the research that the quality of technology-based teaching varies from poorly done to very well done in the same ways as traditional teaching. As new technologies emerge, radical new predictions of teaching and learning improvement tend to be overstated. Dillenbourg cited this by finding that online video lectures are "more innovative from the logistic viewpoint than from the pedagogical viewpoint" (p.129). The third issue revolved around the perception that

teachers should wait to inculcate technology into the classroom because of the belief that tomorrow's funding will be better than today's levels of funding and support. From the research, Dillenbourg found that high levels of funding have supported technology projects in the past and had little impact on teaching and learning efficacy because the purchased technology was not directly used by teachers in the classroom. The three issues Dillenbourg found that were unproven myths were (a) learning technologies created effectiveness gains, (b) computers transformed teaching, and (c) more funding meant more results. Technology integration may have been delayed waiting on higher levels of funding which may or may not occur.

Massy and Zemsky (2004) agreed with Dillenbourg's findings that e-learning has not lived up to expectations of a revolution in teaching and learning. In addition, publishing companies have lost money attempting to create e-learning products and services causing return on investment losses. Besides unmet expectations and financial losses, Massy and Zemsky concluded that e-learning initiatives have not yet changed how teachers teach or what students expect technology to provide in terms of entertainment and interaction. Unrealistic technology expectations and hype were found to be obstacles to e-learning in schools.

Sewall (2005) studied educational publishers themselves as another potential barrier to e-learning becoming more prevalent in schools. Further, publishers tend to be self-protective, because legislators, school boards, state requirements, and adoption committees draw publishers in different content directions while they try to meet general school market demand. The publishers in Sewell's research said varying state adoption methods and differing state standards were the cause for protecting their curricula and

textbooks through trade associations, the expense for which actually increases costs to schools. Sewall concluded that the number of educational publishers was diminishing due to consolidation thus causing fewer curricula choices. Massey and Zemsky's (2004) findings agreed with Sewell in that publishers attempted to protect high revenue streams from printed texts because e-delivery of curricula can be expensive to develop and may never break even.

Internet filtering practices can be perceived to be an obstacle for teachers' use of technology in the classroom. Sutton (2006) found that Internet filtering is affected by teacher beliefs and/or bias based on perceptions of controversial or harmful material. Equating the use of an Internet filter to buying an encyclopedia and then immediately cutting out some pages, Sutton found filtering practices egregious to freedom in education. Sutton's research focused on testing student work results as they use filtered Internet access and on testing student intellectual freedom issues while they work. The findings from this study showed that excessive and inconsistent Internet filtering caused student and teacher annoyances. This led to teachers and students in the study working around the filters in various ways to access sites they deemed pertinent. Sutton concluded that since filters irritated students, teachers, and librarians in this research, analysis should be done to determine if filters are necessary and if so, at what grade levels. The need for Internet filters and teachers' concerns about harmful material reaching the eyes of students may continue to be an obstacle for technology usage in classrooms.

A more thorough list of obstacles to the integration of ICT's in classrooms is identified in Table 2.

Table 2

Obstacles to Integrating ICT in the Classroom

Conservative nature and traditional culture of schooling and classroom instruction
Teacher resistance to changing traditional teaching approaches
Lack of time for teachers to learn and integrate technologies in teaching
Lack of technology infrastructure including computers per student
Lack of specific technologies addressing specific teacher and student needs
Lack of ongoing support
Lack of release time and incentives for teachers
Incompatibility of traditional teaching with constructivist approach of ICT
Need for teachers to unlearn traditional teaching beliefs and practices
Need to prepare teachers by training to integrate technology in classrooms
Need for policy, curriculum and assessment reform

Note. From *Preparing teachers to teach with technology*, by C. Vrasidas and G. Glass, 2005, Greenwich CT: Information Age Publishers, p. 8.

Building on the research conducted by Vrasidas and Glass (2005) in which obstacles to integrating information and communications technologies were identified, Hedberg (2006) studied technology-based teaching strategies which most enable student engagement and motivation and make use of higher order thinking skills. Hedberg's findings added one teacher perception element to the list of obstacles. This element was the rapidly changing educational technology involved in e-learning and its potential to

cause challenges and confidence issues for teachers, which may then further cause reluctance to make full use of technology in the classroom (Hedberg).

In summary fashion, Hew and Brush (2007) also identified obstacles to technology integration and condensed the findings into six categories: (a) resources, (b) institutional issues such as leadership, (c) course subject culture, practices and expectations (d) teacher attitudes and beliefs, (e) knowledge and skills and (f) coverage of material for assessment. Research indicates that the obstacles to the usage of electronic curricula in classrooms are many, and as Hedberg (2006) found, the solution is not just a matter of providing access to technology for teachers, but also providing time for collaboration, providing opportunities to gain experience in the usage of technology and providing ongoing technology support for teachers.

Theoretical Impact of Teachers' Beliefs on Their Actions

Vrasidas and Glass (2005) indicated in Table 2 the need for teachers to unlearn some traditional teaching beliefs and practices in order to enable positive perceptions of integrating technology in the classroom. Beliefs can range from predominant to marginal, can be difficult to express and can affect other beliefs (Leatham, 2007). Research conducted by Wenglinsky (2005) found in complementary fashion that important influences on whether students use computers in the classroom are teacher beliefs about how technology fits into teaching philosophy.

Errington (2004) studied flexible learning delivery, which means making courses available more places to more students, delivered in more ways. Errington found that what teachers believe impacts their teaching choices and envelops "a much broader range of beliefs, such as views about learners and learning, perceptions of worthwhile

knowledge, and the organization of learning" (p. 40). Errington's conclusion was that positive teacher attitudes and beliefs are necessary to foster innovation and influence colleagues to accept change. Errington found that publishers can facilitate positive teacher perceptions of innovation, such as electronic curricula, by helping teachers explore digital options, identify and rectify concerns and fears and identify training resources and support. Through this positive experience, teachers can then better evaluate and align their teaching beliefs with improved perceptions of an innovation such as pursuing online educational content (Errington).

Teacher beliefs or perceptions research mentions the word *constructivism.* As Chen (2008) said, the basis and background for commonly held teacher beliefs is constructivism. Constructivism theory, therefore, requires a definition in order to understand how teacher beliefs are affected by it. Constructivism education concepts build on the influences of Dewey's learner-centered education theory, Piaget's cognitive theory and Vygotsky's related social theory (Henson, 2003). According to Chen, constructivism allows students to investigate for themselves practical, authentic questions, collaborate on, interpret and defend potential answers while gaining experience in learning how to learn. Cortese (2007) added that "a key component in constructivism is [personal] meaning making" (p. 23).

With the definition of constructivism in mind, Chen (2008) further researched the relationship between teachers' pedagogical beliefs and technology integration decisions made by teachers. The purposes of Chen's study were to investigate teachers' pedagogical beliefs in relation to their technology integration practices and to identify and examine reasons for any differences between beliefs and practices. The results of

Chen's study indicated conflict between general teacher agreement with constructivist teaching theory and the contradictory finding that technology was only used in a classroom setting to teach content but not to allow students to explore learning on an individual basis to solve real-world problems. This means teachers' constructivist beliefs in this study were disjointed from their actual teaching-with-technology practices.

When the teachers in the study were asked why their practice differed from their beliefs, they cited lack of preparation time, lack of support for computer downtime and lack of computer lab availability as reasons. These external issues caused negative teacher perceptions of wasted class time and futility in trying to schedule a computer lab. In addition to the issues already mentioned, parents of some students in the study complained to administration about teachers spending valuable time to fix computers in class. The perceived lack of support by administration and parents, Chen (2008) found, caused teachers to consider resuming standard lectures for content coverage purposes without using technology. Chen concluded that providing teachers with examples of how to effectively implement new technology in teaching would assist in resolving conflict between teachers' pedagogical beliefs and associated perceptions of educational technology constraints. Chen also concluded that parents and administration must fully support technology-implemented educational practices for it ever to become transformational.

Ertmer (2005) found that teacher beliefs about how and when to use technology are affected by past experiences which, "have the potential to color perceptions of subsequent events . . . . Furthermore, because of their highly personal nature; beliefs are unlikely to be affected by persuasion" (p. 29). New information about technology uses or

electronic curricula in the classroom may actually be adjusted by teachers to support a bias based on their prior experiences. Ertmer concluded that since beliefs are infrequently adjusted, it may appear that teachers are resistant to change. Since few teachers have yet seen the best uses of technology in the classroom, there may be opportunity to build positive perceptions without having to change teacher perceptions and beliefs about how to use technology to improve student learning (Ertmer).

Gritter's (2005) research for the Maine Learning Technology Initiative examined whether predictions could be made about technology use in the classroom from surveying teachers about their teaching philosophy and beliefs. Gritter simultaneously researched whether teachers' levels of computer experience, teaching experience and degree level affect the relationship between teachers' teaching philosophy and their usage of technology in the classroom. The findings indicated a significant relationship between teachers with prior computer experience and the potential for computer usage in the classroom. Teaching experience and degree level, however, were not found to be good predictors of technology/computer usage by teachers in the classroom. Gritter concluded from these findings that teachers need support to gain experience in using technology/computers into the classroom and should be shown best practices from other schools as a starting point.

Bain and McNaught (2006) summarized teacher beliefs versus practices in their research and defined a range of belief versus practice patterns useful for understanding the relationship. First, on one end of the range is the teacher who is exemplified by concern with content rather than process. Second in the range is the teacher who focuses on experiential case study and constructivist methods. Third in the continuum is the

teacher who relies on intrinsic motivation and providing feedback to students. Fourth is the teacher described as a learning facilitator, who allows work to be student-managed, but with little emphasis on collaboration. Last is the teacher who negotiates learning processes with students, is facilitative and provides little feedback. The point of describing these belief/practice patterns in summary is to demonstrate that these "dichotomous descriptions appear to be insufficient if we want to understand how teachers interpret the possibilities of using technology in their teaching and then make decisions about how they might actually use technology" (Bain & McNaught, 2006, p. 111).

General Teachers' Perceptions of Using Technology in the Classroom

Armstrong (1961) dissected perceptions versus beliefs epistemology and discussed how perception is really nothing more than acquiring knowledge through the five human senses. Armstrong further discussed how unconscious perception based on what has been heard can work its way into judgments people make about issues or things but that are not based on fact. Armstrong said, "Not to look for grounds for our beliefs, but only for causes" (p. 93).

Pasco and Adcock (2007) discussed student and teacher beliefs in terms of personal interpretation. Teaching from technology implemented electronic curricula in the classroom provides a way for students to learn material by searching for and then discovering relevant information and applying the student's own personal interpretation of the data and then summarizing and synthesizing what was learned. The fact that a school is wired for technology or that a teacher has had some training in using technology does not mean electronic curricula usage will increase. Teachers as a group do not yet

believe and are not yet convinced that technology assists in the learning process and should be applied across the board (Pasco & Adcock).

Research conducted by Wright and Wilson (2007) for the Master Technology Teacher initiative at the University of Alabama considered that pre-service teachers' perceptions are important to the future of technology integration in schools. The rationale for the study came from the growing expectation that teachers should make use of technology in student learning, and in order for this to happen, teachers needed to have positive perceptions of technology integration. In order to provide support for the growing technology-in-teaching expectation, a collaborative process was created to place pre-service teachers with experienced technology teachers in order to demonstrate the uses of technology in the classroom and to devise new ways for the pre-service teachers to make use of available technology. Studying the observations, reflections and perceptions of the teachers involved in this study over five years revealed a positive impact on both the pre-service and in-service teachers as shown in Table 3.

Wright and Wilson (2007) concluded from this research that teacher perceptions of teaching with technology were improved because of the collaborative, non-threatening nature behind it. The teachers in this study believed it had been an opportunity for them to enhance their technology integration skills and they were enthusiastic about seeking creative ways to incorporate learning with technology into their lesson plans. One anecdotal piece of information worth mentioning from this study is that a teacher made the statement that the new technology knowledge and understanding prevented feelings of being left behind in teaching practices. Other teachers in the area who heard about the study inquired as to how to get involved. Wright and Wilson found that collaborative

training is a key to improving teachers' perceptions of integrating technology in the classroom.

Table 3

Teacher Perceptions of Using Technology in the Classroom

Modeling the uses of technology in classrooms increased knowledge and confidence
Collaboration between pre-service and in-service teachers reduced fear and hesitancy
In-service teachers perceived technology professional development as threatening
Teachers' confidence increased allowing them to become technology teacher trainers
Teachers felt knowledgable about numerous ways to incorporate technology in teaching
Teachers believed they were better teachers after collaborative learning about technology
Teachers perceived they incorporated more technology into lesson plans after study

Note. From *A partnership of educators to promote technology integration: Designing a master technology leader program*, by V.H. Wright and E.K. Wilson, 2007, Education, 128(1), pp. 80-86.

Teacher centeredness versus student centeredness was the focus of a study of preservice teachers' perceptions of the teacher's role in technology enhanced classrooms. Wang's (2002) research built on the belief that teacher roles change when using technology in the classroom. Finding contrary results in this research, pre-service teachers believed that teaching with electronic curricula should be both student and teacher-centered. The teachers in this study did not support the commonly held belief that technology-enhanced learning automatically means that it is more student focused.

Possible explanations for this include uncertainty in teacher role definition, the fact that the schools attended by the teachers in this study were traditional in style and general resistance to believing that teachers are no longer the center of the classroom. McWilliam (2005) agreed and built on Wang's findings by describing the perception that teachers are "neither sage-on-the-stage nor guide-on-the-side but [rather] meddler-in-the-middle" (p. 11).

Leatham (2007) focused on mathematics pre-service teachers' beliefs about availability, uses and importance of teaching with technology in the classroom. Leatham found that collecting data on teachers' actions in teaching with technology was more difficult than gathering data on what *they say* they will do with technology.

Some of the teachers in Leatham's (2007) study were surprised to realize they had used technology contrary to their stated perceptions and beliefs before students understood the concepts (or pre-mastery) but still did not change their overall presuppositions about when technology should be used, how frequently or the activities best suited for technological assistance. Teachers in this study did not want to have technology used in their classrooms for problem calculation only nor did they want technology to be perceived as the principal manner for teaching mathematics (Leatham).

Table 4

Mathematics Teachers' Perceptions of Teaching with Technology

Technology must help students maximize learning and move on to higher concepts
Some things are better taught with paper and pencil, or activities, or computers
Technology is not always the best pedagogical choice
Should not be substituted for understanding the content
Would not want to teach higher math without electronic tools
Electronic math curriculum provided bad experience when used for calculations only
Electronic curricula must align homework and assessment
Technology must be a natural part of curricula, not forced
Student and teacher technology access must be constant and used frequently
Teachers choose use of technology when only periodically available
Students choose use of technology when constantly available
Perception that technology must only be used post-mastery in math

Note. From *Pre-service secondary mathematics teachers' beliefs about the nature of technology in the classroom,* by K.R. Leatham, 2007, Canadian Journal of Science, Mathematics and Technology Education, 183(25), pp. 184-207.

Using technology to support problem-based learning was studied by Blackbourn et al. (2008) in an effort to gain teacher perceptions as to whether wireless technology and the usage of computers enhanced instruction. The teachers' summarized perspectives in this study provided the viewpoint that the technology used was an improvement for instruction. The teachers found that the technology applications and Internet access used

in the study allowed for immediate research of student questions and in turn provided more timely answers. Teacher perceptions of technology applications for classrooms was viewed as having potential to increase participation by reserved or fearful students in class (Blackbourn et al.).

Levin and Wadmany (2008) focused on what they called the "teachers' voice" (p. 234) to gain an understanding of teacher views and beliefs impacting their usage of technology in the classroom. From an electronic curricula perspective, one primary perception was that technology uses were not aligned with lessons and software was not integrated with textbooks. The views of teachers on these matters must be better understood and taken into consideration in order to advance the cause of technology integration in classrooms. This three-year study examined teacher opinions relative to aspects that improve or hinder the use of technology based on their experience and perceptions. The findings from this research showed that teachers' perceptions of the need for encouragement and support from peers and administration diminished as the teachers' own learning and technology experience increased with their students. Levin and Wadmany (2008) concluded that teacher perceptions of technology usage in classrooms result from experiences and interactions with other people and are not simply personal opinions.

Self-Examination and the Changing Mindset of Teachers

Teachers who conduct self-reviews of teaching practices as a norm will reflect on past assumptions and change opinions and perceptions based on experience. Dawson (2006) studied this concept and stated that experience and reflective activity cause professional growth in teachers. In Dawson's four year study of technology integration

field experiences involving both pre-service and in-service teachers, weekly reflections were collected and examined and four teacher concerns emerged: logistics, teaching-with-technology, students, and in-service partners.

Logistics issues such as downtime were documented but not solved due to general teacher frustration. Teaching-with-technology issues, such as, teachers focusing on the technology being used rather than the curriculum content, were noticed by the researcher's observations but were not recognized in teachers' reflections. Teacher reflections about students indicated they recognize that technology is not a cure-all for every student's learning needs. Perceptions of in-service teachers were mostly positive but included mention of resistance to technology use because of fear. Data analysis from the reflections indicated teachers focused on standard logistics and their own thinking rather than deeper concepts of collaborative actions and technology's impact on student learning.

The more detailed inquiry-based portion of the field experience in Dawson's (2006) research used the process of having teachers create a reflective question, gather data relative to the question, perform analysis based on the learning context and then draw conclusions. By comparison to other reflections examined in the study, more detailed writing occurred in this process and caused the teachers to acquire different perceptions about the need to target collaboration and to move toward integrating technology into the classroom. "Teacher inquiries provide rich research contexts for education technologists to explore prospective teachers' experiences and thoughts as new technology users" (Dawson, p. 287).

In another study Dawson and Dana (2007) questioned whether the process of teacher inquiry assists in teacher mindset changes associated with teaching with technology. The findings in this study showed that teachers who originally believed that there might be only one best technology method for teaching changed personal beliefs after the detailed inquiry process caused new and varied approaches to be explored. This resulted in a shift away from the belief in teaching every student in the same way toward the belief in using differentiated methods of teaching with technology. Dawson and Dana (2007) agreed with Ertmer's (2005) previous conclusion that teachers will need to shift beliefs in order to see growth in technology integration in schools.

Churchill (2006) conducted another study to determine how teachers' private theories change through self-examination and reflection. Participants were asked to document their beliefs about technology and electronic curricula usage in the classroom at the beginning of the study. Beliefs that were documented primarily revolved around traditional views of teacher-driven instruction on content and concluded that any use of technology should be used to continue what has already been proven in the classroom. Teacher participants were then asked to design a prototype electronic curricula teaching model and reflect again on what they learned by creating educational technology tools. At the beginning of the study, teachers believed that electronic curricula or technology-based learning was made up of digital content and quizzes as opposed to learner-centered tools guiding students to scaffold knowledge and to understand a subject. Churchill found that teachers' final reflections in the study indicated that changes had emerged in opinions of the purposes of using technology in the classroom and that the teachers had become more focused on student-centered learning practices.

Helping teachers to consider changing personal beliefs and perceptions of innovations in teaching was the subject of a study conducted by Hughes (2005) to determine if providing experience in teaching with technology will change practices. Teachers perceived that minimal subject-matter training to incorporate technology into specific courses had been provided to teachers, and one assumption in this study was that if teachers learned technology skills separate from the classes they taught, they would be less likely to incorporate technology-based learning in the classroom. "Technology-supported pedagogy may be captured through three categories: (a) technology functioning as a replacement, (b) amplification, or (c) transformation" (Hughes, p. 281).

Teacher case studies were used in this research where technology was incorporated into reading, writing and research courses. Findings from this research indicated that movement past just replacing instruction with presentation software tools toward amplification or transformation required more time for teachers to experiment and reflect on the pedagogical changes. As an example of amplification, e-mail was used in one case to discuss writing assignments that inspired students to keep working due to the fast feedback. Transformational change in practice was exemplified by one teacher who created an electronic field trip for the class to take a journey through elements of history class. Hughes (2005) concluded that informal guidance for teachers boosted teacher confidence about using technology and that ". . . content-focused learning experiences yielded content-based technology integration in the classroom" (p. 295). Providing alternatives for technology integration was useful when targeting a specific course where the teacher had expertise. Hughes' research indicated specific technology alternatives

provided to teachers for specific courses may cause teachers to reflect on and change teaching practices.

In a two-year research project Bird and Rosaen (2005) examined whether providing teacher opportunities to incorporate technology into the classroom would lead to professional conversations, reflections and changes in perceptions regarding the use of technology in teaching. Teachers in the study were required to use and appraise one piece of electronic curricula for math or language arts. Beginning and end of study assessments and interviews were used to indicate any differences in teacher mindset. Pre-study assessments revealed a wide range of teacher perceptions from opposition to technology in learning, to feelings of helplessness, to eagerness to use technology in the classroom. The findings at the end of the study revealed that the majority of the teachers had positive perceptions of the education technology tools they used and wanted to learn more to answer questions and concerns arising in class. Some of the findings indicated that in-class email improved instruction and motivated students and teachers to work more, which reduced teacher workload later. Teachers' self-reflections during interviews showed that the study to review and assess a piece of educational software caused the teachers to identify areas where personal perceptions and thinking changed. Bird and Rosaen concluded by saying that integral to the research was requiring experience of using educational technology but allowing teachers to have options from which they could select. This precluded the perception that teaching with technology in the classroom is a distraction.

Also researching teacher beliefs and technology practices, Ertmer (2005) found that teachers may just need more time, a period of years perhaps to grow in experience of

using technology in the classroom to its fullest potential. The supposition is that using technology over time will automatically bring about teacher changes in beliefs about how technology should be used from simply searching the Internet and typing papers, toward complex spreadsheets, presentations, multi-media and other interactive higher-level teaching methods. "Ultimately, the decision regarding whether and how to use technology for instruction rests on the shoulders of classroom teachers" (Ertmer, p. 27).

Levin and Wadmany (2006) built upon Ertmer's (2005) and Hughes' (2005) research by conducting a three-year study on changes in teachers' perceptions regarding technology-based learning in classrooms. For this study, they set up activities as opportunities for teachers to use technology in inquiry-based learning, learn in teams, provide activities for students in and out of school and then reflect on personal accomplishments. Using open-ended surveys and interviews and analyzing similarities and differences in teacher reflections at year one and again at year three, changes in teachers' views of technology in learning were evident. Year one teacher perceptions indicated that computer technology was difficult to use, should only be used for practice or information-gathering and is at best a learning aid. Year three teacher perceptions showed expanded views of technology in education as enriching instruction, becoming a partner in learning and teaching and having the effect of challenging thinking.

> Finally, the study shows that we cannot, and should not, simply rely on teachers' explicit statements regarding their beliefs or practices. In a period of transition, with teachers facing new educational ideologies and goals, they may not be aware of their own emergent [or changing] beliefs. (Levin & Wadmany, 2006, p. 174).

Factors Teachers Examine for Classroom Technology Usage

There is a need to know the factors influencing teachers' usage of classroom technology, and supporting this statement, Yuen and Ma (2002) studied gender differences as one of those factors. Using a self assessment survey as the basis for the research, the findings showed that men regarded perceived ease of use as prerequisite to technology usefulness, but women emphasized that perceived ease of use was the prerequisite for their intention to use computer technology in the classroom. These findings suggested that to enable teachers to use technology in the classroom, it may be required to help them develop a positive perception of the ease in using computers and other related technology and software. Attention to teacher perceptions of technology-implemented electronic curricula is an area with room for research because without positive perceptions, teacher willingness to use technology in the classroom may not progress. More factors teachers examine for technology integration into the classroom will be discussed in the following sections such as access, training, putting the learner in charge, variety, speed, current and quality materials, feedback, assessment and e-learning for students with disabilities.

Availability, access and training. Franklin (2008) reviewed over 100 elementary school teachers during the first five years of tenure and found that availability and access to information and communications technology was not enough for them to feel prepared to integrate educational technology into daily classroom use. Franklin sought to understand if teacher training is crucial for computers and technology to be used in the classroom and what other factors teachers perceive would be important. Findings indicated four factors that teachers perceive to be important to technology integration in

the classroom. Availability and access to in-class computers, projectors, Internet and smartboards was one of the four because teachers sought out these needs and had to physically move the devices themselves. Next was preparation and training proving its importance to teachers and proving Franklin's hypothesis. Franklin found specifically that teachers who believed they were adequately trained were more likely to incorporate student work involving the usage of technology.

