

## ABSTRACT

Title of Document: DIGITAL LIBRARIES IN SCHOOLS: THE BEST PRACTICES OF NATIONAL BOARD CERTIFIED LIBRARY MEDIA SPECIALISTS

Sheri Anita Massey  
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Co-Directed By: Dr. Allison Druin  
Associate Professor  
College of Information Studies

Dr. Ann Carlson Weeks  
Professor of the Practice  
College of Information Studies

This study investigated the digital library integration behaviors of school library media specialists (SLMSs) who have achieved certification from the National Board for Professional Teaching Standards (NBPTS). A qualitative interview study design was chosen to convert tacit knowledge related to digital library use into explicit knowledge that can be shared with others. The goal of this research was to identify behaviors and techniques that exemplary SLMSs share when using digital libraries to support the curriculum in K-12 schools.

The researcher interviewed and collected artifacts from 10 local National Board certified SLMSs and analyzed the resulting transcripts and materials using thematic analysis. A preliminary coding scheme was derived from the NBPTS

Library Media technology innovation standard, which requires candidates to demonstrate expertise in providing technology access, teaching effective technology use, engaging learners with technology, and using technology to enhance the curriculum. Themes related to these four areas emerged from the data, as did sub-themes in the form of barriers the SLMSs encountered and strategies they developed to meet the standard. The barriers are discussed using Ertmer's (1999) first- and second-order classifications. The strategies are the SLMSs' best practices.

To provide digital library access the SLMSs made themselves and their assistants available to learners; demonstrated mental and resource flexibility when they encountered obstacles; and, implemented creative funding strategies. To teach digital library use they used the research process to help students bridge knowledge learned in various contexts; provided training; remained abreast of digital library innovations; and, offered suggestions to product developers. To maintain engagement with digital libraries they used proven teaching techniques that build on strong instructional design principles. Finally, they relied on collaborative relationships when integrating digital libraries. They increased collaboration by building trust among colleagues; extending their reach beyond the SLMC in person and virtually, diversifying their role within the school, and gathering curriculum information to incorporate information literacy skills into lessons.

Key implications: encourage SLMS-teacher collaboration, build a knowledge management system that captures expertise and supports SLMS communication, reconsider blocking social networking tools in schools to bridge the disconnect between students' home and school information-related behaviors.

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BOARD CERTIFIED LIBRARY MEDIA SPECIALISTS

By

Sheri Anita Massey

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Advisory Committee:

Professor Allison Druin, Chair

Professor Ann Carlson Weeks, Co-Chair

Professor Delia Neuman

Professor Ping Wang

Professor Matthew Kirschenbaum, Dean's Representative

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## Dedication

To Sunni Annette Massey, my identical twin sister, my best friend and my better half—the Cotterpin Doozer to my Red Fraggle.

To Adrian Robinson Massey and Samuel Massey Jr., my parents and my foundation.

To Samuel (Sammy) Massey, III, my little brother and my wonder of wonders.

Words cannot express how much I love you all.

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# Chapter 1: Introduction

This research identifies best practices in technology integration by school library media specialists who have obtained national certification in library media. “Best practices” is used here refer to what Patton (2001) calls promising practices, or “high-quality lessons learned.” They are principles to guide practice that could be applied to future action that are derived from numerous sources, one of which is “practice wisdom and experience of practitioners” (p. 335). The research is situated within a framework that brings together literature on technology use, nationally certified educators, and knowledge management; it follows a qualitative interview study design. The overarching question guiding this research asked: How do exemplary school library media specialists use technology to support the curriculum in K-12 schools? The study identified behaviors and techniques that exemplary school library media specialists (SLMSs) have in common when using digital library technology to support the curriculum in schools. The findings and conclusions from this research could inform practice with a rich description SLMSs’ digital library integration behavior.

## ***1.1 Problem Statement***

This study was motivated by three challenges in school library media research:

1. A limited connection between broad goals outlined in national, state, and local standards designed to guide practitioners and the specific practices of practitioners operating in school library media centers;

2. A lack of research using a methodology designed specifically to capture and share SLMSs' knowledge of technology use; and
3. Limited empirical research that focuses specifically on technology integration in school library media programs (SLMPs).

There is a long history of standards that have been developed to guide SLMSs in the integration of technology (Neuman, 2004). Among others, they include:

*Information Power: Building Partnerships for Learning* developed by the American Association of School Librarians (AASL) and the Association for Educational Communications and Technology (AECT); the *Standards for the 21st-Century Learner* developed by the American Association of School Librarians (AASL); the *National Technology Literacy Standards* developed by the International Society for Technology in Education (ISTE); the *Library Media Standards* developed by the National Board for Professional Teaching Standards (NBPTS); and various state and local standards.

The focus of this research was the NBPTS *Library Media Standards*, which broadly describe the knowledge, skills, and abilities of exemplary SLMSs. The broad nature of the NBPTS means that they offer little practical guidance for professionals striving to meet them; however, general outlines of goals and objectives are sometimes insufficient for busy practitioners who might benefit from more explicit techniques or strategies for use in the field. Both new and experienced SLMSs could benefit from a best-practices framework that bridges the gap between the NBPTS and exceptional performance. This study addresses the need for more information about

how exemplary SLMSs apply their technology integration expertise since the publication of the NBPTS specifically Standard V, “Leading Leading Innovation through the Library Media Program.”

Findings from this study begin to capture how exemplary SLMSs, those who have achieved NBPTS Certification, have been able to use technology to support their schools’ curriculum. The result is a description of best practices for use in promoting knowledge transfer among professionals, thus bringing exemplary practice into reach for other practitioners. The second challenge motivating this study is the need to externalize SLMSs’ professional knowledge for capture and reuse. The expertise of accomplished individuals within an organization is perhaps the organization’s most valuable resource. However, capturing expertise is not easy (Berliner, 2004a); it involves the elicitation and conversion of tacit knowledge into a form that can be documented and shared. In this study, traditional knowledge management strategies were used to elicit SLMSs’ technology use - knowledge resulting in a body of information that may be used to facilitate technology integration in schools. The methodology used in this study demonstrates one way of applying existing methods to capture and share SLM professionals’ expertise.

The third challenge motivating this study is the dearth of empirical research on SLMSs and technology integration. Indeed, there is very little research on how the SLMS uses technology in teaching to support members of the learning community. The paucity of library and information studies (LIS) research on SLMSs’ technology use has resulted in practice being driven largely by research from other disciplines (e.g., education) or by anecdotal evidence. In recent years, much of school library

research in LIS has focused on connecting the school library media program to student achievement. There continues to be a need to explore other areas of practice, such as knowledge sharing and standards implementation. Knowing how SLMSs go about integrating technology into everyday practice will also contribute to the larger knowledge base of the school library media profession within the LIS literature.

Specifically, this study addresses a lack of research that explores how SLMSs use networked electronic resources, or digital libraries. This research identified how NBPTS Certified SLMSs integrated networked digital libraries and related digital information resources into the school curriculum. It brought together information from several SLMSs who perform similar tasks but lack day-to-day opportunities to learn from and share knowledge with one another. The study systematically collected and analyzed exemplary SLMSs' knowledge, beliefs, and practices when integrating this type of technology. The questions used to focus this study were derived from the NBPTS themselves.

## ***1.2 Research Question***

How do exemplary SLMSs use technology (i.e., digital libraries) to support the curriculum in K-12 schools? How do exemplary SLMSs:

- Provide access to digital libraries?
- Teach effective use of digital libraries and other information resources?
- Engage learners with digital libraries?
- Use digital libraries to enhance learning [support the curriculum]?

The result of the study is an initial description of best-practices, or what exemplary SLMSs do to encourage school-level technology integration. When best, or promising, practices are identified, they can be disseminated to others who want or need to improve performance.

This dissertation is divided into five chapters. Chapter 1, the introduction, describes the three problems that motivated the undertaking of this research. Chapter 2 outlines the conceptual framework that focuses the subsequent discussion—bring together research and theory about technology and digital library integration in schools; studies of NBPTS Certified educators; and, concepts and strategies related to knowledge discovery, capture, and transfer. The study design is outlined in Chapter 3. Chapter 4 presents the findings in the form of strategies and barriers to digital library integration. Chapter 5 concludes the dissertation with a discussion of the findings in light of the conceptual framework, study implications, and suggestions for future research.

## Chapter 2: Conceptual Framework

The purpose of this chapter is to present the conceptual framework used to guide this line of inquiry. The chapter introduces relevant terminology and summarizes scholarly and research literature on technology and digital library integration in schools, NBPTS Certified educators, and knowledge management.

**Figure 1:** Conceptual framework



Recent advances in technology infrastructure have led to unprecedented access to digital technology in elementary and secondary schools. According to the U.S. Department of Education National Center for Educational Statistics (2005), computer use by children in elementary and secondary schools rose from 60.1% in 1993 to 83.5% in 2003. Computer use at home also increased from 24.5% in 1993 to 67.6% in 2003. Telecommunications proliferation is increasing the number of children who use the Internet to connect to the global community. In fall 2005, nearly 100% of public schools in the United States had access to the Internet, compared with 35% in 1994 (U.S. Department of Commerce & National Center for



Education Statistics, 2006). As of 2007, 95% of instructional computers in U.S. schools had high-speed Internet connections (Editorial Projects in Education (EPE) Research Center & Education Week, 2007).

Technology is transforming access to information and our interactions with information. Indeed, skills such as problem solving, synthesizing information, and communicating via technology are more important than ever for navigating the tidal wave of information available on- and offline (Barron et al., 2003). The K-12 school library media specialist (SLMS) teaches members of the school community how to be information literate, or how to become “active and creative locators, evaluators, and users of information to solve problems and to satisfy their own curiosity” (American Association of School Librarians (AASL) & Association for Educational Communications and Technology (AECT), 1998, p. 2)

The school library is one of the most technology-rich spaces in many schools, with the SLMS serving as one of the school’s experts in information technology processes and products (Logan, 2001; Oliver, 2004; Seavers, 2002). The SLMS is simultaneously a teacher, an instructional partner, an information specialist, and a program administrator (American Association of School Librarians (AASL) & Association for Educational Communications and Technology (AECT), 1998). As a teacher, the SLMS collaborates with students, staff, and other members of the learning community to expand their understanding of information issues, products, and skills. *Information Power* states that SLMSs should “model and promote effective uses of technology for learning and teaching” (American Association of School Librarians (AASL) & Association for Educational Communications and

Technology (AECT), 1998, p. 71). As an authority and leader in technology integration, the SLMS is ideally situated to guide learners (teachers, students, and staff) as they locate and use digital information resources for teaching and learning.

In light of the critical role SLMSs play in technology provision in schools, the goal of this research was to identify what accomplished SLMSs do to integrate technology, in particular digital libraries, into the curriculum. This research builds upon concepts and findings from the literature on technology integration, NBPTS Certified educators, and knowledge management. These conceptual perspectives form the foundation on which this exploration of SLMSs skills and behaviors rests.

The technology literature focuses on teachers' and SLMSs' technology and, specifically, digital library use. Work in this area contributes to the study by providing working definitions of key terms such as technology, technology integration, and digital library. Due to the limited amount of research on SLMSs' technology use, the technology integration literature review summarizes primarily research on teachers' technology use and extrapolates this information to SLMSs.

Studies of NBPTS Certified educators explain the assumptions and benefits of certification for teachers and SLMSs. For this research, it established NBPTS Certified educators as experts in areas outlined in the NBPTS, including technology integration.

Scholarly writing and research studies in the knowledge management area compare the abilities of expert and novice teachers and describe the importance of externalizing teacher expertise. The studies situate this research in a knowledge management framework focused on the discovery, capture, and transfer of teacher

expertise. Research in this area also suggests that expertise/tacit knowledge can be elicited using a range of methods, including reflection.

## ***2.2 Technology Integration Literature***

As the American Association for the Advancement of Science reports:

Technology is an overworked term. It once meant knowing how to do things—the practical arts or the study of the practical arts. But it has also come to mean innovations such as pencils, television, aspirin, microscopes, etc... In any other senses [sic], technology has economic, social, ethical, and aesthetic ramifications that depend on where it is used and on people's attitudes toward its use. (American Association for the Advancement of Science, 1993, p. 43)

### **2.2.1 Technology and Digital Libraries Defined**

The Association for Educational Communications and Technology (AECT) has defined instructional technology as "the theory and practice of design, development, utilization, management and evaluation of processes and resources for learning" (Seels & Richey, 1994, p. 1). Within the instructional technology framework are learning resources, which are designed, selected, and/or used to bring about learning. Learning resources can be messages, people, materials, devices, techniques, and/or settings. In the K-12 education literature of the past two decades, the term commonly refers to computing devices such as computer hardware, software, and the Internet and their application to the teaching and learning process (Hew & Brush, 2007). One type of "technology" within the broad spectrum of learning resources used in schools is the digital library. Because of the increasing attention to networked information in the information age, the term "technology" in

this study will refer to online digital libraries and related online digital information resources.

There is little consensus on the definition of digital libraries; however, simply put, they are collections of digitized and organized information available electronically via the World Wide Web (Lesk, 2005). An extensive, two-part definition by Borgman (1999) extends the concept of the digital library beyond the passive information retrieval system or collection of digitized materials to include people—information professionals and users:

Digital libraries are a set of **electronic resources and associated technical capabilities** for creating, searching and using information. In this sense they are an extension and enhancement of information storage and retrieval systems that manipulate digital data in any medium (text, images, sounds; static or dynamic images) and exist in distributed networks. The content of digital libraries includes data, metadata that describe various aspects of the data (e.g., representation, creator, owner, reproduction rights), and metadata that consist of links or relationships to other data or metadata, whether internal or external to the digital library.

Digital libraries are constructed - collected and organized - by [and for] a community of users, and their functional capabilities **support the information needs and uses of that community**. They are a component of communities in which individuals and groups interact with each other, using data, information, and knowledge resources and systems. In this sense they are an extension, enhancement, and integration of a variety of information institutions as physical places where resources are selected, collected, organized, preserved, and accessed in support of a user community. These information institutions include, among others, libraries, museums, archives, and schools; but digital libraries also extend and serve other community settings, including classrooms, offices, laboratories, homes, and public spaces. (Borgman, 1999a, p. 29)

Using Borgman's definition as a foundation, in this study a digital library was broadly defined as a collection of digitized and organized information that supports a user community and is available electronically via the World Wide Web.

Networked technologies and digital resources, such as digital libraries, allow people to share information and ideas around the clock and in various formats, thus having the added effect of dramatically increasing the amount of information available to learners. Learners must be information literate to interact effectively with the explosion of information available electronically (American Association of School Librarians (AASL) & Association for Educational Communications and Technology (AECT), 1998). At a time when understanding how to access and use information is critical, SLMSs are positioned to lead the integration of digital libraries into the schools in support of student learning.

### **2.2.2 Integrating technology**

Dias (1999) explains: “technology is integrated when it is used in a seamless manner to support and extend curriculum objectives and to engage students in meaningful learning. It is not something one does separately; it is part of the daily activities taking place in the classroom” (¶ 5). Dias goes on to clarify that, when technology is integrated, the primary goal of a lesson is not simply to use the technology but to engage students in meaningful learning. For Angers and Machtmes (2005) integration means that teachers incorporate technology into their everyday teaching practices in a manner that enhances student learning. The key to technology integration in education is that technology, whatever it may be, is used to enhance the learning experience and develop learners’ thinking skills and not as an add-on or after-thought (Angers & Machtmes, 2005; Dias & Atkinson, 2001; Hew & Brush, 2007; Hoon, 2006).

### **2.2.3 Research Studies: Technology Use and Classroom Teachers**

There are copious studies in education that explore teachers' technology use in the classroom. Considering the SLMS's role as a teacher and an instructional partner, the literature on teachers' technology use can be examined to learn more about the role the SLMS may play when using technology to improve teaching and learning.

Research on teachers' use of technology can be broken into three major areas: studies of technology use in teacher preparation programs, or pre-service teachers' technology use; factors that affect teachers' use of technology; and, variations in expert and novice teachers' technology use behaviors. The results of these studies can be extrapolated to shed light on the technology use by SLMSs in schools.

### **2.2.4 Studies of teacher preparation programs**

The first area of research on teachers' technology use is related to teacher preparation programs. It is in these programs that pre-service educators learn instructional methods, learning theories, foundations of education, and classroom management. Future teachers learn strategies to integrate technology throughout content areas such as math and social studies. Research suggests that field studies and internships in schools are crucial to the acquisition of technology integration skills because these experiences are the principal ways in which education students learn technology integration practices from seasoned cooperating teachers (Hall, 2006). Oftentimes, preservice teachers learn that simply knowing how to use specific technologies is not enough to use them effectively with students (Aust, Newberry,

O'Brien, & Thomas, 2005; Russell, Bebell, O'Dwyer, & O'Connor, 2003). By collaborating or apprenticing with their cooperating teachers, they learn to create and implement curriculum plans that include technology (Franklin, 2005).

### **2.2.5 Studies of factors that affect teachers' use of technology**

Numerous studies on teachers' technology use focus on factors that influence technology integration. In an in-depth exploration of these factors, Ertmer (1999) categorizes barriers that hinder teachers' technology use into two types—first- and second-order barriers. This distinction can be used in the many research studies that investigate technology use factors.

First-order barriers are external or institutional barriers that may or may not be beyond the teacher's control. These barriers include: inadequate or lack of infrastructure, which limits access (Brown, 2000; Bull, Nonis, & Becker, 1997; Chiero, 1997; Morrell & Haslam, 2002); lack of time (Chiero, 1997; McDonald, 2006); lack of technical and/or administrative support (Ball, 2006; Sheingold & Hadley, 1990; Shuldman, 2004); and inadequate training (Bull et al., 1997; Hoon, 2006; Hutchison, 2006; L. R. Rogers, 2007; Winnans & Brown, 1992).

Second-order barriers are internal, personal, and ingrained in a person's beliefs. These barriers include: an aversion to or an unwillingness to change (Baylor & Ritchie, 2002; Dias, 1999; Vannatta & Fordham, 2004) and pedagogical beliefs that conflict with technology use (Dede, 2000; Ertmer, 2005; Franklin, 2005; Morrell & Haslam, 2002; Tuzzio, 2007; Weycker, 2002). After identifying and categorizing the types of barriers teachers face as they work to achieve technology integration,

scholars in education challenge researchers to identify specific strategies for circumventing, overcoming, and eliminating those barriers.

### **2.2.6 Studies of expert versus novice teachers' technology use**

The third area of research on technology use in education focuses on the differences in expert and novice teachers' integration behaviors. Researchers in this category stress the importance of identifying the interpretations, meanings, and beliefs that foster exemplary technology practice or the use of technology to improve student achievement outcomes. Findings from these studies suggest that novice teachers may be more comfortable with the technology but do not always have the skills or integration methods to use the technology to support student learning (Russell et al., 2003; Sheingold & Hadley, 1990; R. W. Smith & Kubasko, 2006). Expert or accomplished seasoned teachers often have a broader understanding of pedagogy, which allows them to focus on technology integration as well as content and/or classroom management when planning instruction (Becker, 1994; Kuhn, 2006; Meskill, Mossop, DiAngelo, & Pasquale, 2002; Pierson, 2001).

The use of technology by classroom teachers has been studied extensively over the years. Synthesizing studies of teachers' technology use beliefs and practices makes it clear that (1) teachers learn a great deal about technology integration from accomplished cooperating teachers in the field; (2) both internal and external factors affect a teacher's use of technology in the classroom; and (3) although novice teachers may be more comfortable with technology overall, expert teachers are more likely to use technology effectively for teaching and learning. Findings from these



studies can inform research on SLMSs as they address teaching and technology use in the school library media program.

### **2.2.7 Research Studies: Technology Use and SLMSs**

SLMSs have received far less attention than classroom teachers in the research literature on technology use. Studies of SLMSs' use of technology most often are rooted in teacher-SLMS collaboration research. Research on teacher-SLMS collaboration suggests that teachers face the same challenges whether they work alone or collaborate with the SLMS. For instance, time and training surfaced as the technology integration challenges most often encountered by SLMSs.

Oliver (2004) found that, although high school teachers viewed the SLMS as a technology expert, the teachers' lack of time limited collaboration, which then limited the infusion of technology into learning activities. Guided by the roles of the SLMS outlined in the first edition of *Information Power* (1988) and by Roger's diffusion of innovations theory, Forrest (1993) studied technology use in a small, rural high school. She found that the time and effort required to diffuse new technologies varies both with the number of innovations and with their complexity and that the attitudes and training of the SLMS, faculty, and administration all affected the diffusion of technology in the school library media center (American Association of School Librarians (AASL) & Association for Educational Communications and Technology (AECT), 1988, 1998; Forrest, 1993; E. M. Rogers, 1962).

Technology training, or professional development, is also a factor in SLMSs' technology use. Miller (1995) surveyed SLMSs in Missouri to find out what

influenced their implementation of technological resources in the library media center. He found that professional development, gained either from attending conferences or from consulting with colleagues, positively influenced technology integration. In another study, Bruns (1997) surveyed SLMSs in Texas about their perceptions of Internet use in their schools and found that his respondents believed that, when SLMSs received Internet training, their students benefited and showed improved research skills and student learning.

Several other factors affecting technology use in the school library have received some attention in the research literature. Powell (1998), who also used Roger's Diffusion of Innovations theory as a conceptual framework for her research, surveyed SLMSs in Tennessee and learned that a positive attitude toward technology positively correlated with use. Grade level was also a factor in technology use in Powell's study. She found that SLMSs in secondary schools were more likely than those in elementary schools to use technology.

Studies that explore the SLMSs' technology use behaviors are few, as are qualitative studies that present a holistic picture of technology integration in school library media programs (Forrest, 1993; Oliver, 2004). Surveys that focus on factors that affect technology use dominate the research landscape (Bruns, 1997; Miller, 1995; Powell, 1998; Truett, 1997) and often stop at listing barriers to technology use without offering strategies to overcome those barriers. Many studies use teacher-SLMS collaboration as a lens to investigate technology use and overlook what the SLMS brings to the table—an expertise in technology integration that is seldom explored in and of itself. But what does this expertise look like? There remains a

need for research that employs qualitative methods to develop an empirically grounded understanding of behaviors that SLMSs employ when using technology in their own practice.

