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# A Study of West Virginia Secondary Public School Library Media Centers and Library Media Specialists and Their Use of 21st Century Technology Tools

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**A STUDY OF WEST VIRGINIA SECONDARY PUBLIC SCHOOL LIBRARY  
MEDIA CENTERS AND LIBRARY MEDIA SPECIALISTS AND THEIR USE OF  
21<sup>ST</sup> CENTURY TECHNOLOGY TOOLS**

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Dissertation submitted to the faculty of the  
Marshall University Graduate College  
in partial fulfillment of the  
requirements of the degree of

Doctor of Education  
in  
Curriculum and Instruction

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Huntington, West Virginia, 2008

Keywords: 21<sup>st</sup> century skills, technology tools, school library media specialist

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## ABSTRACT

### **A Study of West Virginia Secondary Public School Library Media Centers and Library Media Specialists and Their Use of 21<sup>st</sup> Century Technology Tools**

Twenty-first century learning, learning that teaches global and wellness awareness, and civic and business literacy, is essential for students to become vital, contributing members of society. In order for students to participate in an environment of 21<sup>st</sup> century learning, the attainment of 21<sup>st</sup> century skills is essential. Twenty-first century skills encourage students to collaborate, communicate, critically think, and reflect. Such skills involve the use of technology tools – 21<sup>st</sup> century tools – which include computers, Internet, production software, and communication processes. Literature establishes school library media centers as sites where students find many types of 21<sup>st</sup> century tools. Staffed by school library media specialists, school library media centers should be the hub of 21<sup>st</sup> century learning. It therefore becomes necessary to ascertain the types of 21<sup>st</sup> century tools available in school library media centers, how confident school library media specialists are in using the tools, and how often school library media specialists help students use the tools so that effective learning can occur.

This study utilized a researcher developed self-reporting mailed survey to conduct research with all 227 secondary school library media specialists in West Virginia. The study found that school library media specialists have reasonable level of access to 14 of 24 technology tools. The other 10 are absent in more than half of the West Virginia secondary school library media centers. The majority of West Virginia school library media specialists indicated they are extremely confident in using many 21<sup>st</sup> century technology tools; however they never assist students in using most of the tools. findings showed increased incidences of technology training for school library media specialists increase the presence of technology tools in school library media centers, raise the confidence level of school library media specialists in using technology tools, and increase the frequency of assisting students with technology tools.

## **DEDICATION**

One's life can be equated to a patchwork quilt – a culmination of hours of work representing memories and accomplishments. The quilt of my life changed in shape and content throughout this dissertation process. As pieces were created, added, and formed, one group of people stayed by my side, offering their love and cooperation. From the completion of coursework to the presentation of findings, I was upheld, encouraged, and supported by my loving family. I thank each of them and dedicate this dissertation to:

- the memory of my father, Denzil Bickel, who knew what I could do, dreamed of what I could be, and encouraged me to reach for the stars.
- my mother, Neva Bickel, for her love, guidance, and words of advice throughout my life. Her tenacious attitude rubbed off on me.
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- my sons, Tyler and Tanner Sigman who stood by me right through 'til the end. They are the lights of my life.
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## CHAPTER ONE: INTRODUCTION

*For the first time in history, our job as educators is to prepare our children for a future we cannot clearly describe (Warlick, 2007)*

The future for today's students is one filled with challenge and exploration; a future that is ever changing yet always beckoning, a future unlike any ever conceived. Communities, employers, families, and individuals expect America's students at all levels of academia to be prepared and equipped to succeed in a 21<sup>st</sup> century society that is shaped largely by technology and the ability to manipulate said technology. However, the skills needed to survive in such a society are not easily defined nor readily described. School systems struggle to identify and label the skills deemed necessary for achievement, but often find themselves merely listing technology that they feel is needed in their schools. The 21<sup>st</sup> century skills that educators are seeking to define involve digital literacy, collaboration, communication, critical thinking, information gathering, and interpersonal reflection (Partnership for 21<sup>st</sup> Century Skills, n.d.a; Serim, 2003). Knowing this, the question then becomes how can educators and school systems best prepare students to meet the challenges of the 21<sup>st</sup> century?

In order to be prepared to face the changing societal landscape and global learning structure, students must have access to essential tools that aid in the mastery of 21<sup>st</sup> century skills. As a result of this thinking, technology and its utilization has become one of the major areas where educators look to assist students in gaining 21<sup>st</sup> century skills and abilities. Technology is and will continue to be a driving force in education, communities, workplaces, and personal lives due to its ability to help students create, help students archive, help students research and help students learn (Partnership for 21<sup>st</sup> Century Skills, n.d.a; n.d.b). Learners in the 21<sup>st</sup> century must understand how to use

technology tools in order to become successful in retrieving and manipulating data and to become successful in reaching the higher levels of thinking and information processing. Twenty-first century tools that are used by students include computers, Internet, audio, video, and networking. Various types of production and presentation software are also included as 21<sup>st</sup> century tools (Pearlman, 2006; Tiene & Luft, 2002).

As a result of this push to help students gain 21<sup>st</sup> century skills, technology has become essential to learning and has the capability to impact the face of education (North Central Regional Educational Laboratory and the Metiri Group, 2003; Pearlman, 2006). Media, government, and academic literature (Arnone & Small, 2001; Metiri Group, n.d.) are continuous reminders of the sweeping changes in instruction and learning effected in recent years by technology. These changes are particularly evident in middle and high school library media centers where the handling of information is important to the learning process. Technology has altered the means by which school library media centers afford access to information and material for students and educators. School library media center automation has dramatically changed the way that school media centers administer circulation and manage collections. Information from the evaluation of the National Library Power Program research study (DeWitt Wallace – Reader’s Digest Fund, n.d.) and findings from Hones (1997) report on the Library Media Center 2000 initiative, indicate school library media centers are important to school success and are the center of learning and information for schools, often utilized throughout the day as a source of research and production. Due to the advent of technology, the library has evolved to become the hub of technological training and use for most schools (American

Association of School Librarians and Association for Educational Communications and Technology, 1998a; Lance, Rodney, & Hamilton-Pennell, 2000; Prestamo, 2000).