Possible subjects to assist in teachers' positive perceptions of adequate training are outlined as National Education Technology Standards for teacher preparation: "(1) facilitate and inspire student learning and creativity, (2) design and develop digital-age learning experiences and assessments, (3) model digital-age work and learning, (4) promote and model digital citizenship and responsibility and (5) engage in professional growth and leadership" (International Society For Technology In Education, 2008, ¶ 1).

The third of the four factors Franklin (2008) found was leadership support in the school at the principal level. Administration assisted teachers in finding the computers, smartboards and software, but also and more importantly they "help[ed] create a climate in which experimentation with technology is looked on with favor and given encouragement" (Franklin, 2008, p. 55). Fourth among the factors were the teacher perceptions in this study that release time was important to teachers to figure out ways to incorporate meaningful usage of technology into curriculum (Franklin). Fitzpatrick (2007) agreed and stated, "Even when an online course is not written specifically to provide professional development on integrating technology into the classroom, such as with an algebra refresher course, it still [meaningfully] advances the goal of increasing the use of technology" (p. 39).

Knowing students' learning styles and motivation. Electronic curricula can be used online, over the Internet or via CD and DVD. Electronic curricula publishers are faced with students' differing cultures, backgrounds and learning styles which affect motivation according to case studies conducted by Sims and Stork (2007). Rogers, Graham, and Mayes (2007) agreed with Sims and Stork's research that designers of electronic curricula must take into account the cultural differences of students and teachers because it assists in better understanding and therefore better serving learning and teaching needs. Understanding the cultures of students however does not mean electronic curricula providers should make any assumptions or prescriptions for students' learning. Rather, publishers should provide choices for students to select from, with teachers' assistance, so that electronic curricula best suits the teachers' objectives and students' learning preferences.

Hall (2008) agreed with Sims and Stork (2007) and Rogers et al., (2007) in his article on e-learning for multiple generations, where he stated that electronic curricula designers should provide "different options for different learners . . . . And sometimes it means building separate courses for the different learning audiences" (Target training for different preferences section, ¶1). According to Hall, electronic curricula providers will need to assure teachers that students' attention will be maintained by using contemporary technology elements of multi-media and that students will have a say in the tools they can select to learn material.

Learning styles and motivation were studied by Keller (2008), building on previous research from the same year in which four categories of learning motivation emerged: attention, relevance, confidence and satisfaction. Keller added a fifth category,

volition, to his list of four, naming them "first principles of learning motivation" (p. 176). These five principles were found to summarize motivational characteristics and practices. The first one, attention, means capturing the focus and participation of students, as teachers require, by using multi-media or stimulating curiosity. Relevance is the second principle meaning that learning must be pertinent to students' and teachers' objectives. Relevance also means authentic learning, which is a constructivist concept (Chen, 2008), and means learning that is applicable to genuine needs based in the real world. Confidence, the third principle, is the part of motivation teachers examine when students feel they can succeed in coursework, whether textbook-based or electronically delivered. Teachers seek to increase positive experiences for students so that personal initiative and skills are perceived to be the reason for success rather than any other factors. Self-efficacy research by Schunk (2003) supported confidence as an important motivational concept area, finding that students who jointly set their learning goals with teachers and assess personal performance are motivated by the feedback this process produces.

The fourth principle, satisfaction, is what occurs, according to Keller (2008), when students have positive perceptions of learning experiences which then bring about further desire to learn. Volition, Keller's fifth principle, is the concept of student persistence to stay with learning objectives. Anything that potentially could sidetrack a student would have to square off with one's sense of volition in staying on task. These five principles Keller's research defined indicate what teachers want to improve so that students are motivated to continue learning. Canton (2007) also supported this important motivational factor by saying that "students tend to perform better in learning environments that they are comfortable with, enjoy and have confidence in" (p. 53).

One limitation of this study is that no procedures were identified to increase motivation or improve teacher perceptions as they use electronic curricula materials, and teachers become wary of impediments to learning which negatively affected student attention or confidence or caused feelings of helplessness (Keller, 2008).

Ability to put the learner in charge. Building on constructivist concepts, Canton (2007) examined the area of programmed instruction that deals with allowing the learner to control the speed of progression through coursework. The concept of learner-controlled movement is an integral component of electronic curricula and Canton focused on the aspect of testing to see if a difference existed in the performance of students who actively advance their own electronic curricula versus those who passively receive identical material from a teacher. The results of Canton's work were not conclusive but showed that students will move toward the learning process that they feel most relaxed in using. Santos and Powell (2001) supported this finding and labeled these as "push and pull learning strategies" (p. 47), where students either have no influence on their own learning, meaning knowledge is pushed onto them, or where students pull information and learning toward them at their own pace. Whether push or pull learning is used is a matter of teaching style and the roles teachers allow students to play in personal learning.

Adcock (2008) collected data on how teaching styles and roles have changed because of technology usage in the classroom. Adcock observed classroom usage of two-way audio-visual conferencing between students and teachers for coursework and then gathered reflection reports as part of student portfolios. Subjects in the study also researched subject matter and wrote reflections placing them on discussion boards for others to write and respond to peers' perceptions. Adcock found in this study that in

technology-enhanced classrooms, as teachers allowed students to be in charge of learning, teachers performed more the role of moderator of learning and were not in charge or the focal point of the classroom because teachers learned along with students as both grew in technology-implemented electronic curricula experience.

Variety, speed and up-to-date materials. Among the factors teachers examine for electronic curricula usage are whether proposed educational materials are current, have a variety of possible teaching approaches and are of adequate speed in delivery and response. Hennessy, Ruthven, and Brindley (2005) conducted focus groups supporting these considerations among secondary teachers to examine teacher perspectives on integrating technology into teaching. Findings from this research emerged in themes which overall showed negative perceptions by teachers of existing electronic curricula. The themes teachers perceived to be important in this study were speed and efficiency, immediate feedback promoting self-assessment, variety to sustain ongoing interest and fun, student autonomy, building confidence through ease of self-correction, current and wide ranging learning resources and the ability to computerize monotonous calculations. Speed, variety and current electronic materials "improve pupil motivation, the quality of work and facilitate learning" (Hennessy et al., 2005, p. 183). Dror (2008) also agreed that technology speed assisted in "pacing the learning" as students manage their way through electronic curricula (p. 217).

Quality, not quantity of computer use. Another factor teachers reviewed for classroom technology usage was the quality of the proposed electronic curricula as judged by the long-term retention of knowledge by students (Dror, 2008). Using technology in practical ways to enhance learning is acceptable to teachers as long as the

learner is the focus and not the electronic curricula itself. Dror outlined that technology in learning should only be used if it aids in focusing students on the important material or big ideas while leaving out other unimportant material. It is the quality of the material presented for learning that is important to teachers, and electronic curricula must be customized by each student to take full advantage of the knowledge taken away, how long it is remembered and how it is used.

It is not technology itself that improves learning so much as the critical junctures when it simplifies, summarizes and surpasses learning objectives for students (Dror, 2008). If technology-enhanced learning can "promote the three C's of learning: control, challenge and commitment" (Dror, 2008, p. 219), then it is worthwhile for use in the classroom. For example, gaming technology used in learning is fun for students because of its challenging interactive nature, and it avoids presenting information in boring ways, which increases student commitment to use it. The three C's can become a checklist for teachers while considering the usage of electronic curricula in the classroom. Control, challenge and commitment enhancement through technology is the goal and not simply to change material from textbooks into digital lectures (Dror). Wenglinsky's (2005) research previously found that "it was not the quantity but the quality of computer use that makes a difference to student achievement" (p. 82).

Easy to access library. Stucker (2005) stated, "The library must serve students 24 hours a day. This learning landscape should meet different students' needs as well as focus on the three R's: rigor–standards and expectations; relevance–real world connections; and relationships–collaboration" (p. 9). While students today understand how to log on to the Internet and search for raw data, they do not understand how to

discern between good data and bad data. Stucker suggested that media specialists, librarians and teachers should work together on assisting students in proper online library research as part of the electronic curricula experience.

Starkman (2007) asserted that today's librarian teachers go beyond managing books when they meet with teachers to show them how to make use of technology in the classroom and when they help students using technology to do research. Starkman agreed with Stucker (2005) in finding it necessary to teach students to be aware that not all data retrieved from the Internet is useful or valid and that the librarian's role is finding good information, regardless of the technology involved.

Research was conducted by Haglund and Olsson (2008) to examine how young researchers use the tools available to them to research information. The study showed that the Google search engine is a starting point and that the students in the study searched by experimentation rather than a defined set of parameters. The students were confident because of technology and did not need assistance from library staff. Findings indicated the librarians were not nearby and the students in the study were unaware of how the librarian could help them further. These case studies concluded that students must be able to use technology in library searches easily; the results must be of high quality and be individualized for the electronic curricula work assigned. They further concluded that librarian teachers must "change the perception that libraries and library services are complicated, while other sources are easy to use" (Haglund & Olsson, p. 57).

Analyzing the growth of electronic curricula and the need for online library research, Maina and Shaffer (2006) studied the satisfaction level and research abilities of students in online research activities. The rationale for the study was that teachers may be

concerned that students will be challenged in gaining access to valid information in online libraries and may become frustrated in using technology-implemented electronic curricula. Distance learners may be impacted to a higher degree. The study found that providing a course in research methods resulted in high levels of satisfaction in the ease of access and ability to finish assignments. While this study focused on student perceptions of satisfaction levels, the primary conclusions supported teachers' needs to provide practical resources and assistance to complete assignments successfully. According to Maina and Shaffer, the best way to proceed was for teachers to continue to consider digital library access as a key factor in technology usage and to partner with librarians to optimize the processes and learning for students.

Feedback and assessment. The Association to Advance Collegiate Schools of Business (2007) stated, "Expanded assessment capabilities, more customizable courses, more interactive content. These are the factors that digitally minded faculty are looking for in e-learning . . ." (p. 56). Because assessment can influence teaching methods, Boardman (2007) researched the impact of using digital technologies as a means to potentially improve the efficacy of assessment practices. The study examined teacher perceptions of using digital video with sound as a means of documenting improvement in student learning. The findings from this study showed that because of the instant feedback, the recorded video encouraged reflection by the students and the teachers on what was learned and how it was taught. The video provided detail substantiation on environmental factors such as classroom space, student problem solving and teaching methods without a need to translate anything.

Limitations of the Boardman (2007) study were evident where movement in the classroom caused issues in tracking the students with the camera. Teacher perceptions of the assessment study were positive but it required teachers to be interested in using video for assessment purposes. The teachers in the study believed that using technology in assessment was superior to manual journaling practices in a group setting because of the ability to come back to review the video repeatedly. As an element of electronic assessment, having the actual recorded words of students and teachers has proven to be important to teachers in the study for accountability in providing the authentic circumstances in which assessment data was gathered. Teachers also found the digital technology useful to share with parents when needed. Teacher perceptions of the digital assessment process improved teacher confidence in the data collected as proof of student learning (Boardman).

Another manner of assessment teachers have examined as a factor for electronic curricula is digital portfolios, which started in the business sector but have been a growing practice in education. Ali (2008) investigated the usage of portfolios, which has become easier through technology in both creation and archival. Students in the study prepared portfolios over years of courses, and teachers prepared rubrics in order to evaluate the work. The primary finding in this study was that students need more experience in creating digital portfolios as a part of electronic curricula along with more understanding of the associated rubrics. Teachers in the studies perceived that the appropriate place for the digital portfolios to be created was at the end of the process in the final courses. This did not allow for documents to be gathered over time to show growth and learning improvement (Ali).

Ongoing assessment as a factor teachers examine for technology use in the classroom could be satisfied by using multiple means such as personal response systems known as clickers, by effectively designed online quizzes, through surveys or through the use of email, student chat or wikis where fellow students and teachers can interact privately on student work and learning processes (Tuttle, 2008).

E-learning for students with disabilities. According to Evans and Douglas (2008), today's electronic curricula offer opportunities for disabled students to learn and communicate in ways that were formerly unavailable. This study focused on whether e-learning was more difficult for the blind or for the sighted. Online learning tasks were given to 10 blind and 10 sighted students. The blind students, even with the use of screen readers, took up to three times longer than the sighted students to access their learning materials. It was not possible to tell the difference between the actual work required to do the assignment and just navigating around online for any of the participants. In addition, the blind participants did not always want to follow the screen reader in order but wanted to jump around based on learning preference. Conclusions from this research indicated that electronic curricula providers will need to consider short-cut navigation keys to speed up work, improve and test links between data points and improve mnemonic tactics and repeat them several times in the learning process (Evans & Douglas).

Rhodes and Milby (2007) pointed out that "students with special needs still lag behind others and therefore remain a significant concern for teachers and administrators" (p. 255). Through e-books as an element of electronic curricula, students can receive differentiated instruction in sound and text and can direct their learning and build

confidence in their work progress. Embedded scaffolds are a factor for teachers to consider in electronic books which allow flexibility and support for students.

Mitchem, Kight, Fitzgerald, Koury, and Boonseng (2007) investigated the usability and perceived effectiveness of assistive technology tools for students with learning disabilities and emotional and behavioral disorders. Participants in the study used learning software while teachers coached, monitored and assessed students moving them forward based on individual needs. At IEP meetings, students completed a self-assessment and planning tool, reviewing their strengths and plotting out next learning actions. Interviews were conducted and results indicated positive reactions to the electronic learning technology by students and teachers because of the ability for students to self-record, assess and plan learning objectives. Students indicated they preferred that teachers email comments rather than being required to speak to the teacher at the front of the room where peers can see them asking for or receiving special education assistance. Teachers perceived the digital learning tools positively because the students were motivated and IEP students were proactively participating in their own planning for success (Mitchem et al.).

Skylar, Higgins, and Boone (2007) stated that the Internet allows students to seek out massive amounts of information but leaves them to sort out good from bad, valid from invalid. Teachers are interested in examining classroom curricula technology that has been designed to incorporate advanced organizers, which define the learning steps required for students and predefined hypertext study guides, providing structure for both general and special education students.

In a related study by Boon, Burke, Fore, and Spencer (2006), the impact of software-based learning organizers compared to textbook instruction was examined using pre-test/post-test tools for general and special education students. The results of this research indicated that both the general and special education students who used the digital organizers achieved more than the textbook-based students. This research also indicated that teachers should consider electronic curricula whose software provides solid organizers for material to be learned because they have the capability of improving the academic performance of all students.

Specific Classroom Technology Integration Strategies and/or Models

The literature review to this point has provided the general background and foundation for the next phase of further research into specific strategies and models that may be recommended as a planning starting point for schools and districts. Schmoker (1999) discussed how effective leadership, support, teamwork and goal-setting provide the sound foundation for breakthrough strategies in improving schools. He advocated as a strategy targeting small wins in short periods of time in order to build momentum, increase confidence of teachers and gain results. One way to gain quick results is to benchmark or make use of processes that have worked elsewhere, whether for general school improvement or technology integration into classrooms. Teachers who realize processes and plans have worked elsewhere have a sense of eagerness to push forward with their own plans. As Schmoker said, "Goal-orientation. Focus. Enthusiasm. . . . We must establish the right conditions . . . . overcoming that initial wariness and building trust" (p. 42).

In the next sections, elements of effective planning were researched to set the stage, to build trust and to promulgate acceptance of technology in the classroom. Following that, specific features of technology-implemented electronic curricula teachers perceive as most useful were identified from research.

Elements of effective planning for technology integration. LeBaron and Collier (2001) advocated that technology-implemented electronic curricula usage in classrooms requires effective planning well before consideration of a launch date. Evidence of launching technology without effective planning shows up when there is a lack of a needs assessment early in the process or when an extended loss of classroom time to repair equipment, computers or software occurs. These examples of poor planning can lead to negative teacher perceptions of technology integration. A needs assessment conducted to gain teacher and administration support includes two basic analyses. First, documentation of classroom space and set-up design as well as a list of available computers, software, projectors and trained users is required. Second, this current-state list is then compared to the future-state vision for technology integration. A schedule is set for the team to work toward achieving the difference between the current-state and future-state. Administrators set the schedule and then provide support for the effort by listening, communicating and applying resources where needed as the technology initiative progresses. In more detail, LeBaron and Collier recommended beginning the technology integration process with a shared vision, then performing a needs analysis, defining inputs to the process, the planned work and deliverable outputs, assigning responsibilities and finally evaluating the plan and process with the goal of improving the next cycle through.

Because technology integration can be expensive, an immediate return on investment is often expected but seldom attained for several years. The process of obtaining a return on technology investment, according to LeBaron and Collier (2001), begins in the first classroom where technology is used. As the culture of classrooms changes through technology usage, then the culture of schools changes in the same manner. Learning environments become flexible, due to being designed for various methods of interaction and differentiated instruction. As whole schools change in their culture toward technology integration, the school district reaps the return on the technology investment made several years prior as the breadth and depth of learning technology impacts student knowledge positively.

Merrill (2004) discussed the planning involved in implementing learning with technology and found differences between age groups' skills, experience and anxiety levels. It is important to understand the age-based learning differences as a part of the process of effective planning. Isenberg (2007) corroborated the need to understand age-based learning differences by stating a related finding that the technology planning process should "allow a facilitator to tailor an Internet learning experience to unique characteristics of the learner" (p. 195).

Inglis et al., (2002) also researched the process and planning involved in transitioning to technology-based learning environments and outlined six phases of change: planning and project management, examining infrastructure needs, training teachers, courseware development or procurement, evaluation and support systems (p. 191).

Effective planning begins with proper funding support according to Trotter (2008) and building grass roots level support for e-learning is important especially in an economy impacted by housing and taxes. State and local level support plays an integral role by investing in computers, curricula software and professional development needed for teachers who keep the learning through technology initiative progressing.

Aust et al., (2005) conducted research whereby groups of teachers came together to create plans to integrate technology into education practices. The following steps became the planning process findings from the research: (a) form the team to brainstorm ideas; (b) consult with instructional technology designers to improve on the initial set of ideas; (c) create the plan and associated goals, needs, schedule and deliverables; (d) gain approvals of plan; (e) begin the work; (f) check results and refine the team processes; (g) share, celebrate and communicate the results as encouragement to other teams. At the planning stage, "The intent is not to prescribe specific solutions but to create the conditions where innovation emerges as part of the group's dialogue" (Aust et al., 2005, p. 193).

The International Society for Technology in Education (2007) published a list of essential conditions. Table 5 summarizes these elements of effective planning for technology integration in schools.

Table 5

Necessary Conditions to Effectively Leverage Technology for Learning

Shared vision	Proactive leadership in developing a shared vision for educational technology among school personnel, students, parents and the community
Implementation planning	A systematic plan aligned with a shared vision for school effectiveness and student learning through the infusion of ICT and digital learning resources
Consistent and adequate funding	Ongoing funding to support technology infrastructure, personnel, digital resources and staff development
Equitable access	Robust and reliable access to current and emerging technologies and digital resources, with connectivity for all students, teachers, staff and school leaders
Skilled personnel	Educators and support staff skilled in the use of ICT appropriate for their job responsibilities
Ongoing professional learning	Technology-related professional learning plans and opportunities with dedicated time to practice and share ideas
Technical support	Consistent and reliable assistance for maintaining, renewing and using ICT and digital resources

Curriculum framework	Content standards and related digital curriculum resources
Student-centered learning	Use of ICT to facilitate engaging approaches to learning
Assessment and evaluation	Continuous assessment, both of learning and for learning and evaluation
Engaged communities	Partnerships and collaboration within the community to support and fund the use of ICT and digital resources
Support policies	Policies, financial plans, accountability measures, and incentive structures to support the use of ICT in learning and in district and school operations
Supportive external context	Policies and initiatives at the national, regional, and local levels to support schools in the effective implementation of technology for achieving curriculum and technology (ICT) standards

Note. From "Essential Conditions for Implementing the NETS for Students 2007," by International Society for Technology in Education, 2007, ¶ 1.

Having summarized elements of effective planning from research, the next step was to study the body of knowledge concerning teacher perceptions of the specific features of technology-implemented electronic curricula.

Technology-based learning features that teachers perceive most useful. Features of the first e-learning courses, according to Merrill (2004), were just pictures of existing documents or books transferred to software or to the web, but today's publisher must design, develop and provide much more advanced technology-implemented electronic curricula to meet teachers' needs. If an e-delivered course is synchronous, meaning the teacher and the students are all together either in a classroom or on the web, then two-way conferencing and instant messaging are recommended features. For asynchronous learning, where the teacher and all the students may be separated either by distance or time, Merrill recommended a different set of features to allow flexibility in usage by the students. For example, archived audio/video, CD/DVD, e-mail, blogs and on-line bulletin boards are recommended for students who may be taking the e-learning course at various times of day and who have a teacher acting as more of a facilitator or consultant in the learning process.

In an article supporting the electronic curricula features that Merrill (2004) previously identified, Clark (2008) added that some schools are selective in courses that fully transfer and recommended that e-learning courses should be designed for full accreditation. Clarke also recommended that a help desk feature be established for teachers and students to ensure the electronic curricula is well supported.

Cortese (2007) researched Internet learning and studied effects of website design features collecting data through a questionnaire process.

> Pop-up windows which open over the existing webpage . . . had a click here to continue link under the . . . information so participants could move on . . . once they had sufficient time to read the information (p. 47).

This worked as well as hyperlinks in order to focus the attention of students. According to Shelly, Cashman, Gunter, and Gunter (2006), activities such as pop-ups and hyperlinks are "already researched and evaluated, [and] students waste no time needlessly surfing instead of learning" (p. 428). Cortese (2007) also found that students who were asked factual style questions in pop-ups were more focused and able to answer properly than students who were asked to relate multiple pieces of information in a pop-up window. These findings suggested that distraction occurs when students are asked to read pop-up windows covering more than one subject or when the subject matter was too complex for understanding. Formative feedback provided to students in the style of pop-up windows requiring multiple choice answers or requiring writing an answer to synthesize data before moving forward with the next section "may be a means of influencing learning. It is the actual content of these pop-up windows that may need further scrutinizing" (Cortese, 2007, p. 98).

Qvortrup (2008) researched how e-learning is determined to be good or bad and by what criteria, measures, conditions or features an opinion or perception would be formed. Qvortrup identified paradigms useful in ferreting out essential characteristics hypothesizing that "e-learning is not per se good or bad, but different forms of e-learning support different types of knowledge acquisition" (p. 132). From the findings of the Qvortrup study, four paradigms emerged and led to specific recommended technology features from each. From the instructivist paradigm, which means teacher-led, Qvortrup recommended that technology should only be used for raw data gathering and processing by students. From the body-phenomenological paradigm, learning happens with physical presence in the classroom where emotion can be seen and evaluated as part of the

learning process. Qvortrup recommended from this paradigm that only simple knowledge should be provided to students through e-learning and more advanced learning through in-class participation. Under this paradigm, distance education should not be used for upper-level classes. Qvortrup defined collaborative learning as an activity-theory paradigm, and therefore the e-learning support features include recommended group-based work in which dialogue is shared through electronic chatting. The last paradigm Qvortrup's research found was traditional constructivist theory where recommended features for e-learning include the need for the learner to manage one's own learning through frequent communication, feedback and reflection during the process. Usage of digital portfolios was recommended for purposes of collecting student work over time in order to show necessary progression in learning.

In summary, Qvortrup (2008) found that because of each of the specific recommended learning features based on his four teaching paradigms, only performing cost versus benefit analyses for e-learning or electronic curricula may be inadequate.

The ability to tutor online to improve understanding of content is an important feature raised by Cavanaugh and Blomeyer (2007). Various methods of tutoring are needed based on student understanding levels such as e-mails with questions for simpler issues, phone calls with more complex questions, eventually moving into the need for an online whiteboard feature where student and teacher can interact while writing on a shared screen and see each other's comments simultaneously. Electronic curricula with a virtual teacher's office feature allows for teacher and student discussion via a speaker function and to explain and write in parallel on a whiteboard. Students can make use of "emoticons such as a happy face, confused face, raised hand or applause to communicate

with their instructor while tutoring is taking place" (Cavanaugh & Blomeyer, 2007, p. 75). Avatars, which are conversational online images of people, could also act as tutors "to display empathetic emotions to the learner. For example, if the learner is concentrating, the avatar may show a happy or satisfied emotion. The avatar may show empathy when the learner is stuck or gives the wrong answer" (Cavanaugh & Blomeyer, 2007, p. 88).