### **2.2.8 Research Studies: Digital Library Use and Educators**

To date, few studies document how K-12 teachers or SLMSs find, access, and use digital libraries<sup>1</sup>. The study of educators' use of online information resources is frequently embedded in the exploration of their general technology use. Indeed, researchers with the *Effective Access* project surveyed science and math teachers to understand their use of the National Science Digital Library (NSDL) and found that, similar to teachers' overall technology use, their NSDL use was affected by school/district infrastructure, professional development, and time (Hanson & Carlson, 2005). The teachers also expressed a need to have content from authoritative sources, aggregated into one, simple site (Carlson & Reidy, 2004). In a study of SLMSs' mental models for teaching electronic resources, Tallman (1999) found that the SLMSs' mental models for teaching with electronic databases were influenced by their models of teaching access, research, and retrieval with print resources.

Although a significant amount of research has been done on children's use of digital libraries in recreational and instructional settings (for example, (Beheshti, Bowler, Large, & Nettet, 2005; Hourcade et al., 2003; Hutchinson, Bederson, & Druin, 2006; Kuhlthau, 1997; Massey, Weeks, & Druin, 2005; Massey, Weeks, &

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<sup>1</sup> A number of information seeking studies look at how educators look for information in electronic contexts, usually within the context of testing a particular search interface. See, *Relevance Criteria Used by Teachers in Selecting Oral History Materials* (Lawley, Soergel, & Huang, 2005).

Druin, 2007; Reuter, 2007)), few have studied teachers' and SLMSs' digital library use. This lack of research limits our understanding of how educators use digital information resources and of the factors they consider important for their use in instructional settings (Carlson & Reidy, 2004; Hanson & Carlson, 2005).

### ***2.3 National Board for Professional Teaching Standards Certification***

In 1987, the National Board for Professional Teaching Standards (NBPTS) was created to develop standards for educators with the goal of improving student learning by strengthening teaching. The standards were developed by teachers, administrators, school board members, policy-makers, university professors, and community leaders to create a unified vision of educational excellence in multiple content/subject areas (National Board for Professional Teaching Standards, 2001). The standards are not without criticism (Serafini, 2002). Researchers and educators have expressed concerns about the hierarchy and disturbance in collegiality they create (King, 1994; Marshall, 1996); racial and cultural bias in the certification criteria and process (Bond, Smith, Baker, & Hattie, 2000; Irvine & Fraser, 1998); the use of the standards as an assessment tool (Cavalluzzo, 2004; Kane, Rockoff, & Staiger, 2006); and the assumption that NBPTS Certified educators, specifically teachers, perform better compared to teachers without NBPTS Certification. In spite of these criticisms, NBPTS Certification continues to be recognized as a sign of teacher quality and a tool for increasing teacher effectiveness (Goldhaber & Anthony, 2004; Hollandsworth, 2006; Laverick, 2005; Newcomer, 2005; T. W. Smith, Gordon, Colby, & Wang, 2005).

To paraphrase, the NBPTS suggests that exemplary educators can be defined by five core propositions:

1. Teachers are committed to students and their learning;
2. Teachers know the subjects they teach and how to teach those subjects to students;
3. Teachers are responsible for managing and monitoring students' learning;
4. Teachers think systematically about their practice and learn from experience; and
5. Teachers know how to bring parents and other professionals into the process to help learning.

The certification process is designed to “capture the complex nature of teaching by focusing on how teachers work and how they decide on appropriate courses of action in their classrooms” (Pool, Ellett, Schiavone, & Carey-Lewis, 2004, p. 33). Any educator with three or more years of teaching experience may voluntarily pursue certification that is aligned with the NBPTS for his or her area. The process takes one year and is done in two parts. The first, completed in the classroom, takes from four to six months. To demonstrate his/her level of practice, the candidate develops a portfolio made up of a diary, videotapes, and student work samples. The second part of the process takes place at an off-site assessment center. The candidate spends a day taking written exams on content knowledge and best practices in his/her

area. The cost of NBPTS Certification is \$2500, which is often paid for or reimbursed by external funding sources. Once awarded, certification is valid for ten years. SLMSs are certified from early childhood through young adulthood.

In 1998, the NBPTS approved ten standards for SLMSs. These are divided into three categories:

1. what SLMSs know;
2. what SLMSs do; and
3. how SLMSs grow as professionals (National Board for Professional Teaching Standards, 2001, p. 5).

Table 1: NBPTS Library Media Standards

What Library Media Specialists Know		What Library Media Specialists Do		How Library Media Specialists Grow as Professionals	
I.	Knowledge of learners	IV.	Integrate instruction	VII.	Reflective practice
II.	Knowledge of teaching and learning	V.	<b>Lead innovation through the library media program</b>	VIII.	Professional growth
III.	Knowledge of library and information studies	VI.	Administer the library media program	IX.	Ethics, equity, and diversity
				X.	Leadership, advocacy, and community partnerships

The NBPTS for SLMSs are aligned with the *Information Power* guidelines (AASL & AECT, 1998) and the *National Educational Technology Standards for Students* (ISTE, 2000). They require that SLMSs demonstrate knowledge of information literacy, practice instructional collaboration, and the integration of technology into the library media program and the curriculum.

### **2.3.1 Standard Five (V), Leading Innovation through the Library Media Program**

Standard five (V) of the NBPTS is most closely aligned with technology integration. Under it, the NBPTS asserts that “[a]ccomplished library media specialists lead in providing equitable access to and effective use of technologies and innovations” (2001, p. 23). Standard V is divided into four parts (p. 23-25):

1. Providing access to technology information systems
2. Teaching effective use of technology and other resources
3. Engaging learners with technology
4. Enhancing learning

The NBPTS provide few examples of implementation (National Board for Professional Teaching Standards, 2001, pp. 23-25), and those that are available reveal varying levels of granularity and are presented in a short summary rather than in an organized framework. All of the standards would be enhanced by fuller and more detailed descriptions of how they might actually be implemented in day-to-day instructional settings. This study in particular is designed to develop an evidence-based description of expert SLMSs’ digital library use. Evidence-based practices are the behaviors and techniques that accomplished practitioners have in common and represent the most favorable way of achieving a specific objective (Patton, 2001). When best practices are captured and shared, organizations can use them to avoid reinventing the wheel or duplicating basic methods that have long been in existence, potentially cutting costs through better productivity and efficiency (Patton, 2001). An exhaustive exploration of expert SLMSs’ practices, rich in descriptions and examples,

culled from practice, is needed to form the foundation of an information bank on evidence-based practices for technology integration.

NBPTS Certified SLMSs have documented their accomplishments and demonstrated “essential knowledge, skills, dispositions, and commitments that allow them to practice at a high level” (National Board for Professional Teaching Standards, 2001, p. v). These SLMSs have shown their technology integration abilities along with other areas of expertise, adopting and adapting technologies as powerful teaching and learning tools. Because of their success in meeting the rigorous standards established and ratified by library and teaching professionals, NBPTS Certified educators are assumed to be experts in their respective fields. A collection of their evidence-based practices from this study will form the foundation for an information bank on technology integration that can be disseminated among school library media professionals.

### **2.3.2 Research Studies: NBPTS Certified Classroom Teachers**

Since the creation of the NBPTS, research on NBPTS Certified classroom teachers has been ongoing (Education Consumers Foundation, 2006; National Board for Professional Teaching Standards, 2007). Most of this research tends to focus on assessing the impact of National Board Certification on teachers and students. More specifically, scholars have explored the impact of the certification process on (1) teaching practices and (2) professional development and the effect of these two factors on student performance on standardized tests (Education Consumers Foundation, 2006; National Board for Professional Teaching Standards, 2007). To



date, no published studies on NBPTS Certified teachers have specifically examined teachers' use of technology.

Overall, these studies suggest that, although it is difficult to correlate student achievement and National Board Certification (Education Consumers Foundation, 2006; Goldhaber & Anthony, 2004, 2007; Harris & Sass, 2007), participation in the National Board Certification process has been shown to have a positive effect on teacher practice, professional development, and areas of school improvement that are critical to raising student achievement (National Board for Professional Teaching Standards, 2007).

### **2.3.3 Research Studies: NBPTS Certified SLMSs**

Empirical research on NBPTS Certified SLMSs is being undertaken at the Florida State University to explore the impact of a leadership-centered curriculum using the NBPTS tenets as a framework (Branciforte & Dresang, 2005; Dresang, Everhart, & Buerkle, 2006; Everhart & Dresang, 2007). Researchers are also studying the impact of the NBPTS Certification process on the school library media specialist herself (Callison, February 2005; Dickinson, 2005). Unlike previous work, this study does not focus on the SLMS as leader, nor does it focus on how the certification process has affected the candidates. The focus here is solely on technology use and the expertise in technology integration available from this expert population.

## ***2.4 Knowledge and Knowledge Management***

Key concepts from the knowledge and knowledge management literature undergird this study, situating it within the context of knowledge sharing. A grounding tenet of knowledge management is that knowledge becomes valuable when it is re-used, enhanced, and “learned from” in order to create new knowledge (Bulter, 1999, ¶18). Knowledge management scholars describe the importance of identifying, capturing, and transferring knowledge to reduce duplicating information and enhance innovation. Understanding accomplished SLMSs’ technology integration from a knowledge management perspective will inform the development of systems for these users.

### **2.4.1 Knowledge**

Knowledge is information anchored in the beliefs, actions, and values of the holder (Nonaka & Takeuchi, 1995); it resides in the mind of the knower and is made up of experiences, values, information, and insights (Davenport & Porsak, 1998). It includes an awareness or familiarity gained through experience (Satyadas, Harigopal, & Cassaigne, 2001). The focus of this study is the knowledge of digital library use that NBPTS Certified SLMSs’ have accumulated throughout their careers.

Scholars suggest that knowledge exists in two forms—tacit and explicit. Explicit knowledge is that which can be expressed using symbolic forms of representation (Gertler, 2003); it is also rule-based, articulable, teachable, observable, and documented (Davenport & Porsak, 1998). Tacit knowledge, in contrast, is said to defy symbolic representation and is therefore almost impossible to reproduce in a

database (Davenport & Pursak, 1998; Gertler, 2003). Many knowledge scholars believe that tacit knowledge cannot be represented effectively outside the human mind (Davenport & Pursak, 1998; Polanyi, 1966). Others, however, believe that some aspects of tacit knowledge can be surfaced (Loughran, Mitchell, & Mitchell, 2003; Nonaka & Takeuchi, 1995; Nonaka & Toyama, 2003; Shadrick, Lussier, & Hinkle, 2005; H. Taylor, 2005). Moreover, scholars suggest that it is possible to unpack tacit knowledge, converting it into explicit knowledge through the process of externalization (Nonaka & Takeuchi, 1995; Nonaka & Toyama, 2003; Shadrick et al., 2005).

Apprenticeships and reflection both aid in the externalization of tacit knowledge. In an apprenticeship, tacit knowledge is externalized when an expert interacts with a novice and transfers knowledge using metaphors, analogies, and models. During this interaction, tacit knowledge is shared through ongoing dialogue and reflection (Nonaka & Toyama, 2003). Once articulated through these interactions, the expert's formerly tacit knowledge can be captured as explicit knowledge, crystallized, and added to the knowledge network of the organization (Nonaka & Takeuchi, 1995; Nonaka & Toyama, 2003; Shadrick et al., 2005). Expert knowledge and skills that are implicitly learned from everyday experience are also a form of tacit knowledge (Ambrosini & Bowman, 2001; Gourlay, 2004, 2006).

Tacit knowledge also can be revealed when practitioners reflect on how they carry out tasks and approach problems (Schön, 1987). By reflecting on professional behaviors, practitioners are able to focus on their role and how their actions influenced a course of events. Practitioners can then use the insights gained from

reflection to improve their future practice. Two types of reflection can be used to surface tacit knowledge: reflection-in-action and reflection-on-action. Reflection-in-action occurs during an event, when a practitioner encounters a problem and must resolve it immediately— simultaneously thinking and doing (Hatton & Smith, 1995; Schön, 1992). During reflection-in-action, tacit knowledge is called upon when practitioners reframe and address problems using knowledge from past experiences. In contrast, reflection-on-action involves the systematic and deliberate thinking about a behavior after it has occurred (Schön, 1983). In descriptive reflection-on-practice the practitioner revisits an experience to analyze his or her performance and to give reasons for actions taken (Hatton & Smith, 1995). Both forms of reflection allow for the externalization of tacit knowledge, which can ultimately improve practice.

#### **2.4.2 Teacher Expertise and Tacit Knowledge**

Teacher expertise as a form of tacit knowledge has received a great deal of attention in the education research literature (Berliner, 2004a, 2004b). Expert teachers are “professionals who have worked through the complex processes of adapting curricula, classroom design, dynamics, and teaching approaches that can best inform those new to teaching and learning in general” (Meskill et al., 2002, p. 46). From a meta-analysis that encompassed over 200,000 research students, Hattie et al., identified a set of dimensions that are characteristic of expert teachers (Hattie, Clinton, Thompson, & Schmidt-Davis, 1995). Bond and his colleagues compared the performance of novice and expert teachers on these attributes and found that, compared to novice teachers, experts:

- Set challenging goals and provide structures to help students reach those goals;
- Create a classroom climate optimized for learning;
- Have deep representations about teaching and learning and show an integrated understanding of subject matter and student learning to organize and adapt knowledge structures for diverse learners;
- Improvise as required by changing situations, modifying their instruction during the lesson;
- Are passionate about teaching and learning;
- Maintain a problem-solving stance to their work, defining and redefining instructional and curricular issues and developing innovative ways to address challenges;
- Respect their students as both learners and people;
- Express a sensitivity to context and employ flexible and diverse strategies to solve instructional problems; and
- Constantly evaluate new information they gather, testing hypotheses by using the information while teaching, and reflect on the lessons taught  
(Bond et al., 2000)

According to Loughran, Mitchell, and Mitchell (2003), teacher knowledge is not always obvious to others. It is often socially constructed and shared through fleeting personal interactions; the ensuing dialogue and reflection are rarely recorded. A culture that does not create time for professional reflection and discussions of

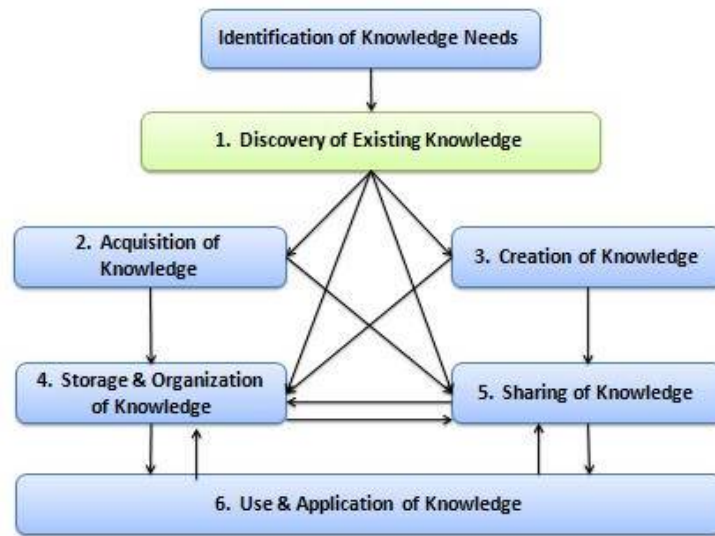
practice, along with other internal and external factors, creates barriers to externalizing teacher knowledge (Loughran et al., 2003). As a result, a large amount of valuable professional knowledge is shared only among small groups. Studies that have attempted the systematic capture of the professional knowledge of expert teachers suggest that it is important to understand how and why teachers gather, organize, interpret, and use information (Berliner, 2004a; Dexter, 2002; Dexter & Greenhow, 2004; Loughran et al., 2003). Furthermore, the studies offer strategies to externalize and capture this expertise.

### **2.4.3 Knowledge Management**

Knowledge management is the act of gathering and leveraging intellectual assets that are essential to organizational innovation and value creation (Gertler, 2003). Patton (2001) quotes *Executive Edge* magazine's definition of knowledge management as "a process that harvests and shares an organization's collective knowledge to achieve breakthrough results in productivity and innovation" (p. 329).

In knowledge-oriented professions like library and information science (LIS), knowledge management includes providing strategies, processes, and technology that enable knowledge sharing for problem-solving and decision-making (Mahdjoubi & Harmon, 2001; Satyadas et al., 2001). Bouthillier and Shearer (2002) put forward a framework of the knowledge management process that can be used to situate the study of teacher expertise within the context of knowledge discovery, capture, and transfer (Figure 1).

**Figure 2:** Bouthillier & Shearer Knowledge Management Framework



The knowledge management process begins and ends with the knowledge user. Knowledge is assembled and applied based on the user's needs. The second step of the Bouthillier and Shearer model describes the discovery of existing knowledge. Unlike the acquisition step, in which knowledge is brought in from external sources, and the creation step, in which knowledge sources are combined or analyzed to create new knowledge, the discovery step involves locating internal knowledge and identifying hidden reservoirs of intelligence that exist at all levels within an organization (Pollitt, 1999). It focuses on a response to the oft-quoted phrase "if only we knew what we know" (Bouthillier & Shearer, 2002). Only after knowledge has been gathered at an individual level can it be shared with other members of a community.

The discovery of existing knowledge, including expertise, calls for the sub-process of knowledge elicitation, "the process of explicating domain specific knowledge underlying human performance" (Cooke, 1999, p. 479). Effectively

eliciting tacit knowledge from an expert requires techniques that prompt the participant to recall and articulate theories or rationalizations to explain his or her behaviors (Cooke, 1999; H. Taylor, 2005). More specifically, participants are asked to surface and articulate their knowledge about a particular situation, taking into account the contextual and experience-based nature of the knowledge (Cooke, 1999). The elicitation of tacit knowledge requires that participants focus on what they actually did in certain situations rather than on what they feel they ought to have done.

Methods such as observations, artifact analysis, process tracing, concept modeling, storytelling, contextual inquiry, retrospective protocol analysis/ stimulated recall, and critical decision making are used to elicit participants' knowledge of actual practices (Cooke, 1999; Shadrick et al., 2005). Interviews are the most frequently employed method of knowledge elicitation, with un- or semi- structured interviews seen as the most useful format in early stages of the elicitation process (Cooke, 1999).

Taylor (2005) used a combination of interview methods including storytelling and cognitive probes in a semi-structured protocol that drew on the respondents' actual experiences and focused the interviews on specific incidents and aspects of importance. The semi-structured interviews yielded descriptions that converged on similar actions, which Taylor then classified and categorized into themes. By interviewing multiple participants and using multiple interview methods, she was able to identify aspects of tacit knowledge. Similar methods for participant and methodological triangulation were used to explore teacher expertise in technology integration in this research.



Together, findings from previous research in technology integration, the practices of NBPTS Certified educators, and knowledge management provide a broad conceptual framework (see: Figure 1) and tested methods for exploring SLMSs' behaviors and beliefs about technology use. This study concentrated on the discovery of knowledge related to determining what expert SLMSs already know and do when integrating digital libraries into the curriculum. It also demonstrated the use of methods for the elicitation and sharing of knowledge in different settings.

## Chapter 3: Research Design

Chapter 3 is divided into three sections. The first section presents the research questions, describes the rationale for using qualitative methods, and outlines the study design. The second section describes how and why the participants were selected. The third section explains the data collection and analysis methods and the rationale for selecting those methods. The third section also addresses ethical issues, threats to validity, and ways to address each. The section concludes with assumptions and limitations related generally to qualitative research and specifically to this study.

### ***3.1 Research and Foreshadowing Questions***

#### **3.1.1 Major Research Question:**

How do exemplary school library media specialists (SLMSs) use technology (i.e., digital libraries and related online digital information resources) to support the curriculum in K-12 schools?

#### **3.1.2 Foreshadowing Questions:**

How do exemplary SLMSs (based on the four parts of NBPTS Standard V):

1. Provide access to digital libraries? How do these SLMSs describe exemplary access to digital libraries? In what ways do they make digital libraries accessible to members of the school community?
2. Teach effective use of digital libraries and other information resources? What do these SLMSs consider effective use of digital

libraries? What strategies or procedures do they use when teaching learners (adults and students) to use digital libraries?

3. Engage learners (adults and students) with digital libraries? How do these SLMSs define an engaged learner? What strategies or procedures do they use to engage learners with digital libraries?
4. Enhance learning [support the curriculum] through digital libraries use? In what ways do these SLMSs believe digital libraries affect student learning? How do they believe their use of digital libraries affects instructional goals? Student learning?

### ***3.2 A Qualitative Approach***

Creswell (1998) notes that in qualitative research “the researcher is an instrument of data collection who gathers words or pictures, analyzes them inductively, focuses on the meaning of the participants, and describes a process that is expressive and persuasive in language” (p. 14). The main goal of this study was to identify nationally board certified SLMSs’ practices and beliefs about their practices when using digital libraries to support the school curriculum. The researcher used a qualitative research design to investigate participants’ perceptions and behaviors when integrating digital libraries into the school curriculum.

Qualitative researchers believe that meaning is “embedded in people’s experiences and ... this experience is mediated through the investigator’s own perceptions” (Merriam, 1998, p. 6). The role of the researcher, then, is to seek, describe, interpret, and explain the world as those in the world experience it. In other

words, the researcher is the “instrument” of data collection and analysis. For this research, the SLMSs’ interpretations of reality were collected and analyzed through a series of systematic methods.

Qualitative researchers also believe that knowledge is not discovered but constructed (Stake, 1995). The aim of the research is not to discover one external, objective reality but to construct a reality formed from human interpretations (Merriam, 1998; Stake, 1995). Merriam (1998) explains that researchers “are interested in understanding the meaning people have constructed, that is, how they make sense of their world and the experiences they have in the world” (p. 6).

Qualitative research methods were used in this study to bring together perceptions from multiple SLMSs to identify themes embedded in the “lived realities” of the participants (Creswell, 1998, p. 54). Doing so enabled the researcher to convert what previously existed as tacit knowledge related to practices in digital library use into explicit knowledge that can be shared with others.

Qualitative research encompasses a number of research designs, including ethnography, phenomenology, case studies, and interview studies (Creswell, 1998; Spradley & McCurdy, 1972). The qualitative design selected for this research is the interview study. The purpose of the qualitative interview is to capture the world as seen by the participant. When interviewing, "the researcher asks those who are studied to become teachers, and to instruct her or him in the ways of life they find meaningful" (Spradley & McCurdy, 1972, p. 11-12). There are several types of interviews, such as life histories, evaluation interviews, and qualitative interviews (Rubin & Rubin, 1995). In the qualitative research interview, the interviewer guides

a conversational partner in an extended discussion about a research topic (Rubin & Rubin, 1995; Spradley & McCurdy, 1972). In this qualitative interview study the researcher collected data from multiple participants to investigate specific aspects of integrating digital libraries into the school curriculum.