Library media centers take on an even more important role as schools move forward in educating students to become active, successful participants in the 21<sup>st</sup> century. The library media center, and the library media specialist, have become increasingly involved with assisting students in attaining the skills necessary to achieve and succeed in a 21<sup>st</sup> century technologically advanced society (American Library Association, 2006; Lance, 2001; Somi & Jager, 2005). A 21<sup>st</sup> century society requires multi-skilled learners, who are able to think critically, solve problems and become lifelong learners. Today's library media centers are resource centers for students and teachers where individuals use tools and learn skills that enable them to become such thinkers and problem solvers. Well-equipped school library media centers are some of the most effective and efficient means to reach students and teachers, to help schools leap into the 21<sup>st</sup> century of information and integration (Hones, 1997; Humes, 1999).

For a library media center to become the center of learning, a well-skilled, highly effective library media specialist must be in place. No longer is the library media specialist simply keeper of the books; today's library media specialist takes on the roles of teacher, manager and collaborator, assisting students and teachers in utilizing the tools necessary to gain 21<sup>st</sup> century skills (Lance, 2002; Lowe, 2001). Literature indicates the library media specialist teaches information accessing along with processing and research skills to further enhance students gaining 21<sup>st</sup> century skills (Lupton, 1996). Research also points to the ever-increasing role of school library media specialists to manage information and help students locate and utilize information (Prestamo, 2000).

Prestamo's research developed an inventory of technology skills for academic librarians that found that the process of information retrieval and the use of technology are important for all academic librarians.

Twenty-first century skills, though not well defined nor systematically taught, are viewed as essential to every student's success in the 21<sup>st</sup> century (Pearlman, 2006; Weis, 2004). These skills involve the use of technology to produce documents, projects, and activities as well as retrieve and effectively use information and data. As a result, the library media center and its many tools (i.e., computers, software, and presentation devices) become a critical component for students in the pursuit of 21<sup>st</sup> century skills, according to a survey by Brewer and Milam (2005) and findings by Lemke (2002).

Recent studies and literature indicate that in order to assist students in acquiring 21<sup>st</sup> century skills, certain tools are critical – tools such as graphs, computers, “smart” whiteboards, databases, spreadsheets and the Internet (Lowe, 2001; Partnership for 21<sup>st</sup> Century Skills, n.d.b). These tools are integral components of many school library media centers and library media centers are often the first place that students and teachers expect to find these tools. Library media specialists, therefore, have become essential in helping students use these tools. As such, the school library media specialist has evolved into the 21<sup>st</sup> century information specialist, a leader in the area of 21<sup>st</sup> century skills and tools (Lowe, 2001; Valenza, 2006).

### **Background of the Study**

As schools and school library media centers enter the 21<sup>st</sup> century, it is clear to all educators that student learning and education are changing. A research study by Casey and Rakes (2002) found that technology is becoming part of the educational backdrop as

teachers are integrating more and more lessons requiring the use of technology tools to produce desired results. According to research by McCarthy (1997), library media centers are involved with the integration of technology. Her research with library media specialists in New England indicated that the specialists feel that they frequently provide leadership in instructional technology and see their facilities as information centers where technology is integral.

As early as 1996, the CEO Forum on Education and Technology began addressing the issue of technology and school readiness and the ability to provide necessary technology to students. The CEO Forum was established to help ensure that schools successfully prepare students to become viable, productive citizens in the 21<sup>st</sup> century. The CEO Forum created an assessment tool, the STaR Chart, for schools to utilize in assessing readiness to provide technology tools to students. The final report has been used as a guide in assisting schools to determine their technology readiness (CEO Forum on Education and Technology, n.d.).

Twenty-first century skills and the tools that lead to the acquisition of said skills became part of the landscape of education in the early part of this century. The Partnership for 21<sup>st</sup> Century Skills, a public-private organization that brings educators, business people and policymakers together in a joint effort to positively impact the landscape of education, was established in 2002. The members of this partnership are diverse and include such businesses and organizations as Apple, Dell, AT&T Foundation, Cisco Systems, Microsoft, and Verizon. The Partnership for 21<sup>st</sup> Century Skills published a report that has brought much attention to the need for 21<sup>st</sup> century skills in today's schools. *Learning for the 21<sup>st</sup> Century* (Partnership for 21<sup>st</sup> Century Skills, n.d.a), a report

on the utilization of technology with children, makes recommendations defining and integrating 21<sup>st</sup> century skills into school curriculum. The report outlines goals for learning in a technology rich 21<sup>st</sup> century. At the same time, the Partnership for 21<sup>st</sup> Century Skills published a guide entitled *Milestones for Improving Learning and Education (MILE) Guide for 21<sup>st</sup> Century Skills* as a companion to its report on 21<sup>st</sup> century skills. A hands-on self-assessment tool, *MILE* assists teachers and administrators in checking school progress in teaching and measuring 21<sup>st</sup> century skills. Both of these documents opened the door for discussion, for evaluation and for learning regarding education and the need for improving student academic skills (Partnership for 21<sup>st</sup> Century Skills, n.d.b; Shelhom & Pickard, 2004).