Hudson (2007) studied learning comparing two perspectives, face-to-face and online chat usage, because of the prevalence of this technology today. The feature of text-based chat was found to influence educational discussions in a way that allows students to participate without peer pressure or fear of embarrassment. This suggested that electronic curricula developers should build in time to allow students to reflect and "compose their thoughts . . . [because] an online learning environment removes the social pressure to respond immediately" (Hudson, 2007, p. 144). Another finding from this research is that in a typical setting "the instructor dominates classroom conversations, but online discussions have more equitable participation" (Hudson, 2007, p. 8). Chat was a key feature in electronic curricula development because it increased student confidence but required more time for typing in and sending responses than normal face-to-face teacher and student interaction.

Doering and Veletsianos (2008) studied how teachers chose to integrate technology-implemented electronic curricula into their classrooms using an online program. The results of this work indicated emerging patterns of teacher preferences for technology integration based on models. The first model was classified as curriculum-based, which led the teachers in the study to use the electronic curricula exactly as

directed in order without deviation. The second model was activities-based, with elements of student-centered activities emphasizing collaboration and student choice. The third model in this study was classified as standards-based, where the teachers involved preferred to adapt curricula pieces to meet specific teacher standards. The fourth model which emerged from the study was media-based, where teachers focused on the student preference of motivation through entertainment. Recommendations from Doering and Veletsianos included recognition that teachers used electronic curricula in unintended and creative ways and allowed for multiple technology integration methods and uses by design. Also, most teachers in this study viewed the electronic curricula "as a guide and not a script to follow on a daily basis" (Doering & Veletsianos, 2008, p. 36). The flexible, authentic, real-world simulation aspects of this research using electronic curricula motivated both students and teachers to use it.

Fletcher (2008) researched how digital content should be delivered by bringing publishers and educators together from three states to survey their perceptions. Emerging themes from this study supported Hudson (2007) in finding that electronic curricula needs to be interactive and also Doering and Veletsiano's (2008) findings that flexibility and adaptability are key features as well.

Ballantyne (2007) researched whether small-sized learning objects should be designed and created for flexibility of choice rather than whole electronic curricula courses with preset components. The rationale for this study was that whole course development is expensive for publishers and is becoming unaffordable for schools. "If educational content is wrapped up in a technology that makes it difficult to adapt in large, integrated, monolithic slabs, it may not be easily adopted" (Ballantyne, 2007, p. 5).

Ballantyne cited four levels of learning objects that emerged as standards from the Learning Technology Standards Committee (2002) for electronic curricula providers to consider (a) level one is single concept data, (b) level two is a combination of level one pieces put together into a lesson, (c) level three is a combination of level 2 lessons built into a course, and (d) level four learning objects are a group of level three courses leading to a certificate or perhaps a degree.

Ballantyne (2007) recommended digital databases of these learning objects that are easily searchable so that teachers are allowed to select, combine and deliver curricula according to personal preferences of content and process. Teachers have the duty to arrange these flexible learning objects in an orderly fashion to avoid unnecessary duplication of materials and distraction of learner attention (Chang & Ley, 2006).

Concluding this literature review section for technology-based learning features teachers perceive most useful, it is important to recognize that "often, students find that these technologies, [such as games, simulations, and social networking] so prevalent in their lives outside of schools, are unwelcome [by teachers] in their classrooms" (Groff & Haas, 2008, p. 12). Real-life simulations and games can be used to create interesting and motivating conditions where students can collaborate, solve problems, create goals, prioritize alternatives and then make decisions.

One final caution Gaytan (2008) made as a result of his study on the delivery of electronic curricula in classrooms was that "being a competent technology user is different from knowing how to effectively teach with technology" (p. 31). The study focused on how to make use of all the electronic curricula features desired by teachers, but findings illuminated potential problems for which to plan. Findings from this research

showed the teachers experienced student distractions, conflict and discipline problems during online teaching sessions and teachers perceived these sessions as lacking in control. Another finding showed that if students are allowed to deviate from the online course plan, then questions outside the teacher's expertise and course topic may arise. Another finding showed teachers were experiencing high levels of students asking for assistance during class. Recommendations from Gaytan's research included linking course goals with activities and assessment to keep students on track and productive. Also, teachers should make meaningful usage of authentic learning situations such as case studies in groups to increase collaboration and focus. Teachers should also consider communicating by wikis and blogs to allow for student reflection and peer and teacher feedback throughout the process.

Summary of Research

The No Child Left Behind Act (2002) was created to improve school systems nationwide and requires every graduating eight grade student to be knowledgeable about computer technology. There is a dichotomy, however, between what tools are perceived to be widely available to teachers (National Center for Education Statistics, n.d.) and the actual usage of those tools in classrooms (Miners & Pascopella, 2007). Other countries are ahead of the U.S. in focusing teacher and student effort toward using technology to teach and learn (Leu et al., 2008).

Technology-implemented electronic curricula such as digital textbooks with pictures and charts have convenience and cost advantages over paper texts (Carlson, 2005; Cavanaugh 2006); however, other sound and visual media increased costs to schools and warranted careful consideration (Inglis et al., 2002). Teachers' interest in

digitally published curricula has grown based on the advantages, and some states have adopted electronic media as part of textbook adoption (Waters, 2007). A blended approach of print and digital curricula was recommended for teachers to consider (Ward & Riley, 2008), especially because, as Tucker (2008) found, migration toward electronic or digital books will increase in the future.

In order to facilitate technology integration, basic school infrastructure must be in place, including computers, leadership support, software, networks, maintenance and training (Lessen & Sorensen, 2006). Classroom layout must be well designed in order to be conducive to technology usage and not become an obstacle (McGrail, 2007). Many obstacles were identified in this research including the belief that fascination with technology can lead teachers and students astray from effective teaching and learning (Sims, 2008). School policy must support teachers as technology use is attempted so that others may try new methods as well (Smolin & Lawless, 2007). Unrealistic teacher and administration expectations can become obstacles to technology deployment (Massy & Zemsky, 2004) and publishers who become protective of printed textbooks can hinder development of new electronic curricula (Sewall, 2005).

Teacher beliefs impact choices about technology and providing digital options for teachers to consider, as well as addressing concerns and providing training, can facilitate positive perceptions of technology (Errington, 2004). One such pedagogical belief which affected technology integration was highlighted as constructivism, or a learner-centered theory where students build personal meaning as learning occurs (Cortese, 2007; Chen, 2008). Teacher beliefs affected by past experience are not often changed (Ertmer, 2005). As a result, teachers who are predisposed to teaching from the front of the room represent

one end of the spectrum of beliefs and those who allow students to design and direct their own learning represent another end. This wide range of teacher beliefs is not helpful to technology integration, but seeking to understand how teachers see possibilities of using technology in the classroom may be useful (Bain & McNaught, 2006).

Theory goes back to Armstrong (1961), where it was found that teacher perceptions may not be based on factual information about a subject but rather on what has been heard from others. Teachers are not yet convinced technology helps the learning process (Pasco & Adcock, 2007). In positive terms, however, teachers perceive that technology use in classrooms has potential to increase student participation by reticent or fearful students (Blackbourn et al., 2008). Seeking out and listening to the perceptions of teachers on technology integration is recommended and the teacher's voice must be heard and understood (Levin & Wadmany, 2008). As well, teachers' self-reflection while attempting the use various technology methods or tools changed beliefs toward increasing technology usage in schools (Ertmer, 2005; Bird & Rosaen, 2005; Dawson & Dana, 2007).

Specific factors teachers examine while considering classroom technology include ease of access and training (Franklin, 2008), the ability to address varying student generational diversity and backgrounds (Sims & Stork, 2007; Rogers et al., 2007; Hall, 2008), and the ability to put the learner in charge (Canton, 2007; Adcock, 2008). Variety and the need for current materials were other factors teachers examined (Hennessy et al., 2005) but quality of materials was more important than the quantity (Dror, 2008). Student searches for information must be easy and provide quality data (Haglund & Olsson,

2008) and the libraries that support electronic curricula must be accessible with 24 hour service (Stucker, 2005).

Feedback and assessment need to be built into electronic curricula as another factor teachers examine, such as through video (Boardman, 2007), through digital portfolios (Ali, 2008), or through quizzes, surveys, e-mail or chat (Tuttle, 2008). In particular, feedback is essential for students with learning or behavioral disabilities. Digital e-books and curricula with scaffolds in levels of learning and assessment provide flexibility and support for students with special needs (Rhodes & Milby, 2007). Teachers perceive digital tools positively if they motivate IEP students and help them plan for success (Mitchem et al., 2007).

Specific strategies and plans for technology integration are required for efficiency but a specific return on investment may take years (LeBaron & Collier, 2001). A list of essential conditions was published by the International Society for Technology in Education for usage as a technology implementation checklist and plan.

There are many specific electronic curricula features teachers perceive to be useful. These include audio and video, CD/DVD, e-mail, and blogs as mentioned in research by Merrill (2004). Courses, according to teachers, must be well-designed for accreditation purposes and be self-correcting with a help-desk feature to avoid lengthy problems (Clark, 2008). Pop-up windows with data and questions and the use of hyperlinks are recommended by teachers to avoid wasting learning time (Cortese, 2007). Another feature that teachers perceived as useful was virtual teachers' offices where conversation, feedback and tutoring between teachers and students can be conducted in a

manner avoiding embarrassment for students (Cavanaugh & Blomeyer, 2007; Hudson, 2007).

In conclusion, features of electronic curricula teachers perceive as useful can vary based on teacher preferences to deviate from content or process standards, to allow student choice or collaboration, to adapt various curricula pieces or to focus on student motivation (Doering & Veletsianos, 2008). Teachers view electronic curricula "as a guide not a script" (Doering & Veletsianos, 2008, p. 36) and want to maximize teaching flexibility. The sizes of the pieces of electronic curricula or learning objects can be scaled to fit teachers' perceived needs at four levels: small, single concept pieces, multiple pieces forming a lesson, multiple lessons which form a course, or multiple courses in a set. Teachers perceive ease of searching these learning objects was necessary to select, combine and make use of technology according to preference (Ballantyne, 2007).

This review of literature investigated topics relative to creating a study which explored teacher perceptions of electronic curricula. The topics investigated included a broad understanding of technology issues, requirements and obstacles and then narrowed to how teacher beliefs, perceptions of technology and the role of self-examination and reflection affect technology usage decision-making. The literature review concluded with examining specifically focused education technology factors, strategies and features teachers perceive to be useful.

Future expectations. We are preparing students for a 21st century world where everything is heading toward electronic "e-mail, e-pals, e-tutors, e-books, e-shops, e-commerce, e-subscriptions, e-classifieds, e-files, e-cards, e-journals, e-payments, e-entertainment . . . e-delivery . . . e-courses and e-learning" (McEwen, 2008, p. 1).

According to Ludes' (2008) research, e-learning has not taken over or become a surrogate for standard classroom teaching. "Forecasts [for technology usage in schools] are noticeably more cautious and sober . . . [and] progress will be slow, contradictory, uneven and certainly controversial" (Ludes, 2008, p. 114). It is understood that technology has changed the employment landscape, that knowledge of technology is required in many fields and that this requirement will continue to grow (Thomas, 2008).

Possible next actions. Hennessy et al. (2005) found that "classroom teachers have historically had little say in designing and implementing development plans for using ICT [or electronic curricula] within their schools, and for defining its role within subject curricula" (p. 157). Publishers who collaborated with teachers better understood how teachers perceive digital content should be delivered (Fletcher, 2008). Proper assessment of educational technology must take into consideration elements of pedagogy, the efficacy of the technology deployment process and input from teachers (Ferdig, 2006).

In the third chapter, teachers' perceptions were explored in order to gain a greater understanding of electronic curricula design, development and implementation issues, needs and priorities.

Chapter III – Methodology

Recall from chapter one that the title of this qualitative research project focuses on teacher perceptions of electronic curricula implementation within an elementary and secondary Lutheran school setting. The purpose of the study is to investigate and attempt to understand LCMS grade school and high school teacher awareness of and attitudes toward the use of electronic curricula in the classroom. In support of the need for this research, it is appropriate to add here that the LCMS publisher, CPH, has received inquiries from Lutheran school teachers as well as the Lutheran Education Association, specifically supporting this study regarding electronic curricula.

Due to the busy schedule of teachers in general, the use of an electronic survey was deemed the most cost and time efficient for gathering data for this study. This allowed teachers to have the maximum flexibility in order to respond to the survey both when they had time and at any time of day. The research method outlined in this chapter has been designed to ask pertinent questions of an available sample of LCMS teachers and from the answers received, make inferences from the emerging issues affecting wider usage of electronic curricula.

Subjects

The subjects involved in this study are kindergarten through 12th grade LCMS parochial school teachers. The researcher shares the same religious affiliation or bias in terms of being Lutheran, however there was no other connection to any specific teacher in the study. This is important to divulge because according to McEwan and McEwan (2003), "Qualitative research can be rendered nearly worthless if researchers fail to

disclose their biases, predispositions and even connections to the subject of the study (p. 84).

As described in chapter one, this research focuses on K–12 LCMS teachers as a subset of the larger teaching community. While it is understood that perceptions of electronic curricula could also have been sought from principals, directors of Christian education and other administrative personnel within the Lutheran school system, the primary interest for this study is in teachers because of their proximity to classrooms and to students who may be impacted by the use of technology in teaching and learning in the 21st century.

Sampling Procedure

The target population for this study was all kindergarten – 12th grade LCMS teachers. The accessible population of Lutheran teachers used in this study was those whose e-mail contact information was available to the researcher at the time of the survey. Not all teachers in the Lutheran school system provide their contact information to the church body or allow it to be used for surveying purposes. It is also not mandatory that school contact information for each teacher be provided to the church's publisher, as that is optional. Therefore the accessible teacher population in its entirety was sent the electronic survey for this study. The number of accessible teachers is described next.

It is believed but unverified that there are approximately 18,000 teachers total in the LCMS school system. The exact number is not known because of poor reliability in voluntary church and school contact information provided to the national church body. Many are pre-school teachers, however, who are not included in this research. Because of the unreliable contact information, attempting to contact teachers via regular mail in

order to reach potential willing participants seemed cost prohibitive, and, given the nature of this research about electronic curricula, usage of an online survey tool appeared to be appropriate for this particular purpose. Since CPH's teacher database has 7,468 voluntarily provided, discrete teacher e-mail addresses recorded, this contact information was selected to form the basis of the available and accessible population for this research.

Considering the 7,468 e-mail addresses as the universe of possible teacher responses, a letter of consent and a survey instrument was developed for purposes of this study. How these documents were devised, reviewed, updated and disseminated will be comprehensively reviewed in the *Instrumentation* section. An invitation to participate in the study and a letter of consent and attached link to the online survey was e-mailed to the list of 7,468 teachers' addresses, and periodic reminders were sent to those who had not responded. The reminders had positive results on the survey numbers, increasing responses within two-three days of delivery. The total number of raw responses accumulated was 1358 but some teachers did not complete the survey or had to be disqualified from this K–12 research by virtue of being a preschool teacher only. After deducting partial responses and preschool teacher surveys from the total, so that only completed K–12 teacher responses were left, it was found that 1,014 valid responses remained for purposes of this qualitative study.

Research Setting

The online survey link, which was e-mailed to teachers in this study, allowed flexibility in terms of time of day and the location from which teachers chose to respond. Whether teachers received the survey at a school-provided or private e-mail address is not known; however, teacher responses were sent at various times of day, with larger

jumps in response numbers appearing over weekends. Additionally, it was understood that while many teachers are able to access school-related e-mail from home, the physical location of teachers when they responded to the survey used in this study was unknown. It was the intention that through the use of an online survey, potential volunteer respondents might be comfortable in selecting the time and place to answer the questions pertinent to teacher perceptions of electronic curricula usage in the classroom.

The analysis of the survey data was independent of the locations of the teachers who responded electronically. The data and findings were reviewed, analyzed and summarized in personal office space and there was no other contact with the teachers who voluntarily responded to the survey used in this study.

External Validity

Fraenkel and Wallen (2006) defined external validity as "the degree to which results are generalizable, or applicable, to groups and environments outside the research setting" (p. G-3). The survey data gathered in this study from teacher perceptions of electronic curricula across the Lutheran school system may be similar to other parochial and public school teacher perceptions regarding the topic. Additional work may be required to validate this generalization; however, "it is much more likely that any generalizing to be done will be by interested practitioners" (Fraenkel & Wallen, 2006, p. 440). Threats to external validity can be identified to further understand the limitations of this research project.

According to Creswell (2009), external validity can be threatened when researchers themselves "draw incorrect inferences from the sample data to other persons, other settings and past or future situations" (p. 162). As an example, many of the specific

threats Creswell identified are focused on research where an experiment or pre and post test scores are potentially influenced because of the passing of time or because of the traits, maturity or intelligence of participants. Because of the nature of the blind electronic survey used in this study, the researcher has no way of determining the impact of these types of factors on the teachers who responded to the questions.

Another possible threat to external validity is called the Hawthorne Effect which was characterized by Fraenkel and Wallen (2006) as having a positive effect on subjects in a study because they feel they are receiving special attention. The Hawthorne Effect may be somewhat at play in this survey environment because of the fact that the consent letter stated their teacher opinions are very valuable for this research. However, due to the ubiquitous nature of e-mail and how commonplace surveys are today in all disciplines, the researcher believes this has not unduly affected teacher responses to the questions.

In conducting quantitative research, one particular threat to the validity of a study may be defined as statistical conclusion validity because the number of responses may not be statistically representative of the total population. According to Bryant (2004), "This means there may simply not be enough cases in the study to result in statistical significance" (p. 103). However, in this qualitative research, the greater than 1,000 teacher responses received from the survey provide more than enough data to gain understanding of and describe the aspects of teacher perceptions related to electronic curricula.

Research Design Procedure

Fraenkel and Wallen (2006) delineated the two types of research methodology, quantitative and qualitative, by describing the differences in study design, organization

and procedures. Quantitative research focuses on statistical connections between variables while qualitative research focuses on understanding and describing attitudes, values, perceptions, preferences, concerns and motivations. Since this education-based study was focused on teacher perceptions of electronic curricula, qualitative methods of research were employed. McEwan and McEwan (2003) argued that neither quantitative nor qualitative methods are better than the other but rather, "The crucial question is the degree of rigor brought to bear by the researcher" (p. 20). The rigorous qualitative approaches to research design considered for this research were case study, phenomenology, ethnography, grounded theory and interpretive inquiry.

Case study. A case study examines individuals or situations or events with "the hope . . . that through the study of a single, rather unique case [or cases] . . . valuable insights would be gained" (Fraenkel & Wallen, 2006, p. 438). Case studies "are bounded by time and activity, and researchers collect detailed information using a variety of data collection procedures over a sustained period of time" (Creswell, 2009, p. 227). Because this research was based on an electronic survey of current teacher perceptions from across the Lutheran school system, and not on a few unique situations where data was gathered over a sustained period of time, the case study methodology was not selected.

Phenomenology. Creswell (2009) stated that in a phenomenological study, the researcher tries to understand "human experiences about a phenomenon as described by participants" (p. 13). The issue with this methodology is that it is unknown which Lutheran school teachers may have experience with classroom usage of electronic curricula and for what period of time they may have used it. The basis for this research was a perceptions survey that was sent out to thousands of Lutheran school teachers but

which does not undertake an experiential study over a lengthy time-period. Therefore, the phenomenological methodology was not chosen.

Ethnography. "To many, qualitative research is embodied in the term ethnography, which includes both observations made by an individual during an extended stay in a specific culture and the construction or interpretation of that culture in a written form" (McEwan & McEwan, 2003, p. 76). This methodology was not chosen because the researcher could not plan to be resident at any particular schools or classrooms where electronic curricula were found to be in use.

Grounded theory. According to Creswell (2009) the outcome of this qualitative method "derives a general abstract theory of a process, action or interaction grounded in the views of participants" (p.13). "But it is an ongoing process. Data are collected and analyzed, a theory is suggested; more data are collected; the theory is revised; then more data are collected; the theory is further developed, clarified, revised; and the process continues" (Fraenkel & Wallen, 2006, p. 437). Because of the iterative nature of this process and the fact that a one-time teacher survey was the data collection instrument used in this study, grounded theory methodology was not selected.

Interpretive inquiry. Relating to the literature review in chapter two, interpretive inquiry is a constructivist approach because "the researcher's intent is to make sense of (or interpret) the meanings others have about the world. Rather than starting with a theory... inquirers generate or inductively develop a theory or pattern of meaning" (Creswell, 2009, p. 8).

Rigor in this study, also according to Creswell (2009), is exemplified by the extensive usage of open-ended questions in the survey for which teachers have written

narrative responses. The use of open-ended questions creates a requirement in which the researcher undertakes focused reading and rereading of the narrative survey responses, which is very time-consuming, but necessary for proper interpretation. Interpretive inquiry was chosen as the methodology for this study because it allows for descriptive summaries of ratings and rankings of preferences and involves inductive (specific to general) development of emerging themes from participant data.

Fraenkel and Wallen (2006) and Creswell (2009) agreed that mixed-methods studies are receiving increased attention. In triangulation design, "the researcher simultaneously collects both quantitative and qualitative data, compares the results and then uses those findings to see whether they validate each other" (Fraenkel & Wallen, 2006, p. 443). No quantitative data was gathered in this teacher perceptions study, and, therefore, triangulation design was not used. Because of the extent of the aforementioned open-ended questions and the large number of narrative responses gathered (greater than 1,000), no additional focus groups or other types of interviews were conducted with any teachers for this study.

Instrumentation

"In educational research, the most common descriptive methodology is the survey, as when researchers summarize the characteristics (abilities, preferences, behaviors, and so on) of individuals or groups or (sometimes) physical environments (such as schools)" (Fraenkel & Wallen, 2006, p. 14). Two types of surveys, longitudinal and cross-sectional, are typically used in research. Longitudinal means data is collected over various points in time to see how responses might change. Cross-sectional means the information has been gathered from a sample of the population, at a single point in time.

Since this study focused on teacher perceptions of electronic curricula at a single point in time, an electronic or online cross-sectional survey tool was the primary data-gathering device for this research.

The electronic survey questions created were developed specifically for this research project, independent of any other existing survey instruments. Recalling from chapter one of this study, the central research question was documented as to why there is a lack of mainstream LCMS grade schools and high schools asking for or using electronically-delivered curricula. While the review of literature in chapter two aided in the development and subsequent improvement of the teacher perceptions survey instrument, no questions were taken directly from other research. Aust et al. (2005) employed some similar interview questions in their research of technology uses which somewhat validated the independent creation of the survey questions used in this study.

Seeking to understand teacher perceptions of electronic curricula in order to answer the central research question inspired the development of the electronic consent letter and survey sub-questions. An invitation to participate and a consent letter was created in order to first request LCMS kindergarten – 12th grade teachers' voluntary participation in a confidential electronic survey regarding their perceptions of electronic curricula usage in classrooms. The consent letter was designed so that in order to proceed to the survey instrument itself, the participants had to agree to volunteer by clicking to electronically sign the consent form.

Both the letter of consent and the initial survey were piloted with eight teachers from the population and all comments provided were used to further improve the instrument. Comments from the eight teachers who piloted the letter of consent and

survey included suggestions for added questions, additional response choices for some existing questions and improvements of some terminology explanations. After all the changes were evaluated and incorporated, the letter of consent and survey were transmitted electronically to the population of LCMS teachers identified for this study, less the eight teachers who piloted the survey and subsequently contributed to the efficacy of the instrument.

In order to begin the survey, the respondent filled in an electronic signature identification number as the first question and, in so doing, consented to voluntarily be a part of the study. The next four questions were demographic in nature asking for education level, gender, age and grade levels the respondents were teaching. Personal technology knowledge and pre-service and in-service training levels were then rated by respondents, followed by rating technology support at school. Participants were then asked what if any electronic media they had experienced. The next six survey questions asked the teacher respondents for narrative answers regarding personal perceptions related to advantages, disadvantages, factors, concerns, prerequisites and improvements concerning technology-implemented electronic curricula. The next two questions asked for a priority of need for curricula subjects and then a rating for necessity of potential media used in electronic curricula. The next question asked for a rating of teacher interest level in teaching from electronic curricula, and the last question was narrative and summative in nature, asking for teachers' perceptions of the overall usage of technology in the classroom. It is important to note that all survey questions allowed respondents to make any comments they desired, even if the question was primarily asking for a rating

or ranking. Designing reliability and validity into the survey instrument was the next consideration in this study.

Reliability. Qualitative reliability "refers to the consistency of scores or answers provided by an instrument" (Fraenkel & Wallen, 2006, p. 165). Since the researcher had administered the survey only once and only at one time for purposes of this research, and since there was no test-retest process with scoring methods employed for the survey participants, reliability of the instrument was not threatened in terms of any objective scoring differences for this study's results. Reliability issues can arise, however, when narrative responses to survey questions are transcribed and coded.