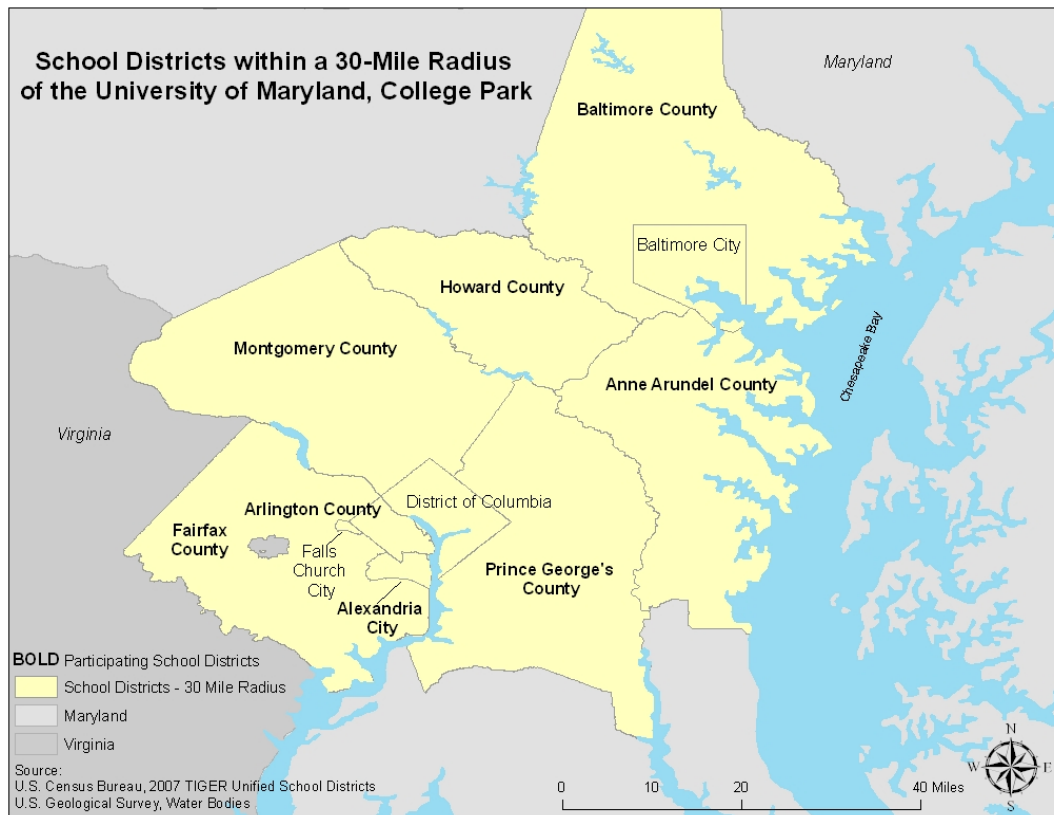
### ***3.3 The Researcher***

Because the qualitative researcher is the primary instrument of data collection and analysis, it is important to describe her here. She is African-American and attended public schools in urban areas throughout her K-12 education. She has six months of experience teaching English to third grade children in Mexico and six months of experience as a third grade classroom teacher in the United States. The researcher has experience working in special (two years) public (six months), and academic libraries (two years) and is gaining experience in school libraries throughout her doctoral studies. She is a doctoral candidate in a library and information studies program at a large university on the east coast, where she also earned her MLS with a specialization in school library media. She is a graduate research assistant on an interdisciplinary, intergenerational team studying the development and use of an international children's digital library. She has conducted research in Germany, Honduras, Mongolia, New Zealand, and the United States. The researcher's interests include: digital libraries; multicultural children's literature; the information seeking and uses behaviors of school library media specialists; and diversity in libraries.

### 3.4 Participants

NBPTS Certified K-12 SLMSs from public school districts in the Washington, DC, metropolitan area were asked to participate in this research. According to the US Department of Education National Center for Education Statistics, there are eleven public school districts within 30 miles of the University of Maryland<sup>2</sup>, which is located in College Park, Maryland (see Figure 3).

**Figure 3:** School districts in the Washington, D.C., metropolitan area<sup>3</sup>



<sup>2</sup> Using zip code 20742; Does not include charter schools; Core of Data for public school districts for the 2005-2006 school year. Accessed August 21, 2007, at: <http://nces.ed.gov/ccd/>.

<sup>3</sup> Map by Laurel L. Davis, MCP, of Optimal Solutions Group, LLC.

At the time this study was proposed (August 21, 2007) the NBPTS website listed 32 NBPTS Certified SLMSs within these districts<sup>4</sup>.

**Table 2: Number of NBPTS Certified SLMSs within the Research Region**

<b>State</b>	<b>District</b>	<b>Admin.</b>	<b>Elem.</b>	<b>Middle</b>	<b>High</b>	<b># of NB SLMSs</b>
<b>District of Columbia</b>	District of Columbia					
	Anne Arundel County		1			<b>1</b>
<b>Maryland</b>	Baltimore City					
	Baltimore County				1	<b>1</b>
	Howard County		2			<b>2</b>
	Montgomery County	1	7	1	2	<b>11</b>
	Prince George's County	1			3	<b>4</b>
	Alexandria City	1			1	<b>2</b>
<b>Virginia</b>	Arlington County		3		2	<b>5</b>
	Fairfax County	1	4		1	<b>6</b>
	Falls Church City					
<b>3 Regions</b>	<b>11 Districts</b>	<b>4 Admin</b>	<b>17 Elem</b>	<b>1 Middle</b>	<b>10 High</b>	<b>32 Total</b>

### 3.4.1 Participant Selection

When selecting participants for a study, qualitative researchers often use purposive sampling to maximize what can be learned about a phenomenon (Patton, 1990; Stake, 1995). Purposive sampling, explains Merriam (1998), “is based on the assumption that the investigator wants to discover, understand, and gain insight and therefore must select a sample from which the most can be learned” (p. 61). Creswell (2003) adds that participants selected in this way “will best help the researcher understand the problem and the research questions” (p. 185). When sampling

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<sup>4</sup> National Board for Professional Teaching Certified Teachers Database: Accessed August 21, 2007, at: [http://www.nbpts.org/resources/nbct\\_directory](http://www.nbpts.org/resources/nbct_directory)

purposively, the researcher identifies criteria that are essential for choosing the people to be studied. In criterion-based purposive sampling, the researcher develops a list of attributes that guides the selection of participants and sites. The list is then used to locate units that match the list (Merriam, 1998; Yin, 2003).

This study used criterion-based purposive sampling to identify participants from the group of 32 NBPTS Certified SLMSs in the Washington, DC, metropolitan area:

First-level criteria:

- NBPTS Certification has not expired;
- Used technology (digital libraries/online digital information resources) in the NBPTS Certification lesson.
- Were willing to dedicate approximately six hours to the study for interviews and informal discussions; and,
- Would permit the researcher access to teaching and digital library integration-related materials

The second-level criteria were developed in anticipation of a large number of respondents in an attempt to distribute the participants among grade level, geographic setting, and experience level. Second level criteria:

- grade level (elementary, middle/junior high, high)
- geographic setting (county or city), and
- experience level (number of years as a teacher and/or media specialist)



The second-level selection criteria were not used because the responses to the first-level criteria yielded a manageable number of participants.

### 3.4.2 Participant Characteristics

Ten SLMSs met the first-level criteria. All ten were Caucasian/White women with a median age of 46 years. In total, the women represented eight of the eleven school districts within 30 miles of the University of Maryland, College Park. The one eligible middle school LMSs within the region declined to participate in the study. No men and no people of color participated in this study. The group is reflective of the SLMS population as a whole. A summary of the participants and their regions appears in **Table 3**.

**Table 3: Research Participants by Region**

State	District	# of NB SLMSs in the study	Level
District of Columbia	District of Columbia	0	--
Maryland	Anne Arundel County	1	1 Elementary school SLMS
	Baltimore City	0	--
	Baltimore County	1	1 High school SLMS
	Howard County	1	1 SLM Administrator
	Montgomery County	3	2 Elementary school SLMS, 1 High school SLMS
	Prince George's County	2	1 SLM Administrator, 1 High school SLMS
Virginia	Alexandria City	1	--
	Arlington County	1	1 High school SLMS
	Fairfax County	1	1 SLM Administrator
	Falls Church City	0	--
<b>3 Regions</b>	<b>11 Districts</b>	<b>10 SLMSs</b>	<b>3 SLM Administrators, 3 Elementary, 4 High</b>

All of the SLMSs held a Master's in Library Science (MLS) or an equivalent degree. In addition to the MLS, eight of the ten SLMSs held teaching degrees: Bachelor's degrees in elementary education, early childhood education, science education, secondary art education, and foreign language education. Many of the SLMSs held some form of instructional technology certification, such as leadership in technology integration and instructional technology certification. Four of the participants became SLM administrators after achieving NBPTS Certification.

On average, the SLMSs had eight years of experience teaching in the classroom. In addition to the eight years in the classroom, the SLMSs averaged ten years of experience in the SLMC. They reported spending most of their time during the day in three major areas: communicating with learners (students, staff, parents, and community members); teaching; and managing the facility, including the technology. The SLMSs communicated with library stakeholders face-to-face and via email, phone, and the Web when answering questions, scheduling class sessions, completing paperwork, and updating Websites and newsletters. The second most reported activity was instruction—planning and teaching information literacy skills to students, staff, and parents. Troubleshooting, which included general problem-solving and technology support, was the third most reported task that consumed the SLMSs' time. The SLMSs reported repairing copiers, computers, and other machines.

Four years was the average number of years the SLMSs had been NBPTS Certified. Their reasons for pursuing certification were fairly consistent—financial benefit, the portability of the certification, and recognition of their teaching skills.

Most of the SLMSs reported that their main reason for pursuing certification was financial. They underwent the certification process to take advantage of financial incentives, usually bonuses or pay raises, offered by schools and districts to those who successfully achieved certification. The second most reported reason for attempting the certification process was license portability. Educators are typically certified at the state level, and NBPTS Certification allows them to transport their credentials across state lines (National Board for Professional Teaching Standards, 2008). Finally, the SLMSs took advantage of the opportunity to improve their teaching skills. They used the certification process to reflect on their teaching and improve their craft. By doing so they hoped to gain recognition and establish the credibility of their teaching expertise in the eyes of classroom teachers and administrators. A summary of demographic details is available in **Table 4**.

**Table 4: Research Participants' Characteristics**

Characteristics	N/Median
Gender	10 (all) female
Race/ethnicity	10 (all) Caucasian/White
Median age	46 (37 minimum, 53 maximum)
Most represented degrees/certifications	Master's in Library and Information Science (or equivalent), Bachelor's of Science in Education (or equivalent), Instructional Technology Certification
Median # of years in the classroom before becoming a SLMS	7.8 (3 minimum, 26 maximum)
Median # of years in the SLMC	10.5 (5 minimum, 21 maximum)
3 most common tasks	<ol style="list-style-type: none"> <li>1. Communicating with stakeholders (email, phone, Web)</li> <li>2. Teaching (information literacy skills instruction)</li> <li>3. Troubleshooting (technology, general problem-solving)</li> </ol>
Median # of years with NBPTS Certification	3.7 (2 minimum, 8 maximum)
3 reasons for pursuing NBPTS Certification	<ol style="list-style-type: none"> <li>1. Financial benefits</li> <li>2. Portability of certification</li> <li>3. Reflect upon and improve teaching skills</li> </ol>

### ***3.5 Data Collection***

This research underwent human subjects review and was approved in 2007 and renewed in 2008 by the Institutional Review Board (IRB) at the University of Maryland, College Park (see Appendix I). Data were collected in the spring and summer of 2008. Multiple interviews and artifact analysis were used during data collection to triangulate the data sources. The researcher scheduled one interview with each participant, a reflective interview with four participants, and one focus group interview with a subset of participants. The researcher also collected artifacts, or materials related to classroom practice, such as lesson plans and handouts, throughout the process.

Throughout the study, field notes were written whenever possible. The researcher transcribed the audiotapes recorded when participants were discussing artifacts. Two assistants were present at the focus group interview to monitor audio recording, take snapshots of the process, and take notes. Information was recorded in such a manner that subjects cannot be identified, directly or through identifiers linked to the participants. Participants are anonymous in this and future written and non-written presentations of this work. The data collected will be destroyed five years after the completion of the study.

**Table 5: Data Collection**

Phase	Collection method	Products for analysis
Interview 1 (10 people)	Demographic questionnaire Semi-structured, open-ended interview	<ul style="list-style-type: none"> <li>• Questionnaire data</li> <li>• Interview transcripts</li> <li>• Researcher's notes</li> </ul>
Interview 2 (3 people)	Semi-structured, open-ended reflective interview	<ul style="list-style-type: none"> <li>• Interview transcripts</li> <li>• Researcher's notes</li> </ul>
Interview 3 (4 people)	Focus group discussion of findings to explore the transferability of technology integration behaviors from one digital library to another	<ul style="list-style-type: none"> <li>• Discussion transcript</li> <li>• Concept maps</li> <li>• Photographs</li> </ul>
Artifacts (10 people)	Sample student work, planning documents, website information, pathfinders, etc.	<ul style="list-style-type: none"> <li>• Copies of documents</li> <li>• Notes related to artifacts</li> </ul>

### 3.5.1 Interview 1

Ten SLMSs participated in this first phase of data collection, which included a demographic questionnaire and a semi-structured interview, consisting of open-ended questions that allowed the participants to verbalize aspects of their behaviors and beliefs regarding teaching and digital libraries. The questionnaire was a modified version of the *Exemplary Teacher Survey* used in a study of NBPTS Certified business and technology teachers (Leatherwood, 2004), and the SLMSs received it in advance to complete and bring to the interview session. The SLMSs also received the interview questions in writing before the interview to allow time for personal reflection (See Appendixes B through F for the interview protocols). The researcher took notes before, during, and after the interviews. Responses to the interview questions were audiotaped and transcribed. At the end of each interview, the researcher collected artifacts related to the SLMSs' teaching and digital library integration practices and scheduled the second interview.

### **3.5.2 Interview 2**

Based on the richness<sup>5</sup> of the responses they gave at the first interview, three SLMSs were asked to participate in second individual interviews that were in-depth, open-ended, and reflective. The goal of the reflective interviews was to produce detailed narratives of the SLMSs' decision making processes during specific teaching situations. More specifically, each participant focused on the instructional decisions made before, during, and after a specific teaching episode in which she had used one or more digital libraries and collaborated with a classroom teacher. At each interview the researcher asked clarifying questions when a participant's response was unclear, and guided the SLMS to reflect on a lesson of her choice. The resulting narratives were audio-recorded and transcribed for coding. The researcher took hand-written notes before, during, and after each interview. The conversational nature of the interviews caused them to be lengthy—from two up to five hours in some cases.

### **3.5.3 Focus Group**

After the individual interviews had been completed and the artifact data were collected the researcher identified four SLMSs to invite to participate in a focus group interview based on the richness of the individuals' initial interview data and the diversity of experiences represented in the group. Two elementary school and two

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<sup>5</sup> A rich response is one that is highly detailed and allows the reader to envision what happened in the field. It is shared with the reader as quotes and contextualized descriptions (Geertz, 1973).

high school LMSs who had provided thick<sup>6</sup> descriptions of the digital library integration process were invited to participate in the focus group. Three of these four had participated in both the previous interview sessions; one had participated only in the initial interview. When one of the high school LMSs was not able to attend a another high school SLMS selected to balance the group. She had also given rich descriptions of her digital library use. The researcher interviewed participants in a focus group (Creswell, 2003; Rubin & Rubin, 1995) to capitalize on participant interactions and communication to generate data.

During the first and second interviews, the SLMSs considered a variety of digital libraries when discussing their digital library integration behaviors. Data from the first two interviews were used to identify strategies and techniques the SLMSs employed when using different digital libraries. One goal of the focus group interview was to discuss the strategies and barriers that emerged from analyzing the data from the first and second interviews in order to determine the consistency and transferability of those preliminary findings. The four participants also drew concept maps as visual representations of their descriptions of a “digital library.”

#### **3.5.4 Artifacts**

Artifacts are symbolic materials related to the phenomenon under study that are not collected through interviews or observations (Merriam, 1998). Although this was an interview study, classroom materials were collected including documents,

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<sup>6</sup> Thick description means “the complete, literal description of [an] incident or entity being investigated” (Merriam, 1998, p. 29).

websites, promotional media, anonymous student work, curricular materials, and/or other objects that each SLMS believed figured prominently in her online digital information resource use and beliefs. These artifacts were used to verify perceptions or claims from interviews and to shed light on similar events from a different point of view. For example, sample lesson plans supported the idea that planning in collaboration with a teacher made it possible to integrate information literacy skills and digital library use skills into the curriculum.

### ***3.6 Data Analysis***

Data analysis is the process of transforming raw data into findings, themes, or propositions. It “combines inductive category coding with a simultaneous comparison of all social incidents observed” (Goetz & LeCompte, 1993, p. 58). Data collection and analysis occur simultaneously in qualitative research; the process is recursive and dynamic as the researcher continuously develops, refines, and validates emerging codes (Merriam, 1998).

According to Patton (2001), “the challenge of qualitative analysis lies in making sense of massive amounts of data. This involves reducing the volume of raw information, sifting trivia from significance, identifying significant patterns, and constructing a framework for communicating the essence of what the data revealed” (p. 432). In order to make sense of what was collected, this researcher conducted an inductive, thematic analysis of the interview and artifact data. Themes and/or propositions that emerged from the data were shaped and modified throughout the



research process, with the goal of presenting an accurate description of the participants' experiences (Boyatzis, 1998).

Thematic analysis (Aronson, 1994; Attride-Stirling, 2001; Boyatzis, 1998) is the process of gathering and coding information into emergent codes or themes (Merriam, 1998; Strauss & Corbin, 1998; S. J. Taylor & Bogdan, 1984). In thematic analysis, patterns of experiences are identified from direct quotes or the paraphrasing of common ideas in the data. Related patterns are then identified and expounded. To identify themes in data requires identifying the unit of coding, or "the most basic segment, or element, of raw data or information that can be assessed in a meaningful way regarding the phenomenon" (Boyatzis, 1998, p. 63). The unit of coding in this study was a participant's response to a question. The response could have been expressed as a short phrase or as a longer narrative if it encompassed the participant's complete reply.

All responses that fit under a specific pattern are identified from the data and placed with the corresponding pattern. Related patterns are then combined and catalogued into themes and sub-themes. Themes are units resulting from patterns such as "conversation topics, vocabulary, recurring activities, meanings, feelings, or folk sayings and proverbs" (Taylor & Bogdan, 1984, p.131). The themes that emerge from the data are brought together to form a comprehensive picture of the participants' collective experience (Aronson, 1994).

In this research, the coding was done for each participant (SLMS) and across participants in an ongoing process of breaking down, examining, comparing, conceptualizing, and categorizing the data (open, axial, and selective coding) (Corbin

& Strauss, 1990; Glaser & Strauss, 1967; Strauss & Corbin, 1998). The researcher used NVIVO, a qualitative analysis software package, to manage the analysis process.

The themes that emerged were organized using NBPTS Standard V as a framework: How do exemplary SLMSs provide access to digital library systems, teach effective use of digital libraries and other resources, engage learners with digital libraries, and use digital libraries to enhance learning? These sections were further divided into barriers the SLMSs faced when integrating digital library technology and strategies they used to overcome those barriers. Coding definitions and examples can be found in Appendix H. Detailed descriptions of these themes begin in Chapter 4.

### ***3.7 Trustworthiness***

The researcher took steps to safeguard the credibility, transferability, dependability, and confirmability of the study (Lincoln & Guba, 1985). A summary of the safeguards for trustworthiness is presented in **Table 6**: triangulation, peer review, thick description, creation of an audit trail, and a search for disconfirming evidence (Denzin & Lincoln, 1994; Guba & Lincoln, 1982; Lincoln & Guba, 1985).

Credibility is the degree to which the participants' understanding of their realities agrees with the researcher's construct of those realities (Guba & Lincoln, 1982). Merriam defines credibility as "how research findings match reality... and [if] the findings capture what is really there" (Merriam, 1998, p. 201). Triangulation was used to elicit a full picture of the participants' constructions of reality by asking multiple questions of multiple participants, using multiple data collection methods (Creswell, 1994; Creswell, 1998; Guba & Lincoln, 1982; Maxwell, 1996). Because

the purpose of qualitative research is to describe a phenomenon as experienced by the research participants, the participants should assess the credibility of the findings.

Peer reviews were done with the research co-chairs.

Transferability refers to “the extent to which findings from one study can be applied to other situations” (Merriam, p. 207) or how findings from one setting relate to another. The person reading this work will judge the degree of transferability by comparing his or her situation to situations described in the study. Purposive sampling was used to identify a range of participants to represent multiple perspectives. To assist the reader in transferring findings, the researcher provided a thick, detailed, and precise description of the data related to the phenomenon under study.

Dependability is the degree to which research is likely to be repeated in the same or similar settings with similar results (Guba & Lincoln, 1982, Merriam, 1998; Yin, 1989). An audit trail of raw data, personal and process notes, and other material related to the research process was kept to allow others to evaluate the researcher’s interpretations and conclusions. Triangulation, peer debriefing/review, and thick description were also used to address dependability.

Confirmability— the degree to which findings are derived from the collected data and not from the researcher’s biases (Guba & Lincoln, 1982) — addresses whether findings can be substantiated or corroborated by others. Triangulation, peer debriefing/review and thick description were used to guard against threats to confirmability.

**Table 6: Summary of Strategies Used to Increase Trustworthiness**

Concern	Qualitative term	Addresses	Safeguards
Truth value	Credibility	Do your sources believe your findings?	Triangulation, peer debriefing/review
Applicability	Transferability	Can propositions be taken from one group and applied to another?	Purposive sampling, thick description
Consistency	Dependability	Are your propositions/findings stable?	Triangulation, peer debriefing/ review, thick description
Neutrality	Confirmability	Do your data support your propositions?	Triangulation, peer debriefing/review, thick description

### **3.8 Ethical Considerations**

In qualitative research, “ethical dilemmas are likely to emerge with regard to the collection of data and dissemination of findings” (Merriam, 1998, p. 215). The researcher took steps to protect the privacy and confidentiality of study participants. As noted earlier, the study was approved by the University of Maryland Institutional Review Board (IRB). As required in the IRB approval process, the objectives of the research were clearly communicated both orally and in writing to each participant. After each participant was informed of the nature of the research, she signed a written consent form. In addition, the researcher used coded references to protect the anonymity of the participants.