Literature indicates that 21<sup>st</sup> century tools are items that enable students to gain and utilize 21<sup>st</sup> century skills (North Central Regional Educational Laboratory and the Metiri Group, 2003; Partnership for 21<sup>st</sup> Century Skills, n.d.a; Rivero, 2006). These include computers, scanners, digital cameras, printers and data projectors. Other tools include software that enables students to create spreadsheets, databases, digital presentations, and multimedia projects (Pearlman, 2006; Tiene & Luft, 2002). Fryer (2005) and Pearlman (2006) also indicate that tools that enable students to podcast, blog, and instant message should be included in the list of 21<sup>st</sup> century tools.

West Virginia has long been involved in implementing a systematic approach to technology and curriculum alignment and inclusion. In so doing, the state's department of education has demonstrated its vision of preparing students to meet the societal and global demands of a 21<sup>st</sup> century work force and educational environment. In 1996, the West Virginia Legislature amended state code to provide for the "utilization of

technology in middle, junior high and high schools” (West Virginia Department of Education Office of Technology, n.d.b). As part of school reform in the Jobs through Education Legislation (West Virginia Department of Education Office of Technology, n.d.c), the West Virginia Legislature funded the West Virginia SUCCESS Initiative with approximately eight million dollars per year, based on a per pupil ratio. SUCCESS, Student Utilization of Computers in Curriculum for the Enhancement of Scholastic Skills, provides technology tools that help prepare students in grades seven through 12 to succeed in post-secondary education or successful job placement (West Virginia Department of Education Office of Technology, n.d.b).

The West Virginia SUCCESS Initiative was established to provide secondary schools with quality technology tools that aid in preparation for future endeavors. The initiative goes further by outlining the types of tools needed for success, flexible timelines for implementation, and equity of access for students and educators. The SUCCESS initiative for middle, junior, and high schools continues under the title West Virginia Tools for Schools Secondary as West Virginia leads the way in 21<sup>st</sup> century tools procurement for its students (West Virginia Department of Education Office of Technology, n.d.b). As a result, *Education Week* named the state’s school organization as having the best educational technology system in the United States (Editorial Projects in Education Research Center, 2006).

In November 2005, West Virginia became involved with the Partnership for 21<sup>st</sup> Century Skills (West Virginia Department of Education, 2005). As only the second state to implement the Partnership’s 21<sup>st</sup> century standards for education, West Virginia made great strides in assisting its students in gaining 21<sup>st</sup> century academic skills. Through a



systemic approach, the West Virginia Department of Education began implementing an educational model that ensures the students of the state's schools will have the knowledge and skills necessary to succeed in 21<sup>st</sup> century society. The model further establishes an alignment with the state's economic development plan in order to better prepare students to enter the job market and compete in a global economy (Partnership for 21<sup>st</sup> Century Skills, n.d.a; W.Va. Focuses on 21<sup>st</sup>-Century Learning, 2006).

In conjunction with the affiliation with the Partnership for 21<sup>st</sup> Century Skills, West Virginia established the West Virginia Skills Initiative as a means for addressing the attainment of 21<sup>st</sup> century skills in West Virginia schools. The initiative is broken into three frameworks: one for elementary schools, one for middle schools and one for high schools. Along with these 21<sup>st</sup> century skills frameworks, the state has also reworked its content standards to address rigorous pursuit of 21<sup>st</sup> century skills attainment. The West Virginia initiative provides for professional development for teachers and administrators in order to give these individuals the training and tools to work effectively in the classrooms and schools across the state (West Virginia Department of Education, n.d.b).

In 2002, the No Child Left Behind Act of 2001 (U.S. Department of Education, n.d.) reauthorized the Elementary and Secondary Education Act of 1965. As a result, the Enhancing Education through Technology program (EETT) was established (West Virginia Department of Education Office of Technology, n.d.a). This program is utilized in West Virginia schools as a means of providing funding for technology and technology support in schools that qualify for competitive funding. Technology Integration Specialists, hired with monies from this grant, are placed in schools to help with the integration of technology tools in classrooms and with students and teachers.

Recently, the West Virginia Department of Education took the intentions of the EETT grant even further by providing specifically for the training of school library media specialists to become Technology Integration Specialists (West Virginia Department of Education Office of Technology, n.d.a). In July 2006, the West Virginia Department of Education's Office of Technology implemented an initiative to provide professional development for middle and/or high school library media specialists in order to enhance their use of technology (West Virginia Department of Education Office of Technology, 2007). The West Virginia Department of Education stated that the library media specialist's role should evolve to become a collaborator with teachers and students in the development of information literacy (B. Williams, personal communication, April 16, 2007). This has led to the creation of the Library Media Technology Integration Specialist Initiative. The goal of the Library Media Technology Integration Specialist Initiative is to give school library media specialists in West Virginia's secondary schools 21<sup>st</sup> century skills and tools necessary to become Technology Integration Specialists. All of these components work in conjunction to emphasize and illuminate information and communications technology literacy, critical thinking, communication, global consciousness and economic literacy, which, in turn, present the students with skills that, prepare them for the 21<sup>st</sup> century.

### **Statement of the Problem**

School library media centers are critical elements in students' attainment of 21<sup>st</sup> century skills (Hones, 1997; Lance, 2001; 2002). It is, therefore, progressively more important that school library media centers contain the tools necessary to assist students in their quest for 21<sup>st</sup> century skills and abilities. Accordingly, school library media

specialists are crucial to the success of any school library media center and, therefore, are essential to the integration of 21<sup>st</sup> century tools. Brewer and Milam (2005) indicate this in their research noting that 67% of surveyed school library media specialists participate as a member of a school technology team.

In order for students at the middle and high school levels to successfully attain 21<sup>st</sup> century skills, school library media centers must provide students with the essential tools to master the required skills. Consequently, school library media specialists must have the knowledge and abilities to properly instruct students in the use of 21<sup>st</sup> century tools. Readiness to address these issues is crucial as schools attempt to budget monies and provide necessary training to teachers (American Library Association, 2006).