In this study, as narrative responses from teachers were reviewed and coded for potential emerging issues, the researcher was aware that it was possible to evaluate the essay responses differently. To ensure that narrative text evaluation approaches were as consistent as possible, and in order to mitigate potential transcription errors, data were presented as written by electronically copying from the online survey responses into the matrix form by using Microsoft Excel. This copying process avoided the need for manual rewriting of words and enabled consistency in searching by similar key-words easily, which then allowed for theme labels to be developed, evaluated and redeveloped as necessary.

In addition, Creswell (2009) paraphrased Gibbs' (2007) suggestion for avoiding a "shift in the meaning of codes [while developing theme labels]...by constantly comparing data with the codes and by writing memos about the codes and their definitions" (Creswell, 2009, p. 190). This method was employed by the researcher as another reliability improvement procedure in this study.

The number of participants in a study also has an impact on the ability to judge reliability or consistency in answers and typically, if greater than 100 people are tested or surveyed, reliability and validity may be improved (Fraenkel & Wallen, 2006). In the case of this study, more than 1,000 responses were received from teachers which improved reliability and validity.

Validity. Validity can be defined as "appropriateness, meaningfulness, correctness and usefulness of any inferences a researcher draws based on data obtained through the use of an instrument" (Fraenkel & Wallen, 2006, p. 165). Many surveys are designed and created but never validated. According to Bryant (2004) while the lack of rigorous validation is prevalent and common in qualitative research, surveys still gather useful and descriptive information about current conditions, beliefs or perceptions. In this study, a group of eight teachers from Lutheran schools piloted the survey in advance of it being e-mailed out to the whole population. "The typical process of having a knowledgeable panel review a questionnaire . . . is usually sufficient in such studies" (Bryant, p. 103). Fraenkel and Wallen agreed with Bryant and went on to advise that trying out the survey on a sample of the respondents allows for improvements to be made where there are "ambiguities, poorly worded questions, questions that are not understood, and unclear choices [for answers]" (p. 405).

As was mentioned previously, the researcher shared the same religious affiliation or bias in terms of being Lutheran; however, there was no other connection to any specific teacher in the study. Revealing this potential bias is a form of self-reflection which improves validity and, as Creswell (2009) stated, "creates an open and honest narrative that will resonate well with readers" (p. 192).

Another method Creswell (2009) cited to improve validity is to present opposing information which seems to be contrary to the emerging themes of a study. When coupled with "rich, thick description to convey the findings . . . the results become more realistic . . . and can add to the validity of the findings" (Creswell, 2009, p. 191). The researcher provided both rich description as well as contrary information presented in opposition to evidence leading up to emerging themes in chapter four.

Data Analysis

According to Bryant (2004), qualitative research presents three methodology challenges for the researcher: gathering enough survey data, organizing the large amount of data received and then interpreting the survey data in a meaningful way. Having a vision and a plan to manage each of these three challenges in advance of gathering data is necessary. To address these challenges, over 1,000 teacher survey responses have been gathered from which to interpret and draw inferences. Literature was reviewed to compare work performed by prior researchers with the findings and emerging themes from this study as a further validity check.

Simple descriptive frequencies and percentages were used to summarize responses to the survey questions which asked for ratings and rankings while survey questions asking for narrative data were organized by using a detailed coding process in order to identify emerging themes from the written narrative teacher responses. Using inductive data analysis "allowed for categories and patterns to emerge from the data" (Isenberg, 2007, p. 61). Notes were hand-written from the data in order to create and assemble like categories of information into emerging themes. These emerging themes

generated from the teacher responses in this study were organized as major findings in chapter four (Creswell, 2009).

Summary

It should be emphasized that this study employed two methodologies, descriptive and interpretive inquiry. Descriptive methods were used to analyze frequencies and percentages for responses to questions asking for ratings or rankings of data. Interpretive methods were used as the methodology to analyze responses to questions asking for narrative data because it allows inductive (specific to general) development of emerging themes from participant data. This researcher endeavored to summarize a cross-section of Lutheran school teachers' perceptions of electronic curricula usage in classrooms. The findings of this study are intended to inform and therefore further other new work related to the study of technology usage in 21st century classrooms.

Chapter IV – Results

The researcher in this study examined teachers' perceptions of electronic curricula implementation within a kindergarten through 12th grade Lutheran school setting. The electronic survey instrument tested and used in this research was designed to answer the question, why is there a lack of mainstream LCMS grade schools and high schools asking for or using electronically-delivered curricula? The supporting qualitative hypothesis phrased in an affirmative manner is as follows: K–12 teachers' positive perceptions of electronic curricula increases the implementation. Phrased as a null hypothesis, there is no relationship between teacher perceptions of electronic curricula and classroom implementation.

The initial set of questions indicated in chapter one were tested and improved upon by eight teachers in the population; many of those testing the questions had earned doctorates. The electronic survey instrument used may be found in the appendix. This chapter is organized in terms of the order of the final survey questions that respondents answered over the course of November 2008 through January 2009. To begin, the respondents were asked to enter a unique identification number which authorized agreement to participate in the study and electronically sign the consent form required to start answering any survey questions. Then, LCMS teachers answered four demographic questions, followed by 15 questions about specific ratings, rankings and teacher perceptions pertaining to the usage of electronic curricula.

The process for reading, reviewing, summarizing and presenting the data from 1,014 teacher responses for each survey question was in itself a lengthy undertaking. The data for the initial four demographic questions and the first five perception questions

were analyzed and assembled via the presentation of Tables 6-7 and Figures 1-9 shown on subsequent pages. These tables and figures allowed for the researcher to call attention to the major facts or findings revealed from the survey responses for those questions. Likewise, the analysis of teacher responses for questions 12-14 was handled in the same manner as shown by the data presented in Figures 10-12 followed by appropriate discussion. This left defining the analysis process used for the remaining teachers' perceptions responses to questions 6-11 and the final survey question 15.

The open-ended design of questions 6-11 and question 15 was purposeful and allowed for the LCMS teachers to write perception responses of any length they chose, in statement or essay form, as opposed to selecting from multiple choices, ratings or prioritizations such as those used in the other survey questions from this study. The process for analyzing these written perception responses followed the validity and reliability procedures outlined in chapter three.

First, the 1,014 survey responses for each of the questions 6-11 and 15 were copied verbatim from the electronic survey results directly into Microsoft Excel so that the data could be easily reviewed and printed. The perception responses from the LCMS teachers were read and contemplated while creating hand-written thoughts and reflections regarding the raw data over a period of months. The teachers' perceptions were reviewed again and color-coded for organization into teacher response categories. The color-coding process for analyzing responses to questions 6-11 and 15 was designed to ensure that the groupings and categories fully captured all of the teachers' perceptions input. There was a comparison of the teachers' responses with the color-coding to ensure reliability.

The final step was to reexamine the newly created summarized categories of responses for each of the individual questions 6-11 and 15. These summarized categories were then further analyzed through the use of the same process outlined above until words or phrases were noted as being repetitive. These repeating words or phrases became emerging themes representing the macro-level LCMS teachers' perceptions which are discussed immediately following the presentation of data.

Presentation of Data

Consent question 1of 1: To electronically sign this consent form and continue with the survey, please enter the unique signature ID contained in the email you received. The very first step of the survey process was to ensure that all LCMS teachers would be voluntarily submitting their personal perceptions as they answered each question. The voluntary submittal of teacher responses, meaning without any coercion or influence, was handled by virtue of the need for teachers to read a consent letter and then agree to enter a unique signature identification number to begin the electronic survey.

Table 6

Survey Mailing History

Mailing Steps	Date of Contact	Number of Recipients	Surveys Received	Total Number of Surveys Received
Initial e-mailing	11/11/08	7,468	1,153	1,153
1st Follow-Up	12/12/08	6,315	104	1,257
2nd Follow-Up	01/09/09	6,211	101	1,358
Survey closed	01/14/09	------	------	1,358
Less Incomplete and Preschool Responses			344	1,014

As shown in Table 6, the total number of raw responses accumulated from the LCMS teachers was 1358; however, some teachers did not complete the survey or had to be disqualified from this K–12 research by virtue of being a preschool teacher only. After deducting partial responses and preschool teacher surveys from the total, so that only completed K– 12 teacher responses were left, it was found that 1014 valid responses remained for purposes of this qualitative study. All of the teacher-respondents electronically signed the consent forms before being admitted to the survey instrument online.

Demographic question 1 of 4: What is your education level (bachelor's degree, master's degree, doctorate, or other)?

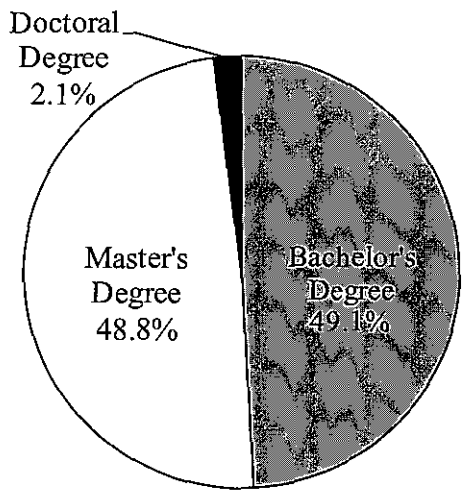


Figure 1. Education degree level by percentage of LCMS teacher-respondents.

The LCMS teachers who participated in this study hold bachelor's, master's and doctorate degrees by percentage, close to the latest national average. According to a 1998 survey cited by the National Center for Education Statistics (n.d.), 45% of full-time public school teachers held a master's degree and 1% held a doctoral degree. Approximately half of the LCMS teachers who participated in this study held master's and/or doctorate level degrees (see Figure 1). Many LCMS teachers indicated they had education credit hours well beyond the bachelor's degree and were presently pursuing either a master's or doctoral-level graduate degree.

Demographic question 2 of 4: What is your gender (male or female)?

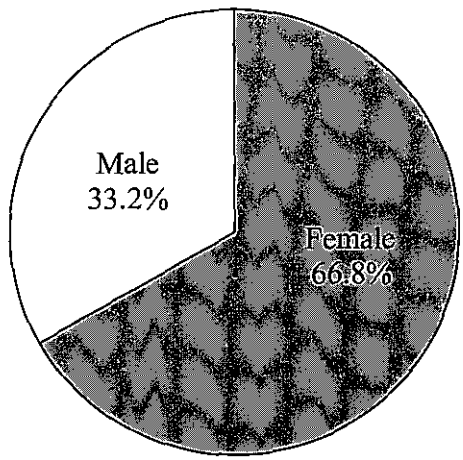


Figure 2. Gender by percentage of LCMS teacher-respondents.

LCMS teachers who participated in this survey were predominantly female; however, these statistics were not as pronounced as the national average for public and private elementary and secondary school teachers. According to 1999-2000 data cited by the National Center for Education Statistics (n.d.), historically, females make up 75% of the teacher workforce while males account for approximately 25%. One-third of the total of the LCMS teachers who participated in this study were male teachers (see Figure 2). Differences by grade level are not presented because many LCMS teachers are responsible for multiple grade-levels of students.

Demographic question 3 of 4: What is your age (in years)?

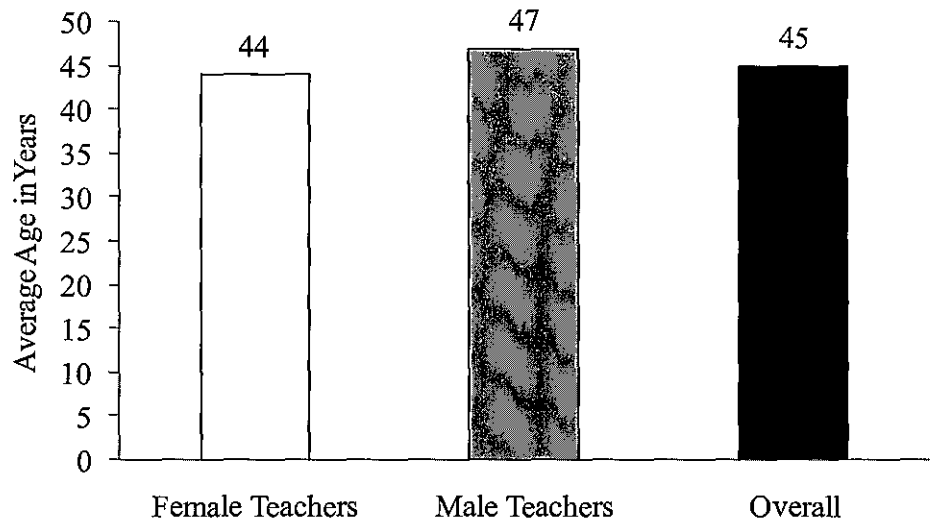


Figure 3. Average age of LCMS teacher-respondents.

The 1999-2000 data presented by the National Center for Education Statistics (n.d.) indicated that the average age for public and private K – 12 teachers was 42 years overall. The same data also revealed that the average teacher age for the LCMS for the 2003-2004 time period was 43.8 years. Figure 3 shows that the average age of the LCMS teachers who participated in this research was 45, which was slightly older than either of the reported national averages. This could be accounted for by the length of time since the national survey was conducted or by the current LCMS trend, which according to Lutheran Church – Missouri Synod Board for Higher Education 2008 data fewer students are entering the LCMS university system to prepare for careers in Lutheran education.

Demographic question 4 of 4: What grade levels do you teach (K – 12)?

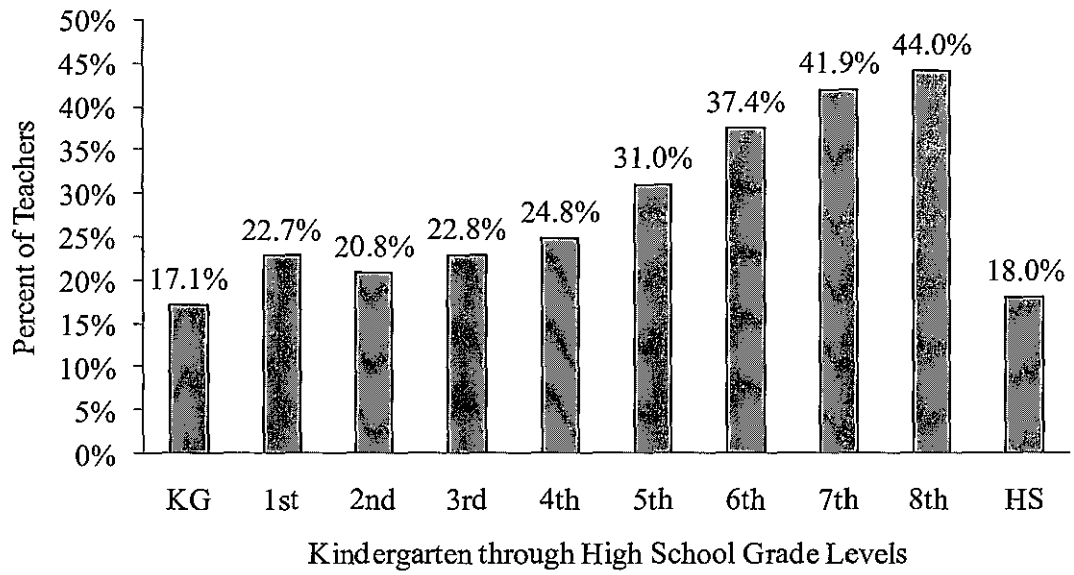


Figure 4. Grade levels taught by percentage of LCMS teacher-respondents.

The predominance of the grade levels that the LCMS teachers represent in this study are weighted toward the middle school bracket of 5th through 8th grades (see Figure 4). Although not explicitly shown but implied by the percentages depicted, the majority of LCMS teachers who participated in this research were responsible for multiple grade levels. In order to validate this, further review of the data was conducted and it was found that 55% of the teachers in this survey taught two or more grade levels. It was interesting to find that some teachers taught as many as eight different grade levels. It was assumed that teachers who do this may be teaching the same subject to multiple grade levels.

Perception question 1 of 15: Explain at what level (novice user, occasional user regular user or expert user) you as a teacher perceive your personal knowledge

regarding the usage of electronic media such as CD/DVD/PowerPoint, the Internet, and electronic/digitally delivered curricula.

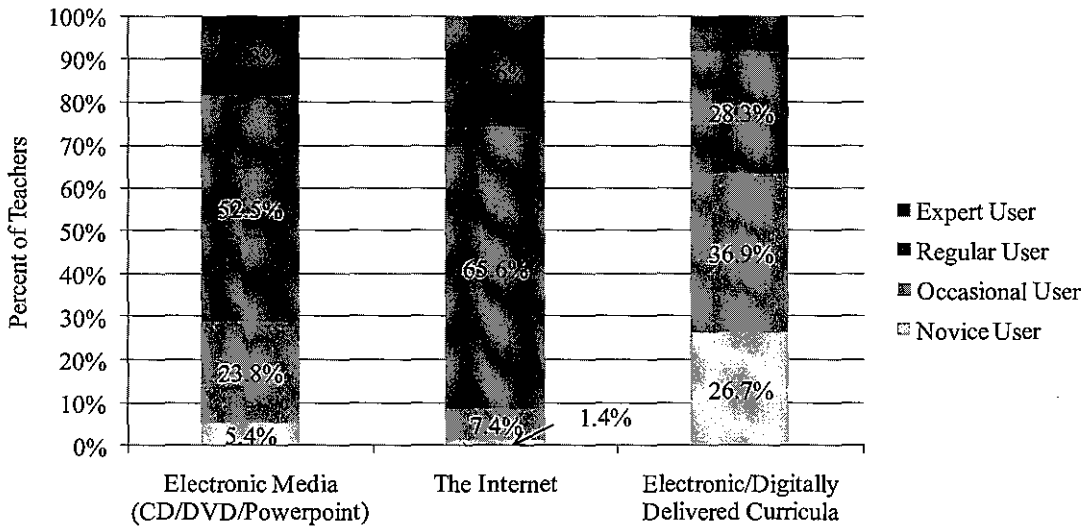


Figure 5. Percentage of teacher-respondents self-rating their personal knowledge of electronic media.

Noting that only 1.4% of teachers rated themselves as novice Internet users as Figure 5 shows, LCMS teachers believed they were adequately knowledgeable regarding usage of the Internet and commonplace multimedia such as CD/DVD's and typical software such as PowerPoint. By comparison, however, the LCMS teachers in this study rated their personal knowledge and experience with electronic curricula more toward the occasional and novice types of usage.

Perception question 2 of 15: How do you feel about the level of teaching-with-technology training (non-existent, less than adequate, adequate, better than adequate or

exemplary) you received in either undergraduate or graduate school? Please comment on what you liked or disliked or both.

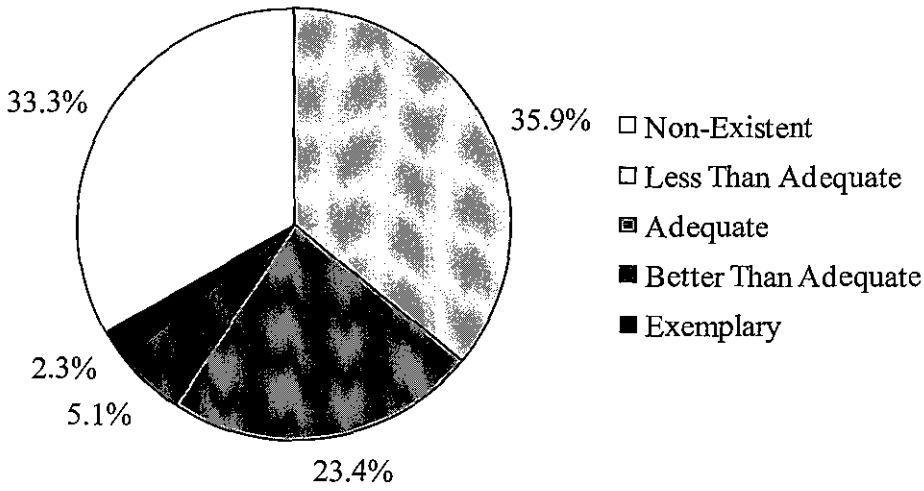


Figure 6. Teacher-respondents adequacy rating of teaching-with-technology training received in either undergraduate or graduate school.

Nearly 70% of the LCMS teachers who participated in this study rated their teaching-with-technology training from undergraduate and graduate school as non-existent or inadequate, as Figure 6 indicates. A compendium of what teachers liked and disliked about their training was assembled as representative of those teachers who provided further comments for this survey question.

The following is a summary of what teachers liked about their undergraduate and graduate school training:

1. Students liked the fact that using technology was encouraged and recommended on campus.

2. Training was more practical than theoretical, was hands-on and taught them how to integrate teaching with technology.
3. Where teachers were supplied with laptops, using and teaching with technology was perceived as easier.
4. Usage of online lesson plans, rubrics, the Internet, PowerPoint, Excel, smartboards, student response clickers, email and sending, reading and evaluating papers electronically gave teachers direct application.
5. Concordia University Seward has an entire class geared toward technology in the classroom.
6. Teaching-with-technology training addressed 21st century skills that students will need.

The following is a summary of what teachers disliked about their undergraduate and graduate school training:

1. The instruction was too basic and many teachers already knew the content.
2. The training offered did not have enough practical application as to the integration of technology in the classroom by subject area.
3. Old technology was used in the class and everything had already changed in the real world. There was not enough opportunity to work with smartboards.
4. The class time went too fast and there was not enough time to learn everything.
5. Where the instructors were perceived as inadequate, teachers say they had to self-teach the content.

6. Where the technology was not available at the school where teachers work, the skills they were taught in college could not be used and were therefore lost.
7. An anecdotal but opposing view was expressed that technology training should not be an integral part of teacher education.

Perception question 3 of 15: How do you feel about your current level of in-service teaching-with-technology training (I learn on my own, too little to assess or less than once a year; needs to be more frequent or 1-2 times per year; adequate training or greater than 2 times per year; or exemplary training both timely and pertinent)? Please comment on what you liked or disliked or both. LCMS teacher opinions of in-service sessions for teaching-with-technology training were not rated any more positively than what teachers rated training received when they were in college. In fact, Figure 7 shows that only 20% of the teachers in this study believed that in-service technology training at their school was adequate or exemplary in terms of timeliness and pertinence. A compilation was assembled regarding what teachers liked and disliked about their in-service training which is shown after Figure 7.

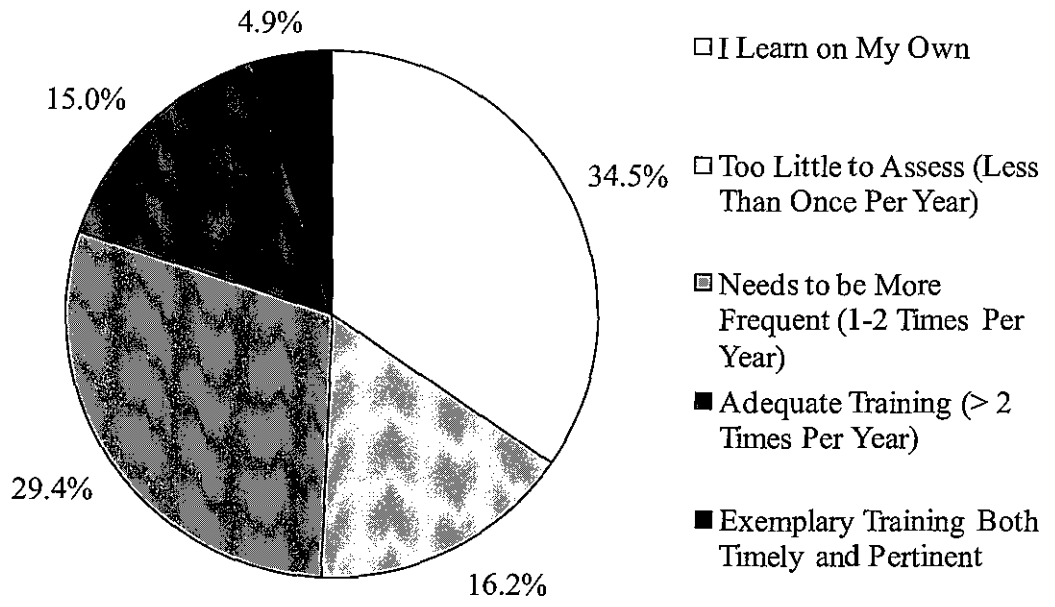


Figure 7. Teacher-respondents adequacy rating of in-service teaching-with-technology training.