### **3.9 Assumptions and Limitations**

There are several assumptions and limitations of this study. First, the researcher assumed that NBPTS Certified SLMSs are experts in their craft and are worthy of study. Second, the researcher assumed that the sample size and distribution

of participants was sufficient to capture the SLMSs' best practices in digital library integration. Finally, the researcher encountered resistance from the NBPTS organization when attempting to include portfolio items in the data set, thus limiting the kinds of artifacts that could be collected and analyzed.

The researcher assumed that the NBPTS Certified SLMSs participating in this study possess special knowledge, authority, and/or characteristics based on their participation in a rigorous process to achieve additional certification. Although they have achieved additional certification testifying to their broad expertise, the participants may or may not display expertise specifically in digital library use.

These NBPTS Certified SLMSs have been recognized as leaders in the field and are assumed to be able to provide insights into what accomplished professionals do when using digital libraries that can be shared to improve overall practice. However, because only a limited number of SLMSs from a small geographic area participated in this study, they do not represent the majority of SLMSs in the country or even the region. Also, with repeated written and phone requests, no middle school LMSs agreed to participate in this study. The value of these findings is in their contribution to the existing bodies of literature on best practices, technology integration, and school library media programs. In addition, the thick description of study procedures and findings allows the reader to judge whether the findings can be transferred to other contexts.

The study's most serious limitation resulted from the researcher's lack of access to the participants' NBPTS portfolios, and although the researcher mailed a letter to the organization that included the SLMSs' consent forms and an explanation

of the nature of the study and expressly stated that this research would not evaluate the SLMSs nor would it assess the efficacy of the NBPTS Certification process, the NBPTS declined the researcher's request to use the SLMSs' portfolios for the study. The researcher believes that findings from this study may have been more robust had access to the NBPTS portfolios been granted.

Despite these and other possible study assumptions and limitations, the data and reports generated from this research contribute to the knowledge of digital information resource use by SLMSs. As they currently exist, standards written by various professional bodies (ISTE, ALA, AASL and AECT, NBPTS) fail to connect the broad goals they propose with specific practice. The standards tell SLMSs what they should be doing but do not tell them how to do it. This research examines what exemplary SLMSs do to meet the standards in order to share their best practices with others.

Most of SLMSs' technology use practices go unrecorded. It is important to capture and share this tacit knowledge if practice and, conceivably, student learning are to be improved. By eliciting the unspoken knowledge of these experts, the researcher began to develop a knowledge base of best practices and provided information that can be used to design systems to organize and share the professional expertise of SLMSs. In light of the limited empirical research on technology use by SLMSs, more research is needed to discern how novice SLMSs move from technology familiarity to technology integration. Exploring the best practices of exemplary SLMSs provides an empirical basis on which to design programs, build systems, and develop policies to improve the school library field.

## Chapter 4: Findings

Ten school library media specialists (SLMSs) participated in a three-phase interview process to determine how they use digital information resources to support teaching and learning. Data were gathered from in-depth individual interviews with ten SLMSs, reflective interviews with three SLMSs, a focus group interview with four SLMSs, and artifacts related to teaching with digital libraries. Chapters 4 through 8 describe the findings that emerged from a thematic analysis of the interview and artifact data (Boyatzis, 1998). The teaching-related artifacts were analyzed after the interviews were analyzed. The artifacts confirmed and underscored the themes identified in the interview data but did not reveal any new behaviors. Findings from the artifacts are integrated into the overarching strategies and barriers presented below. Following the data analysis procedures outlined in Chapter 3 and using NBPTS Standard Five (V), Leading Innovation through the Library Media Program, as a preliminary coding scheme, the interviews were coded line-by-line to identify recurring themes and sub-themes.

Chapter 4 is divided into five sections. Section 4.1 describes the SLMSs' perceptions of digital libraries. It includes definitions of the term "digital library" from all ten participants, concept map drawings from four participants in which they visually represented their conceptions of the "digital library," and descriptions of how all ten of the SLMSs believe digital libraries support student learning.

Sections 4.2 through 4.5 present detailed descriptions of study findings as they related to each element of the NBPTS Standard Five (V): How do exemplary SLMSs (4.2) **provide access** to digital libraries, (4.3) **teach effective use** of digital libraries,

(4.4) **engage learners** (adults and students) with digital libraries, and (4.5) use digital libraries to **support the curriculum**? Sub-themes are presented as barriers to digital library integration and strategies to address those barriers. The researcher initially identified:

- Access: 11 barriers, 18 strategies;
- Use: 7 barriers, 22 strategies;
- Engagement: 7 indicators of engagement, 5 strategies; and
- Curriculum integration: 17 barriers, 25 strategies.

When these preliminary sub-themes were identified and saturation was reached, the researcher revisited the interview data and recoded the transcripts for consistency. The codes were collapsed into a more succinct scheme. The final sub-themes were entered defined and quotations that provide examples for each code were selected (see Appendix G). The resulting codes included:

- Access: 5 barriers, 4 strategies;
- Use: 3 barriers, 4 strategies;
- Engagement: 2 indicators of engagement, 2 strategies; and
- Curriculum integration: 4 barriers, 3 strategies.

The strategies and barriers are not organized by frequency. Frequency counts were used early on in data analysis to identify common strategies and barriers, but are not listed here. Instead, qualitative descriptions of oft-mentioned occurrences are



presented along with illustrative examples for clarification. However, strategies and barriers that were mentioned by all of the participants are noted for emphasis.

There was not a one-to-one connection between the barriers and strategies. Indeed, the SLMSs used the strategies as a repertoire to overcome multiple barriers. Their expertise was repeatedly demonstrated by the fluidity with which they implemented a range of strategies, often simultaneously, to address barriers. Because no notable differences in behavior emerged, the researcher does not distinguish between the insights of the SLMSs who are still in practice and those who are now SLMP administrators.

## ***4.1 Perceptions of Digital Libraries***

### **4.1.1 Digital Library Definitions**

When asked to define the term “digital library” the school library media specialists (SLMSs) gave a variety of responses. Their definitions can be organized using Christine Borgman’s two-part digital library definition (Borgman, 1999b). The first part of Borgman’s definition states that content and the information storage and retrieval systems comprise part of the digital library. The SLMSs’ explanations also focused on digital library content and systems. The second part of Borgman’s definition states that digital libraries are constructed by and for a community of users. The SLMSs’ described interacting with their users virtually and face-to-face.

All ten of the SLMSs’ digital library descriptions focused on the content and the systems. The SLMSs’ explained that directories, eBooks, online repositories, structured information on the free Web, and databases (free and subscription) as online resources could all be part of the digital library concept. The most frequently mentioned component of the digital library was the online database. Indeed, throughout the interview process participants used “database” as a generic term for “digital library,” even in reference to other online services. One participant explained, “I know that we have electronic databases ... we have *World Book Online* ... *Culture Grams* ... *Teaching Books.net* ... the *International Children’s Digital Library*” (MS-MEHM, Interview 1, February 11, 2008). Together, subscription and free databases made up the majority of the participants’ definitions of a digital library.

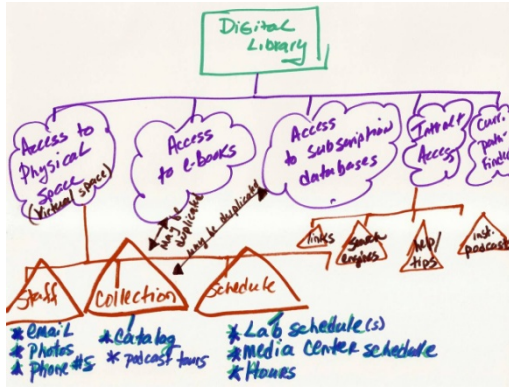
The second part of Borgman's digital library definition emerged in the SLMSs' inclusion of social networking and virtual spaces in their digital library definitions. Although they highly valued the physical library space, they believed that both virtual and physical library spaces were important to making library services available electronically. The SLMSs focused a great deal of attention on using social networking tools to extend the physical library space into online environments. They pointed to the public libraries' success in providing services online and in turn strengthening their face-to-face services. "Arlington [public] library is one of the most successful because its outreach from an electronic standpoint is phenomenal." She continued "If they reach out virtually it gets people interested [and] the people come in" (MS-MMHV, Interview 3, June 21, 2008).

Blogs, wikis, and other online services through which library users can interact with others formed part of the SLMSs' definitions of a digital library. Again, the SLMSs used public libraries as models of success in using social networking tools to enrich both face-to-face and distributed interactions. "[A] lot of public libraries are now going to having a presence on...a social networking type page... I always equated digital libraries with an online database, something that you had a portal to go through, but I think Web 2.0 now is opening up libraries to a different customer base in a different way" (MS-NNHM, Interview 1, January 25, 2008). As safer social networking technologies are developed, and as policy restrictions are modified to permit the use of those new technologies in schools, the SLMSs plan to incorporate social networking services into their digital repertoires.

In sum, the study participants noted that digital libraries are comprised of content and systems (directories, eBooks, online repositories, structured information on the free Web, and free and subscription databases) and the user community (blogs, vlogs, wikis, and other social networking sites). Four of the ten participants created visual representations of their digital library definitions during the focus group session, and Borgman's two-part definition of digital libraries is reflected in those drawings. Although all of the drawings touch on similar elements, some focus more on one particular aspect of the digital library concept. The drawings and related quotes are available at the end of this section in **Table 7**.

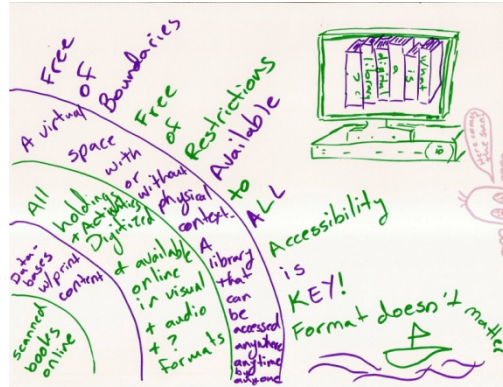
**Table 7: Concept Maps: Conceptualizations of Digital Libraries<sup>7</sup>**

Participant MS-NNHM focused on digital library **content and systems**.



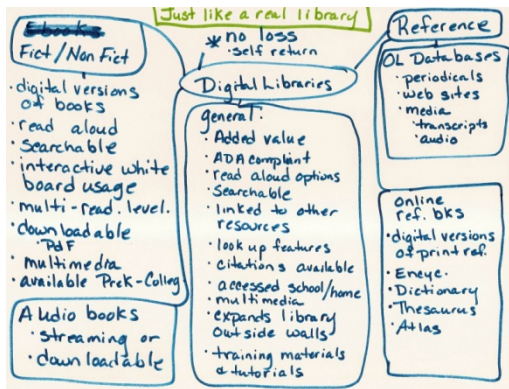
“Some of the things were duplicated. If your physical collection contains print books you give access to them through your catalog, but they may also be available on eBooks, so it kind of overlaps there.” (MS-NNHM).

Participant MS-MMHV focused on the digital library **user community**.



“You go back to basic ALA principles—free of boundaries, free of restrictions, available to all. Accessibility is key and that goes back to the idea that you could be on a boat and access a library” (MS-MMHV).

Participant AD-EEEV focused on digital library **content and systems**.



“[I]t’s just [that] making our collection, what has traditionally been inside the walls, available digitally takes it outside the walls and makes it more available to them” (AD-EEEV).

Participant MS-MEHM focused on the digital library **user community**.



“Now you have new content that was never accessed before, like blogs, which are becoming really important to the election and everything...” (MS-MEHM).

<sup>7</sup> See Appendix G for larger versions of the concept maps.

## **4.1.2 Digital Libraries Support Student Learning**

The SLMSs were asked how their use of digital libraries affects student learning. They indicated that digital libraries contribute to teaching in three ways: by extending the collection, offering opportunities for differentiated interactions with content, and supporting cognitive tasks.

### **4.1.2.1 Extend the Collection**

The SLMSs used digital libraries to extend the scope of their collections. They used them to provide access to primary resources and up-to-date information that best met the learners' (adults and students) needs. Digital libraries have had the strongest effect on physical reference collections. Some SLMSs have reduced their print reference sections to single copies of select series and allow those copies to circulate. Others are considering eliminating their print reference sections altogether in favor of digital resources.

Elementary school SLMSs found digital collections to be particularly valuable in working with multiple sections of a single grade level. One elementary school SLMS had nine sections of kindergarten working on the same topic at the same time. The same was true for her second and third grades—nine sections, all on the same topic. Access to the digital resources is not limited by the space available. Her small space could not accommodate multiple copies of various texts so she turned to digital libraries to supplement the content. She used eBooks and subscription databases to extend her collection. Elementary school SLMSs also noted that they often had trouble finding biographies and other in-depth non-fiction texts in print format; they

believe that digital libraries were an alternative source for more varied content for younger children.

#### **4.1.2.2 Provide Differentiated Interactions**

The SLMSs highly value the ability to personalize or differentiate information based on their learners' learning needs. They rely on digital libraries to tailor information for learners with different learning styles, disabilities, higher or lower level information needs, and learners of other languages.

An elementary school LMSs describes:

[Digital libraries] provide information in a variety of formats. You address multiple learning modes that way. Some children are going to respond much more favorably to seeing it online...many of the online resources have videos as part of the information. You can hear an animal roar. You can see an animal move in for attack on prey ... So, for children who learn in other ways than just reading print on a page, they're great. [They] address multiple learning styles. (MS-NMEM, Interview 1, January 25, 2008)

#### **4.1.2.3 Support Cognitive Tasks**

Finally, digital library features were reportedly used to support learners' (adults and students) reading, information organizing, idea synthesizing, and other cognitive behaviors. According to participants, the organized information helps learners find and cite their sources more easily. The most valuable contributions of the digital libraries are tools that support the synthesizing of information and ideas; most are some form of reference management tool. "There's a reason why synthesis is the hardest of the levels of thinking," commented one SLMS. "There's no real thought process or integration of the information if you just cut and paste... a lot of times the kids don't synthesize. They just kind of mush together, and mushing is not

synthesizing” (MS-MEHM, Interview 1, February 11, 2008). Traditional methods of organizing and synthesizing information using note cards and spreadsheet programs are giving way to tools like *NoodleTools* that graphically represent the synthesis process. Digital libraries aid learners throughout the research process as they record, organize, synthesize, and present information.

Interestingly, although the SLMSs value the contributions of digital libraries to student learning, they reported that they often begin their instruction with print resources and later have learners transfer their print-based skills to online contexts. One SLMS summarized the groups’ belief in the importance of teaching skills that could be used independent of format:

The skill of being able to organize information outlives the technology. You have to figure out how to translate what we used to do in print to digital. The ability to think ‘I’m going to look this up in the index’ Well, looking stuff up in the index is actually identifying the key words. So the people who were not necessarily skilled at deciding what to look up in the index would go to SIRS...and type in ‘What is the name of?’ So, I guess the metacognition is important ... It is okay to share your enthusiasm for the technology, but teach the skills and not the technology. (MS-MEHM, Interview 1, February 11, 2008)

#### **4.1.3 Summary: Perceptions of Digital Libraries**

In summary, the SLMSs in this study consider databases, which they used as a generic term for networked online resources, and social networking spaces in their definitions of the digital library. Their multifaceted definitions are supported by Borgman (1999a), who includes content and systems and the user community in her digital library definition. The importance of both entities as described by Borgman (1999a) is evident in the participants’ concept maps of digital library spaces and



throughout the discussion that follows. To them, digital libraries support student learning by extending the library's collection, providing differentiated learning experiences, and supporting cognitive tasks.

#### ***4.2: Exemplary SLMSs Provide Access to Digital Libraries***

According to the NBPTS, Standard Five (V), providing access to technology information systems encompasses building virtual and physical information spaces that are accessible locally and remotely, to all members of the school community. When asked what it means to provide exemplary access to digital libraries, the school library media specialists (SLMSs) focused on delivering services at the point of need and ensuring that the proper equipment is available to meet those needs. One participant explained that “Exemplary access is meeting needs when they arise” (MS-MEHM, Interview 1, February 11, 2008). Meeting those needs requires developing an understanding of the user population to tailor services. A SLMP administrator advised, “I think you have to look at who are your patrons. And put all the pieces together to define what access you’re trying to provide” (AD-EHHM, Interview 1, January 22, 2008).

Throughout the three phases of interviewing, the SLMSs shared experiences in making digital libraries accessible to members of their learning communities. The barriers they encounter and the strategies they use to ensure access are listed below. They are not organized by frequency; however strategies and barriers that were mentioned by all of the participants are noted. **Table 8** summarizes the barriers and strategies.

**Table 8: Providing Access to Digital Libraries**

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Providing access means making digital libraries available to all members of a learning community.

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Barriers:

- Lack of awareness
- Cost
- Policy and password restrictions
- Scheduling

Strategies:

- Availability of staff and equipment
  - Flexibility
  - Creative Funding
- 

#### **4.2.1 Barriers to Providing Digital Library Access**

Four barriers emerged as the most notable challenges the SLMSs encounter when attempting to provide digital library access to users: a lack of awareness about the SLMP, high costs associated with digital libraries, policy and password restrictions, and scheduling problems.

##### **4.2.1.1 Access barrier: Lack of awareness**

Participants reported that a general lack of awareness of school library media program (SLMP) services impede access to digital libraries. This barrier was mentioned by all ten of the SLMSs. “They don’t understand us... They don’t see so much of what I do” (MS-MMHV, Interview 3, June 21, 2008). A SLMS in Virginia described this as a larger problem in teacher education: “I don’t think there’s any point in teacher school or administration school where they say this is what librarians do” (MS-MMHV, Interview 3, June 21, 2008). They appreciate what the SLMS does, she continued, but the lack of knowledge makes it difficult for the SLMS to contribute to the school’s learning program, which includes providing access to digital library resources.

#### 4.2.1.2 Access barrier: Cost

“When you’re planning your collection and you have some funds for collection development, where do you put those funds and how do you get the best bang for your buck?” (AD-EHHM, Interview 1, January 22, 2008). The high costs associated with providing digital library services are a major obstacle for all ten of the SLMSs. A SLMS reported that at least a third of her budget goes to database subscriptions. The expenditure is especially frustrating for SLMSs when fee-based services go unused.

The price of providing digital library access, believe the SLMSs, extends beyond the cost of database subscriptions to include the cost of acquiring and maintaining sufficient hardware and connectivity. As one SLMS explained, “You also have to have a sustainable funding source because the right equipment today is not going to be the right equipment tomorrow” (AD-EHHM, Interview 1, January 22, 2008). Insufficient technology infrastructure or unexpected technology failure emerged as a considerable challenge to making digital libraries accessible. The SLMSs listed power failures, unexpected server repairs, login problems, and other crises in their descriptions of technology breakdowns. They have also come to realize that they are often the first line of defense when technology fails.

The SLMSs have met with unexpected failures and disruptions when using old hardware to run new services. One SLMS explained that, when learners are forced to wait, “you’ll lose them. The minute they have to sit and wait [for slow processing or connectivity] they’re going to say, ‘I’m not doing this. This is dumb’ and they’ll think it’s because they’re not Googling or Wikipedia-ing. They’re going

to think it's because your software or your database is the problem" (AD-EEEEV, Interview 1, January 24, 2008). They turn away from the school's services and resort to what is reliable for them. Slow connections and outdated equipment are problematic for both teachers and students, and SLMSs run the risk of losing both user groups.

#### **4.2.1.3 Access barrier: Policy and password restrictions**

In a personal interview, one participant explained, "[W]e need to eliminate obstacles in the library as much as possible... You need to keep [students] safe without blocking their access to knowledge" (AD-EEEEV, Interview 1, January 24, 2008). Two policy-related barriers hinder the SLMSs' ability to provide digital library access. The first is password restrictions imposed by the state or districts. The second is filters and blocked websites, specifically those related to popular social networking sites.

The participants agreed that regardless of the value of the information in the password protected online resources, logins are a problem for users that needs to be addressed. Student learners find logging in to multiple databases challenging. "The reason these databases are not being used is not because they're not useful. It's because you're making access too hard" (MS-MMHV, Interview 3, June 21, 2008) exclaimed a SLMS. Login problems also affect access to the schools' Learning Management Systems (LMSs). SLMS staff spend a great deal of time reminding people of their LMSs logins: "Parents call us all day, all the time, to get into their EdLine accounts. It is annoying and one of my assistants who's...in charge gets

annoyed. I stress to her that it's very important that everybody can access all the services. It's just what we do" (MS-NNHM, Interview 3, June 21, 2008).

Policy restrictions limit student access to digital libraries. The SLMSs believe blocking websites could result in lost learning opportunities for library users. When reflecting on a lesson she taught using Flickr photographs, a SLMS described using the service to reinforce her lesson on copyright and "copyleft" with Creative Commons examples. Another study participant explained, "There is inappropriate stuff out there and I don't think that we do our kids any favors by putting a blindfold on them telling them not to look." She continued, "What we need to do is say, 'This is going to happen. What do you do when you encounter it? [B]ut my hands are tied'" (MS-NNHM, Interview 2, April, 22, 2008). As a group, the SLMSs questioned relying solely on strict password and policy restrictions. The SLMSs recommended that professionals use the opportunity to teach learners the skills they need to evaluate information and situations and to make decisions to protect themselves on- and offline within the safety of the learning community.

#### **4.2.1.4 Access barrier: Scheduling**

Scheduling space and time in the school library media center (SLMC) limits digital library access. For some the amount of teaching space available in the SLMC is limited. Others expressed concern that library space is increasingly being used to house school personnel or for activities; they lamented this encroachment as part of "the general erosion of the school library media program" (MS-NNHM, Interview 3, June 21, 2008). Even as library use increases at these schools, the SLMSs struggle to make the SLMC space available.

## **4.2.2 Strategies for Providing Digital Library Access**

The SLMSs use common strategies to address barriers to providing access to digital libraries. Analysis of the data revealed that one-to-one relationships do not exist between the SLMSs' barriers and their problem-solving strategies. They use multiple approaches to overcome obstacles as they occur. To address digital library access barriers, the SLMSs reported that they use three strategies: relying on the availability of other SLMP personnel, being flexible when faced with unexpected occurrences, and identifying funding sources creatively.

### **4.2.2.1 Access strategy: Availability of staff and equipment**

Staff availability allowed the SLMSs to increase awareness of their services. This, in turn, increased digital library access. "You're the primary point of access," stressed one SLMS (AD-EEEV, Interview 1, January 24, 2008). Face-to-face communications with students help to market the SLMP and its resources to potential users.