### **Purpose of the Study**

This study will assess the 21<sup>st</sup> century tools that West Virginia secondary school library media centers have available to students. This study will also assess the confidence of West Virginia secondary school library media specialists in using 21<sup>st</sup> century tools. Finally, the frequency with which West Virginia school library media specialists assist students in utilizing 21<sup>st</sup> century tools will be examined.

### **Research Questions**

Quantitative methods will be used to address the following three questions:

1. What 21<sup>st</sup> century tools are available in West Virginia secondary school library media centers?
2. To what extent are West Virginia secondary school library media specialists confident in utilizing 21<sup>st</sup> century tools?

3. How often do West Virginia secondary school library media specialists assist students in using 21<sup>st</sup> century tools?

Ancillary findings related to demographic data and written descriptions of activities provided by secondary school library media specialists will be discussed where significant.

### **Operational Definitions**

The following are operational terms defined for use in this study:

*21<sup>st</sup> Century Tools* – For the purpose of this study, 21<sup>st</sup> century tools are defined as information and communication technology tools. These are the tools that students need to be productive and creative (Fryer, 2005; Partnership for 21<sup>st</sup> Century Skills, n.d.a; Tiene & Luft, 2002). Twenty-first century tools include: computers, handhelds, scanners, digital cameras, word processing software, presentation software, spreadsheet software, database software, video editing software, desktop publishing software, interactive whiteboards, multimedia data projectors, emailing, creating DVD's, Internet, online databases, CD-Rom/online encyclopedias, blogs, podcasts, distance learning, instant messaging, and networks as indicated on the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* (Appendix A).

*Technology* – For the purpose of this study, technology refers to electronic or digital products, devices and materials as indicated on the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools*.

*To What Extent* – For the purpose of this study, “to what extent” refers to the degree (extremely unconfident, mostly unconfident, slightly unconfident, slightly confident, mostly confident, confident, and extremely confident) to which West Virginia

secondary school library media specialists are confident in assisting West Virginia secondary school students in utilizing 21<sup>st</sup> century tools as indicated on the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools*.

*How Often* – For the purpose of this study, “how often” refers to the incidence (never, rarely, monthly, occasionally, weekly, frequently, and daily) that West Virginia secondary school library media specialists assist students in utilizing 21<sup>st</sup> century tools as indicated on the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools*.

*West Virginia Secondary School Library Media Center* – For the purpose of this study, West Virginia secondary school library media center is defined as a school library media center that services a West Virginia public secondary school and is funded by the school district and the state of West Virginia as indicated on the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools*. The school library media center is a room or rooms that house a collection of materials and equipment used by the school’s staff and students for educational and informational purposes. This material and equipment may include but are not limited to computers, data projectors, word processing software, production software, digital cameras, and electronic whiteboards.

*West Virginia School Library Media Specialist* – For the purpose of this study, a West Virginia school library media specialist is defined as a trained individual who supervises and maintains the school’s library media center and its collection and who responded to the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools*.

*West Virginia Secondary Schools* – For the purpose of this study, West Virginia secondary schools refer to public schools in the state of West Virginia that contain students in grades six through 12, in any combination of grade levels as indicated on the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools*.

*Activities* – For the purpose of this study, activities refer to any assignments, projects, lessons, or tasks that students are required to complete as part of the school’s curriculum as indicated on the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools*.

### **Significance of the Study**

On May 6, 2006, West Virginia Senate Education Committee Chairman Bob Plymale stated, “Technology serves as the doorway to 21<sup>st</sup> century learning...” (West Virginia Department of Education, 2006d). In order for this doorway to 21<sup>st</sup> century learning to remain open for the students of West Virginia, successful inclusion of 21<sup>st</sup> century tools is vital. This study outlines data and information from West Virginia secondary school library media specialists that will point to technology use and integration.

In determining the types of 21<sup>st</sup> century tools available in secondary school library media centers in West Virginia, 21<sup>st</sup> century skills readiness is outlined. Data that ascertains the confidence level of the surveyed West Virginia secondary school library media specialists in using technology indicates if any training may be needed for the West Virginia secondary school library media specialists in order to help them better utilize technology tools. By establishing the frequency with which West Virginia secondary school library media specialists assist students in using technology tools, it is

revealed how often West Virginia secondary school library media specialists are aiding students in the attainment of 21<sup>st</sup> century skills. Finally, by determining the kinds of activities West Virginia school library media specialists help students achieve through the use of 21<sup>st</sup> century tools, the types of 21<sup>st</sup> century tools that are being utilized might be discovered.

The West Virginia 21<sup>st</sup> Century Skills Initiative, established in 2005 (West Virginia Department of Education, n.d.b), outlines the curriculum pathway to successful implementation of 21<sup>st</sup> century skills in West Virginia classrooms. This study is relevant and timely in its approach to assess the availability of 21<sup>st</sup> century tools in the state's secondary school library media centers, as the availability of such tools is tantamount to successful learning of 21<sup>st</sup> century skills. The survey tool used with this study collected baseline data concerning 21<sup>st</sup> century tools and school library media specialists' abilities to assist with these tools. Baseline data may be important to establish before the 21<sup>st</sup> Century Partnership is too far along in its implementation within West Virginia's schools. Baseline data established prior to the statewide implementation of the 21<sup>st</sup> century Content Standards and Objectives may also be useful. Data from the survey may be used to further advance the West Virginia 21<sup>st</sup> Century Skills initiative by aiding in the determination of additional training and educational needs of the state's public secondary school library media specialists with regard to successful utilization of 21<sup>st</sup> century tools.

Local school districts and area Regional Educational Service Agencies (RESAs) may utilize the information from this study when creating continuing education courses for school library media specialists. This study also provides data that examines the West Virginia secondary schools library media specialists' confidence in utilizing 21<sup>st</sup> century

tools. The data indicates areas where school library media specialists might have needs concerning 21<sup>st</sup> century tool integration, and local school districts and RESAs can then shape continuing education courses that meet these needs.