The following is a summary of what teachers liked about their in-service technology training:

1. When the length of training was short and practical, it was preferred over long, in-depth training sessions.
2. Teachers preferred those sessions that were immediately applicable to subject matter being taught to students.
3. Training was viewed positively where opportunities were provided to learn new software for immediate application to the classroom.
4. Having time to practice what was just learned and work on one's own is important to teachers.

5. Project learning was viewed favorably where examples were provided to teachers so that students could use software to augment text with KidPix and then assemble everything into PowerPoint for presentation to the class.
6. Training was preferred that was current and provided just-in-time so that teachers could use what was just learned immediately in the classroom.
7. The Mentoring Technology Ministry course was positively viewed by teachers.

The following is a summary of what teachers disliked about their in-service technology training:

1. Teachers perceived negatively less than adequate computer labs with old or too few computers.
2. Classes where the student only watches the instructor navigate are viewed negatively. Teachers disliked not being able to practice skills long enough to feel comfortable.
3. Teachers were frustrated when the training was too basic or the technology instructors were inadequate. Tailored training is perceived superior over making assumptions about the level of teachers' technology knowledge. People are wide apart in abilities.
4. Teachers disliked the amount of creativity required to create a PowerPoint presentation.
5. Where technology training was attempting to present too much information too fast, it was perceived that the teachers were overwhelmed. Following-up on training with reinforcement is required.

6. Teachers often want technology training for art and music not just academic subjects.
7. If the training is perceived to cost too much it may not be conducted.

Perception question 4 of 15: Please rate the level of technology support you have at your school (inadequate, adequate, above average or outstanding). Please provide any other comments.

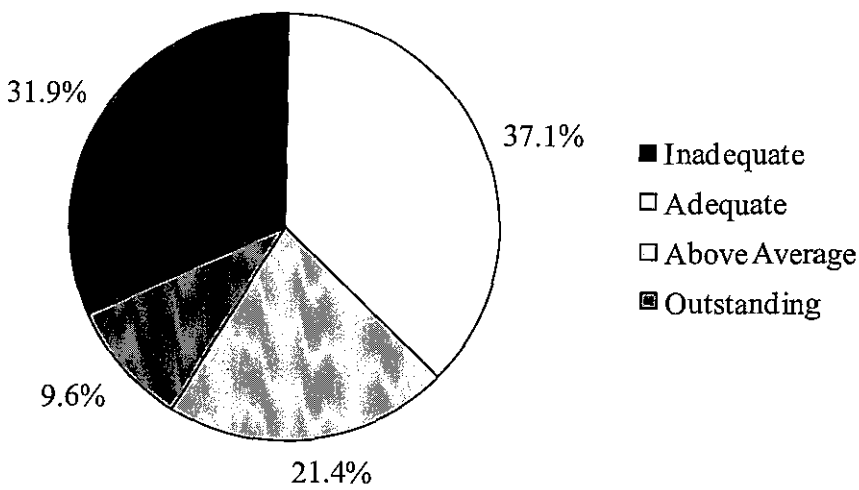


Figure 8. Teacher-respondents rating of technology support at school.

When LCMS teachers who participated in this study were asked to rate their current level of technology support within four categories, 68% rated their school's support level at or above adequate and up to outstanding, as Figure 8 presents. Those who rated positively cited reasons such as volunteers who maintain the school's infrastructure, proper funding which supports technology upgrades and updates, qualified staff and support personnel, and implementing one-to-one laptops for students. Those respondents who commented negatively about the technology support level at their school pointed at

the lack of or the cost of on-site help or the help-desk, the fact that troubleshooting was left to teachers with limited technology knowledge and the lack of Internet filtering.

Perception question 5 of 15: What electronic teaching media or software are you currently using in your classroom (from 19 choices please check all that apply). Please elaborate on other choices not listed that you may be using.

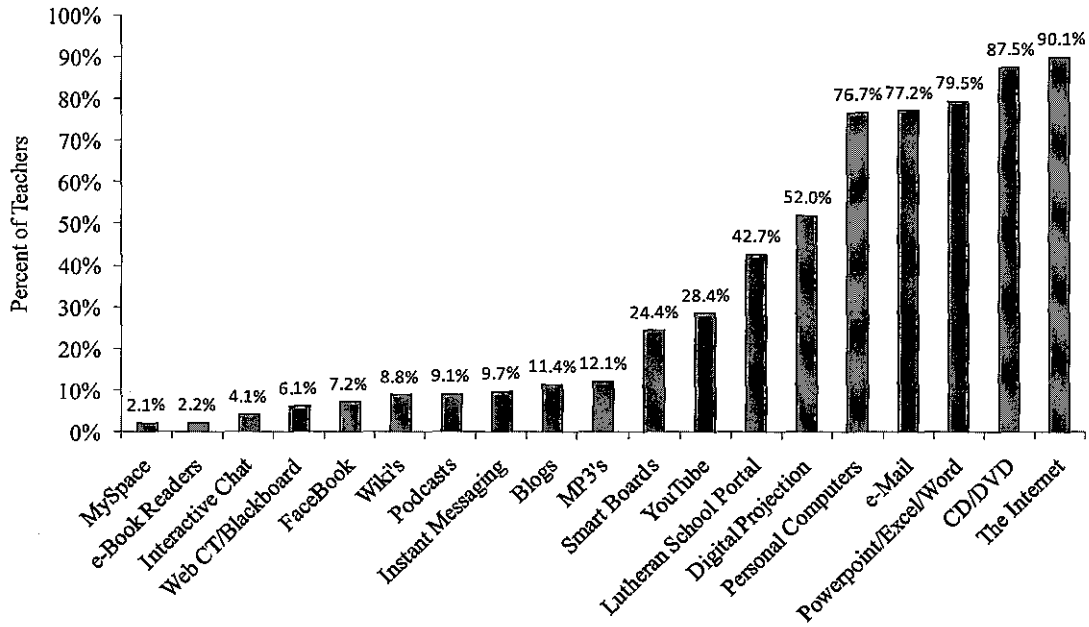


Figure 9. Percent of teacher-respondents using various media and software in the classroom.

Table 7

Other Media, Tools, Hardware and Software Currently in Use by LCMS Teacher

Hardware	Online Learning/Presentation Resources
Document camera	Discovery Education Video
Mimeo smartboard	Quia Online
Promethian board	United Streaming
Digital microscope	SpellingCity
AverKey	Scholastic resources
Interactive Clickers	Accelerated Reader
Video cameras	TI Smartview for Math
	Type-to-Learn
Management Systems	Mavis Beacon Teaches Typing
Moodle	Fast ForWord
Angel learning	Media Shout
TeacherEase	Wilderness Classroom
Edline	My PyramidTracker
Classroom Performance Support	Educators Virtual Mentor
PowerSchool	BrainPop
Gaggle.net	
RenWeb	

Table 7 (continued)

Other Media, Tools, Hardware and Software Currently in Use by LCMS Teachers

Concept/Mind Mapping Tools	iDVD
Inspiration	Audacity
FreeMind	Photostory 3
	GarageBand
Assessment Tools	Finale
Gradequick	MusicAce
Gradelink	AlfredTheory
FastDirect report cards	KidPix
Webgrader	My Doodle
Powergrade	iTunes
Hot Potatoes quizzes	Picassa
	Easybook
Social Networking/Online Communities	
TeacherTube	Web Browsers/Development
GodSpace	Safari
GodTube (now called Tangle)	Firefox
Ning	Chrome
	Explorer
Music/Movies/Photos/Art	DreamW
iMovie	

LCMS teachers use a wide variety of media and software in the classroom. As shown in Figure 9, the Internet had the highest classroom usage, followed by other standard visual and auditory media. It should be noted that only 77% of the teachers who responded to this survey identified using personal computers in the classroom. Table 7 lists other media, tools and software that the LCMS teachers in this study identified as currently being used in their classrooms. The auditory and visual presentation resources listed are indicative of the wide variety of possibilities available to K – 12 teachers.

Perception question 6 of 15: Please discuss below your perceptions on the advantages of teaching from technology-implemented electronic curricula in your classroom.

Teacher Response Category: Money

According to the LCMS teachers who responded to this question, electronic curricula are expected to save schools money in the long run versus a printed text. The issue of cost, initially discussed in chapter two from research by Dillon (2004) and Cavanaugh (2006), was a frequent answer provided by teachers especially in light of the existing free resources easily found on the internet.

Teacher Response Category: Pedagogy

Teachers believed that one primary advantage of electronic curricula is that classrooms no longer have walls in an online environment. Ward and Riley (2008), as indicated in chapter two, described flexible online learning where students who are not bound by time and location or students who are sick or unable to be at school for other reasons can keep up on their own. With limitless content supplied by the Internet in connection with electronic curricula, LCMS teachers believed that greater creativity in

teaching can be achieved providing more ways to reach students in the learning process, as Sims and Stork (2007) advocated in research highlighted in chapter two. Teachers in this study also perceived that various learning styles and multiple intelligences can be accommodated to a greater degree and special needs students can be assisted through the flexibility that electronic curricula can provide.

Additionally, the testing, grading and assessment capabilities of electronic curricula provides instant feedback sought after by teachers. Hudson (2007) supported LCMS teacher perceptions from this study that electronic chat can save some students from the fear of asking questions because they can communicate with the teacher privately. Student questions can be answered faster digitally and then reinforced later by viewing the curricula materials online. LCMS teachers cited that making the teaching process easier and more efficient are beneficial educational goals and that electronic curricula can demonstrate content to students which is impossible to create in the classroom. For example, virtual field trips or science experiments can be conducted while students listen to instructions straight from an expert. By using electronic curricula there is less of a need for teachers to reinvent the wheel each year. Teaching with technology was perceived by LCMS teachers as more authentic through the enrichment of lessons and the ability to expand thinking through deeper exploration of concepts, as was supported in chapter two by Keller (2008). LCMS teachers also perceived that the variety and creative delivery aspects of electronic curricula will encourage lifelong learning.

Teacher Response Category: Schools

Electronic curricula were considered by LCMS teachers to be the media of the day in modern education which was a position supported by Dede's (2008) research from

chapter two. LCMS teachers believed that using technology to teach will promote learning and train students in its usage for educational research and decision-making. Teachers further believed the use of technology in the classroom is necessary to compete with other schools and is expected by society so that all students are prepared for 21st century industry standards.

Teacher Response Category: Curriculum

LCMS teacher responses indicated a belief that electronic curricula can bring subjects to life for students, making old lessons new again. Just as was discussed in chapter two from research by Dillon (2008), the perception that updating lessons is becoming easier using electronic resources was causing textbooks to be viewed by LCMS teachers in this study as static and inferior. The adaptability and tailoring of curricula items was viewed positively and was seen as having potential to free teachers from the blackboard to move around the room. The advantages of electronic curricula included the interactive aspects of the design where LCMS teachers and students each have quick access to integrated resources. LCMS teachers' responses indicate they believe that work can be saved from week to week or year to year saving time and even paper. The teacher perception that electronic curricula will save paper agrees with research previously identified in chapter two by Ward and Riley (2008). LCMS teachers expressed their desire to have access to more electronic curricula choices as they would prefer to provide students with the very latest learning material available.

Teacher Response Category: Students

The impact of electronic curricula on students enhanced the experience according to teachers in the survey. As was mentioned in chapter two, Dror (2008) supported

teachers' perceptions in this research that students tend to organize ideas more efficiently because they are interested in technology and are more engaged, interested, motivated and focused throughout the learning process. Students preferred to use technology over the standard textbook, appeared more involved, and retained not only the required information, but also the process or procedure used in obtaining the information. This synthesis of process and content was beneficial to a more efficient learning process according to teachers' responses. When skills are practiced in student groups, teachers identified that the collaboration involved, although more challenging, encouraged self-reliance, self-direction and improved results.

Teacher Response Category: No advantages

Although in the minority, some teachers believed that there are no advantages to electronic curricula and that it is not needed. Input from these LCMS teachers included the beliefs that there was no pressing need to use electronic curricula over standard print-based curricula because it was not necessarily pedagogically superior, but only perceived as different, as was discussed by Sheppard et al. (2008) and highlighted in chapter two. The perception that good teachers do not need technology was frequently mentioned by the LCMS teachers in this study along with a sense of being unsure as to the benefits. These teachers felt they need to be presented with the clear benefits of using electronic curricula in the classroom, which was also contended in Dillenbourg's (2008) research as indicated in chapter two.

Perception question 7 of 15: Please discuss below your perceptions on the disadvantages of teaching from technology-implemented electronic curricula in your classroom.

Teacher Response Category: Cost

One disadvantage identified by teachers in this study was the perception that electronic curricula may be expensive and thus cost prohibitive for LCMS schools. This perception was surfaced particularly by teachers in the smaller schools with the accompanying suggestion that sources of outside funding should be explored to improve the implementation of teaching with technology in the classroom. This concept of the need for fund-raising for electronic curricula was also supported by research in chapter two by Lessen and Sorensen (2006).

Teacher Response Category: Training

The need for training, according to the LCMS teachers in this study, continues to thwart the advancement of electronic curricula in classrooms. Where there are willing teachers who would like to progress with technology usage in the classroom, the lack of professional development opportunities and in-service training frustrates their ability to keep up with advancements in hardware, software and pedagogy. This finding is supported from research indicated in chapter two by Franklin (2008) on the importance of technology training. Where there is an unwillingness to use or learn about technology because of a lack of confidence or comfort, teachers identified stresses associated with students knowing more about the subject than the teachers. Finding the proper media and technology resources and making use of them in the classroom requires training and practice for which little support is provided.

Teacher Response Category: Time

Closely related to teachers' perceptions of the cost of funding electronic curricula is the subject of having the resource of time to deal with proper planning. The concept of

teacher time being a constraint or obstacle for proper planning was brought out in chapter two by Vrasidas and Glass (2005). Teachers believed they must spend the time necessary to preview electronic curricula materials for reliability and then devise the incorporation of digital media into the already preplanned school day. Teachers perceived that the time required to set-up a classroom for projection involves increased classroom layout planning over traditional teaching approaches. In addition, electronic curricula lesson preparation is perceived to waste valuable class time if the set-up, log-in and responsiveness time are suboptimal. Teachers need to be able to find and use what they desire in an efficient and effective manner.

Teacher Response Category: Copyrights and permissions

LCMS teachers' survey responses also revealed concerns regarding the importance of teachers and students using materials from the Internet without full knowledge or attribution of the source. Supported by research identified in chapter two by Waters (2007), LCMS teachers also believed that electronic curricula must have built in services to assist with the legal requirements necessary to protect schools from copyright infringement.

Teacher Response Category: Reliability

Another disadvantage cited by LCMS teachers in this study was the concern about what to do when technology does not work. If hardware, software, the Internet or the network inside the school cease to operate during class time, an alternative lesson plan becomes necessary. When electricity goes out, even momentarily, work can be lost or critical systems may need to be rebooted safely by skilled technical support personnel, which many LCMS schools do not have on staff. Initially mentioned in chapter two by

McGrail (2007), LCMS teachers in this study were also aware that periodic maintenance is required on computers and all supporting infrastructure for updates, upgrades and other reliability improvements. LCMS teacher reluctance to rely solely on electronic curricula due to reliability concerns can be ameliorated by providing backup paper copies for those occasions when unplanned downtime occurs.

Teacher Response Category: Students

Teachers cited many potential disadvantages in using electronic curricula from the students' perspective. Of primary concern was student safety from inappropriate usage of the Internet. LCMS teachers identified issues relative to the need for student understanding of concepts before learning steps are automated by electronic means. This is supported by research shown in chapter two by Leatham (2007) that indicated that technology should not be used before student understanding of concepts is attained. LCMS teachers fear that students will grow to depend on video games and special effects as learning by entertainment rather than depending on learning the basics of subjects. The LCMS teachers in this study also believed that students need to experience the manual note-taking, the hands-on derivation of research and the persistent pursuit of solutions to problems such as those found in mathematics and the sciences, while incorporating the social interaction between teachers and students important to human growth.

Too much of a focus on technology usage may cause student distraction, such as when projecting images in a dark classroom. Teachers were also concerned about increased opportunities for cheating that technology provides through chatting or texting. Additionally, equity in student knowledge of and access to computers and software at home may cause issues with homework and preparation for class.

Teacher Response Category: Curricula

Characteristics of electronic curricula itself were cited as disadvantages by teachers in this study. Based on what teachers have been exposed to thus far, electronic curricula is perceived to be continually in a beta-testing mode and never final. In this way, the updating and testing required to make the software as current as possible also served as a frustration for teachers who are continually asked to try or test a function or feature and then provide feedback to the publisher. This is perceived as a poor quality issue even though it is intrinsic to the software development industry.

Teachers pointed out that hard copy manuals for electronic curricula are easier to work with when the computer is in use and technical questions occur. This would be preferable to attempting to read the manual online from the same computer from which students in a classroom are being taught. Additionally, all electronic curricula materials need to be printer-friendly for teachers and frequently asked questions or should be designed with students in mind. Teachers perceived that existing electronic curricula is incapable of adaptation to the learner, is lacking in state approved content or does not promote higher-level thinking skills. Easy navigation through instructions and content is cited by LCMS teachers as a basic requirement for electronic curricula to be successful in classrooms.

Teacher Response Category: Administration Support

LCMS teachers indicated that principals and school boards can be potential disadvantages for increasing the usage of electronic curricula, which was supported by chapter two research conducted by Chen (2008). Principals should provide continuous encouragement and endorsement for the initiative, support through difficulties and

allowances for flexible scheduling and changes in teaching styles. Assistance is required from administration, according to teachers, so that the usage of electronic curricula in the classroom can be launched properly and sustained even during difficult financial times.

Teacher Response Category: Pedagogy

LCMS teachers in this study are concerned with the impact of electronic curricula on the science and profession of teaching including the potential for teachers to be replaced by technology some day. Specifically, teachers perceived electronic curricula should not be viewed as a panacea for all difficulties. Dillenbourg's (2008) research from chapter two supported the LCMS teachers' perceptions in this regard. Disadvantages listed in this category included the belief that electronic curricula may cause laziness in the teaching profession from a loss of focus and an overreliance on what is perceived as just another tool for teachers to use. Using technology to teach when it adds nothing new is viewed negatively by LCMS teachers. This is further supported by research identified in chapter two where Hughes (2005) indicated that electronic curricula must provide additional pedagogical benefit for teachers to willingly transfer time-tested current teaching methods for those of a more technologically advanced nature.

Teacher Response Category: No Disadvantages

Many LCMS teachers who participated in this study simply stated there are no disadvantages of teaching from technology-implemented electronic curricula because it is another method available for teachers to incorporate as they see fit. Other LCMS teachers stated they could not identify any disadvantages because they have not had the opportunity to use electronic curricula for any length of time and are thus unable to evaluate and compare student learning results to other methods. Ertmer's (2005) research

highlighted in chapter two supported the notion that there is opportunity to build positive perceptions with teachers who have not yet had experience with electronic curricula.

Perception question 8 of 15: Please discuss below what factors influence your decisions as a teacher to seek out and teach from technology-implemented electronic curricula.

Teacher Response Category: Price

One of the first categories which surfaced as an influencing factor was LCMS teachers' analysis of the cost of electronic curricula. Affordability of the components of electronic curricula must provide value considered to be equal to or greater than standard textbooks. The price that teachers will compare electronic curricula against will be the opportunity costs of other needed resources. The total cost of curriculum cannot be perceived as increasing without significant improvement in either available teacher time, ease of teaching a subject or student achievement.

Teacher Response Category: Curricula

Major factors influencing teachers' decisions to seek out and teach from electronic curricula involve the characteristics of the curricula itself. Necessary curricula traits noted in this research include increasing the students' excitement, enjoyment, engagement and interest in the learning process. Not only must the electronic curricula be grade appropriate, incorporate state content standards and provide the desired student learning outcomes, it must also offer a variety in teaching methods that teachers cannot provide in better fashion to students on their own. LCMS teachers' perceptions indicating a perceived requirement for variety in electronic teaching methods was also supported by Hennessy et al. (2005) as previously outlined in chapter two.

Other factors teachers considered were ease of usage and preparation time, the electronic methods for maintaining the currency and accuracy of content and the perceived value of student and teacher interactivity by digital means. The quality of the electronic curricula must exceed textbooks in terms of the ability to make use of self-assessment that according to LCMS teachers, is a motivating factor for both teachers and students. Teachers are not looking to simply replace paper worksheets with electronic ones, but are interested in new ways to engage students. LCMS teachers will value electronic curricula that provide a deeper understanding of subject matter in an authentic or real-life manner, while simultaneously gaining the addition of images, sounds or online text that helps improve technology usage skills. Teachers perceived that if electronic curricula can assist with reaching students' varying learning styles through differentiated instruction that improves student attention and learning, then the use of technology would be considered cutting edge and an improvement over textbook teaching styles.

Teacher Response Category: Learning Curve

Wright and Wilson (2007) demonstrated, as shown in chapter two, how increasing knowledge about using technology in the classroom created more comfort for teachers as they attempted to teach. In similar fashion, the comfort level that LCMS teachers believe they have with electronic curricula was perceived as a factor in their decision to use it. The ability to learn the process for using electronic curricula quickly and intuitively is important to LCMS teachers, and training must be supported by the publisher to facilitate familiarity of all the features and available content.

Teacher Response Category: Schools

LCMS teachers indicated in the survey responses that they believed that an important factor in the decision to use electronic curricula is the need to present well in our communities. This means that staying on the cutting edge of technology is necessary so that LCMS schools remain competitive to other private and public school systems. This need for LCMS teachers and schools to be current with the latest pedagogy is manifested in the fact that students are already using technology for other aspects of life and learning, which was supported by Ward and Riley's (2008) research indicated in chapter two. Many publishers and schools are making the transition to electronic curricula according to LCMS teachers. The LCMS teachers in this study believed that society expects this transition and that the LCMS school system needs to produce technologically competent students for the 21st century.

Teacher Response Category: Accessibility and Support Resources

The availability of hardware for teachers to use in the classroom to deliver electronic curricula in a satisfactory manner is a fundamental factor teachers consider. First, LCMS teachers perceived that accessibility to computers and projection is necessary, as McGrail's (2007) research from chapter two supports, as well as the reliable maintenance of the infrastructure of the school through a technical support function. Having current hardware and software is considered by LCMS teachers to be half of the equation with the other half being the technical support for the common problems that arise from their usage. This split requirement was also supported by Franklin's (2008) research identified in chapter two.

Teacher Response Category: Time

Among the factors teachers consider when deciding whether to seek out electronic curricula for teaching purposes is the issue of time. LCMS teachers perceived that electronic curricula should be judged on the saving of time, just as Franklin (2008) found in research identified in chapter two, in terms of researching the features and functions and the easy exploration of the available components and content of the curricula. LCMS teachers also believe that advance preparation and set-up time to use the electronic curricula are key factors in deciding to teach with technology.

Teacher Response Category: Administration Support

Another important factor as to whether LCMS teachers will decide to use technology in the classroom is the level of support from school administration. Beginning with simple encouragement from principals, teachers require positive reinforcement to aim in the direction of electronic curricula. The written survey results indicated that where there was a firm expectation levied by administration, teachers perceived they were more prone to using technology-implemented electronic curricula in the classroom.

Teacher Response Category: No Influences

Errington (2004) previously found that teachers' perceptions of teaching with technology have improved by being offered options to explore electronic curricula and identify training and support through the process as was indicated in chapter two. There was a contingent of LCMS teacher survey responses in this study that indicated either no factors presently influence teacher decisions as to the usage of electronic curricula or that these teachers do not seek out or currently use technology. This category of teacher perceptions was in the minority. Cortese's (2007) research from chapter two would

perhaps indicate that these LCMS teachers have not yet had an opportunity to make any personal meaning out of teaching with technology.

Perception question 9 of 15: Please discuss below what concerns, if any, you as a teacher have about teaching from technology-implemented electronic curricula in your classroom.

Teacher Response Category: Students

Balancing student safety and Internet filtering needs with the need for freedom in education was the subject of research identified in chapter two by Sutton (2006). Teachers' fear for student safety was found to be an obstacle in Sutton's research on expanding electronic curricula in the classroom. In a similar manner, LCMS teachers expressed concerns relative to the impact on students of using electronic curricula in the classroom. Beginning with the concern that safety from adult and other inappropriate websites requires a monitoring system, teachers are also worried about the hidden dangers of using the Internet such as online bullying. Increased cheating and plagiarism is also a concern because of losing the personal touch of listening and the interactive, hands-on work time with students that is needed, according to teachers, for meaningful discourse and proper learning. Losing the ability to manually perform the basic tasks of writing and various mathematics skills is also a concern for LCMS teachers regarding the use of technology in the classroom.