The participants also stressed the importance of their library media assistants. The assistants aided in materials processing, interacted with visitors, and performed other tasks that allowed the SLMSs to focus on teaching and administration. One SLMSs went so far as to ask her principal, "Do you really want this highly valuable, highly-paid, highly-educated person checking books in and out and putting them back on a shelf?" (MS-NNHM, Interview 3, June 21, 2008). A SLMS defined exemplary access as the ability to find information with relative ease. To accomplish this, she trained her staff in all of the databases and word processing packages used in the

library. “They call us all librarians, which is an affront to an MLS degree to a point. I don’t take it that badly because I want them to see us all as a help. I want to make sure the human aspect is accessible” (MS-NNHM, Interview 1, January 25, 2008). Participants believe they are more capable of raising awareness of SLMP services and products when the SLMS and the assistant are available.

Electronic communication is also critical to making information accessible and to promoting the SLMP. “As part of the physical space access, you would want to make your staff accessible through email, through photos, through phone numbers or whatever” described a SLMS in a high school (MS-NNHM, Interview 3, June 21, 2008). Laptops and mobile labs were the most mentioned form of mobile access. An elementary school SLMS explained her use of tablet PCs in the classroom to teach part of the research process. The SLMSs extend their programs beyond the class period using book carts, laptop computers, social networking services, and even mobile devices. “I carry a Blackberry and I get emails and texts all times of the day or night asking for the passwords and respond quickly” (AD-EEEV, Interview 1, January 24, 2008). The participants in this study recognize the importance of mobility and mobile devices for providing just-in-time service and access to digital libraries at the point of need.

#### **4.2.2.2 Access strategy: Flexibility**

To these SLMSs being flexible meant two things: resource flexibility and mental flexibility. First, the SLMSs rely on the flexible use of their collections and their space to address access barriers. Resource flexibility is closely related to having



a strong, diversified collection but includes being flexible in how the SLMC space is used to make those resources accessible.

When the SLMSs found their lesson progress impeded by technology failure, they either switched from the online digital library that was the focus of their lesson to a different resource with similar features or one with content that could be accessed offline—or they relied on the strength of their non-networked resources (e.g., print materials).

“[A]s a new librarian or a new media specialist you need to know the databases that you have... You need to know what’s in them and when it’s appropriate to go to them” (MS-NNHM, Interview 1, January 25, 2008). She later discussed the importance of knowing what is in the collection and what free digital libraries are available on the Web. With an intimate knowledge of the subscription and free resources available, the SLMSs could identify alternative resources in a variety of formats when a digital library failed.

A strong print collection serves as the foundation for each of these SLMSs’ collections. As part of being prepared for technology failure, they see the ability to rely both on the library’s print and on non-networked resources as imperative. A SLMS joked: “Whenever there’s no online access you either tap dance or go to a book” (MS-NNHM, Interview 1, January 25, 2008). Having a variety of resources available makes it easier for these SLMSs to deal with technology failure and continue with their teaching.

Second, the SLMSs rely on mental flexibility to overcome obstacles like technology failure, policy restrictions, and students who are having difficulties in a

lesson. For instance, when online resources are unavailable, the SLMSs change the focus of a lesson to incorporate print electronic or turn to other electronic services that could be accessed offline. The SLMSs implement alternative plans rather than abandoning lessons. “[I]f they are there to do research and I realize that the majority of them are having a hard time finding the information ...I scrap the research part and then it becomes a lesson on how to find the information” (AD-EEEM, Interview 1, February 6, 2008). As exemplified in the previous quote, the SLMSs routinely assess student learning throughout their lessons, sometimes changing a lesson’s focus as a result. They value turning a failed lesson into an unexpected learning opportunity. Together mental and resource flexibility allow the SLMSs to overcome technology failures, teaching failures, and space/time difficulties.

#### **4.2.2.3 Access strategy: Creative funding**

Cooperative purchasing, grant writing, contests, and awards all emerged as potential funding sources for digital libraries. The most discussed non-traditional funding strategy was state-level contract negotiating. District and state group purchasing has made it possible to standardize digital library prices, specifically database prices, across districts. In the state of Maryland, for example, the MDK12 Digital Library Project is a statewide purchasing consortium that bargains for cost-effective access to electronic resources for students in public and participating nonpublic schools (MDK12 Digital Library Project, n.d.). “...all school systems, no matter what size, [could afford] to have databases for their students...the purpose was not only to raise awareness of these resources but to have some equity in access” (AD-EHHM, Interview 1, January 22, 2008). Schools within the MDK12 consortium

have access to subsidized resources and can use their school-level budgets to purchase products tailored to their user populations.

#### **4.2.3 Summary: Providing Digital Library Access**

The experts interviewed for this study reported a number of barriers to providing access to digital libraries. A lack of awareness related to the SLMP, the high costs of providing digital libraries, policy and password restrictions, and insufficient time and space are all barriers to providing digital library access to members of the school community. In response to these barriers the SLMSs turn to a range of strategies. They make themselves and their assistants available electronically and face-to-face, embracing new technologies to improve mobile services. They maintain mental and resource flexibility, and they seek creative funding sources.

### ***4.3: Exemplary SLMSs Teach Effective Use of Digital Libraries***

NBPTS Standard Five (V) explains that teaching effective use of digital libraries and other resources means teaching learners to select and use appropriate resources to solve problems or meet information needs. When asked to describe what it means to use digital library technology “effectively,” the SLMSs described a shift away from teaching how to use technology tools and toward teaching learners to use digital libraries to meet information needs.

They focused specifically on the learners’ ability to maximize the digital library’s search capabilities, moving beyond basic search features to use Boolean and the advanced search pages. Effective use also means selecting the best technology to communicate information and express oneself. In their interviews, the SLMSs recounted their experiences teaching others to use digital libraries and other online resources. They reported a number of common obstacles when teaching and described similar approaches to overcoming those obstacles. The barriers and strategies they use to teach digital library use are listed below.

**Table 9: Teaching Digital Library Use**

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Teaching use means teaching how to use digital library technology to meet an information need, focusing on the technology not the information in the product

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Barriers	Strategies
<ul style="list-style-type: none"><li>• Role misperception</li><li>• Technology misperceptions</li><li>• Product design</li></ul>	<ul style="list-style-type: none"><li>• Technology bridge</li><li>• Training and personal skill development</li><li>• Design suggestions</li></ul>

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### **4.3.1 Barriers to Teaching Digital Library Use**

Three major areas of concern when teaching digital library use emerged from the SLMSs' interview data. The participants encountered barriers when a teacher misperceived the secondary SLMS's role during a lesson, when learners exhibited a limited grasp of technology, and when design problems appeared in the resources themselves.

#### **4.3.1.1 Use barrier: Misperception of the SLMSs' role**

In many cases the high school SLMSs and the teacher did not have a shared vision of the role the SLMSs was to play during a lesson. The SLMSs argued against teaching mechanics (e.g., how to use a specific tool) in favor of teaching processes (e.g., how to use a set of tools to meet an information need). The secondary SLMSs reported they seldom teach how to use specific technologies. Instead they briefly introduce general applications the student learners could use throughout the research process. In other words, the SLMSs rarely teach how to open, create, and/or save a PowerPoint at the high school level. Instead they spend a short time teaching how to use slideshow technologies in general but focus their lessons on finding and synthesizing information that would later be displayed in the slideshow. "Show the students that you have a variety of resources out there and you don't have to stick to one" summarized a high school SLMS (MS-NNHM, Interview 2, April 22, 2008). Only when a lack of digital library basic skills hinder the progress of a lesson do the SLMSs embed short tutorials within the context of larger research-focused lessons to address the skill gap.

This pattern suggests a shift in secondary SLMPs away from teaching whole lessons on a single piece of technology. Many of the SLMSs in this study had taught how to use specific technologies in the past but now consider that the technology teacher's role. Using technology in context is the SLMS's role. "They love technology," a high school SLMS expressed, "but when you try to teach straight technology it just doesn't work. There were times in my life I taught about computer stuff and...faces would glaze over. But when I teach it in context, it happens" (MS-MMHV, Interview 1, February 7, 2008). The SLMSs do, however, teach specific elements of digital library products (e.g., advanced search features).

In addition, some suggested that the ubiquity and standardization of software products has lessened the need to teach most of the basic skills needed to interact with digital libraries. "I used to have to teach kids how to use a Web browser! I would never dream of teaching them to use a Web browser now! That would be like teaching them to turn a page" (AD-EEEEV, Interview 1, January 24, 2008).

#### **4.3.1.2 Use barrier: Technology misperceptions**

There was some disagreement among the SLMSs about the level of their student learners' technology skills necessary to use digital libraries effectively. Their positions fall into two groups. The first group of SLMSs believe that, as digital natives, or children who have grown up with computers, their student learners need little coaching to exploit a digital library's advanced features (Oblinger, 2004; Oblinger & Oblinger, 2005a, 2005b). "This generation, they're the digital natives...I'm convinced that many times they're just sitting there being respectful and compliant and humoring us until they can get home back to their real lives" (AD-

EEEV, Interview 2, May 6, 2008). These SLMSs have high expectations of the “digital natives”’ ability to interact with information online and worry mostly about how much of the knowledge from their lessons is being used outside of school.

In contrast, a strong argument against relying too heavily on the “digital native” concept emerged from interviews with a second group of SLMSs. “You hear a lot that students these days are digital natives because they can click really quickly and they can go in and out around the computer and stuff. But the natives are struggling, I’ve noticed. I’m not sure I like that terminology” (MS-NNHM, Interview 2, April 22, 2008). A SLMS explained that in her school, “[k]ids know how to go onto a computer, but I don’t know that they really know how to use it.” She continued, “They know how to do a natural language search on Google. They don’t know what a keyword is. They don’t know the difference between search engines” (MS-MMHV, Interview 1, February 7, 2008). This group is concerned that unrealistically high expectations of students’ technology abilities obscure gaps in their knowledge of how to optimize their technology use in academic contexts. This second group of SLMSs posits that being a digital native gets students only so far and that students need help bringing the skills they learn in their recreational lives to bear in their academic lives. The challenge for them is to identify the actual depth of their students’ technology familiarity. In both groups the SLMSs’ knowledge of the adequacy of the students’ technology skills affect how much of the technology they choose to teach.

The SLMSs in this study are also concerned with their own familiarity with emerging technologies. They find the amount of technology and the rate of

technological change overwhelming. “I’m trying to keep up but things are coming out much quicker now... it doesn’t give enough time to actually learn how to use it, put it into practice and then maybe train somebody before a new technology comes out” (MS-HHHM, Interview 1, February 18, 2008). Another SLMS said, “[T]here’s change. [T]he [digital libraries] we had my first couple years that I was here, I knew exactly what to do with them and then they’re gone” (MS-MEHM, Interview 1, February 11, 2008). The rate of technology development, including digital library development, surfaced as a significant challenge for all the SLMSs in this study.

#### **4.3.1.3 Use barrier: Product design**

Surprisingly, only a few of the SLMSs mentioned product design barriers, or elements of digital libraries that make it difficult for their student learners to use, as a challenge. It was mentioned as most problematic in elementary settings. The elementary school LMSs are concerned with their students’ reading nonlinearly online, getting lost on the Web, or being distracted by multimedia features.

The SLMSs themselves experience problems using their digital libraries that are different from the students’ barriers. During the focus group interview one SLMS clarified, “[I]f you’ve ever tried to look at the data from multiple databases, they report things differently. Some of them report searches, some of them report documents accessed...You can’t compare their statistics. You’re comparing apples to oranges” (MS-MMHV, Interview 3, June 21, 2008). The SLMSs want to know how the statistics were gathered so that they could compare usage data across resources. They recognize that having uniform logins and passwords would make it difficult to gather usage data outside of the school, where internet protocol (IP) addresses were



used instead of personal logins. However, having statistical data on how and when the library resources are being used, they believe, would give them hard data they need to document the services the SLMP provides.

### **4.3.2 Strategies for Teaching Digital Library Use**

The SLMSs in this study call upon several strategies to encourage effective digital library use. They have taken on the role of bridging technology and classroom content; they work to developed personal, parent, staff, and student digital library skills as well as their own; and they are aware of ways to improve digital library design.

#### **4.3.2.1 Use strategy: Technology bridge role**

To address the gap between teaching technology and teaching the research process, the SLMSs described themselves as bridges. They described themselves as “the magic blend people” whose focus was not on the technology itself but on implementing new technology in context. “[T]eachers tend to be end-product focused. They have the goal—the kids need to achieve this. We’re more journey focused. We’re more into how a kid is going to get there,” explained one SLMS when asked how her use of technology differs from a teacher’s use (MS-MMHV, Interview 3, June 21, 2008).

In her reflective interview, another SLMS explained her shift away from teaching technology. She said: “The role of the media specialist ... is to show them the connections. Connect their background knowledge...to what they need to know to do this thing that you’re trying to teach them. That’s my role” (MS-NNHM,

Interview 2, April 22, 2008). The idea of blending technology, content and research skills in the SLMP emerged repeatedly as a theme in digital library integration.

#### **4.3.2.2 Use strategy: Training and personal skill development**

Although their focus is teaching the research process, the SLMSs recognize the expectation that they would provide some technology training. When school staff or parents lack an understanding of digital libraries, the SLMSs develop group and personalized training sessions as needed.

The participants gave several suggestions for successful group training such as: keeping group training sessions under twenty minutes long; holding group sessions once a year (or in parts with time for experimentation); using vendor-supplied training materials; tailoring the training with subject-specific databases and examples; targeting teachers in subjects and grade levels being tested in a particular year; and using multiple delivery methods throughout delivering instruction. A SLMS commented on a successful staff training session held by a database vendor. She laughed when explaining, “We brought in a vendor and he’s young and he’s cute. He didn’t say anything differently than I say. He didn’t show them anything differently than I would show them...It’s about varying the message” (MS-NNHM, Interview 2, April 22, 2008).

Varying the delivery method also was recommended in personalized training sessions. Personalized training sessions happen in short bursts between classes, during classes while students are otherwise occupied, online, or even in hallways using laptops or other mobile devices. The SLMSs recognize that individualized training is difficult: “[T]he most effective stuff is the one-on-one at the point of need.

It's not the most efficient, but it's definitely the most effective" (AD-EEEEV, Interview 1, January 24, 2008). Nevertheless, the SLMSs continue to believe that the users need to be able to see the digital library and what it could do for them as individuals. The SLMSs had trained adults in digital library use in groups and by tailoring their messages in personalized training sessions. They had trained parents at PTA meetings and other parent-focused events. Those who had trained parents in digital library use reported increases in usage statistics and a deeper understanding of digital libraries for those parents' children.

When asked about training student learners to use online resources like Google, Yahoo and Wikipedia, the SLMSs did not object to their use. "I think it's important for kids to know how to use Google appropriately. I don't think it's something you should say you can't use because kids use it, I use it, everybody uses it. We just have to teach them how to use it effectively and efficiently" (MS-ENEM, Interview 1, February 20, 2008). Indeed, the SLMSs recognize the opportunity to teach information literacy skills using digital libraries. Using these sites, they teach how to use information ethically by citing sources; how to evaluate information sources for authority; and how to use multiple sources to verify the accuracy of information. The SLMSs also use the sites to help students build background knowledge on unfamiliar topics. Indeed, students use Wikipedia to gather basic information on a topic and to identify keywords to use when searching other digital and print resources.

Personal skill development also emerged as a digital library use strategy. Remaining abreast of digital library technology development is a challenge for

SLMSs and for members of the learning community. As one SLMS noted, keeping abreast of new technology is important to both her teaching and collection development roles. She believes her role is to know “what’s coming down the pike ... Being forward thinking enough to see the applications of new technology and new media” (AD-EEEEV, Interview 3, June 21, 2008). When the SLMSs want to learn more about new technology on the horizon, they rely on formal training, networking, and personal experimentation.

#### **4.3.2.3 Use strategy: Design suggestions**

The SLMSs suggested a number of design improvements for digital library developers. Some of their suggestions are available in some products but not others, and they recommended more widespread use of features they consider beneficial. They suggested improvements that would benefit various learners: students, teachers and other SLMSs.

The participants in this study believe that student learners in particular could benefit from two improvements. The first suggestion addresses fee and subscription databases. The SLMSs suggested that digital library providers improve their products’ federated search capabilities, the ability to search multiple databases simultaneously. Some database providers offer federated searching of their databases, while others do not. Because the SLMSs have agreements with multiple providers, the students’ interactions with the various databases are inconsistent. To make federated searching easier, the SLMSs recommended creating a portal on the library webpage that would allow students to search the library’s entire database collection at once. In other words, upon entering the library’s homepage students would enter

search terms into one search box, which would then search all of the library's databases. A further improvement would be to allow users to include the library's print and multimedia collections in the federated search.

The second student-centered design improvement suggested was for digital library providers to make communication among users safer for students. The SLMSs suggested integrating social networking tools, such as chat and wiki features, into the digital libraries. They believe these features would allow students to interact with peers and educators throughout the information search process within the digital library environment.

The SLMSs made two recommendations they believe might benefit all users, but especially teachers. First, they suggested that digital library providers add note-taking features to their products. The note-taking feature would allow teachers to identify specific texts, annotate those texts with formatting or voice/video recordings, and make the annotated texts available to students. The students would then have the option to view the texts with or without annotations. This feature could be used, for instance, to teach keywords to young children. The teacher could highlight keywords in the text and students could identify which words are the keywords. They could then turn on the highlighting feature to reveal which keywords they correctly identified.

The second teacher-centered design improvement would be to include curriculum information in the digital library's metadata. The SLMSs suggested including information literacy goals and indicators and curriculum goals and

objectives in the metadata that would allow teachers to align an identified source with learning expectations quickly.

The SLMSs also gave design suggestions they believe would benefit their practice. First, they recommended making available sample lesson plans designed for use outside of the traditional classroom, such as in the SLMC. Second, they suggested embedding a program in the digital library that would conduct something like a preliminary reference interview with users. A reference interview is a structured conversation, often guided by a series of questions, that gives the librarian insight into the library user's information need (Ross, Nilsen, & Dewdney, 2002). For younger children, the interview might be audio-driven to minimize typing. Third, the SLMSs called for less reliance on the Portable Document Format (PDF). They find that with their older equipment the PDFs are slow to load and cause frequent computer crashes. They want digital library developers to consider PDF alternatives or to make PDFs easier manipulate.

The SLMSs' next two design recommendations have to do with password management. In many cases each digital library provider requires a different password to access the company's products. Most of those company-created passwords cannot be changed without time-consuming negotiations with the providers. The SLMSs want first, one password for all of the school's digital libraries, including their subscription databases, and second, the ability to change that password when necessary.

Finally, study participants expressed strongly the need for digital library developers to systematize data collection and statistics reporting procedures. Indeed,

they want the same kinds of statistics collected across databases and across vendors. Uniform statistics would enable them to establish how the digital libraries are used, which could inform collection development.

### **4.3.3 Summary: Teaching Digital Library Use**

The barriers the SLMSs face when teaching digital library use range from reaching consensus with teachers on the SLMS's role during a lesson to design barriers. To address these barriers, the SLMSs are clarifying to staff that their role has evolved from that of one who teaches technology to that of one who teaches skills in context and builds bridges among ideas. The SLMSs perform this role by regularly updating their technology skills, training library users, and suggesting ways to improve digital library technology.

#### ***4.4: Exemplary SLMSs Engage Learners with Digital Libraries***

According to NBPTS, Standard Five (V), “engaging learners with technology” means using technology to capture learners’ (adults and students) attention and stimulate the learning process. For this chapter, the SLMSs did not identify barriers to engagement; in fact, all of them believe that technology itself is inherently engaging. When describing her students’ digital library use, a high school SLMS said, “I think the nature of technology is that it’s naturally engaging for teenagers...The more interaction [digital library developers] can create with the technology, the more engaged people are” (MS-MMHV, Interview 3, June 21, 2008).

In this part of the research, the participants were first asked to describe indicators of engagement. In other words, they were asked to identify the behavioral cues that typified a learner’s interest when using a digital library. Their initial responses were unclear, and they found their thoughts on the topic difficult to articulate. For instance, one SLMSs said, “It’s hard to quantify. You know it when you see it ... It’s an expression. It’s the way they are emotionally” (MS-MMHV, Interview 1, February 7, 2008). Nevertheless, with time to reflect during the interview, the SLMSs were able to describe a number of physical manifestations of engagement. They described learners’ emotional reactions and the ways learners control their physical behaviors when they are engaged with digital library technology. In addition to describing indicators of engagement, the SLMSs shared common strategies to promote engagement.



**Table 10: Engaging Learners with Digital Libraries**

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Engagement means motivating users with digital libraries

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Indicators of engagement	Strategies
<ul style="list-style-type: none"><li>• Behavioral control</li><li>• Emotional reactions</li></ul>	<ul style="list-style-type: none"><li>• Proven teaching techniques</li></ul>

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#### **4.4.1 Indicators of Engagement When Using Digital Libraries**

The indicators of engagement mentioned most by the SLMSs' fall into two categories—behavioral control and emotional reactions. These are discussed below.

##### **4.4.1.1 Indicator of engagement: Behavioral control**

Behavioral control is a noteworthy indicator of engagement mentioned by multiple participants. One SLMS, for example, believes learners are engaged when “[y]ou don’t have to remind them on behavior. You don’t have to remind them to stay on task” (MS-MMHV, Interview 1, February 7, 2008). Another participant joked that she knows her student learners are engaged when “they’re doing what they’re supposed to be doing and not hitting somebody over the head who’s sitting next to them” (MS-NMEM, Interview 1, January 25, 2008). Behavioral control sometimes manifested as quiet and focused or as reading and writing. “They are quieter. Not so chatty to each other on side topics” mentioned one SLMS. She added, “You can tell that they’re focused on what they’re reading in front of them” she added (MS-HHHM, Interview 1, February 18, 2008).

Engagement could also be noisy. In fact, learners discussing their assignments with others and asking questions were other behavioral indicators of engagement. Discussion-as-engagement is not always easy to differentiate from discussion-as-distraction. “It’s hard to measure when they’re actually reading the

information. Again, a lot of times will be ‘Oh man, you've got to see this’ when they comment to each other ... you really want to make sure that you’re hearing the discussion among the kids to see if something works”(MS-MEHM, Interview 1, February 11, 2008).

Ultimately, the most mentioned sign of engagement was the completion of an assigned task. Learners are engaged when “they can complete whatever the task is or the activity that I’ve given them ... When they meet the outcomes I know they’re engaged” (MS-ENEM, Interview 1, February 20, 2008).