Data and information from this study may be used by institutions of higher education as a means of shaping school library media programs and coursework. The evidence produced from this study could shed light on the confidence of West Virginia secondary school library media specialists to utilize 21<sup>st</sup> century tools. By using the data from this study, colleges and universities might determine the types of technology coursework, lessons, assignments and training that their library media students need in order to be successful in the work environment.

West Virginia policymakers are important stakeholders in the development and implementation of the West Virginia 21<sup>st</sup> Century Skills initiative. Their involvement in supplying funding and in providing support is vital to the success of the project. Legislators may use the data from this study to aid in viewing the use of technology tools in the state's secondary school library media centers and in assessing the availability of technology tools throughout the state's secondary schools. Support for continued funding and/or additional funding may result as policymakers use the data from this study in conjunction with West Virginia Department of Education reports.

As West Virginia educational strategies and guidelines are formulated, the importance of 21<sup>st</sup> century skills must be considered and addressed by school systems throughout the state that are striving to prepare students for the demands of a 21<sup>st</sup> century society. This study provides valuable information and data that educational leaders at all levels could use. As West Virginia Content Standards and Objectives (CSOs) are



improved and shaped to include 21<sup>st</sup> century skills and outcomes based lessons, the tools needed to complete these tasks become key elements in the academic arena.

### **Limitations and Assumptions of the Study**

This study cannot be generalized outside of West Virginia. Only secondary school library media specialists were included in the population. This study is limited to self-reporting of the participating school library media specialists and is limited to the timeframe in which the data was collected.

It is assumed that all secondary school systems in West Virginia are aware of the West Virginia 21<sup>st</sup> Century Content Standards and Objectives (CSO's) due to various statewide trainings, memos, and Website updates, but the standards and policies are not mandated for inclusion until August of 2008. However, all schools are moving towards the implementation of the CSOs through workshops, trainings and informative sessions. All West Virginia secondary schools have been following the guidelines of the West Virginia SUCCESS (more recently entitled West Virginia Tools for Schools Secondary) Program since 1997.

The willingness of surveyed individuals to write a response to an open-ended question may be a limitation to the study. According to Greer (1988), respondents may be reluctant to voice their opinions or respondents may see their answers as inarticulate and will, as a result, not answer open-ended questions. Respondents to open-ended questions, Greer feels, will answer the open-ended query if they view the question as salient, but may skip over the question if it is deemed by the respondents as unimportant.

## **Summary of the Study**

This study is submitted in five chapters. Chapter 1 introduces the study and gives the background, problem, purpose, questions, definitions, significance, limitations, and summary. Chapter 2 presents a review of research and literature pertinent to the study. Chapter 3 outlines the methods and research procedures utilized with this study. Chapter 4 communicates the findings and analyses of data garnered from the research questions. Chapter 5 presents the summary, conclusions, discussion, and implications of the study along with recommendations for future research.

## CHAPTER TWO: REVIEW OF THE LITERATURE

“At no time in history has the ability to locate, organize, evaluate, manage and use information... been more important to today’s learners” (Arnone & Small, 2001, p. 592). To promote lifelong learning and the pursuit of information attainment, students need skills that will enable them to search and create – skills termed 21<sup>st</sup> century skills (Jobs for the Future, n.d.). As such, it is imperative that West Virginia secondary school students have access to 21<sup>st</sup> century tools that will help them in the attainment of these 21<sup>st</sup> century skills. West Virginia secondary school library media centers play an important role in providing for West Virginia secondary school students these aforementioned tools. As presented earlier, the school library media center is the center of learning (DeWitt Wallace – Reader’s Digest Fund, n.d.) and as such is looked to for supplying needed tools and assistance to students in pursuit of 21<sup>st</sup> century skills.

The role of the school library media specialist, therefore, becomes key in a discussion that involves the utilization of 21<sup>st</sup> century tools. As the “gatekeeper” of the school library media center, the school library media specialist is integral in helping students correctly use 21<sup>st</sup> century tools. His/her skills and knowledge with regard to 21<sup>st</sup> century tools is important for students to gain the 21<sup>st</sup> century skill sets necessary to success (DeGross, 1997). The role of the school library media specialist, then, becomes important in the acquisition of and utilization of the 21<sup>st</sup> century tools housed in West Virginia secondary school library media centers.

In 1998, Thomas C. Wilson wrote *The Systems Librarian: Designing Roles, Defining Skills* in which he identified responsibilities of the average school librarian. These roles and responsibilities in view of technology, included: integrated library

systems management, desktop computing, server administration, technology exploration, technology support, and network management. Other roles included communication and coordination, training, purchasing, budgeting, and application development. These roles outlined in 1998 already included many tasks that involved computers and technology, and pointed to a future where the school library media center would be rich in technology tools. An additional list of librarians' roles compiled almost ten years later indicated the duties of the school library media specialist as involving more detailed technology skills. An article by the Association of College and Research Libraries (Mullins, Allen, and Hufford, 2007) pinpoints the roles of college librarians; however, these roles could apply to today's secondary school library media specialists, including:

- Emphasis on digitizing collections.
- Improvement of methods of data storage and retrieval.
- Demand for faster and greater access to services.
- Demand for technology related services.
- Students viewed as consumers, expecting high-quality facilities and services.
- Options for distance learning expanded.

It is evident that the role of the school library media specialist is evolving to include more detailed and specific technology related demands and duties.