LCMS teachers believed that too much technology usage can adversely affect students' language and social brain development. The fear that dependence on technology may replace thinking was first brought out in chapter two by Dawson (2006) and was indicated in this study from LCMS teachers' perceptions that students' focus will narrow

causing unrealistic expectations that all aspects of education should be fun like a video game. Students who may not have a computer or Internet access at home may find it difficult to be prepared each day by keeping up with homework assigned over electronic media. Teachers are worried that because of all of these aforementioned concerns, it will be difficult to meet the state standards in the time allotted using electronic curricula.

Teachers Response Category: Pedagogy

Teachers expressed concern that with the usage of electronic curricula the educational value of teaching will be replaced and lost. Some teachers believed that teaching with technology is a fad, soon to dissipate, because people are tired of PowerPoint presentations and projectors in dark rooms. One teacher stated that the usage of technology could "sterilize the teachers' gift of teaching if not planned around." LCMS teachers perceived that playing with technology in the classroom is catering too much, takes time away from real learning and may cause students to miss the big ideas necessary in the curriculum. Sims' (2008) research highlighted in chapter two studied technology as a distraction from effective learning as well and found that technology should be a consideration but not an assumption in education. LCMS teachers believed that technology is being overemphasized and should be considered as just one tool to get a point across. LCMS teachers worry they will be stuck behind computers while missing opportunities to walk around the classroom in order to observe student learning in action.

The LCMS teachers who responded to this survey indicated that some teachers are fearful or unwilling to change from current teaching habits and that additional time and support will be needed to help them move forward. The primary concern these

teachers have is that the students may be smarter than the teachers relative to technology and that the benefit of teaching with electronic curricula has not yet been proven.

Teacher Response Category: Copyrights

Remembering the era of using a copy machine to copy textbooks, it took many years, according to LCMS teachers, to inform and reinforce with educators that reproducing copyrighted materials was not only illegal but unethical. The concerns expressed in the results of this section involve teachers who want to be sure that all online materials used are properly provided with the appropriate permissions from authors and publishers.

Teacher Response Category: Time

The ability to make effective usage of electronic curricula includes testing lessons before using them, general teaching preparation and researching various best practices. These steps in the teaching process are important to teachers and the primary concern is that they will take longer to perform electronically than they did manually. This perceived waste of time would be unacceptable for LCMS teachers.

Teacher Response Category: Accessibility and Reliability

LCMS teachers are concerned about being limited in the ability to access the hardware and software necessary to make effective use of electronic curricula. The ability to maintain technology in as current a state as possible is important to the learning process. Losing data because of the loss of electricity or reliability of the Internet service at LCMS schools are teacher concerns because downtime affects content coverage. All equipment and digital resources need to be user-friendly according to teachers because

technology difficulties prompt teachers to use alternative teaching methods rather than wasting class time attempting to troubleshoot.

Teacher Response Category: Training

Teachers believed that confidence in using electronic curricula will grow as LCMS teachers are provided more training and support. Teachers believed it is necessary to stay current on the newest technology and are looking for more training on the subject. Teachers are concerned that perhaps a subject they teach, such as mathematics, will not lend itself to the usage of technology and that their inexperience in attempting to force digital media into the process will cause a less than valuable learning experience for students. Providing training to teachers on the usage of electronic curricula they believe should be a top priority.

Teacher Response Category: Administration Support

Having the encouragement and support of administration, namely from the principal, was a concern for LCMS teachers while attempting to use technology-implemented electronic curricula. Teachers fear parents may go elsewhere for the education of their children unless LCMS schools make the investment in technology required for 21st century education. Teachers would like increased encouragement from principals in order to create greater staff commitment and remove fear from the process of inculcating electronic media in LCMS classrooms.

Teacher Response Category: Affordability

If electronic curricula cannot be produced affordably, LCMS teachers are concerned that schools will not make the initial investment. The publishers' cost must be reasonable and comparable to textbooks in order for electronic curricula to be more

widely used in LCMS schools. Publishers must overcome the teacher perception that electronic curricula may be just a different way to do the same thing with textbooks.

Perception question 10 of 15: Please discuss below what you perceive is necessary for technology-implemented electronic curricula usage to grow in Lutheran schools. Teachers' answers to this survey question were noticeably shorter and more concise. In many cases, single word answers were sufficient to understand the teachers' perceptions. Each of the teacher response categories were easier to assemble for this question based on words such as funding or training that were used in the answers.

Teacher Response Category: Funding

At the top of the list regarding what LCMS teachers perceived is necessary for electronic curricula to grow in Lutheran schools is first, an affordable curricula price relative to traditional choices and second, a source of funding that would enable wide spread usage. Without these two financial considerations, teachers believed electronic curricula will not get underway in the LCMS.

Teacher Response Category: Training

The need for training as an enabler for the usage of electronic curricula was expressed in various ways by the teachers' answers to this question. Education, mentoring, awareness, communication and on-staff support all are perceived by teachers as necessary to overcome teachers' fears about using technology in the classroom.

Teacher Response Category: Accessibility and Reliability

LCMS teacher responses indicated that all of the hardware, software and Internet connections intrinsic to electronic curricula must be easy to access, upgrade, repair and support in order for it to be more widely used in Lutheran schools.

Teacher Response Category: Administration Support

Adopting a strong sense of urgency among principals in the LCMS school system for the usage of electronic curricula in the classroom is necessary for it to expand. Encouragement is perceived by teachers to be needed from principals to support the belief that technology is important to our students' future. Following up on how teachers are using technology in the classroom is seen as the last step necessary to ensure consistency in application.

Teacher Response Category: Develop and Deploy

LCMS teachers in this study perceived they are ready for publishers to incorporate more electronic curricula into activities and lessons, which is supported by research from chapter two by Sheppard et al. (2008). While ease of use and effectiveness are other necessary features that teachers discussed, until publishers begin deploying more electronic curricula into LCMS schools, ongoing evaluation and incorporation of technology-based teaching methods will continue to be delayed.

Teacher Response Category: Time

Preparation time is a necessity, according to LCMS teachers, for electronic curricula to grow. Teachers need time to explore, test, experiment with and then plan how to incorporate electronic curricula into everyday teaching. This time to learn, practice and grow comfortable with electronic curricula is required for teachers to aim in the direction of expanding classroom technology usage.

Perception question 11 of 15: Please discuss below what improvements in curricula design you perceive would increase the effective use of technology in your classroom.

Teacher Response Category: Support

The need to provide technology support within electronic curricula was an improvement in design perceived as necessary for LCMS teachers to increase classroom usage. Usage of an online help-desk and providing answers to frequently asked questions was suggested by teachers.

Teacher Response Category: Training

LCMS teachers perceived they would like opportunities for workshops or further communication on what electronic curricula resources can do to enhance the learning experience. LCMS teachers do not know what is available to them and they believe they do not know how to fully use existing technology. Teachers suggested improved on-line assistance from publishers would address some training needs and that the use of blogs could be a tool for teachers to discuss and share success stories. Providing teachers with occasions to observe classrooms where technology is being modeled will allow the benefits to be witnessed in real-time and establish benchmarks for learning various applications.

Teacher Response Category: Time

Improvements in electronic curricula design that assist teachers by saving time either for increased instruction or additional preparation is perceived positively and would increase the usage of technology in the classroom.

Teacher Response Category: Affordability

LCMS teachers believed that designing electronic curricula to be affordable by comparison to alternatives would increase the effective usage of technology in the classroom. A license fee structure that renews every three to five years was suggested.

Teacher Response Category: Accessibility

LCMS teachers perceived that in order to increase the effective use of technology in the classroom the hardware and software need to be made more available. Projectors, increasing the speed of the Internet service, smartboards, a computer for each student and basic DVD players are needed in order to consider the usage of electronic curricula. In addition, the classroom layout including electrical outlet placement needs to be considered as part of the design.

Teacher Response Category: Internet Filtering

LCMS teachers have perceptions that over-blocking the internet is a detriment to the effective use of electronic curricula in the classroom. LCMS teachers want access to sites such as YouTube where there are vast numbers of educational videos.

Teacher Response Category: Administration Support

LCMS teachers perceived that increased levels of encouragement from principals would aid in reducing resistance to using technology in the classroom. In order to increase the effective use of electronic curricula, substantial support must be provided so that teaching methods can be willingly changed by teachers as necessary and commitment from teachers to use technology replaces what is perceived as insincerity or simply lip service.

Teacher Response Category: Descriptors of Electronic Curricula

The survey responses from LCMS teachers to the question of what improvements in curricula design will increase usage prompted a lengthy list of recommendations. First, teachers recommended moving forward with more materials and involving teachers in the design of electronic curricula from the beginning. The lessons need to be creative,

interesting and provide real-world examples for students to experience. Multi-media assignments from current, regularly updated websites would allow for project-based learning activities. Accompanying study guides with assessment features are needed. While lessons should be collaborative in nature, choices must be incorporated to allow for individualized student learning. Content must be designed for all class sizes, must not limit the location of either the teacher or the student and must take into account diversity in backgrounds and learners with disabilities. Reinforcing the research from chapter two, LCMS teachers believed that teaching students proper library skills while doing work should include content such as how to know a reliable source from an unreliable source on the Internet. Lessons should be more visual and provide less printed matter in order to provide opportunities for students to learn problem-solving skills.

LCMS teachers perceived that electronic curricula design must be aligned with state standards, geared to the appropriate grade-level, have integrated assessment and should be focused on promoting higher-order thinking skills.

Teachers preferred a mosaic approach which means having the ability to select in small pieces from the various curricula items offered by publishers. LCMS teachers recommended specific media for electronic curricula including short video clips, embedded charts, PDF materials and the use of common platform software with universal design or open-source characteristics for commonality purposes. Teachers also suggested the usage of webquests, games and podcasts ensuring that all are from kid-safe websites.

LCMS teachers also perceived that improvements in curricula design necessary to increase technology usage should focus on user-friendliness, quick-reference capability and online teachers' guides with integrated training at each step. An easy to use

electronic curricula format will engender more usage in the classroom according to the LCMS teachers in this study.

Teacher Response Category: Dissenters

A group of LCMS teacher responses included those who perceived that curriculum should not be intentionally designed around technology. These teachers believed that there is a need for written material and that technology is more frustrating than it is assistive in nature. Some teachers reported that technology has taken the joy out of teaching because they feel pressured to make use of electronic curricula and they do not know how yet. Many teachers believed electronic curricula should only be used if it offers some advantage over printed alternatives, and technology should be considered simply to be another teaching tool and not a replacement for all other teaching tools at one time.

LCMS teachers in this group further believed that using technology at the lower elementary grades is detrimental to social interaction and educational growth. This group believed it is simpler to write on the board than to spend time creating a PowerPoint presentation. These LCMS teachers want their students to understand the basics of subjects such as mathematics before they ever use a calculator to speed up the process.

Perception question 12 of 15: How would you prioritize the need for technology-implemented electronic curricula in each of the following subject areas (10 subject areas listed as choices to prioritize with 10 being the highest priority down to 1 being the lowest priority)? Please provide comments for any other subject area not listed.

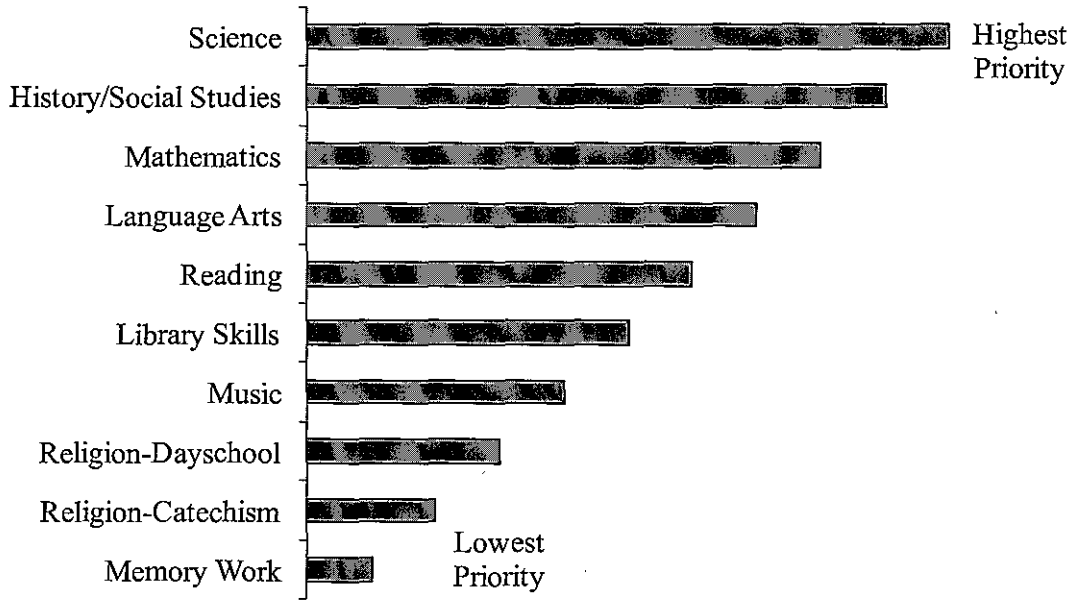


Figure 10. Teacher-respondents assigned priority and ranking of the need for electronic curricula by subject area.

These results were summarized using a weighted ranking method standard to establishing priorities. Multiplying each priority 1-10 by the number of teachers who ranked each subject for a priority and then summing for each subject provided the weighted rank shown in Figure 10. LCMS teachers prioritized core subjects such as science, social studies, math and language arts/reading over the non-core subjects of religion and music, for example, when considering the need to develop electronic curricula for use in the classroom.

Perception question 13 of 15: How would you rate (not needed, possibly needed, or needed) the following media, tools and software (19 listed) as necessary parts of technology-implemented electronic curricula for your classroom. Please comment on any other media not listed.

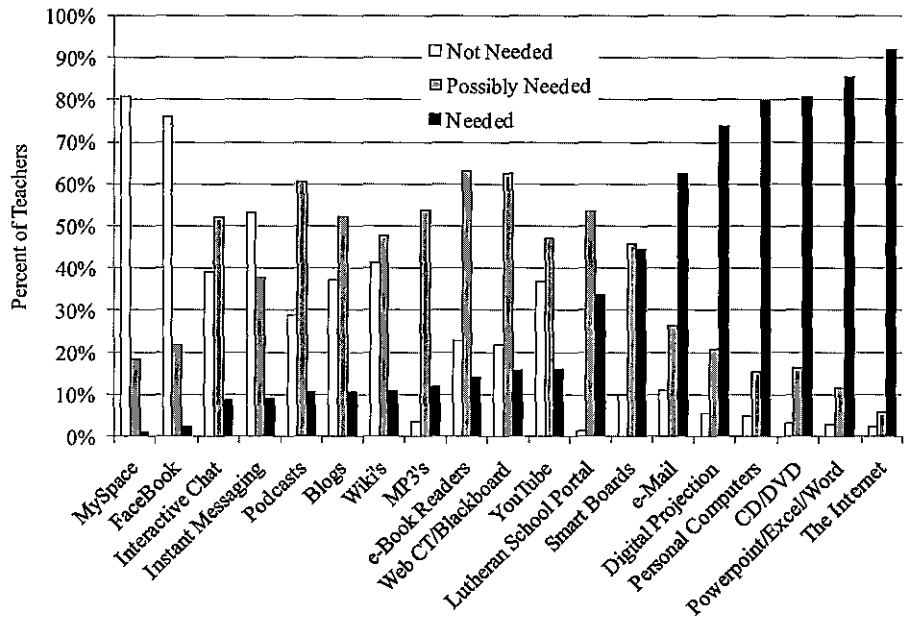


Figure 11. Teacher-respondents assigned rating of media and software as necessary components of electronic curricula.

LCMS teachers who responded to this question provided remarks that supported their selection. The Internet was perceived to be the highest need for the classroom by greater than 90% of the teachers in this study, followed by standard computer programs such as PowerPoint. Ancillary equipment such as CD/DVD players were ranked next highest even though computers are capable of the function. Personal computers and projection equipment that form the basis for electronic curricula follow in ranking according to LCMS teachers.

At the opposite end of the ranking, teachers perceived interactive web activities that are possibly unsupervised as safety risks for potential problems such as cyber-bullying. MySpace, Facebook, chat and instant messaging were therefore rated by 40%-

80% of the teachers to be in the category of not-needed, which means they are perceived as unnecessary parts of electronic curricula.

E-book readers, podcasts and WebCT had a greater than 60% teacher perception rating that they are possibly-needed or required for classroom usage.

Perception question 14 of 15: How would you describe your interest level (not interested, moderately interested, or significantly interested) in teaching from technology-implemented electronic curricula? Please comment if necessary in more detail.

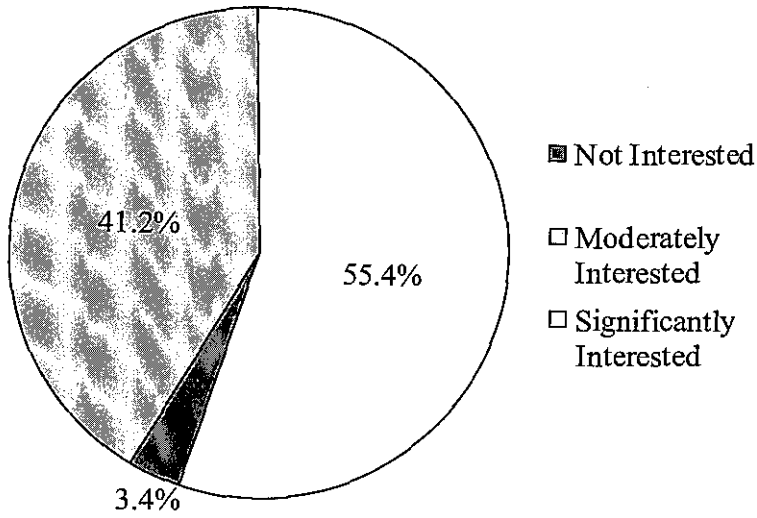


Figure 12. Percentage of teacher-respondents by interest level in teaching from electronic curricula.

LCMS teachers' perceptions and curiosity about being attracted toward electronic curricula is positive. Responses indicated that 96.6% of teachers surveyed were moderately to significantly interested in teaching with technology-implemented

electronic curricula. Only 3.4% stated they were not interested in teaching with technology in the classroom.

Perception question 15 of 15: State your perception of the overall use of technology in the classroom and please explain why. The final survey question regarding perceptions of the overall use of technology in the classroom allowed teachers the ability to summarize and clarify their thoughts in terms of what they already provided. The following categories of data condense the information.

Teacher Response Category: Digital Age

Responses from LCMS teachers revolved around the concept that technology is part of the world and critical to students' 21st century success. Students must be familiar and comfortable with using technology because every aspect of our lives is touched by it. Teachers perceived that Lutheran schools need to keep up and not fall behind in making electronic curricula an integral part of teaching because nearly all students have some form of technology in the home and have grown to expect it in school. One objective comment made was to imagine the current times if Martin Luther had not made use of the newly invented printing press of his time to quickly reproduce the Bible for the masses. According to the LCMS teachers who responded to this question, technology is an essential priority, should be implemented on a daily basis and is currently used far too little in LCMS classrooms.

Teacher Response Category: Pedagogy

Electronic curricula can reach more children in terms of visual, auditory and kinesthetic learning styles and keeps the attention of students better in the process. LCMS teachers also believed that technology engages students in the learning process by

incorporating variety into group or independent work and in the manner of interaction with the materials. The perceived up-to-date nature of electronic materials is valuable because it creates enthusiasm for students and allows students to learn more by going into subjects on a deeper basis. LCMS teachers believed that students who use electronic curricula have the ability to work at their own pace and receive valuable real-time feedback throughout the process.

Teacher Response Category: Safety

LCMS teachers' responses indicated a concern for the safety of students as they use electronic curricula. Students need to be influenced positively, taught the ethics of Internet usage and grow as responsible people. Proper filters are required so that teachers can be reasonably assured students are focused on curricula or research library skills while using computers and not on unapproved websites. Teachers believe that electronic curricula can be a useful tool with proper supervision.

Teacher Response Category: Budget

Schools require the budget to support electronic curricula without taking money away from other curricula needs. In addition, LCMS teachers believed that teaching with technology is a wise investment and that in the long run it will save schools money by eliminating from the budget the need to replace textbooks.

Teacher Response Category: Training

LCMS teachers' responses indicated they would like to learn more about using electronic curricula in the classroom. If teaching with technology can help teachers become more effective, then they believe that learning how to use electronic curricula

correctly from the beginning would be a good way to avoid the frustration of trial and error.

Teacher Response Category: Accessibility

The requirement of sharing computers on a cart does not, according to LCMS teachers, inspire frequent usage. LCMS teachers believed that more computers are needed in classrooms, perhaps enough for each student. State-of-the-art computers and software should be purchased for LCMS schools according to the teachers who responded to this survey.

Teacher Response Category: Grade Levels

LCMS teachers perceived that students in upper grades should have priority and immediate access to electronic curricula more so than students in lower grades; however, students in the lower grades should be exposed to technology to begin to provide a solid foundation. Kindergarten usage of technology should be minimal because the students are just learning to read and write

Teacher Response Category: Dissenters

Some of the responses to this survey were from LCMS teachers who believed that technology distracts from the curricula it attempts to communicate. These teachers believed technology should support and not replace the teacher. Some teachers stated that electronic curricula are overrated, unproven and not necessary for teaching. Some teachers viewed technology in the classroom as entertainment or as an escape from rigorous work. LCMS teachers would prefer that students interact with their peers and have limited time with a computer screen.

At the end of the spectrum of dissenters are those LCMS teachers who perceived they are being forced into using technology and are intimidated by the growing urgency. Some LCMS teachers say they want to resign if administrators push the need to use electronic curricula in the classroom.

Emerging Themes

As was mentioned earlier in this chapter, the final analysis step was to reexamine and synthesize the previously summarized teacher response categories from each of the individual questions 6-11 and 15. The summarized categories were read and reread so that further inductive analysis could then lead toward more general or overarching premises or themes. Each of the teacher response categories was analyzed and twelve words or phrases were noted as being repetitive in theme. These repeating words or phrases which are listed in Table 8 became emerging themes representing the thousands of teachers' perceptions data elements in this research. The data elements were then reread to ensure that the proper coding corresponded with the proper theme names. The emerging themes are explained in detail.

Table 8

Emerging Themes from Lutheran Church – Missouri Synod (LCMS) Teachers

Digital age requirements	Pedagogy
Administrative encouragement and support	Impact on students
Affordability of technology	Safety of students
Accessibility and technical support	Copyrights and permissions
Time for teachers	Descriptors of electronic curricula
Training for teachers	Learning from dissenters

Emerging theme: Digital age requirements. LCMS teachers had varying degrees of belief that using technology in the classroom represents the media of the day. Every aspect of students' lives will be increasingly touched by technology and teachers want to train students on the proper use of the Internet as part of the world in which they live. It seems as if most students make use of some form of technology for other aspects of life and have various audio, visual and computing devices in the home. The usage of electronic curricula in the classroom is necessary to present Lutheran schools well in our communities and compete with other public and private schools. Keeping up with the latest developments in technology should be a priority because it is expected by society that we make the transition and not allow our schools to fall behind. Teachers believe that electronic curricula is underutilized in LCMS classrooms and that staying on the cutting edge with technology is necessary to prepare students for success in the world of 21st century industry standards. LCMS teachers perceive they are ready for publishers to

create more electronic curricula and would first like to focus on development and deployment for upper grades.

Emerging theme: Administrative encouragement and support. A consistent opinion was expressed in this study that a stronger sense of urgency is required from principals and school boards so that electronic curricula usage expands in LCMS schools. More firm expectations from administration is perceived by teachers as what is needed to reduce fears teachers may have, improve commitment to transform current teaching methods and generally reduce the resistance to technological change that LCMS schools are experiencing. The perception that simple encouragement from principals will advance technology usage is widespread, and without such support, LCMS teachers believe parents will go elsewhere in search of education for their children where administration champions electronic curricula.

Teachers believe that LCMS principals first need to understand that using technology in the classroom is important training and experience for students' futures. Principals then need to support the electronic curricula initiative through difficulties in transition and scheduling and also through financial obstacles that many LCMS schools encounter. Teachers also believe that follow-up is required by principals so that consistency is achieved in deployment of electronic curricula usage in LCMS schools.