#### **4.4.1.2 Indicator of engagement: Emotional reactions**

Emotional reactions are also indicators of engagement with digital libraries. “They’re sometimes excited about what they found. They’ll even say, ‘Oh! I found it!’ or they’ll share sometimes, ‘This database actually works!’” (MS-HHHM, Interview 1, February 18, 2008). Another high school SLMS described a student progressing through the affective stages of Kuhlthau’s information search process (Kuhlthau, 2004). She noted:

“The thing is I like Kuhlthau, there was one girl in the class who was doing the emotional thing that is part of the process. And I said, honey, there is this person who does research and says that there’s this process that when you find the topic and you’re excited about it and then you start looking at it and you’re just like ‘Oh my God I can’t do this.’ And then you start finding information and it starts to build and then you think there’s just too much information. I hate this topic. I want to change my topic. And I told her all about the steps and I looked at her and I said, ‘You’re the only person in this whole class who has done this. That means to me you’re the only person in this class who is doing it right!’ And she looked at me like I was crazy and then she thought about it. She said ‘You know you’re right.’” (MS-MEHM, personal communication, February 11, 2008).

#### **4.4.2 Strategies to Promote Engagement with Digital Libraries**

After they provided descriptions of engagement, the SLMSs were asked what strategies they used to motivate learners to use digital libraries. All believe that proven teaching techniques rooted in strong instructional design are essential to sustaining engagement.

##### **4.4.2.1 Engagement strategy: Proven teaching techniques**

The SLMSs all agreed enthusiastically that proven teaching techniques keep learners engaged after the initial excitement about the technology diminishes. They recommended providing opportunities for all learners to feel successful, pairing learners to promote discussion, and informally assessing student learning with ongoing questioning.

The most emphasized method of prolonging engagement with digital libraries is strong instructional design. The participants advised starting with a lesson plan, no matter how simple, and having it available when teaching. For beginning SLMSs a participant recommended “some kind of a lesson plan template even if it’s very basic...you’re going to bring in the background knowledge; then you’re going to get into the teaching of the databases; how you’re going to end it all; and what are you going to do next. Have that framework” (MS-NNHM, Interview 2, April 22, 2008). According to all of the participants in this study, the use of digital libraries with learners must be carefully planned to maintain engagement throughout a lesson.

#### **4.4.3 Summary: Engaging Learners with Digital Libraries**

The SLMSs all believe that digital libraries are inherently engaging. For that reason this section has focused on indicators of engagement. When first asked, the SLMSs in this study found it difficult to articulate what it means to be engaged when using digital libraries—but they believed they knew it when they saw it. Ultimately, their descriptions of indicators of engagement include behavioral control and emotional reactions. They believe that to maintain engagement after the initial “technology-induced thrill” it is important to use proven teaching techniques based in strong instructional design.

#### ***4.5: Exemplary SLMSs Support the Curriculum with Digital Libraries***

NBPTS Standard five (V), states that accomplished SLMSs integrate technology to enhance learning. As noted previously, technology is integrated when “it is used in a seamless manner to support and extend curriculum objectives and to engage students in meaningful learning” (Dias, 1999, ¶ 5). The SLMSs’ descriptions of exemplary digital library integration support the idea of seamlessness: “These tools should be seamless ... It should just occur to them, ‘Is this where I go for the answer?’ Not ‘This is Proquest’ ... they don’t think about the fact they’re using a digital library” (AD-EHHM, Interview 1, January 22, 2008). One SLMS suggested that educators “interweave [technology] with other resources. You want everyone to understand that they’ve got all of this at their fingertips ... It needs to be part of the fabric of the lessons, but not the only thing” (MS-NMEM, Interview 1, January 25, 2008). The SLMSs believe that they successfully integrate digital libraries into the SLMP when learners select and use the best resources available to answer a question without focusing on format.

The SLMSs believe that collaboration is critical to integrating digital library technology seamlessly and that it increases the likelihood that research process instruction will be included in the lesson. Collaboration includes planning, conducting, and evaluating learning activities with members of the learning community (American Association of School Librarians (AASL) & Association for Educational Communications and Technology (AECT), 1998). In her definition of collaboration, a SLMS explained, “In an ideal world you’d be able to sit down

together, you would co-plan, co-teach, co-assess” (AD-EEEV, Interview 2, May 6, 2008). By collaborating the SLMSs could integrate information literacy skills into the subject areas, including skills necessary for maximizing digital library use. The SLMSs reported common barriers in their attempts to integrate digital libraries into the curriculum seamlessly. As experts, they had implemented similar strategies to overcome those barriers.

**Table 11: Integrating Digital Libraries into the Curriculum**

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Integrating digital libraries means teaching information use, or how to use the information contained within a digital library product.

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Barriers	Strategies
<ul style="list-style-type: none"> <li>• Time limitations</li> <li>• Poor curriculum-technology fit</li> <li>• Insufficient curricular knowledge</li> <li>• Inaccurate research expectations</li> <li>• Impetuosity or territoriality</li> </ul>	<ul style="list-style-type: none"> <li>• Building relationships</li> <li>• Online participation</li> <li>• Diversify roles</li> <li>• Information gathering</li> </ul>

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#### **4.5.1 Barriers to Integrating Digital Libraries into the Curriculum**

All of the barriers presented below are related to inadequate collaboration.

The SLMSs believe that insufficient collaboration results from time limitations, poor curriculum-technology fit, insufficient curricular knowledge, SLMS territoriality, and inaccurate expectations of the research process.

##### **4.5.1.1 Curriculum integration barrier: Time limitations**

Time limitations emerged as the greatest obstacle to communication and as a result, to collaboration. The teachers and SLMSs simply lack the time needed to

develop a plan that integrate content and information literacy skills. For example, a SLMP administrator reported:

[Teachers] are busy and they have so much on their plate... there's the specialist that shows up at your door and you're like, 'Oh, God, what are they going to make me do now?' and there's the specialist that shows up at your door and you 'Oh, thank God they're here. They're going to help me with it.' You want to be that second specialist. (AD-EEEV, Interview 1, January 24, 2008)

A lack of time limits collaboration and makes it difficult to bring digital libraries into the curriculum as little more than an afterthought.

#### **4.5.1.2 Curriculum integration barrier: Poor curriculum-technology fit**

It is crucial to the SLMSs that the digital library and related technologies used in a lesson support the curriculum objectives. It is important to them that the digital libraries chosen for a lesson have a sufficient amount of content, in the appropriate format, and at the right level to support learners. The elementary school SLMSs reported that it is especially challenging to find readable, in-depth, high interest information for their young users. Information in many digital libraries contain only cursory information, and the libraries are inconsistent from topic to topic in the formats they present. Speaking about a research project on animals for her primary (K-2) students, a SLMS noted: “[T]here might be a video on tigers, but there might not be one on anteaters” (MS-NMEM, Interview 1, January 25, 2008) causing students without multimedia in their resources to lose interest in their work. The SLMSs believe that consulting with teachers before a lesson allows them to increase the likelihood that students will access resources with information in similar or equivalent formats.

#### **4.5.1.3 Curriculum integration barrier: Insufficient curricular knowledge**

The SLMSs stressed the importance of becoming familiar with the school's curriculum early in one's tenure at a school to identify possible areas for collaboration and for collection development. For example, when reflecting on her teaching, a SLMS explained, "A lot of media specialists feel like, 'Oh, I couldn't do high school. I don't know all those subjects well. My job isn't to know all the subjects. I just have to ask the right reference questions'" (MS-NNHM, Interview 1, January 25, 2008). Not knowing enough about the school curriculum, reported the SLMSs, is a barrier to collaboration. Some SLMSs lack the knowledge of their school's learning goals and objectives; therefore, it is difficult to communicate how the SLMP could contribute to student learning. A lack of curricular knowledge impedes collaboration and is thus a barrier to digital library integration for some SLMSs.

#### **4.5.1.4 Curriculum integration barrier: Inaccurate research expectations**

"Go do research" (AD-EEEV, Interview 3, June 21, 2008). The SLMSs struggle to explain to staff the importance of teaching research as a process even with new technologies to assist in the process. "[Y]ou have to say to the teacher, 'Well, how do you do [research]?' ... [T]hey've already internalized the method that they use," recounted a high school SLMS when trying to remind her teachers that research skills must be learned. She continued, "It's so automatic that they don't realize that they need to teach their kids how to do that, too. Again, it goes back to a lot of our teachers thinking, well these are bright kids they can figure it out. I have to say, no,



they can't. You didn't just figure it out" (MS-MEHM, Interview 1, February 11, 2008). When teachers have inaccurate perceptions of the research process and the steps involved in selecting, evaluating and synthesizing information, it was difficult for SLMSs to integrate that process into lessons. Consequently, the SLMSs sometimes find it challenging to promote a shared research model within their schools—a model that would guide the use of digital libraries and related resources making the research processes easier for students.

#### **4.5.1.5 Curriculum integration barrier: SLMS impetuosity or territoriality**

The SLMSs described impetuous SLMSs who alienated their colleagues and must spend a great deal of time rebuilding the relationships necessary for collaboration. "[T]hey tell all the staff in the building that they're doing it wrong...and let's do it my way and it's really a big turn off" (MS-NNHM, Interview 1, January 25, 2008). They reported that some SLMSs "set new rules or jump in and say 'You have to do it this way' or 'You can't do it that way'" (MS-ENEM, Interview 1, February 20, 2008) resulting in relationships that are difficult to mend and limited teacher-SLMS collaboration.

Territoriality is also a barrier to collaboration. Indeed, some participants believe that dividing roles or subjects among the SLMSs in a school could inhibit collaboration and the seamless integration of digital libraries. One SLMS explained: "[W]e refuse to divide a rigid line between our duties...anybody can come in and talk to anyone and we can't say, 'Well, she's off today...that's her domain'" (MS-NNHM, Interview 1, January 25, 2008). In instances such as these the teachers

would become frustrated with unpredictable access to the collaborator. The SLMSs also described colleagues who felt threatened by technology liaisons or other technology teachers, which hampered planning efforts with these specialists.

#### **4.5.2 Strategies for Integrating Digital Libraries into the Curriculum**

Again, collaboration is the SLMS's strongest tool when integrating digital libraries into the curriculum. The SLMSs who participated in this research share a common set of strategies to address collaboration barriers. They build partnerships with members of the learning community, diversify their roles within the school, and gather information to improve their practice.

##### **4.5.2.1 Curriculum integration strategy: Build relationships**

When possible, participants in this study build working relationships with school personnel. The SLMSs consider administrators as partners who model, promote, and assess collaboration efforts. A high school SLMS noted that when she works with pro-library principals, "it sends a message. The staff buy into the library more when the principal buys into the library." The same SLMS explained: "[There] should be administrative cooperation... you should be working cooperatively with an administrator the same way you work cooperatively with teachers" (MS-MMHV, Interview 3, June 21, 2008). The SLMSs recognize the value of working with administrators who can have a positive influence on the school climate for the SLMP.

They consider other SLMSs, reading specialists, and technology specialists valuable partners and seek opportunities to work with classroom teachers as well. "The teacher and I are teaching together...we both have our own agenda, but both

agendas work together... [T]he teacher is looking at content and I'm looking at how they're getting to the content" (MS-NNHM, Interview 2, April 22, 2008). Indeed, the SLMSs believe that, in order to plan lessons with teachers, they must first promote dialog, build relationships, and expect incremental growth.

The SLMSs often initiate dialog inside and outside of the SLMC. "You really have to go out to the teachers and meet them where they're at," explained a SLMP administrator. They initiate conversations at "[teacher] team meetings or at their department meetings or in their classrooms or at lunch" (AD-EEEEV, Interview 2, May 6, 2008). They ask teachers how they use digital libraries; ask about teacher and student information needs; explain how those needs could be met using networked resources; and follow up these conversations with concrete examples.

These conversations often strengthen teacher-SLMS relationships. "There is an element of trust. The teacher has to trust you," reported a SLMS. She added, "[T]his particular teacher and I worked really well together and she allows me to take risks and she trusts me to do what I think is right. I think that's important especially when you're dealing with technology because technology is not always successful" (MS-NNHM, Interview 2, April 22, 2008).

As is often the case, the most important aspect of building relationships for these SLMSs is time. The SLMSs agreed that starting small is often necessary for future success when introducing digital libraries to teachers. They recommend starting with one teacher who could then be an exemplar for the success other teachers might achieve when working collaboratively with the SLMS and digital

libraries. They expect incremental growth and work patiently to build on small successes.

#### **4.5.2.2 Curriculum integration strategy: Online participation**

The SLMSs use the features of digital libraries and networked technologies to increase their involvement in the school and throughout instruction. For some SLMSs initiating dialog to create relationships is challenging. An introverted SLMS uses email and other services to make her presence and potential contributions known to her colleagues. “I don’t have to go up to a group of twenty people and talk to them ... You can reach people in so many different ways ... I can shoot an email and that’s how I get to be the expert” (MS-MEHM, Interview 3, June 21, 2008).

The SLMSs use online technology to participate in processes such as assessment that traditionally take place outside of the SLMC. Throughout a lesson, the SLMSs access student accounts, leave feedback on work, and share information about student progress with teachers regardless of whether the students are working in the SLMC. When they are excluded from the assessment process, the SLMSs rely on short, informal assessments immediately after a lesson to gauge the success of their efforts. Whenever possible, one SLMS tries to visit her students’ classroom to watch presentations or view final project; however she reported that, “[u]nfortunately, once they get through the major part of using the library you may not see them again” (AD-EEEV, Interview 2, May 6, 2008). Being excluded from the assessment process was an oft-mentioned barrier to the collaboration needed to integrate digital library technology.

#### 4.5.2.3 Curriculum integration strategy: Diversify roles

To increase the likelihood of integration, participants perform multiple roles in their schools. They serve as bridges across subject areas and as the institutional memory. They perform non-traditional duties when needed.

[Y]ou touch every student, every curriculum area, every teacher, every family, absolutely every initiative going on in that school has something to do with the library. Nobody else, not even the principal, has that level of involvement with everything. (AD-EEEEV, Interview 1, January 24, 2008)

The SLMSs are in a unique position to interact with learners (students, teachers, and staff) on multiple occasions over long periods of time, often over multiple years. They use these repeated encounters to plant and nurture the seeds of a research model that users could call upon regardless of subject or grade level.

AGOPE and the Big 6 were the research models<sup>8</sup> mentioned most often by these participants (Eisenberg & Berkowitz, 2009; Montgomery County Public Schools, 2008). They had instituted research models that would facilitate the effective use of library resources, including digital libraries.

With the amount of information generated at the school level exploding, the SLMSs in this study have taken on the role of institutional memory. In many cases, they are simply continuing a role that always existed, modifying their record keeping practices to include both print and digital materials. “I’m the keeper of the information. I’m the teachers’ memory. I’m the teachers’ organizer. A lot of times they can’t put their hands on things really quickly and I’m like, ‘Here it is! Got a file right here’” (MS-NNHM, Interview 2, April 22, 2008). For example, participants

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<sup>8</sup> Research models are also known as inquiry process models, inquiry models, information problem solving models, or library use models.

reported storing passwords, lesson plans, yearbooks, newspapers, website source files, email messages, digital newsletters, photographs, school records and planning documents, and other information in multiple formats, sometimes for decades. Their role as keepers of institutional knowledge has increased interactions and has sometimes resulted in collaboration opportunities.

The research participants reported that SLMSs play a number of roles that teachers do not always expect. They identify and acquire artifacts and digital objects for use in classroom teaching; develop pathfinders for teachers that students can use at home and school (whether they come into the SLMC or not); and, help teachers focus on their objectives. “[S]ometimes [teachers are] so close to the subject matter and they’re so impassioned about something that they lose sight of the big picture,” explained a high school SLMS. She continued, “[I] ask, ‘What do you really want the kids to learn? Is this really important in the big scheme?’” (MS-NNHM, Interview 2, April 22, 2008). This role is related to the “curriculum bridge” role in that the SLMSs are in a unique position to identify gaps, connections, and unnecessary repetition in the curriculum. They use this role to recommend supplemental digital libraries and other resources.

#### **4.5.2.4 Curriculum integration strategy: Information gathering**

When they encounter gaps in their curriculum or content knowledge that limit their ability to communicate with staff, the SLMSs study the curriculum and increase their involvement in the school and the local communities. By doing so they can identify and suggest relevant library resources.

“[T]he basis [of instruction] is the curriculum, so pulling in resources...depends upon the curriculum and what you’re trying to have children do with the curriculum and how you want them to learn it” (AD-EEEM, Interview 1, February 6, 2008), stated one SLMS turned technology specialist. Her views were echoed by other participants. A thorough understanding of the curriculum strengthen communication and collaboration efforts among SLMSs and teachers, giving them a common language and clarifying shared goals. In a related area, the SLMSs stressed the importance of connecting their teaching to standardized tests. They cull past standardized tests for questions related to information literacy skills and develop lessons or modules based on those topics. The lessons often include skills necessary for the effective use of digital library technology, for instance identifying parts of a URL and identifying keywords. With knowledge of the curriculum and the standardized tests, the SLMSs target grade levels and subject areas when developing the digital and print collections.

The participants in this study use their involvement in the school community as a strategy to address gaps in their curriculum or content knowledge. They are active on school teams and partner with parent-teacher organizations. They meet informally with their colleagues during lunch, at coffee breaks, and special events. A SLMS explained, “You might ask at the team meeting what their level of [technology] expertise is. You need to get an idea of where everybody is because that tells you where you need to plug in” (MS-NMEM, Interview 1, January 25, 2008). They use these occasions as opportunities to share information about digital resources

that parents and staff can access remotely and to identify the information needs of their stakeholders for collection development.

#### **4.5.3 Summary: Integrating Digital Libraries into the Curriculum**

The SLMSs believe that digital libraries are integrated when learners use the appropriate resources to answer a question without focusing on format. Collaboration is critical to their ability to integrate digital libraries seamlessly into the curriculum. Time limitations, poor curriculum-technology fit, insufficient curricular knowledge, inaccurate research expectations, and SLMS impetuosity or territoriality are all barriers to collaboration and digital library integration. The SLMSs use multiple approaches to address the difficulties. Most importantly, they build relationships with colleagues so they can plan for digital library use within the context of content and information literacy skill acquisition. They use online technologies to interact with the learning community; diversify their roles—acting as bridges across the school curriculum; and gather curriculum and subject information when possible.



## Chapter 5: Discussion

Ten exemplary school library media specialists (SLMSs) participated in a three-phase interview process to determine how they use digital information resources to support teaching and learning. Data were gathered from in-depth individual interviews with ten SLMS, reflective interviews with three SLMSs, a focus group interview with four SLMSs, and artifacts related to teaching with digital libraries.

National Board for Professional Teaching Standards (NBPTS) Standard V, Leading Innovation through the Library Media Program provided the basic structure for the study. The standard is divided into four parts (p. 23-25):

1. Providing access to technology information systems
2. Teaching effective use of technology and other resources
3. Engaging learners with technology
4. Enhancing learning

These four parts were used to develop foreshadowing questions and the preliminary coding scheme for this research. Additional findings emerged in the form of strategies and barriers to digital library integration. **Table 12** summarizes the barriers the school library media specialists (SLMSs) encountered and the strategies they used to address those barriers to address each part of Standard V.

The goal of this chapter is to situate the study findings from this research within a conceptual framework that addresses technology integration; National Board for Professional Teaching Standards (NBPTS) research; and knowledge management. The chapter then presents the implications of new information from this study for

school library media practice, school policies, and digital library designers. The chapter concludes by identifying areas for further study.

**Table 12: Summary of Barriers and Strategies by Standard Area**

<b>Access:</b> providing access to digital libraries to all members of a learning community	
<i>Barriers</i>	<i>Strategies</i>
<ul style="list-style-type: none"> <li>• Lack of awareness</li> <li>• Cost</li> <li>• Policy and password restrictions</li> <li>• Scheduling</li> </ul>	<ul style="list-style-type: none"> <li>• Availability of staff and equipment</li> <li>• Flexibility</li> <li>• Creative funding</li> </ul>
<b>Use:</b> teaching how to use digital libraries to meet an information need, focusing on the technology rather than the information in the product	
<i>Barriers</i>	<i>Strategies</i>
<ul style="list-style-type: none"> <li>• Role misperception</li> <li>• Technology misperceptions</li> <li>• Product design</li> </ul>	<ul style="list-style-type: none"> <li>• Technology bridge</li> <li>• Training and personal skill development</li> <li>• Design suggestions</li> </ul>
<b>Engagement:</b> engaging or motivating users with digital libraries	
<i>Indicators of engagement</i>	<i>Strategies</i>
<ul style="list-style-type: none"> <li>• Behavioral control</li> <li>• Emotional reactions</li> </ul>	<ul style="list-style-type: none"> <li>• Proven teaching techniques</li> </ul>
<b>Curriculum:</b> using information contained within a digital library product (information use).	
<i>Barriers</i>	<i>Strategies</i>
<ul style="list-style-type: none"> <li>• Time limitations</li> <li>• Poor curriculum-technology fit</li> <li>• Insufficient curricular knowledge</li> <li>• Inaccurate research expectations</li> <li>• Impetuosity or territoriality</li> </ul>	<ul style="list-style-type: none"> <li>• Build relationships</li> <li>• Online participation</li> <li>• Diversify roles</li> <li>• Information gathering</li> </ul>

## 5.1 Digital Library Integration

The SLMSs in this study indicated that digital libraries are integrated most successfully when learners select and use the best resources available to them, regardless of format, to answer a question. They face multiple barriers when

integrating digital library technology into the curriculum via the school library media program (SLMP); some of which are similar to those faced by classroom teachers.

As discussed in Chapter Two, Ertmer (1999) posits that barriers to technology integration that teachers face can be classified as first- or second-order. First-order barriers are external or institutional barriers that may or may not be beyond the teacher's control. They include: inadequate or lack of infrastructure, which limits access; lack of time; lack of technical and/or administrative support; and inadequate training.

Second-order barriers are internal, personal, and ingrained in a person's beliefs. These barriers include: an aversion to change and pedagogical beliefs that conflict with technology use. Although Ertmer's classifications were developed for the classroom context, the SLMSs in this study encountered first- and second-order barriers of their own in each area of digital library service they attempted to provide.

It is important to note that the participants consider most networked and/or online resources to be digital libraries. Their conceptualizations of the "digital library" include the directories and repositories on the open web, fee-based and free databases, social networking sites where information is organized for later retrieval, and collections of eBooks. Because these resources are all quite different, it is somewhat difficult to determine which barriers are application specific and which are general. However, in most cases coding of the transcription data was done at a high level of abstraction to address the diversity of the resources. For instance, cost is an overarching barrier that includes not only subscription costs but also the costs incurred to maintain and update computer equipment.