This new breed of school library media specialist has responsibilities extending beyond the usual perceptions of librarians as keepers of books and shushers of noise. Today's school library media specialists facilitate classes that help students grasp the use of technology for many purposes, including research, homework, and assessments. School library media specialists attend meetings and conferences where they share ideas

with media specialists and technology directors to learn about current technology trends (Starkman, 2007). These media specialists meet with their schools' teachers to help integrate technology into the curriculum and to assist teachers in determining the best technology tool for the job. Finally, today's library media specialists conduct workshops and model technology usage by doing online searches, using interactive whiteboards, creating DVD's, and utilizing other types of technology in an attempt to bring computers and technology into the mainstream of academia (Logan, 2004; Lowe, 2001). School library media specialists facilitate the use of technology and, as such, must be prepared to utilize 21<sup>st</sup> century tools in pursuit of this end.

Research that determines the availability of 21<sup>st</sup> century tools in West Virginia secondary school library media centers for West Virginia secondary school students has, as of yet, not been conducted. It becomes important to determine the types of 21<sup>st</sup> century tools available to West Virginia secondary school students in the schools' library media centers in order to establish the presence or lack thereof of tools that will aid in the attainment of 21<sup>st</sup> century skills. It is also important, at the same time, to ascertain the kind of assistance West Virginia secondary school library media specialists are giving to West Virginia secondary school students concerning utilization of 21<sup>st</sup> century tools. This assistance is necessary for students in West Virginia secondary schools to become credible users of 21<sup>st</sup> century tools and ultimate achievers of 21<sup>st</sup> century skills.

The attainment of 21<sup>st</sup> century skills is paramount in America's public education system as evidence of achievement (Jobs for the Future, n.d.; Partnership for 21<sup>st</sup> Century Skills, n.d.a). However, in order for students to pursue 21<sup>st</sup> century skills and be successful in attaining such skills, 21<sup>st</sup> century tools must be available to each child.

These tools include many types of technology and software that enable students to produce work and gain experience in using current types of technology (Partnership for 21<sup>st</sup> Century Skills, n.d.a; n.d.c; Tiene & Luft, 2002). Recognized as the hub of schools, the library media center is the place where many students and teachers turn in order to find the tools needed to generate work, projects, and documents. School library media specialists, therefore, have become leaders in promoting information literacy and 21<sup>st</sup> century skills (Hopkins, 2000; Lance, 2002). Research findings indicate (Brewer & Milam, 2005) that 84% of school library media specialists help teachers utilize 21<sup>st</sup> century tools and advocate for the integration of 21<sup>st</sup> century skill activities using 21<sup>st</sup> century tools.

In 2002, the No Child Left Behind Act of 2001 (U.S. Department of Education, n.d.) was signed into law, reauthorizing the Elementary and Secondary Education Act of 1965. As a result of this reauthorization, the Enhancing Education Through Technology Program (EETT) was established (West Virginia Department of Education Office of Technology, n.d.a). This program has been used in West Virginia schools since 2002 as a means of providing funding for technology and technology support in schools that qualify for competitive funding. The goals of the EETT Program are to:

- Improve student academic achievement with technology.
- Ensure every student is technologically literate by the end of 8<sup>th</sup> grade.
- Encourage technology integration with teacher training and curriculum development.

By encouraging technology integration – the last of the goals - with teacher training, the program set about assisting schools in their quest to procure Technology

Integration Specialists – teachers who work solely with technology and with teaching students technology skills (West Virginia Department of Education Office of Technology, 2007; n.d.a). These teachers have made great strides in bringing technology into the classroom and in aiding schools in effectively utilizing technology.

In 1997, the West Virginia Department of Education established the Student Utilization of Computers in Curriculum for the Enhancement of Scholastic Skills (SUCCESS) initiative for West Virginia secondary schools (West Virginia Department of Education Office of Technology, n.d.b). As a component of school reform in the Jobs Through Education Legislation (West Virginia Department of Education Office of Technology, n.d.c), the West Virginia SUCCESS program was funded by the state’s legislature to make technology tools available for secondary students in West Virginia. The initiative provided technology tools that could help students in grades seven through 12 prepare to succeed in college, in post-secondary education, or in employment. In so doing, the Department of Education made known its intent to help middle, junior and high schools purchase and implement technology, i.e., computers, Internet access and software. This legislation was the beginning of the relationship between technology and education in West Virginia and it continues to be essential to the ongoing inclusion of 21<sup>st</sup> tools in the secondary public schools (West Virginia Department of Education, n.d.b; West Virginia Department of Education Office of Technology, n.d.b). Renamed Tools for Schools Secondary in 2006 (West Virginia Department of Education Office of Technology, n.d.c), this program continues to be the driving force in providing funding for technology tools in West Virginia’s secondary public schools.

## **Need for 21st Century Skills**

The industrial economy has given way to the knowledge economy, promoting a demand for highly skilled workers (Jobs for the Future, n.d.). The need for 21<sup>st</sup> century skills is well documented in literature and has become the topic of much interest and debate nationwide. Literature indicates that in order to thrive in a digital economy, students need digital age proficiencies. These proficiencies require students to think critically and creatively, to attain a digital literacy, to communicate interactively, to utilize 21<sup>st</sup> century tools, and to plan and manage for results (North Central Regional Educational Laboratory and the Metiri Group, 2003; Partnership for 21<sup>st</sup> Century Skills, n.d.a)

Creating secondary schools that will improve learning and competencies is crucial in preparing students to face the challenges of a 21<sup>st</sup> century society. The skills of the nation's workforce will progressively be the defining trait that determines the extent to which an economy can develop and utilize new technologies and, in turn, compete in the global marketplace (Partnership for 21<sup>st</sup> Century Skills, n.d.b). A knowledgeable workforce in every area requires the ability of the workers to use high-level cognitive skills for managing, interpreting, communicating, and reacting to information. Society today values thinking skills such as abstract reasoning, problem solving, and collaboration (Partnership for 21<sup>st</sup> Century Skills, n.d.c; Wilson, Cator, & Soule, 2006). However, in order for students to prepare for careers and jobs that require these types of competencies, 21<sup>st</sup> century skill attainment is crucial.