Emerging theme: Affordability of technology. Integral to more widespread usage of electronic curricula in LCMS schools is the subject of cost versus value. LCMS teachers believe that technology is a wise investment as long as the electronic curricula's value is perceived to be equal to or greater than standard textbooks. This means that in the long run, savings should occur or electronic curricula should be capable of replacing

textbooks in the school budget. LCMS teachers believe that smaller schools must be able to afford teaching with technology and not be forced to take away from other school needs to purchase electronic curricula. The cost of or affordability of electronic curricula was the most expressed perception LCMS teachers provided in this study. Getting past the initial investment by LCMS schools is the largest hurdle for electronic curricula according to teachers, and, therefore, a primary suggestion was a license fee structure renewing every three to five years.

Teachers believe that sources of outside funding need to be explored by publishers, to enable more wide-spread deployment of technology into LCMS schools. Publishers will need to overcome the teacher perception that teaching with technology is just a different way to do the same thing as a textbook. Providing increased value to teachers in areas of improving available teacher time, ease of teaching and improved student achievement should become the hallmark of electronic curricula.

Emerging theme: Accessibility and technical support. The need for more state-of-the-art hardware and software first and then the need for technical support second are the two responses provided by teachers in this study when discussing requirements for LCMS schools. Teachers believe that sharing computers across classrooms does not allow enough opportunity to plan effectively for electronic curricula to be used on a daily basis. More computers are needed and should be provided for each student to effectively teach with technology. In addition, LCMS teachers are always seeking out projectors, increased Internet speed and DVD players as companion devices necessary for the use of electronic curricula. The layout of the classroom is affected by the use of technology, and

the location and placement of electrical outlets need to be planned to accept more devices being used at one time.

Technical support personnel are perceived as required by teachers to maintain, upgrade, repair and support the usage of electronic curricula in the classroom. LCMS teachers fear excessive downtime of electricity, the Internet, or computers and that there will be an associated loss of student and teacher work. Unplanned downtime will require alternative lesson planning or paper back-up copies, which can be supplied by publishers, to ease teachers' fears in this category. A reliable periodic maintenance and technical support plan is required according to LCMS teachers, to increase the usage of electronic curricula in LCMS schools.

Emerging theme: Time for teachers. Perhaps the most valuable dimension owned and guarded by LCMS teachers is time. Time was mentioned consistently throughout the teachers' survey responses relative to the two related concepts of improving available time and avoiding anything that wastes time. LCMS teachers are critical of set-up or log-in time as well as electronic curricula functions that take longer electronically than if done manually. Electronic curricula capable of providing efficiencies that improve planning and preparation time, thus saving time for increased instruction during the school day, is viewed positively by LCMS teachers. Additionally, teachers perceive it is necessary to have the time to preview lessons, explore features, test responsiveness, practice delivery and experiment with electronic curricula so they can learn and grow comfortable with using technology in the classroom more widely.

Emerging theme: Training for teachers. The lack of training for LCMS teachers is having a negative impact on spreading the use of technology in the classroom. Teachers

identified the types of training they seek as well as the topics the training should cover. Workshops, on-line assistance from publishers and blog site discussion groups to discuss and share success stories were suggested as efficient training forums. Benchmarking schools where electronic curricula is already in use is helpful to teachers, especially when direct classroom observation is possible. In-service training and professional development opportunities are perceived as ways to overcome teacher fears and improve confidence in using technology. The addition of on-staff support to reinforce assistance after training is suggested by teacher responses so that teachers put into action what was just learned.

LCMS teachers fear that attempting to force electronic curricula into classrooms where teachers are not properly prepared and trained embarrasses teachers because students may know more about technology than teachers, which then causes a less than valuable learning experience for students. Training topics that teachers perceive are valuable include how to stay current on the latest technology, what electronic curricula is available, how one uses the technology features intuitively, how classroom subjects lend themselves to technology usage, what electronic curricula features have the potential to enhance learning and how to incorporate teaching-with-technology methods into the school day.

Emerging theme: Pedagogy. LCMS teachers expressed negative and positive pedagogical perceptions in the survey results. On the negative side, teachers are concerned that electronic curricula may be seen as a panacea for all contemporary teaching issues. Teachers expressed fear over being stuck behind computers and eventually being replaced by impersonal technology. Teachers also have the perception

that over time technology will cause laziness in the teaching profession from overreliance on a single tool that has not yet proven to increase long-term student learning. Teachers in this study consistently expressed the opinion that students are smarter than teachers on technology subjects and are tired of rudimentary PowerPoint presentations. LCMS teachers worry that the use of electronic curricula may only be a short-term fad and not a long-term increasing trend in the teaching profession.

On the positive side of teachers' responses to the survey was the general view that using technology in teaching has the potential to reach more students by keeping their attention and enthusiasm through the creative delivery and variety in methods that characterize electronic curricula. LCMS teachers believe that students may go deeper into subjects and learn more in either a group or independent setting. Subject-matter questions are answered more quickly through electronic means such as online chat, and students are capable of working at their own pace, without the constraints of specific class periods or locations. Because of the limitless content that electronic curricula can incorporate, authentic learning such as science experiments and virtual field trips provide student experiences that cannot normally be achieved in the classroom.

Emerging theme: Impact on students. Responses by LCMS teachers as to perceptions of the impact of electronic curricula on students were divided. On one side of the issue, teachers were concerned about cheating and plagiarism which goes undetected because of the usage of electronic media. In subjects such as language arts, mathematics and science, LCMS teachers preferred the mastery of basic writing and calculation skills by students before they begin using computers to type or to calculate automatically.

Students who do not have access to computers at home may not be able to complete homework assignments and will need paper-based alternatives.

The positive perceptions of using electronic curricula outweighed the negative comments primarily due to the perception teachers have of student interest, engagement and motivation to use technology in the classroom. LCMS teachers perceive that students will organize their thoughts more efficiently, will synthesize content and process learning and will achieve self-reliance in the learning process because of improved results.

Emerging theme: Safety of students. LCMS teachers consistently expressed concern over student safety from inappropriate websites and online bullying if the use of computers is unsupervised. Proper filters are required while at the same time not over-blocking valuable websites from schools. Electronic curricula that provides Internet filters help students learn the ethics of Internet usage while still having access to pertinent websites such as YouTube where many educational videos are stored and made easily available.

Emerging theme: Copyrights and permissions. LCMS teachers are aware of the legal implications of duplicating copyrighted materials and perceive that electronic curricula should contain a feature that informs and reminds students and teachers of general requirements. Built-in functionality to request and record proper permissions when printing electronic curricula would be viewed positively by teachers who are focused on time-constrained content delivery. Copyrights and permissions software already exists to protect authors and publishers, and teachers need to be aware of limitations. Music materials in particular can cause copyrights and permissions intricacies not easily understood by non-industry professionals.

Emerging theme: Descriptors of electronic curricula. Teacher perceptions provided by LCMS teachers in this study included descriptions of how electronic curricula should be designed, the order in which it should be produced by grade and subject, the features it should present as options and the integrated support necessary to make teaching with technology a success. Without repeating the lists of these characteristics found in Table 7 and Figures 9-11, a summary of the descriptors from this study can be delineated.

The design of electronic curricula should include teachers' input from the beginning of the process because of the need for teachers to trust in the usefulness of the final product. The overall design should bring subjects to life for students and not just replace existing paper texts, worksheets and tests. The design of electronic curricula should focus on student safety from harmful websites, as well as aid in teaching students how to discern between reliable sources of information and inadequate sources.

LCMS teachers want to be able to tailor and adapt electronic curricula for all class sizes, backgrounds and learning styles as well as for students with disabilities. The choices that electronic curricula can provide for individualized student learning is valuable to LCMS teachers because they perceive it would free them from traditional blackboard teaching in order to provide more feedback by moving about the classroom. Moving beyond the normal requirements of grade-appropriate, standards-based design, electronic curricula must also develop higher-level thinking skills for students while targeting the desired learning outcomes. Designing electronic curricula to provide learning experiences that provide deeper learning and more authentic or real-life

understanding of subject matter is important so that LCMS teachers perceive there is added value in using the technology in classrooms.

It is apparent from this research that LCMS teachers believe it is important for publishers to create a mosaic approach, which means providing choices for the selection of which pieces of electronic curricula are used in the classroom. Without mentioning all the specific software and media, LCMS teachers perceive that images, sounds, short video, online text, games, webquests and podcasts should be integral features of electronic curricula, designed with open-source or common platform programming. Interactive, project-based learning opportunities provided by electronic curricula are viewed positively by LCMS teachers because of the ability to improve student confidence and problem-solving skills. Teachers value curriculum that engages students in creative and enjoyable learning experiences that are typical of teaching with technology in a more visual manner with less printed texts. Having said less printed matter would be appreciated, LCMS teachers perceive it useful to have their own printed manuals to use while the computer is in use to avoid having to switch screens in front of students during class. Current, updated and accurate content in electronic curricula should include study guides, integrated self-assessment and easy navigation between electronic modules.

Support for LCMS teachers throughout the process is important to the perception that electronic curricula can be user-friendly instead of frustrating. Integrated technology support and quick reference capability is required so that frequently asked questions can be answered easily and so that training can be obtained at each step of using electronic curricula.

Emerging theme: Learning from dissenters. Those LCMS teachers who disagreed with the beliefs or opinions of the majority were unsure as to the benefits of using electronic curricula and did not believe there should be a pressing need to use it in the classroom. This group of teachers felt forced into using technology in the classroom when they believe it is simpler and would prefer to write on the board rather than create electronic presentations. Finding that electronic curricula is not pedagogically superior to other methods, these LCMS teachers aim to teach students the basics of writing well and performing mathematical computations manually, and they prefer students have more face time and less screen time per day. Some teachers find the use of digital media to be entertainment focused, which is perceived as distracting from the rigor of teaching the curriculum. Perceiving the worst, these LCMS teachers find electronic curricula to be detrimental to social and educational growth especially in the lower grades. Dissenters found that electronic curricula are not a replacement for all other teaching tools and it should not be considered as a panacea for all teaching and student learning issues. Rather, electronic curricula needs to be proven to these LCMS teachers as a tool that increases student achievement over standard printed textbooks coupled with traditional styles of teaching.

Summary

It is interesting to note that many of the essential conditions to leverage technology for learning purposes, recommended by the International Society for Technology in Education (2007) and shown in Table 5 from chapter two, mirror the emerging themes from this study of Lutheran Church – Missouri Synod (LCMS) teachers' perceptions. International Society for Technology in Education conditions such

as having a proper vision, sound planning, appropriate funding, equal access, training for teachers and technical support all aiming at student-centered teaching, and learning from technology appears to have universal context for the implementation of electronic curricula.

The results presented in chapter four indicated clearly that many of the LCMS teachers in this study have responsibility for more than one grade-level of students and wish to improve their knowledge of the potential uses of teaching with technology to prepare their students for the 21st century. Technology training provided for teachers in the LCMS has not been adequate to assist in this endeavor. Technical support is rated well only because in most cases parent volunteers are performing the intermittent work for Lutheran schools that full-time staff personnel should be assigned. Teachers are familiar with the Internet and how to use it but are not as familiar with electronic curricula assembled by publishers for classroom purposes. Funding is needed to secure the basic infrastructure needs for schools, and administrative support is necessary to identify and pursue the appropriate levels of training and support for both students and teachers. A long list of various media, hardware and software is being used by the greater than 1000 teachers who responded to this survey, but not in any coordinated fashion within Lutheran schools much less across grade schools and high schools in the LCMS.

The emerging themes synthesized the findings in this chapter and will be used as the basis for developing new meaning and implications for effective schools which will be explained in detail in chapter five.

Chapter V – Discussion

As was established in chapter one, the education community seems to be continually examining and discussing potential improvements in teaching methods and tools to assist with the ever changing needs of future students of the 21st century (Schmoker, 1999). One pertinent question being discussed revolves around whether traditional teaching methods and the use of conventional tools such as textbooks are changing fast enough to afford today's teachers the flexibility to make use of the latest technology for the advancement of education (Dede, 2008).

LCMS teachers may be faced with the need to make decisions about the alternatives of continuing to buy printed textbooks for the classroom, versus teaching with technology-implemented electronic curricula (Ward & Riley, 2008). Reaching today's students with more cutting-edge media to which they are accustomed is the subject of numerous studies, experiments and debates as was discussed in chapter two (Carlson, 2005; Sheppard et al., 2008; Tucker, 2008). This study, as was described in chapter three, was specifically designed to research LCMS kindergarten through 12th grade teachers' perceptions regarding the use of technology to deliver curricula. This study may have professional value to the Lutheran school system as a subset of the larger teaching community, as well as to CPH which supports them by creating curricula resources. This study may be one source of data used by LCMS educators and policy makers while making strategic decisions regarding textbook versus digital-based curriculum purchasing and related topics of training, school infrastructure, and other budgetary matters for the future. This research may also be useful for schools outside the LCMS.

Implications from This Study's Findings for Effective Schools

Upon consideration of the emerging themes shown in Table 8, there appeared to be several ways that they could be ordered for understanding. One way to order the emerging themes was to examine how LCMS teachers answered the various survey questions in terms of personal perceptions of priorities. Another way in which the emerging themes from chapter four could be examined was in terms of logical groupings. While any such groupings are debatable, relationships were revealed between each of the emerging themes with other emerging themes. An interpretation of these relationships is depicted in Figure 13 showing a gear-like mechanism for which emerging themes are impacted by movement from other emerging themes. The central hub or gear shown as "facilitating the use of electronic curricula in the classroom" is being affected by movement from any of the other interlocking gears or groups of gears which are important considerations to LCMS teachers in this study. These emerging themes are supported by research from chapter two indicated in Table 2 by Vrasidas and Glass (2005) where obstacles to integrating technology into the classroom are discussed. The Figure 13 themes are further supported by the list of necessary conditions shown in Table 5 (International Society for Technology in Education, 2007, ¶1).

One sub-grouping of the emerging themes shows that LCMS teachers' perceptions revolved around the impact of electronic curricula on students in terms of safety from inappropriate websites and online bullying. Sutton (2006) discussed and supported this concern in terms of ensuring student safety while making use of suitable Internet filters. All of the pedagogical concepts of successfully reaching students with authentic learning from electronic curricula are in this grouping, while consciously

striving not to create an overreliance on technology to do the work of the teacher (McGrail, 2007).

A second sub-grouping depicts how LCMS teachers perceived that the resource of time during the school day is important. In related fashion, any time taken for training on the subject of using electronic curricula in the classroom should improve the efficacy of teaching overall, thus improving, or perhaps not worsening, the availability of class time for LCMS teachers.

A third grouping shown in Figure 13 indicates that teacher perceptions about the importance of administration encouragement and support are among the first order requirements necessary to launch an investment in electronic curricula. Encouragement from principals and school boards, according to LCMS teachers, is fundamental and requisite to planning and budgeting for technology infrastructure needs such as access to computers and the internet, as well as technical support for electronic curricula usage during the school day.

A fourth grouping shown in Figure 13 indicates that LCMS teachers have expectations about the features that electronic curricula should offer. According to LCMS teachers' perceptions, the primary legal issue of managing copyrights and permissions is separated out of the long list of features as significant and necessary in terms of increasing the usage of electronic curricula. Ludlow and Duff (2007) agreed with this emerging issue because of past practices of copying resources without permission. Coupled with the expected list of features that electronic curricula will provide is another list of issues that, if addressed, could win-over some teachers who perceived they are electronic curricula detractors. Taking the time to address the potential benefits of

electronic curricula in terms of increased student motivation and achievement, as an example, might positively impact those LCMS teachers who perceive electronic curricula as mere entertainment (Dillenbourg, 2008).

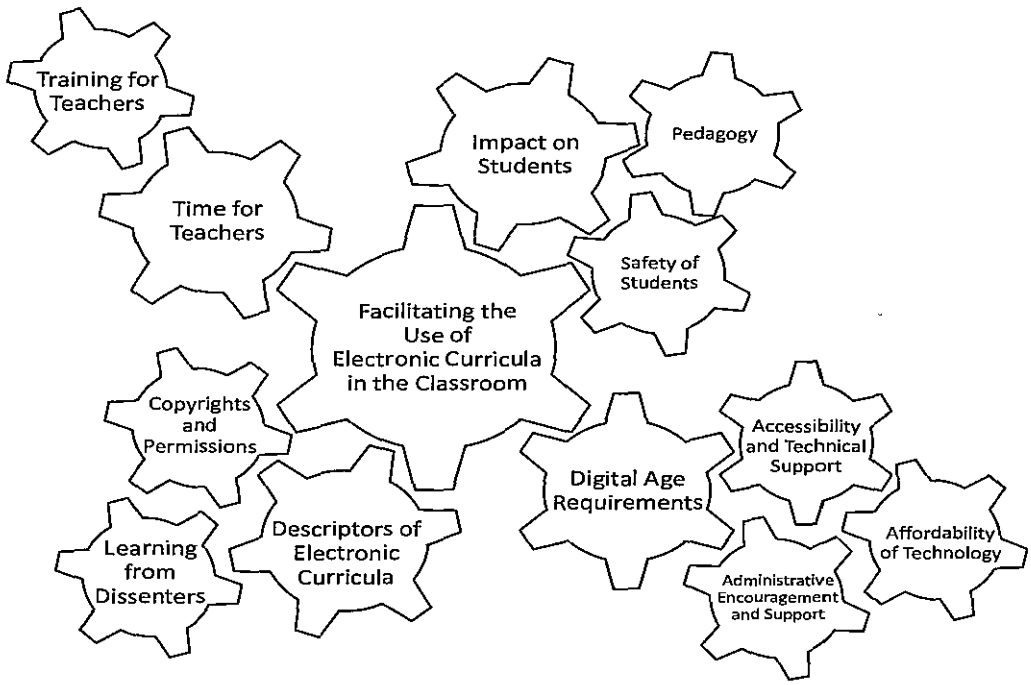


Figure 13. Interlocking nature of the themes emerging from LCMS teachers' responses.

Upon further study, the interrelationships of the emerging issues began to represent a proactive process as yet another method of overlaying a logical order onto the emerging themes derived from the LCMS teachers' perceptions. Viewing the emerging themes and their supporting data through the lens of a process flowchart led to new meaning and new insights, which will be described in detail in the recommendations section.

Answering the Primary Research Question and Hypothesis

The primary research question was phrased in chapter one as why is there a lack of mainstream LCMS grade schools and high schools asking for or using electronically-delivered curricula? The data collected and discussed in chapter four has provided insights that help to answer this question. For example, Figure 4 indicated that 55% of the LCMS teachers in this study taught two or more grade levels and some as many as eight grade levels. While it could be assumed that these teachers taught the same subject to multiple classes, they may have had to switch classrooms frequently and found that each classroom was outfitted differently in terms of available technology tools. The lack of familiarity with each classroom's technology specifics could cause teachers to ignore using it for the present. This situation could worsen if the results are combined (see Figure 5) where 64% of the LCMS teachers in this study rated their personal knowledge and experience with electronic curricula toward the occasional and novice categories.

Figures 6 and 7 indicate that 70% and 80% of LCMS teachers who participated in this research rated their pre-service teaching-with-technology training as well as their in-service training as non-existent or inadequate. With this high percentage of teachers believing they are not adequately trained, the lack of mainstream LCMS schools asking for electronic curricula is not surprising to the researcher. Without proper training, one possible fall-back position could be that adequate technology support, if consistent, could make up the difference to LCMS teachers, affording them the ability to use electronic curricula in the classroom. Unfortunately Figure 8 data did not bear this out showing that one-third of LCMS teachers believed their technology support is inadequate. Interestingly, even the remaining two-thirds of the LCMS teachers in this study who

believe they are adequately supported for the use of technology in the classroom found it inconsistent and not from full-time, on-staff personnel, but from volunteers, which is typical of many church-associated private schools.

Another contributing factor that answers the primary research question as to why there is a lack of mainstream LCMS teachers asking for or using electronic curricula may be the disparate usage of many different kinds of electronic media, tools, hardware and software across the LCMS school system. While Figure 9 shows that 90% of teachers are familiar with using the Internet in classrooms, the wide variety of technology found in LCMS classrooms as indicated in Table 7 could be a result of the independent nature of church and school combinations, each having their own boards and leadership. Without a consistent LCMS vision for the usage of electronic curricula, no economies of scale can be planned or gained for the school system as a whole.

The open-ended survey questions used in this study also reinforced the aforementioned conclusions about why there is a lack of mainstream LCMS teachers asking for or using electronic curricula. Concern over the cost of electronic curricula versus funding, and the relative savings over standard textbooks, has yet to be proven to LCMS teachers.

Many LCMS teachers perceived that electronic curricula would improve student motivation for learning and then improve overall student results (Keller, 2008). This is not, however, a universal belief in that some LCMS teachers see no advantages in teaching-with-technology over traditional teaching methods and tools. Until LCMS teachers perceive they have formal input into the design and features of electronic curricula, increased demand and usage may be delayed. Examples of input that LCMS

teachers perceive as responsible for delaying usage of electronic curricula in the classroom include validation of content standards, feedback and assessment requirements and comprehensive student safety precautions with proper Internet filters, as well as built-in copyrights and permissions management.

The genesis, however, for movement toward the usage of electronic curricula as a school system is first providing encouragement and support to teachers from principals and school boards. Only then will LCMS teachers perceive that spending valuable time to investigate, evaluate, learn and possibly inculcate teaching-with-technology into the classroom is warranted. This is supported by Chen's (2008) research identified in chapter two where it was found that parents and administration must fully support teaching with technology for it ever to become transformational. It is incumbent on publishers to understand the Figure 10 ranking of priority for electronic curricula development in areas of science, history, mathematics and language arts before any other subjects will be considered by LCMS teachers in this study. Additionally, publishers must understand that there is a plethora of free resources already available on the Internet. Publishers will need to show LCMS teachers they are capable of adding value through the organization and evaluation of various electronic curricula.

The lack of mainstream LCMS grade schools and high schools asking for or using electronically-delivered curricula can be explained by the aforementioned factors which negatively affect teachers' perceptions. The LCMS teachers' perceptions can also be evaluated in light of the hypothesis put forth early in this study. While the creation of hypotheses may be arguably more typical of quantitative research than of qualitative research, the researcher found the hypothesis developed during the course of this study to

be helpful in unison with the primary research question. Having answered the primary research question, the supporting qualitative hypothesis from chapter one phrased in an affirmative manner was that K–12 teachers' positive perceptions of electronic curricula increases the implementation. From the data summarized in this research, teachers' positive perceptions of electronic curricula alone do not automatically increase the implementation. The lack of many of the factors named earlier including administration encouragement, funding, training and technical support can hamper electronic curricula implementation even when teachers' perceptions are positive (McGrail, 2007; Chen, 2008; Franklin, 2008; Trotter, 2008).

When the hypothesis was phrased in the null, it stated that there is no relationship between teacher perceptions of electronic curricula and classroom implementation. Stated in this manner the null hypothesis is also not true because this study did find that there are relationships between teacher perceptions and classroom implementation of electronic curricula in terms of the interlocking nature of the emerging themes shown in Figure 13 which were supported by Ertmer's (2005) research cited in chapter two. It should be noted from Figure 12 that 97% of LCMS teachers perceived they were interested in using electronic curricula. It was concluded that publishers in general and CPH in particular must create a process to ameliorate the negative LCMS teachers' perceptions identified in this study and augment the positive perceptions of electronic curricula to increase technology usage in classrooms.

Protocol

Isenberg (2007) modeled a format to ground protocol elements or guidelines to the literature review of this study. Using this format, protocol elements create strategic

aspects or foundational features for this study's recommendations. Phrased with a verb at the beginning, these protocol elements could be used as a checklist for creating electronic curricula and also introducing technology into LCMS classrooms. At the end of each of the following protocol elements is the page number within this study where the suggestion was first gleaned from research identified in chapter two.

1. Consider elements of pedagogy in educational technology (p. 15 and p. 25).
2. Gather input from teachers (p. 15 and p. 41).
3. Prepare students for 21st century education (p. 17).
4. Create electronic curricula so as not to increase overall cost to schools (p. 18).
5. Ensure that electronic curricula design adds value over standard printed textbooks (p. 20).
6. Provide options in electronic curricula to allow for individual learning preferences (p. 21).
7. Examine both costs and return on investment of electronic curricula (p. 21).
8. Address the information technology infrastructure required to operate electronic curricula in schools (p. 24 and p. 47).
9. Consider classroom shapes and layouts suitable for the usage of electronic curricula (p. 25).
10. Address technology as a priority, increase computer-to-student ratio and provide technical support to teachers (p. 25).
11. Investigate fund-raising opportunities to facilitate technology usage in classrooms (p. 26).
12. Provide adequate levels of training to teachers (p. 26 and p. 32).