## **5.1.1 Providing Access**

### **5.1.1.1 First-order access barriers**

Cost is a first-order barrier to digital library access for these SLMSs because it could be eliminated with the provision of adequate resources. It should be noted that classroom teachers encounter similar resource-related technology integration challenges (Brown, 2000; Chiero, 1997; Hew & Brush, 2007; Hutchison, 2006; L. R. Rogers, 2007) as did other SLMSs (Oliver, 2004). Just as classroom teachers have turned to shareware, grants, and donations to manage economic challenges (Ertmer, 1999; Hew & Brush, 2007), these SLMSs use similar strategies to manage first-order barriers to digital library access.

### **5.1.1.2 Second-order access barriers**

A general lack of awareness of the digital libraries the SLMP offers, scheduling arrangements, and policy and password restrictions are second-order barriers to access. They are categorized as such because they are rooted in the belief systems of school library users and because removing these barriers might not automatically result in digital library integration. In some instances these barriers are conflated. In other words, to challenge restrictive policies, such as blocked websites, the SLMSs have to address teacher and administrators' inaccurate perceptions of the SLMP's role within the school community. Instead of blocking or restricting access to information, perhaps a more positive approach would be to have the SLMS teach learners the skills they need to navigate all kinds of information. As Kerr suggests (1996), addressing these barriers sometimes requires confronting underlying

pedagogical beliefs. A question that addresses these second-order barriers must be, what are the SLMP's goals and what is their relationship to the school's technology policies?

In sum, when addressing any second-order access barriers the SLMSs' most powerful strategy is availability. They market their services to potential users, maintain mental flexibility, use mobile technologies, and make themselves and their assistants available inside and outside of the SLMC. Interacting with users provides opportunities to clarify inaccurate perceptions of the SLMP's role in the school and share their expertise.

## **5.1.2 Teaching Use**

### **5.1.2.1 First-order use barriers**

Like teachers, SLMSs encounter digital library design challenges and technology familiarity as first-order barriers to technology use (Ertmer, 1999; Hew & Brush, 2007). In reaction to these barriers, participants focus on learner skill development and on purchasing databases with features that address design challenges. The SLMSs use social networking and other Web 2.0 tools to support collegial interactions and extend their digital library knowledge. We might expect this trend to continue as Web technologies continue to evolve.

### 5.1.2.2 Second-order use barriers

In comparison, role interpretation is a second-order barrier that appears to be unique to the SLM context<sup>9</sup>. Interview data suggest that the SLMS and the teacher do not always agree on what should be taught in a lesson. The teacher might want to focus on how to use specific technology tools, whereas the SLMS might want to teach how to use a set of tools to meet an information need. To address the lesson focus barrier, the SLMSs present themselves as “magic blend people,” or technology bridges who bring together technology, content, and research skills. Especially in secondary schools, the SLMSs want to progress beyond teaching technology at the mechanical level to providing technology support at the instructional level. They experiment with new technologies to find ways to merge computer skills with curriculum goals.

Ironically, Ertmer (1999) found that teachers expected their own professional development training to move beyond teaching technology mechanics to training in integration. The SLMSs in this study had to communicate this new role to teachers to help students and staff members rethink the SLMP’s purpose and contributions. They did this by slowly and incrementally building relationships with teachers that resulted in collaborative efforts. Collaborating made it possible for the SLMS to demonstrate how research process instruction can be infused into content area lessons.

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<sup>9</sup> Lesson focus might also be a barrier for other non-classroom teachers/specialists.

### **5.1.3 Curriculum Integration**

#### **5.1.3.1 First-order curriculum integration barriers**

Finally, first-order barriers to integrating digital libraries into the curriculum include curriculum-technology fit, insufficient curricular or content knowledge on the part of the SLMS, and design problems. These are first-order barriers in that they could be solved by the SLMSs familiarizing herself with the curriculum, and by purchasing digital media to better meet the needs of the learning community more effectively.

#### **5.1.3.2 Second-order curriculum integration barriers**

Second-order barriers include: time, classroom teachers' inaccurate expectations of students' research abilities and of the research process as a learned skill (the "go do research" phenomenon) and impetuosity or territoriality. The SLMSs address these through ongoing conversations with colleagues to develop a shared vision of technology use and the research process—a practice recommended by Ertmer and others (Ertmer, 1999; Sheingold & Hadley, 1990).

Although the above discussion focuses primarily on Ertmer's categories of first- and second-order barriers, it is interesting to note that the SLMSs in this study have gained expertise in an impressive number of strategies to address those barriers. They face barriers similar to those experienced by classroom teachers but also find it necessary to address barriers unique to their positions. Most of these involve managing collaboration. It might be said that the strongest strategy in the SLMSs' repertoire is availability. Exemplary SLMSs make themselves available to advocate

for their changing roles within the school and to champion the value added by digital libraries.

## ***5.2 NBPTS Certification, Expertise and Knowledge Management***

Scholars suggest that expert teachers often have a broad understanding of pedagogy, which allows them to focus on technology integration rather than only on content and/or classroom management when planning instruction (Becker, 1994; Kuhn, 2006; Meskill, Mossop, DiAngelo, & Pasquale, 2002; Pierson, 2001). SLMSs certified by the NBPTS are experts in using technology in schools. The SLMSs in this study possess strong understandings of the school curriculum and of their collections. They know what resources are available to them and, in turn, could focus on seamlessly integrating digital library technology into the curriculum.

Expertise in teaching is characterized by fluency, automaticity, and efficiency achieved through experience and reflection on experience (Garmston, 1998). A goal of this research was to externalize SLMSs' professional expertise for capture and reuse through reflection on practice. This externalization of tacit knowledge provides a way to share expertise with novice SLMSs (Hatton & Smith, 1995; Schön, 1992). One benefit of undergoing the NBPTS Certification process is the experience of reflecting on one's practice (Education Consumers Foundation, 2006; National Board for Professional Teaching Standards, 2007) and the study participants' experience of certification set the stage for the study.

Accordingly, the researcher used an interview study design, a method used often in the knowledge management field, to externalize the SLMSs' digital library



expertise, thus capitalizing on their reflective experience. Interview questions were designed to get the SLMSs to think systematically about their behavior after it occurred (reflection-on-action) (Hatton & Smith, 1995; Schön, 1992). Participants reflected on their general digital library integration practices in Interview 1 and then on a specific digital library lesson in Interview 2. The interviews successfully externalized barriers to digital library integration. More importantly, this research identifies a common set of strategies for circumventing those barriers—information lacking in previous LIS research literature.

In conclusion, the barriers and strategies externalized in this study can be used to promote knowledge transfer among professionals, thus bringing exemplary practice into reach for other practitioners. For example, during the apprenticeship phase (field study, student teaching) of SLMS preparation, a cooperating SLMS might use the description to identify which barriers exist in her school and demonstrate for the student how she implements the strategies to address specific barriers.

### ***5.3 Implications***

In combination with the research literature, findings from this study have far-reaching implications for school library media practice, education policy, and digital library design. A description of how this work informs related areas is presented below.

### **5.3.1 Implications for School Library Media Practice**

Several implications should be highlighted related to the SLMSs' digital library integration behaviors as they were critical to integration success. First, to increase learner access to digital libraries the most frequently mentioned best practice was cooperative purchasing, or for SLMSs to consider forming state or regional consortia to negotiate with vendors for standardized pricing across schools, districts, or cities. Other practices for improving digital library access at the school level include familiarizing oneself with the library's collection and the digital resources available to library users; using that knowledge to remain flexible in the face of unexpected hardware and software technology failure; and advocating for the SLMP to raise awareness of the various services the program offers.

SLMSs improve the teaching of digital library use by continually updating their personal knowledge about newly developed technologies and how to use them in academic settings. The findings suggest that they do continue to develop their digital library skills in both online and face-to-face settings. The SLMSs in this study also use non-traditional library resources like Google, Wikipedia, and their counterparts to reinforce information literacy skills.

In general, the SLMSs found digital library technology to be inherently engaging, but they stress the importance of solid instructional design to sustain students' engagement. They use inquiry-based research questions that were student-generated or rooted in student interests.

Based on the findings from this study, collaboration and building relationships with other educators in the building are the most powerful tools the SLMSs use to

improve the integration of digital libraries in the curriculum. They promote ongoing conversations with teachers and other specialists, identifying opportunities to integrate digital libraries when possible. They also participate on school committees and teams and cull documents (standardized tests, the school curriculum, and learning standards) for ideas for potential integration.

### **5.3.2 Implications for School Administrators and Policy Makers**

One of the access implications this research holds for administrators and policy makers is the need for ongoing monitoring and negotiation of digital library contracts with approved and outside vendors. Administrative support is a crucial element in making digital library access more affordable. The SLMSs also reinforced how important it is for administrators to budget for library assistants. Having assistants increases the SLMSs availability and frees them to teach and integrate digital libraries into the curriculum. Administrations should be urged to make assistants available to SLMSs.

These findings also have important implications for acceptable use policies in schools and the divide between home and school use of social networking technologies. The SLMSs consider these policies to be barriers to making digital libraries accessible. Blocked content and the inability to access resources that support learner interactions (wikis, blogs, etc.) limit the relevance of the learning experiences to students' everyday lives. Administrators might consider revisiting these policies with the expectation that information literacy skills taught in the SLMP will empower students to make smart decisions as they navigate information in online contexts.

The results from this study have curriculum integration implications for administrators. The SLMSs in this study recommended that curriculum developers incorporate information literacy skills and the research process into content standards. They also conveyed that implementing flexible scheduling can address time constraints that impede collaboration and integration opportunities.

An additional implication for administrators is that they should consider setting expectations among staff for teacher-SLMS collaboration. Those expectations could then be evaluated, with some attention paid to digital library integration. Finally, administrators could also learn more about the SLMP by monitoring digital library access data via formal reporting and implementing SLMS-specific performance evaluations.

### **5.3.3 Implications for Digital Library Designers**

The SLMSs considered many disparate types of systems to be digital libraries. This is possibly a reflection of a disconnect between what users consider a digital library and what designers consider a digital library. Perhaps it is time to include K-12 educators, specifically SLMSs, in the digital library conversation. Indeed, perhaps it would be productive to bring together digital library creators and K-12 researchers and practitioners for a discussion to explore the meaning of the term “digital library”.

Evidence from this study resulted in numerous suggestions for digital library designers, which would be of benefit to students, teachers and SLMSs. For students, the SLMSs suggest improving federated searching, and incorporating social networking tools into the digital library environment. For teachers they

recommended integrating note-taking tools and curriculum standards (including information literacy standards) into digital libraries. Finally, they proposed a number of improvements digital library creators could implement to support their practice. They suggested including plans for lessons that could take place outside of the traditional classroom setting; introductory screens that conduct reference interviews with users; one password for all of their digital libraries (especially for subscription databases) that could be changed when necessary; alternatives to the PDF file format; and systematized data collection and statistics reporting procedures across digital library products.

## ***5.4 Future Research***

This study lays a foundation on which to extend our understanding of SLMSs and digital library integration behaviors. This section outlines lesson learned after conducting this study and recommendations for future research.

### **5.4.1 Methods**

Methodologically, future studies could use a similar qualitative study design to compare and contrast how SLMSs integrate technologies other than digital libraries into the curriculum. Allowing the participants to tell their stories using open-ended questions resulted in rich descriptions of practice from each of the SLMSs interviewed. However, due to the length of the interviews (2-5 hours), if time were an issue in the replication of this study, researchers should consider incorporating more structured questions into the interviews to balance the open-ended questions.

They might also explore other SLMS populations: NBPTS Certified SLMSs in other regions; SLMSs at specific grade levels across the nation; SLMSs in urban and rural contexts; novice, preservice, and seasoned SLMSs; or SLMSs in affluent and under-resourced areas. Further studies might also compare use of technology by different groups, such as teachers and other school specialists.

Further research can be conducted to test the generalizability of the barriers and strategies that have emerged from this and other qualitative explorations. Using quantitative measures, researchers could explore the effect of these barriers and strategies on student performance or collaborative experiences. Researchers could also combine qualitative and quantitative methods to explore the integration of other technologies.

Another potential research resource to explore for studies on SLMSs' best practice would be educators' portfolios. The NBPTS portfolios are rich with recorded video, reflective journals, photographs, and other artifacts that took years for the candidates to assemble. Similar portfolios are assembled for evaluation purposes in schools. These data could be invaluable in learning more about how SLMSs and other educators incorporate technology into their work.

#### **5.4.2 Systems**

Future research might inform the development of customizable digital libraries for different user groups, mobile devices for educators, and systems to capture and reuse the knowledge of SLMSs. Some of the design concerns the SLMSs in this study mentioned might be used to inform the design of a customizable system

that can be configured and reconfigured for different user groups as needed. Systems that recognize the user as part of a specific user group can tailor search options and returns to the user's needs. For instance, a fifth grader whose first language is Spanish could interact with a digital library differently than a SLMS attempting to integrate information literacy skills into a lesson developed with the fifth grade science teacher. This area is rife with potential design ideas for digital libraries.

SLMSs in this study also touched briefly on the growing importance of mobile devices to do their jobs. This technology could become an increasingly important field of study as mobile devices become more ubiquitous in school settings. What features or applications might educators need? How might this differ for educators outside of the traditional classroom setting? Studies that explore SLMSs' mobility would add to the human-computer interaction literature and inform the development of mobile devices for this population.

Finally, future research might develop and test a learning content management system that incorporates both aspects of Borgman's digital library definition. The system would allow for the sharing of learning objects, but also provide spaces to support a community of practice. The system would allow users SLMSs from around the world to contribute learning objects for modification and reuse, and share their technology integration expertise.

### **5.4.3 Theory**

Using this work as a foundation, scholars, administrators, and practitioners could move beyond descriptions of the practice to a theory of SLMS technology

integration behavior. We can begin to develop a framework for thinking about a theory based on the findings from this work. Human actors that influence technology integration might be the members of the school community: students, teachers, specialists, staff, parents, and administrators at various levels. They might also include actors outside of the school community, such as vendors and telecommunications providers. The type of technology being integrated could significantly influence the integration process. For instance, how might the integration of electronic whiteboards differ from that of mobile devices? Finally, a theory should address the role of school culture in the process—specifically the collaboration vital for integration via the SLMP.

## ***5.5 Conclusion***

In conclusion, this study has brought early and provocative answers to the original research question: how do exemplary school library media specialists (SLMSs) use technology (i.e., digital libraries and related online digital information resources) to support the curriculum in K-12 schools? They make themselves and their staff members available to learners, demonstrate mental and resource flexibility when they encounter obstacles, and implement creative funding strategies to ensure digital library access. The SLMSs help students bridge knowledge learned in various contexts, provide digital library training, keep abreast of digital library innovations, and offer suggestions to product developers. They use proven teaching techniques that build on instructional design principles to sustain engagement. Finally, the SLMSs believe that collaboration is vital to digital library integration. To increase



collaboration they build trust and relationships with colleagues, use emerging tools to extend their reach beyond the SLMC, diversify their role within the school community, and gather curriculum information to incorporate information literacy skills into the school's content area goals and objectives.

The barriers and strategies identified in this study form the basis of an evidence-based description of the best practices SLMSs use when integrating digital libraries into the curriculum. The description can be used to promote knowledge transfer among professionals, thus bringing exemplary practice into reach for other practitioners.

# Appendixes

## Appendix A: Letter of Invitation

Date

Name

Title

School

Street

City, State, Zip Code

Dear Name,

I am a doctoral student in the College of Information Studies at the University of Maryland, College Park. My dissertation research will examine the best practices of nationally certified school library media specialists, in particular, how they use digital libraries in the classroom. I am looking for potential participants from the Your School District who are National Board for Professional Teaching Standards (NBPTS) Certified in library media. More specifically, I am seeking media specialists with current National Board-certification who incorporated digital libraries or online information resources in their NBPTS certification video.

Participation in this study will involve:

- A one-on-one interview: discuss your use of digital libraries (2 hours).
- A reflective review session: watch and discuss your teaching (2 hours).
- A focus group interview: selected participants will discuss which aspects of digital library use expertise should be captured and shared with others.
- Sharing copies of lesson plans and student work (anonymous) that illustrate your digital library use.

Please complete and return the attached forms using the enclosed stamped envelope. Even if you decide not to participate in the study, please help me by returning this cover letter with the appropriate boxes checked.

Will you participate?

Y    N    I will participate in this study. I have completed the attached demographic survey and signed the Informed Consent document.

Y    N    I will not participate in this study.

Please check all of the following that apply to you.

- I am currently NBPTS Certified. My certification has not expired.
- I used digital libraries/online information resources in teaching.
- I can dedicate up to six hours to the study for interviews and informal discussions.

— I will permit anonymous access to artifacts (such lesson plans and samples of student work) for analysis.

Although there is no monetary compensation for participating in this study, your involvement may contribute to our understanding of how exemplary library professionals effectively use technology to support the school curriculum. I hope that you will agree to assist us in our research endeavors. My research is supervised by Dr. Allison Druin (allisond@cs.umd.edu) and Dr. Ann Weeks (acweeks@umd.edu). If you have any questions concerning the study, please call me at (301) 405-2051, or send email to smassey@umd.edu.

Please respond by Friday, November 2, 2007.

Sincerely,

Sheri A. Massey  
Doctoral Candidate  
University of Maryland  
College of Information Studies  
4117B Hornbake Classroom Building  
College Park, Maryland 20742  
E: smassey@umd.edu  
P: 301-405-2051

## Appendix B: SLMS Questionnaire

Please highlight or underline the following demographic information that best describes you. Please elaborate on the back of the survey if you require additional writing space<sup>10</sup>.

<b>Demographic Background</b>			
Gender ( <i>circle one</i> )	Female	Male	
Age			
Race/ethnicity ( <i>circle one</i> )	African- American/ Black	Asian-American/ Asian	Native-American/ American Indian
	Latino/Hispanic	Caucasian/White	Other

---

**Professional Background**

---

*I currently hold the following degrees/licenses/certifications (please list):*

*Previous work history*

Employer & Location	Title	Nature of work	Length of employment
1.			
2.			
3.			

*What principles/philosophies underlie your professional approach as a SLMS?*

*How do you spend most of your time on a typical day at work? (list 4 activities in order of amount of time spent)*

- 1.
- 2.
- 3.
- 4.

*How many years of classroom experience do you have? \_\_\_\_\_*

\_\_\_\_\_

<sup>10</sup> Adapted from Leatherwood, K. (2004). Appendix E: Exemplary teacher survey. In National Board for Professional Teaching Standards: The impact board certified teachers on career and technology business and information technology education student outcomes (pp. 162-166). Unpublished doctoral dissertation, Oklahoma State University, Stillwater, OK.

*How many years of experience do you have in a school library media center (SLMC)?*

\_\_\_\_\_

*If you are not a building level SLMS, what is your current form of employment? Why did you leave the SLMC?*

---

**National Board for Professional Teaching Standards (NBPTS) Background**

---

*How many years have you taught/did you teach after obtaining National Board certification? \_\_\_\_\_*

*Why did you pursue NBPTS Certification?*

---

**Miscellaneous**

---

*What, in your opinion, is a “digital library”?*

## Appendix C: Interview 1 Protocol: Researcher Questions

### Opening

On the questionnaire I asked what you think a digital library is. Let's revisit that. You said \_\_\_\_\_. Is there anything you would like to add/change about your description? What role, if any, do digital libraries play in your school library media program?

*Providing access to technology information systems* encompasses building information-rich physical and virtual environments that are accessible locally and remotely and to all members of the school community.

1. What does it mean to provide "exemplary" access to technology-based library resources?
2. The school community includes students, teachers, administrators, and parents. Describe an incident in which you had to make a digital library available to someone in your school community.
3. Was there ever a time when providing access to digital libraries went horribly wrong? What happened? What would you do differently?
4. Suppose I just finished library school and entered the classroom. Step-by-step, what should I do to make digital libraries available to all members of my school community?

*Teaching effective use of technology and other resources* involves teaching learners to select and utilize appropriate resources to solve problems or meet information needs.

1. What does it mean to "use technology effectively"?
2. Can you tell me about a time when you taught a person or a class how to use a digital library to find and use information?
3. Describe an incident when teaching learners to use a digital library was particularly challenging? If you could teach this topic again, how would you change it?
4. Again, suppose I am a novice SLMS. What techniques would you share with me if I wanted to teach learners to use digital libraries and other information resources to meet their information needs?

*Engaging learners with technology* addresses how SLMSs use technology to capture students' attentions and stimulate the learning process.

1. How do you know when your learners are "engaged" in the learning process?
2. Describe an experience in which you used a digital library to get students' attention or to engage them in the learning process?
3. Were you ever unsuccessful in using a digital library to get students' attention? How did you recover?
4. What strategies could SLMSs use to engage learners with digital libraries?

*Enhancing learning* involves promoting the use of technology to support an inquiry-based, problem-solving curriculum.

1. Other than getting people's attention, how might digital libraries support the school curriculum through the SLMP?
2. An inquiry-based lesson is one in which learners gather, understand/process, and communicate information, usually to answer a question or to address a problem. Could you give me an example of a time when you used a digital library to meet learning objectives in an inquiry-based lesson?
3. What should a SLMS do if he or she has trouble using a digital library to support an inquiry-based curriculum? Has this ever happened to you?
4. How would you explain to another SLMS how to use digital libraries to support inquiry-based, problem solving lessons?

Closing

Is there anything you would like to share/cover that we have not already discussed?



## Appendix D: Interview 1 Protocol: Participant Questions

### Opening

On the questionnaire I asked what you think a digital library is. Let's revisit that. You said \_\_\_\_\_. Is there anything you would like to add/change about your description?

What role, if any, do digital libraries play in your school library media program?

*Providing access to technology information systems* encompasses building information-rich physical and virtual environments that are accessible locally and remotely and to all members of the school community.

1. What does it mean to provide "exemplary" access to technology-based library resources?
2. The school community includes students, teachers, administrators, and parents. Describe an incident in which you had to make a digital library available to someone in your school community.

*Teaching effective use of technology and other resources* involves teaching learners to select and utilize appropriate resources to solve problems or meet information needs.

1. What does it mean to "use technology effectively"?
2. Can you tell me about a time when you taught a person or a class how to use a digital library to find and use information?

*Engaging learners with technology* addresses how SLMSs use technology to capture students' attentions and stimulate the learning process.

1. How do you know when your learners are "engaged" in the learning process?
2. Describe an experience in which you used a digital library to get students' attention or to engage them in the learning process?

*Enhancing learning* involves promoting the use of technology to support an inquiry-based, problem-solving curriculum.