Garrison, Jeung, and Inclan-Rodrigues (2006) write that Barbara Stein, project manager in the National Education Association's External Partnerships and Advocacy



Department, outlines many reasons for stressing 21<sup>st</sup> century skills for today's students. The work required of workers in the 21<sup>st</sup> century is constantly changing, requiring employees to be flexible and prepared to meet new and challenging demands. In the critical areas of math, science and problem solving, students must rise to meet the challenges put forth from peoples of other nations. Today's students must also be prepared for the changing nature of work that often requires the ability to continually learn and adapt. Finally, the future of America may depend upon students learning to be effective citizens who can find information, determine its uses and purposes, and make thoughtful decisions.

On December 1, 2002, the North Central Regional Educational Laboratory in conjunction with the Metiri Group released enGauge, a framework for effective technology use (Lemke, 2002). The North Central Regional Educational Laboratory (NCREL) was one of ten federally funded educational laboratories whose role was to facilitate the pursuit of educational excellence. Though the contract for NCREL ended in 2005, their resources continue to hold merit throughout the educational arena (North Central Regional Educational Laboratory, 2002). The Metiri Group serves the educational community with a broad range of consulting services. The group's goal is to empower educators to advance effective teaching and learning, to use technology effectively, and to foster 21<sup>st</sup> century skills (Metiri Group, n.d.). Together, these organizations have helped develop the technology framework titled enGauge (North Central Regional Educational Laboratory and the Metiri Group, 2003) which includes a list of 21<sup>st</sup> century skills that the group advocates as purposeful for every student in order to achieve and thrive in a digital world. Students, the enGauge framework suggests, need

to acquire different, changing skills as a means of coping in a different, changing society. Physiologically speaking, advances in the cognitive sciences indicate that when students are actively engaged in education via authentic, real-world experiences, learning increases (Bransford, Brown, & Cocking, 2000). The skill sets required to entertain this type of engagement involve the use of technology and digital learning. The 21<sup>st</sup> century skills require not only knowledge about using 21<sup>st</sup> century tools, but knowledge about what technology involves, how technology works, when to use particular skills and tools, what purposes technology serves, and how technology can be used to achieve particular objectives (Lemke, 2002; Partnership for 21<sup>st</sup> Century Skills, n.d.a). Table 1 indicates the various types of 21<sup>st</sup> century skills students need to learn, live and work in a 21<sup>st</sup> century society (Lemke, 2002; North Central Regional Educational Laboratory, 2002).

**Table 1: 21<sup>st</sup> Century Skills**

Digital-Age Literacy	Inventive Thinking	Effective Communication	High Productivity
Basic, Scientific, and Technology Literacies	Adaptability, Manageability, and Self-Direction	Collaboration and Interpersonal Skills	Planning and Managing for Results
Visual and Information Literacies	Creativity	Personal and Civic Responsibility	Effective Use of Real-World Tools
Global Awareness	Higher Order Thinking and Reasoning	Interactive Communication	Construct Relevant Products

Based on two years of study, the above enGauge 21<sup>st</sup> Century Skills chart represents a new look at educational technology by taking into account globalization and the eccentricities of the digital age. The enGauge 21<sup>st</sup> century skills are based on literature reviews, input and survey data from educators, and reactions from community

groups (Lemke, 2002; North Central Regional Educational Laboratory and the Metiri Group, 2003). The skill clusters, listed as headings in the chart, provide a common understanding of what is needed by students, citizens, and individuals in a digital age of education, work, and commerce. Under each of the skill clusters are more definitive types of skills that students need to attain.

### ***Digital Literacy***

As society advances, the skills needed to attain success change. Public education, in recognition of these changes and advances, now expects all students to build on the basic literacies of reading, writing, and calculating skills. The newer types of literacy skills, termed digital literacies, create a cluster that indicates students' needs for and understanding of information in all of its forms.

Basic, scientific and technology literacies indicate the need for students to learn to read critically, write persuasively, reason logically, and problem solve. Basic literacy involves being language proficient – able to read, write, listen, and speak effectively. Such literacy becomes even more important in a digital age that requires students to handle and disseminate masses of information and data from various sources (Garrison, Jeung, & Inclan-Rodrigues, 2006; Metiri Group, n.d.). Students who are technologically literate demonstrate an understanding of the nature of technology systems and consider themselves proficient users of said systems. These same students understand and use a wide variety of technology tools ethically and effectively. Technologically literate children use technology to access, evaluate, process, and communicate information (Learning Point Associates, 2004e). The scientifically literate student has the knowledge and understanding of scientific concepts and can make personal decisions based on these

concepts. These students can understand and evaluate scientific issues and can pose arguments based on their evaluated opinions (Learning Point Associates, 2004c).

Information literacy requires today's students to be more information literate and to utilize visual representations of information more than any generation before them. Presented with large amounts of information, students and teachers need to learn how to find the information they need, evaluate it, and use it in a meaningful way (Schrock, 2001). Information, in recent years, has increased and access to such information is easy and convenient due to the various types of technology tools. However, information has filled cyberspace, often unregulated, and the need for students to find, utilize, and interpret authentic, useful resources becomes of key importance (North Central Regional Educational Laboratory and the Metiri Group, 2003). Information literacy is required for the production of new knowledge, on which future economic success depends (Bundy, 1998).