13. Create electronic curricula to focus on effective learning (p. 27).
14. Determine student access to computers in advance of launching electronic curricula (p. 28).
15. Present benefits of electronic curricula to teachers in terms of time and cost savings and improved student learning and achievement (p. 28, p. 31 and p. 36).
16. Become a source of assistance to teachers as a publisher (p. 29 and p. 33).
17. Design electronic curricula with balanced Internet filtering (p. 30).
18. Win teachers over by providing briefings on how technology fits into teaching philosophy (p. 32).
19. Seek to collaborate in order to gain teachers acceptance of change (p. 33).
20. Design electronic curricula with student-centeredness in mind and allow students the ability to tailor and manage their own learning process (p. 33, p. 38 and p. 63).
21. Facilitate administrator and parental support for electronic curricula (p. 34).
22. Provide examples of how to implement technology in teaching and show teachers best practices from other schools in order to build positive experiences thereby improving teacher perceptions of electronic curricula (p. 35).
23. Ensure high quality content in electronic curricula is maintained (p. 35).
24. Allow teachers to reflect on experiences with electronic curricula and provide feedback (p. 41 and p. 44).

25. Assess changing teacher perceptions of technology in learning to avoid assumptions (p. 46).
26. Design electronic curricula as easy-to-use or intuitive in nature (p. 47).
27. Create electronic curricula to capture student attention, relevance, confidence and satisfaction (p. 50).
28. Design electronic curricula to have variety, speed and current materials (p. 52).
29. Incorporate feedback and assessment throughout the design of electronic curricula (p. 56).
30. Create a process-based approach for effective planning with goals for advancing curricula and teaching with technology in schools (p. 59).
31. Form teacher-led teams to brainstorm ideas, consult with electronic curricula publishers, check results and then refine the design, and finally communicate the positive results as encouragement (p. 61).

In addition to the protocol elements used in the design of the ASPECTs process are the remainder of the elements taken from chapter two, which will specifically contribute to the design of electronic curricula and perhaps assist CPH as a publisher and provider.

1. Evaluate the elimination of traditional paper texts, and investigate a blended print and digital curricula approach where possible (p. 17 and p. 22).
2. Design electronic curricula to allow changes to be made from one central location (p. 19).

3. Ensure copyrights and permissions are managed within the function of electronic curricula (p. 22).
4. Address the disadvantages in the design of electronic curricula (p. 23).
5. Move toward a web-focused model for electronic curricula (p. 24).
6. Build into electronic curricula capability to aid students' mastery of skills in subjects rather than just simple issues or calculations (p. 39).
7. Support problem-based learning in design of electronic curricula for students (p. 40).
8. Capture technology-supported pedagogy by methods of replacement, amplification or transformation as research by Hughes (2005) indicates (p. 43).
9. Address the National Education Training Standards for teacher preparation in using technology in the classroom (p. 47).
10. Design electronic curricula with different cultures, backgrounds, disabilities and learning styles in mind (p. 48 and p. 56).
11. Provide training within electronic curricula to assist students in determining credible information from worthless information found on the Internet (p. 53).
12. Consider a digital library or virtual bookshelf as a key factor in technology usage for the future (p. 54).
13. Automate a digital portfolio process within electronic curricula to capture proof of student learning throughout the process (p. 56).
14. Consider using student chat and online quizzes and tests in a formative manner to assess what students need to increase their learning (p. 56).

15. Address the list of necessary conditions to leverage technology in LCMS schools (p. 62).

16. Use pop-up windows in electronic curricula to ask factual questions (p. 65).

The first list of protocol elements in the preceding section assisted in the formulation of recommendations. The protocol elements were merged with a specific plan as to how technology for the classroom could be implemented via electronic curricula, while addressing the LCMS teachers' perceptions and emerging issues rising out of this study.

Recommendations

The findings resulting from this research led to the development of a proposed process that systematically endeavors to provide a potential solution for the issues identified from the LCMS teachers' survey responses and emerging themes. This proposed process titled as Advancing Student Performance with Electronic Curricula Tools, referred to as ASPECTs, proposes a hopeful design to address root causes for the lack of mainstream LCMS grade schools and high schools asking for or using electronically-delivered curricula. New understanding derived from this study led to new insights about the proper ordering of events, which if conducted carefully, could improve the usage of electronic curricula by teachers in LCMS schools. The process flowchart shown in Figure 14 depicts a phased approach for implementation of electronic curricula.

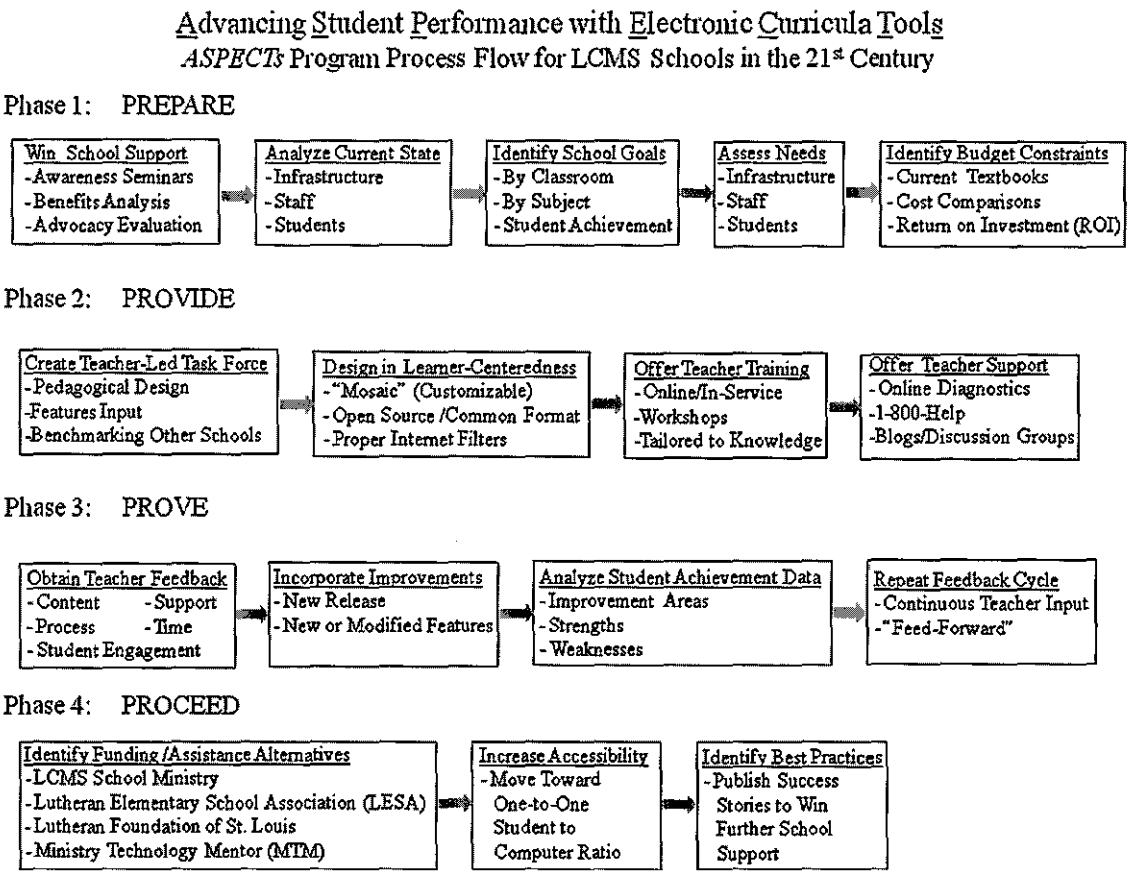


Figure 14. Four phases of the proposed ASPECTs program for LCMS schools.

Restudying at length all of the input from the LCMS teachers' responses, it was evident that the emerging issues previously explained in chapter four represented many aspects of teachers' perceptions. These aspects seemed to lend themselves to a particular order as well as to different stages or phases at the same time (Aust et al., 2005). This realization then led to the creation of many drafts of the boxes shown in Figure 14, placing them into an ordered continuum of four phases. These phases were named prepare, provide, prove and proceed in an effort to differentiate the aspects by the characteristics descriptive of each of the four phases. Creating effective planning for the

integration of technology into classrooms is backed by research by LeBaron and Collier (2001) which was cited in chapter two.

There is an idiom that says, a picture is worth a thousand words but a metaphor is worth a thousand pictures. In this study, the metaphor or image of Figure 14 illustrates the emerging themes from LCMS teachers' responses but represents them in such a way as to transform them into actionable steps. The *prepare* phase, the first step shown, indicates that in order to improve or expand the usage of electronic curricula, administration and teachers should be won over and cannot be coerced into altering their teaching methods (Wenglinsky, 2005). Awareness seminars can be conducted at the school level to aid in providing the information to teachers that analyzes the potential benefits of teaching with technology. As school awareness increases over a period of time from the seminars, evaluations or surveys can be conducted to determine if teacher advocacy for electronic curricula is growing and at a level to support the work necessary to transition toward a digital teaching environment.

The next steps in the *prepare* phase of the ASPECTs process involve a current-state analysis of a school's technology infrastructure, the technology knowledge level and ability of staff, and an assessment of student familiarity with technology and their access to computers. When brought together with school goals by class, subject and achievement levels, this then allows the specific infrastructure, staff and student needs to be identified, which may differ school by school. At this point in the proposed process, the identification of budget constraints comes into play. A return-on-investment analysis can be conducted with LCMS teachers on the team to compare electronic curricula costs against the cost of textbooks and ancillary teaching resources. The identification of the

budget constraints step in the process should attempt to bear out how long a period of time is required for the purchase of electronic curricula to provide a payback benefit to the school.

Once the steps of winning school support, identifying the specific needs of the school and budget analysis has been conducted, the second phase in the ASPECTs process can be initiated. Phase two, called the *provide* phase, then begins by creating a teacher-led task force, which according to LCMS teachers in this study, is crucial for success. This task force would be responsible for creating a pedagogical design in concert with the publisher for electronic curricula based on content standards and desired features. This pedagogical design would be informed as well by benchmarking other schools that are currently in various stages of electronic curricula deployment. Gritter's (2005) research and Ferdig's (2006) study cited in chapter two supports this recommendation for LCMS teachers as well.

The teacher-led task force would have full control over the learner-centered design and should take into account LCMS teachers' input that the electronic curricula should be customizable and provide a common format for usage with appropriate student protections from harmful Internet websites. A one-size-fits-all approach by publishers in the design of electronic curricula is not preferred according to the LCMS teachers' responses in this study. Ballantyne's (2007) research cited in chapter two supports the recommendation for giving LCMS teachers the ability to select from smaller electronic curricula learning objects according to their content and process preferences. The teacher task force, having just created a learner-centered design, would then have the opportunity to aid the publisher in designing teacher training tailored to the specific needs of the

school being reviewed. Learning from the LCMS teachers' emerging issues in this study that technical support for electronic curricula goes hand-in-hand with training, online diagnostics, help-lines and discussion groups, 24 hours per day service would need to be made available from the publisher so that teachers are not limited by time of day or location when they require technical assistance. This recommendation would also be supported by Dawson's (2006) research shown in chapter two as a solution for teacher frustration from technology downtime.

After the phases involving school preparation and then teacher-led design of the electronic curricula, publishers would need to obtain feedback from LCMS teachers on what was developed to facilitate content, process, support or features improvement. This phase three activity of the ASPECTs process is aptly named the *prove* phase, so that LCMS teachers' input is listened to and incorporated on a continuous basis. Bird and Rosaen (2005) support this recommendation for LCMS teachers with the research cited in chapter two that teachers' perceptions became positive where they had opportunity to review and assess educational software. In the *prove* phase, student achievement data would be reviewed by the teacher-led team, analyzing strengths and weaknesses (Schmoker, 1999) and subsequently identifying potential improvement areas to target further design of new electronic curricula options. In this way, LCMS teachers' feedback then becomes a type of feed-forward, informing the future design and improvement requirements important to teachers' usage of technology in the classroom.

The term *proceed* is used to identify phase four of the proposed ASPECTs process. In this phase, funding alternatives could be explored at a level higher than individual schools are capable of pursuing. Lessen and Sorensen (2006) and Trotter

(2008) supported the exploration of funding as a recommendation, which was shown in their research cited in chapter two. Various foundations and organizations, indicated in Figure 14 and known to LCMS schools, can be polled and applications can be made toward the award of matching funds or grants supportive of the purchase of computers and teaching with technology. According to the LCMS teachers in this study, the issue of not having enough computers for the students impedes teachers in using technology in the classroom.

The second step shown in phase four of Figure 14 indicates that one result of the proposed ASPECTs process would be improvement in the computer-to-student ratio, first at the individual LCMS school level, then at the school system level. Increasing the computer-to-student ratio across the school system is important to LCMS teachers as they change schools based on available opportunities over their career. The last step in the fourth *proceed* phase is sharing success stories and best practices resulting from the implementation of the ASPECTs process in LCMS schools (Gritter, 2005). These best practice success stories can be fed back into the ASPECTs process at phase one and used in awareness seminars to gain additional advocacy and support for the future effort. The ASPECTs process is proposed to be cyclical in nature, iterating from the prepare phase through provide, prove and proceed phases and then starting over again at the preparation phase. This understanding may be useful as technology and electronic curricula advancements occur over time.

Summary

While contemplating the usefulness of the ASPECTs program process flow for LCMS schools in the 21st century, a potential new funding opportunity surfaced that could add to the list of alternatives under phase four of Figure 14. A proposal was prepared for what could be called the Concordia Publishing House Foundation for the Advancement of Lutheran Church – Missouri Synod Schools. This foundation, which was presented as a concept to the CPH Board of Directors, would be funded from the publisher's financial reserves and would be set aside for the purpose of advancing the Figure 14 ASPECTs process in LCMS schools. While the suggested CPH foundation's corpus of $10 million dollars should not be used, the proposal involves using the interest or dividends from investing the principal on an annual basis to purchase computers and electronic curricula for LCMS schools each year. The enduring conclusion or perhaps the walk-away message from this study is that the greater than 1000 LCMS teachers who participated in this research project may receive direct benefit from the ASPECTs process and potentially from the proposed CPH foundation yet to be approved and created. The ASPECTs process with each of the recommended four phases could be transferable for usage in other private and public school settings. Further research will be needed, however, to generalize this assertion to see if public and private school teachers have similar perceptions of electronic curricula for the 21st century.

Appendix A – Consent Letter

Informed Consent Form

Dear Lutheran Teacher,

I am writing to you as an education doctoral student at Lindenwood University in St. Louis, Missouri and the president of your Concordia Publishing House.

I am conducting research on the topic of "Teacher perceptions of electronic curricula implementation within a K-12 Lutheran School setting."

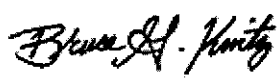
The data I plan to collect through an electronic survey will focus on your perceptions of what is important to you in seeking out and using electronic curricula in the classroom.

Your voluntary participation in this survey is requested because your input as a teacher is very valuable. If you choose to participate in this study, your identity as a participant will remain confidential and your name will never be publicly associated with any data or answers you provide. Results will only be reported in group form at the conclusion of report writing and acceptance by Lindenwood University.

There is no risk of physical injury from participation in this study. There is no penalty imposed if you decide you do not wish to participate.

Regardless of your decision, I give thanks for your continued service to the church as you teach children and youth at your school.

In Christ's service,



Bruce G. Kintz
Primary Research Investigator

***To electronically sign this consent form and continue with the survey, please enter the Unique Signature ID contained in the email you received.**

Appendix B – Electronic Survey Instrument

Teacher Perceptions of Electronic Curricula Implementation in LCMS Schools Demographic Questions

(100% Confidential)

* **What is your education level?**

☐ Bachelors
☐ Masters
☐ Doctorate

Or indicate below any other education / degree level.

* **What is your gender?**

☐ Male
☐ Female

* **What is your age (in years)?**

* **What grade levels do you teach? (Check all that apply)**

☐ Preschool	☐ 3rd Grade	☐ 7th Grade
☐ Kindergarten	☐ 4th Grade	☐ 8th Grade
☐ 1st Grade	☐ 5th Grade	☐ High School
☐ 2nd Grade	☐ 6th Grade	

Teacher Perceptions of Electronic Curricula
Implementation in LCMS Schools
Survey Questions

Below, you will see the term "technology-implemented electronic curricula". This means any computer related media or internet usage to present instructional material to students, or any other technological teaching alternative to the use of textbooks in a traditional setting.

It would be helpful to my research if you would expand on your perceptions by typing comments for this survey. Please use the comment boxes under every question for this purpose. This is necessary in order to understand "emerging issues" which are important to you. You may type as much or as little as you wish but the more the better for this research. I realize your time is valuable so I thank you in advance for your assistance!

*** 1) Explain at what level you as a teacher perceive your personal knowledge regarding the usage of:**

	Novice User	Occasional User	Regular User	Expert User
Electronic Media (CD / DVD / PowerPoint, etc.)	☐	☐	☐	☐
The Internet	☐	☐	☐	☐
Electronic / Digitally delivered curricula	☐	☐	☐	☐

*** 2) How do you feel about the level of "teaching with technology" training you received in either undergraduate or graduate school?**

☐ Non-existent technology training
☐ Less than adequate technology training
☐ Better than adequate technology training
☐ Exemplary technology training allowing me to be proficient

Please comment on what you liked or disliked or both regarding your undergraduate or graduate teaching with technology training:

*** 3) How do you feel about your current level of " in-service teaching with technology" training?**

- ☐ I learn on my own
- ☐ Too little to assess (less than once a year)
- ☐ Needs to be more frequent (1-2 times per year)
- ☐ Adequate training (greater than 2 times per year)
- ☐ Exemplary training provided in-service both timely and pertinent to usage of technology as a teaching tool.

Please comment on what you liked or disliked or both regarding in-service teaching with technology training.

*** 4) Please rate the level of technology support you have at your school.**

- ☐ Inadequate technology support
- ☐ Adequate technology support
- ☐ Above average technology support
- ☐ Outstanding technology support

Please comment on your perception of the level of technology support at your school:

*** 5) What electronic teaching media or software are <u>you currently using</u> in your classroom? (Check all that apply)**

- ☐ Web/CT and Blackboard
- ☐ Smart Boards
- ☐ Digital Projection
- ☐ Personal Computers
- ☐ PowerPoint / Excel / Word
- ☐ e-Book Readers
- ☐ Podcasts
- ☐ MP3's
- ☐ CD / DVD
- ☐ Internet
- ☐ Email
- ☐ Instant Messaging
- ☐ Interactive Chat
- ☐ Lutheran School Portal
- ☐ Blogs
- ☐ Wikis
- ☐ MySpace
- ☐ Facebook
- ☐ YouTube

Please elaborate below on usage of, or preference for, <u>other media, tools or software</u> you may be using:

*** 6) Please discuss below <u>your perceptions</u> on the advantages of teaching from technology-implemented electronic curricula in your classroom.**

* **7) Please discuss below <u>your perceptions</u> on the disadvantages of teaching from technology-implemented electronic curricula in your classroom.**

* **8) Please discuss below <u>what factors</u> influence your decisions as a teacher to seek out and teach from technology-implemented electronic curricula.**

* **9) Please discuss below <u>what concerns</u>, if any, you as a teacher have about teaching from technology-implemented electronic curricula in your classroom.**

* **10) Please discuss below what <u>you perceive</u> is necessary for technology-implemented curricula usage to grow in Lutheran schools.**

* **11) Please discuss below what improvements in curricula design <u>you perceive</u> would increase the effective use of technology in your classroom.**

*** 12) How would you prioritize the need for technology-implemented electronic curricula in each of the following subject areas?**

Please note: Click in the "10" column for the Highest Priority, down to "1" for the Lowest Priority selection, with each column having only one check mark. Again, "10" is the "Highest Priority".

	10 (Highest)	9	8	7	6	5	4	3	2	1 (Lowest)
Religion-Dayschool	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Religion-Catechism	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Reading	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Memory Work	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Library Skills	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Math	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Science	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
History/ Social Studies	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Language Arts	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Music	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Please provide comments regarding your selections above or the need for technology-implemented electronic curricula for any other particular subject area:

*** 13) How would you rate the following media, tools and software as necessary parts of technology-implemented electronic curricula for your classroom?**

	Not Needed	Possibly Needed	Needed
Web/CT and Blackboard	☐	☐	☐
Smart Boards	☐	☐	☐
Digital Projection	☐	☐	☐
Personal Computers	☐	☐	☐
PowerPoint/Excel/Word	☐	☐	☐
e-Book Readers	☐	☐	☐
Podcasts	☐	☐	☐
MP3's	☐	☐	☐
CD/DVD	☐	☐	☐
Internet	☐	☐	☐
Email	☐	☐	☐
Instant Messaging	☐	☐	☐
Interactive Chat	☐	☐	☐
Lutheran School Portal	☐	☐	☐
Blogs	☐	☐	☐
Wikis	☐	☐	☐
MySpace	☐	☐	☐
Facebook	☐	☐	☐
YouTube	☐	☐	☐

Please provide other comments regarding media, tools and software requirements for technology-implemented electronic curricula:

*** 14) How would you describe your interest level in teaching from technology-implemented electronic curricula?**

☐ Not Interested in Using Electronic Curricula

☐ Moderately Interested in Using Electronic Curricula

☐ Significantly Interested and Willing to Begin Using Electronic Curricula

Please discuss your interest level in using technology-implemented electronic curricula in more detail:

*** 15) State your perception of the overall use of technology in the classroom and explain why:**

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Curriculum Vitaé

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Background Summary

Born on July 21, 1960 in Saint Louis, Missouri, the author has been married to his wife Kimberly for 21 years and has one son, Joshua, and one daughter, Rachel. With over 20 years of domestic and international leadership business experience, the author has diverse expertise in management of operations focused on improved business performance and growth. The author has led divisions and companies toward:

- Implementation of Strategic Plans to Meet Business Objectives
- Proactive Operations Management
- New Business Development
- Multiple Project and Program Management
- Malcolm Baldrige Quality Systems and Process Improvement
- Multi-disciplined Team Development and Leadership
- Creating Customer Loyalty and Engagement

As the current President and CEO of Concordia Publishing House, the author makes ongoing use of all available quality systems such as "Town Hall" forums, team building and mentoring senior executives, boards and business leaders to create, sell and implement company-wide improvement initiatives and plans.

Business Contributions

Concordia Publishing House – Saint Louis, Missouri 1999 - Present

As the leader of an historic 140 year old Saint Louis publisher of books, curriculum, periodicals and other resources, the author has served in the following capacities:

- President and Chief Executive Officer 2006 - Present
- Vice President and Chief Operating Officer 2002 - 2006
- Vice President of Operations 2001 - 2002
- Director, Operations-Publishing Processes and Teams 1999 – 2000

The Boeing Company/McDonnell Douglas – Saint Louis, Missouri 1987 - 1999

The merger of two of the largest manufacturers of military and commercial aircraft, rotorcraft, spacecraft and missiles has allowed the author to have a wealth of experience in most business areas. The following positions were held by the author supporting various locations in Missouri, California, Kansas and Toronto, Ontario:

- Director Level Asst. to the VP of Aerospace Support 1998 - 1999
- Director, Operations and ERP, MD-11, MD-80/90, MD-95 1996 - 1998
- CEO's Executive Development Program 1995 - 1996

- Sr. Production Engineer and Asst. to the VP/GM Operations 1993 - 1995
- Senior Principal Specialist, Quality Systems, All Programs 1992 - 1993
- Foreman and Manager of Operations, C-17 Globemaster 1990 - 1992
- Contracts, Pricing and Audit Specialist, Fighter Programs 1987 - 1990

Education

Doctor of Education (Ed.D.), Lindenwood University, 2009

Master of Business Administration (MBA), Fontbonne University, 1989

Bachelor of Science (B.S.), Mathematics & Business, Maryville University, 1985

Associate of Arts (A.A.), Pre-Law, Business, Mathematics, St. Louis C.C. 1981

Accreditation

President, Protestant Church-Owned Publishers Association (PCPA) 2008 - 2010

Manufacturing Executive Program, Cornell University 1997

Center for Creative Leadership Executive Program – Graduate 1996

McDonnell Douglas Executive Development Program 1995 - 1996