1. Other than getting people's attention, how might digital libraries support the school curriculum through the SLMP?
2. An inquiry-based lesson is one in which learners gather, understand/process, and communicate information, usually to answer a question or to address a problem. Could you give me an example of a time when you used a digital library to meet learning objectives in an inquiry-based lesson?

### Closing

Is there anything you would like to share/cover that we have not already discussed?

## **Appendix E: Interview 2 Protocol**

Reflective interview prompts:

Before reviewing the lesson:

1. What led you to use a digital library in your lesson? How did you come up with the idea to use digital libraries in this lesson?
2. Why did you select this particular digital library for your lesson?
3. Describe lesson: Tell me about this lesson (subject, topic, goals, objectives, student information, planning procedures; role of online digital information resources and other information resources)

During lesson review (repeat as needed):

1. What are you doing here? Why?
2. What were you thinking when you did that?
3. Would you have done that again? Why?
4. Were you thinking of any alternative strategies? Why?

After reviewing the lesson:

1. What would you have done differently in planning or carrying out this lesson?
2. How would a new SLMS go about designing a lesson like this one?

## Appendix F: Focus Group Interview Protocol

### Introduction

Good morning/afternoon! My name is Sheri Massey. Our task today is to talk with you about your experiences using digital libraries to support your school's curriculum.

### Guidelines:

- Please speak clearly, one speaker at a time
- If you need clarification of the question, please feel free to ask
- There are not right or wrong answers.

### Part I: General overview

First, please introduce yourself and briefly describe your school and your role in the school.

Where technology is concerned, how is your role as a media specialists different from the roles of teachers in technology integration?

What is a "digital library"?

-- Break--

### Part II: Use scenario: Implementing the ICDL

In what ways would you use a digital library to support teaching and learning in your school? - Focus on: Access, Use, Engagement, Curriculum enhancement

### Part III: Closing

Questions? Comments?

Thank participants

Adapted from Trump, G. C., & Hange, J. E. (1996). *Concerns about and effective strategies for inclusion: Focus group interview findings from Tennessee teachers* (Publication no. ED397576). Retrieved May 16, 2007, from ERIC.

## **Appendix G: Enlarged Digital Library Concept Maps**

Figure 4: Enlarged concept map (MS-NNHM)

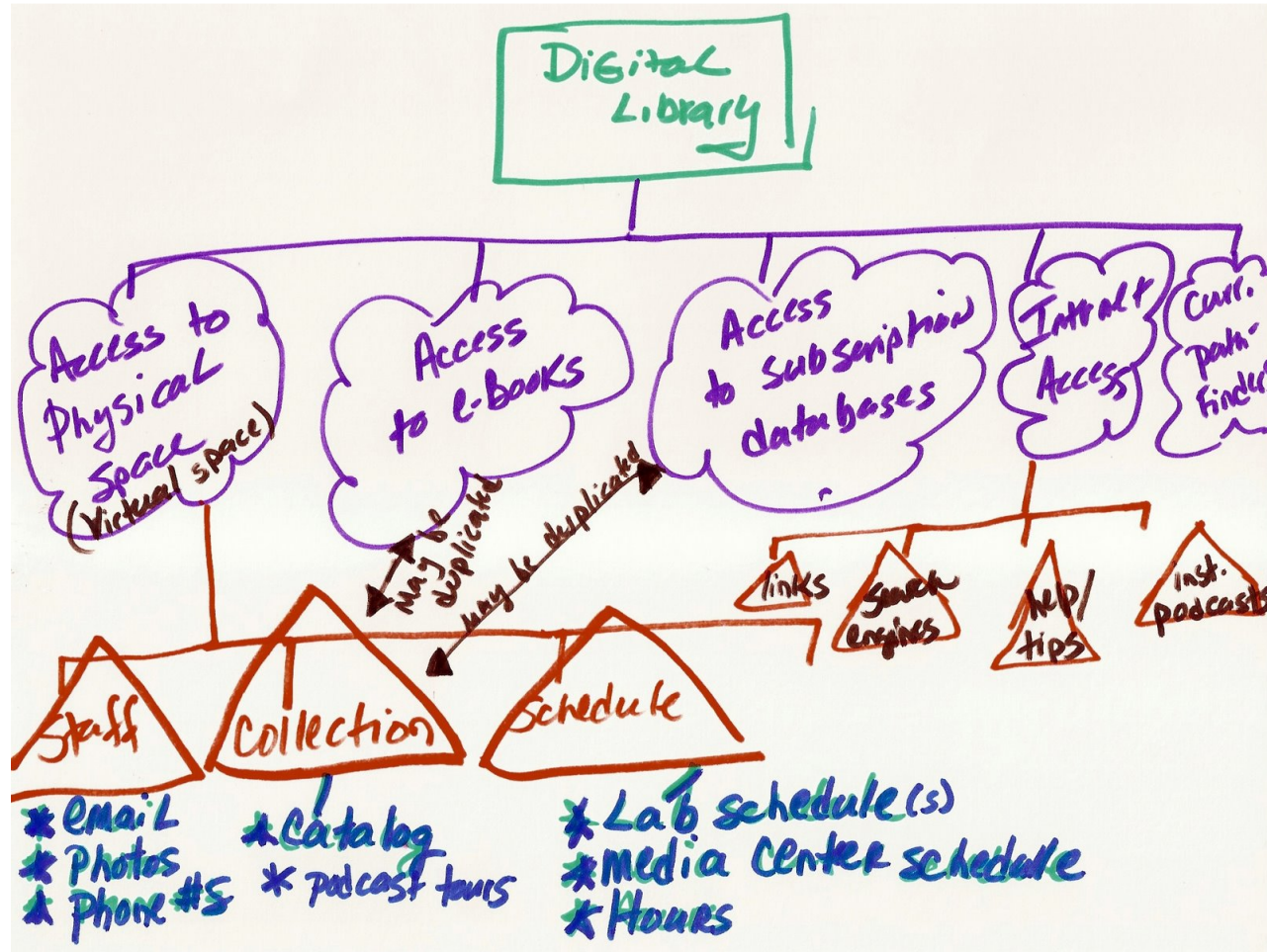


Figure 5: Enlarged concept map (MS-MMHV)

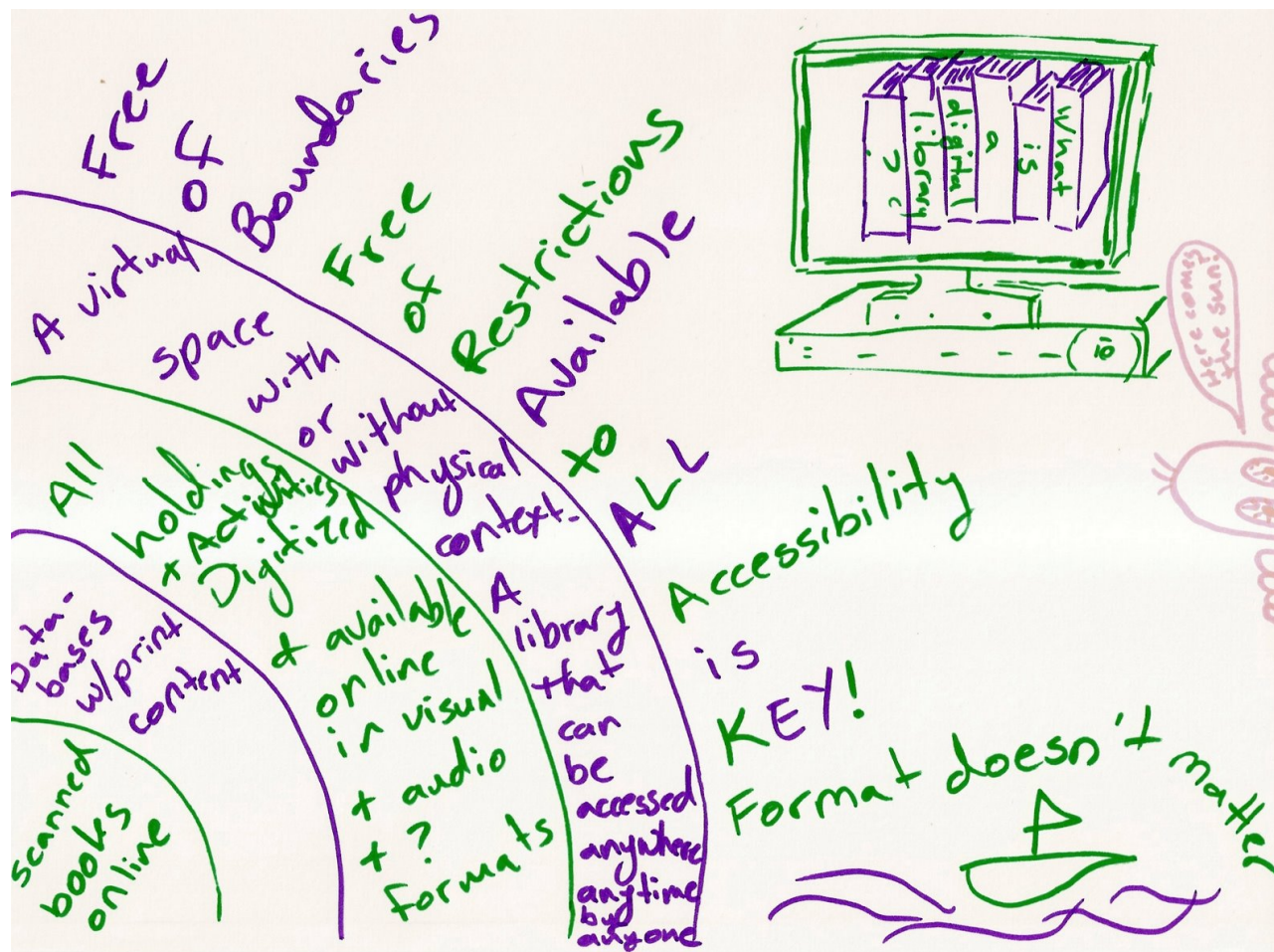


Figure 6: Enlarged concept map (AD-EEEV)

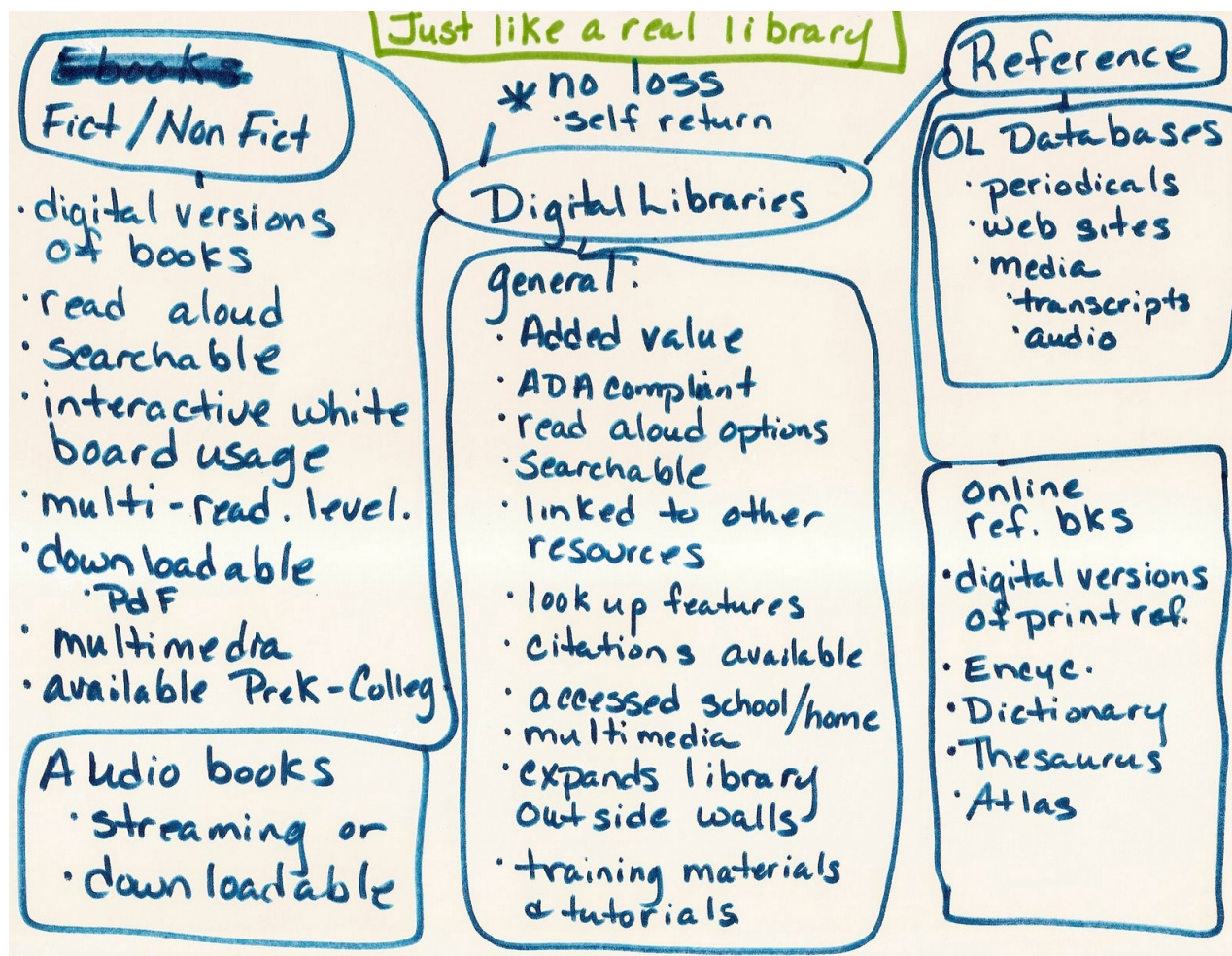


Figure 7: Enlarged concept map (MS-MEHM)





## Appendix H: Coding Definitions and Examples

Code term	Code definition	Examples
About Digital Libraries	Codes in the "digital library" (DL) category refer to definitions of the term "digital library" as explained by the participants. The SLMSs described what they believed to be a digital library or components of a digital library. Their descriptions often overlapped-- the same idea could be coded multiple times depending on the digital library components mentioned.	<p><b>Example:</b> "I look at [a library] as any place where you can find, digitally, information."</p> <p><b>Example:</b> Support student learning/Skill transfer/Book to online: "You have to teach them ... how text features in an online service may be similar and different to the text features that they've learned about in a print source and how you can use those to dig deeper and find the details of the information that you find."</p>
Access	Codes in the "access" (ACC) category refer to the provision of access to digital libraries to all members of a learning community. The codes in this category are further divided into the SLMSs' descriptions of exemplary access (ACC-EXM), barriers they faced in providing access (ACC-CHA) and strategies for overcoming those barriers (ACC-STR).	<p><b>Example:</b> Exemplary access: "Exemplary access is meeting needs when they arise ..."</p> <p><b>Example:</b> Access challenge/Policies: "The filters are problematic...and you can't get rid of them because if you do you lose 12 to 17% of your budget because the federal government won't give you money if you don't have a filter."</p> <p><b>Example:</b> Access strategy/Mental flexibility: "We're ultimately flexible. Some of your lessons change at a moment's notice and they should. If you're doing any kind of formative assessment along the way you should say to yourself, 'Okay, this didn't work. We need to backtrack and try it again'."</p>

Curriculum	<p>Codes in the "curriculum" (CURR) category refer to integrating technology into the curriculum to support student learning. These codes were not applied to ideas about using the technology. Codes in this category refer specifically to issues related to using the information once it is found. The codes in this category are further divided into the SLMSs' descriptions of the ways in which digital libraries support student learning (CURR-STU), barriers the SLMSs face in facilitating the use of information retrieved from digital libraries (CURR-CHA) and strategies for overcoming those barriers (CURR-STR).</p>	<p><b>Example:</b> Curriculum challenge/Curriculum-technology fit/Technology-objective match: "It's knowing which sources are the best for the particular assignment that's at hand..."</p> <p><b>Example:</b> Curriculum strategy/Diversify roles/Curriculum bridge: "[W]e see all of them and all the teachers, all the subject areas. [Principals] just maybe see the people on their team or in their subject area...[Y]ou can be the one that pulls it all together."</p>
Engagement	<p>Codes in the "engagement" (ENG) category are applied to ideas about engaging or motivating users with digital libraries. The codes in this category are further subdivided into SLMSs' descriptions of learners when they are engaged (ENG-SOE) and strategies for using digital libraries to motivate learners (ENG-STR). The SLMSs did not discuss barriers in engaging learners with technology, which led to the elimination of that code.</p>	<p><b>Example:</b> Indicators of engagement/Emotional reactions: "They're sometimes excited about what they found!"</p> <p><b>Example:</b> Engagement strategy/Proven techniques/Instructional design: "[Have] some kind of a lesson plan template even if it's very basic...Open your lesson, you're going to bring in the background knowledge and then you're going to get into the teaching of the databases, how you're going to end it all and what are you going to do next? Kind of have that framework."</p>

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Use	<p>Codes in the "use" category referred to the use of the technology itself, not the information in the product. Codes in this category were subdivided to reflect the SLMSs' descriptions of effective use (USE-EFF), barriers faced when teaching others how to use digital libraries and other networked resources (USE-CHA), and strategies the SLMSs used to address those barriers (USE-STR).</p>	<p><b>Example:</b> Effective use: "...to know how to find information ...and then how to communicate that information and just that sense that they can use technology to express themselves."</p> <p><b>Example:</b> Use/Barriers/Tech familiarity: "You hear ... that students these days are digital natives ... but the immigrants are struggling ... [T]they were not familiar with tagging, but then when you tell them it's like when you label your photos, oh, okay, they label their photos all the time, but really it's a tag. They didn't know we were talking about the same thing but using different terminology. So, if I connect the two together then they get it... "</p>
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# Appendix I: IRB Application Approval



UNIVERSITY OF  
MARYLAND

INSTITUTIONAL REVIEW BOARD

2100 Lee Building  
College Park, Maryland 20742-5121  
301.405.4212 TEL 301.314.1475 FAX  
irb@deans.umd.edu  
www.umresearch.umd.edu/IRB

July 30, 2008

## MEMORANDUM

*Application Approval Notification*

**To:** Dr. Allison Druin  
Ann Carlson Weeks  
Sheri Anita Massey  
College of Information Studies

**From:** Roslyn Edson, M.S., CIP *RE*  
IRB Manager  
University of Maryland, College Park

**Re:** **IRB Application Number: # 07-0340**  
**Project Title:** "The Technology Use of Exemplary School Library  
Media Specialists Certified By the National Board for Professional  
Teaching Standards"

**Approval Date:** **July 30, 2008**

**Expiration Date:** **August 1, 2009**

**Type of Application:** Renewal

**Type of Research:** Non-Exempt

**Type of Review  
For Application:** Expedited

The University of Maryland, College Park Institutional Review Board (IRB) approved your IRB application. The research was approved in accordance with 45 CFR 46, the Federal Policy for the Protection of Human Subjects, and the University's IRB policies and procedures. The IRB approves waiver of signed informed consent as per criteria in 45 CFR 46.116(d). Please reference the above-cited IRB application number in any future communications with our office regarding this research.

**Recruitment/Consent:** For research requiring written informed consent, the IRB-approved and stamped informed consent document is enclosed. The IRB approval expiration date has been stamped on the informed consent document. Please keep copies of the consent forms used for this research for three years after the completion of the research.

**Continuing Review:** If you intend to continue to collect data from human subjects or to analyze private, identifiable data collected from human subjects, after the expiration date for this approval (indicated above), you must submit a renewal application to the IRB Office at least 30 days before the approval expiration date.

**Modifications:** Any changes to the approved protocol must be approved by the IRB before the change is implemented, except when a change is necessary to eliminate apparent immediate hazards to the subjects. If you would like to modify the approved protocol, please submit an addendum request to the IRB Office. The instructions for submitting a request are posted on the IRB web site at:  
[http://www.umresearch.umd.edu/IRB/irb\\_Addendum%20Protocol.htm](http://www.umresearch.umd.edu/IRB/irb_Addendum%20Protocol.htm).

**Unanticipated Problems Involving Risks:** You must promptly report any unanticipated problems involving risks to subjects or others to the IRB Manager at 301-405-0678 or [redson@umresearch.umd.edu](mailto:redson@umresearch.umd.edu).

**Student Researchers:** Unless otherwise requested, this IRB approval document was sent to the Principal Investigator (PI). The PI should pass on the approval document or a copy to the student researchers. This IRB approval document may be a requirement for student researchers applying for graduation. The IRB may not be able to provide copies of the approval documents if several years have passed since the date of the original approval.

**Additional Information:** Please contact the IRB Office at 301-405-4212 if you have any IRB-related questions or concerns.

\_\_\_ I agree to be audiotaped during my participation in this study.

\_\_\_ I do not agree to be audiotaped during my participation in this study.

**What are the risks of this research?**

There are no known risks associated with participating in this study.

**What are the benefits of this research?**

The benefits to the study participants will be an opportunity to reflect on their practice, and add to the research literature on school library media programs.

**Do I have to be in this research? May I stop participating at any time?**

Your participation in this study is completely voluntary. You may choose not to take part at all. If you decide to participate in this study, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify. If you decide not to participate or to stop participating in this study, please inform me (the graduate researcher) of your decision in writing.

**What if I have questions?**

This study is being conducted by Sheri Anita Massey and the College of Information Studies at the University of Maryland, College Park. If you have any questions about the study itself, please contact Sheri Anita Massey at: College of Information Studies, 4117B Hornbake Classroom Building, College Park, Maryland, 20742. Call: 301-405-2051. Send an email message to: [smassey@umd.edu](mailto:smassey@umd.edu).

If you have questions about your rights as a study subject or wish to report a study-related injury, please contact:

Institutional Review Board Office; University of Maryland  
College Park, Maryland, 20742  
(e-mail) [irb@deans.umd.edu](mailto:irb@deans.umd.edu); (telephone) 301-405-0678

This study has been reviewed according to the University of Maryland, College Park IRB procedures for research involving human subjects.

**Statement of participant age & consent**

Your signature indicates that:

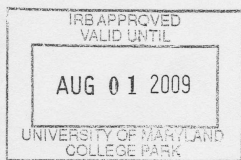
- You are at least 18 years of age;
- The research has been explained to you
- Your questions have been fully answered; and,
- You freely and voluntarily choose to participate in this study.

**Signature & Date**

\_\_\_\_\_  
Name of participant

\_\_\_\_\_  
Signature of participant

\_\_\_\_\_  
Date



Initial here: \_\_\_\_\_

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