Visual literacies incorporate the ability to interpret, translate, and express thoughts, concepts, and impressions using images, graphs, charts, and video. Being visually literate means being aware of the cognitive influences in the perception of visual aids and documents; being aware that graphics and icons are representations of deeper often more abstract theories, views, and notions. Such literacy involves the comprehension of representational, abstract, and symbolic images and graphics in the pursuit of educational thoughts and concepts. Information literacy is the ability to find, evaluate, and utilize information effectively and appropriately, a keystone for lifelong learning (North Central Regional Educational Laboratory, 2002). Accessing information has become progressively important with the advent of databases, online information, and

the digitizing of documents. Familiarity with inquiry and searching strategies are also among the types of informational literacy skills that today's secondary students must acquire. Ultimately, students must understand the relationships between and among library collections, proprietary databases, Internet documents, personal manuscripts, and digitized materials to ensure effective searching and accurate evaluation of varied and diverse resources (American Association of School Librarians, 1998; Farmer, 2001).

Global awareness is the understanding and recognition of the interrelationships among nations, corporations, and societies throughout the world. Advances in technology have created a much smaller world; access to other cultures, societies, and ways of life are simply a click away. The world has become a wired civilization, resulting in globalization of commerce and trade. This, in turn, has increased the need for cultural literacy and global awareness (Metiri Group, n.d.). The globally aware student must be able to recognize and analyze major trends in global relations and determine how these trends affect local and national issues. Such a student must be knowledgeable about the connectedness of nations historically, politically, and economically and how these connections can have both positive and negative influences on more local concerns. There is a greater necessity for knowing, understanding, and appreciating other cultures, as well as a need for participating in the knowledge development and exchange that results (Learning Point Associates, 2004b).

### ***Inventive Thinking***

To be prepared to participate in a global society, a world that is constantly changing, a world that utilizes technology to access and disseminate information, students must learn to think in a different manner. Students must learn to think rationally

and creatively, to solve complex problems, to access and manage information, and to communicate effectively (North Central Regional Educational Laboratory, 2002). The cluster that involves the ability to participate in a technology rich society is tantamount for success. By mastering such inventive thinking skills, students will be prepared to participate in today's technologically global society (Engler & Hunt, 2004).

Adaptability, manageability, and self-direction are important skills in today's connected world. Interaction in such an environment of complexity requires students to plan, manage, and design in various types of situations and with various types of technological tools. Because of the nature of technology, the ease with which information can be located, data can be disseminated, and projects can be completed, a larger burden is placed on the capability to adapt, manage, and self-direct (Metiri Group, n.d.). Students who utilize these types of skills must be capable of reacting to changing conditions independently, to analyze new conditions quickly, and to identify new skills required to deal with changing conditions (Southern Regional Education Board, n.d.).

Creativity is making use of the inherent desire to know, to learn, and to understand. A curiosity about the world is a natural ability in each individual; however, the capacity to channel this ability, to use it in a constructive manner, is essential for today's students. Knowledgeable students must adjust to changing environments, thus the ability to remain curious and creative is necessary to stay informed (North Central Regional Educational Laboratory, 2002). The creative student can produce original and unique products. This student is imaginative, flexible, and takes risks in the pursuit of knowledge. By becoming creative, the student gains the ability to execute and evaluate solutions, often more than one, to problems and processes (Metiri Group, n.d.).

The ability to reason and produce higher order thinking is essential to compete in a globalized, technologically advanced society. Critical thinking involves the exercising of sound reasoning in making complex choices. It involves the ability to frame and analyze diverse problems while developing new ideas and staying open to the opinions of others. As learning content becomes more challenging, students must be encouraged to interact and share ideas and problem solving skills in searching for answers and formulating questions. Critical thinking must become a daily activity for today's students, critical thinking that allows for independence in learning, exploration in learning, and collaboration in learning as students stretch their abilities to imagine, to dream (Partnership for 21<sup>st</sup> Century Skills, n.d.a; Weis, 2004).

### ***Effective Communication***

According to enGauge (North Central Regional Educational Laboratory, 2002) the cluster of effective communication skills is essential for success in today's information-based society. Communication is a social and personal skill that many companies and businesses are looking for in employees. As such, it becomes important that today's schools and educators assist students in becoming good communicators, whether it be communication via verbalization, writing, instant messaging, or blogging.

Collaboration and interpersonal skills involve the ability to cooperate as a member of a successful group. Collaboration involves a shared drive among team members to attain a shared goal. Schools and teachers must pose problems that inspire collaboration among students and then create classroom environments that both encourage and reward successful collaborative efforts. The ability to interact efficiently with others and to work well in a group is key to successful collaboration and important

to the attainment of interpersonal skills. The student who exhibits these attributes can reflect and use experiences to make future contributions (Learning Point Associates, 2004d). The student who exhibits interpersonal skills can share personal understandings and participate knowledgeably, yet empathetically, in debates. Listening, speaking, sharing, and refocusing are all important attributes that fall within this category and that help students successfully attain knowledge (Metiri Group, n.d.).

Personal and civic responsibility is the ability to govern the use of technology in a manner that promotes community and society while protecting the community, the environment, and independent ideals. As technology increases and the world becomes smaller, students need to advance the values that guide the application of technology in society. In doing so, students must learn to manage the use of technology tools such as the Internet and databases in order to contribute as informed individuals in a global society. The civically responsible student engages in public discourse and promotes positive technology changes. Important skills, personal and civic responsibility are nonetheless challenging to teach and learn (Engler & Hunt, 2004; Metiri Group, n.d.).

Interactive communication indicates that students must be able to express, share, retrieve, and understand information. Students must understand how to communicate via technology. The student who can communicate interactively, chooses media appropriately and with purpose while engaging in virtual communities. Such a student also manages electronic communication and exhibits personal responsibility in doing so. In order to participate in a global society, students must have contact with people from other cultures and societies. This can be accomplished through successful integration of



interactive communication skills (Garrison, Jeung, & Inclan-Rodriguez, 2006; Lemke, 2002).

### ***High Productivity***

The skills involved in the high productivity cluster incorporate the results that are achieved by utilizing technology skills and knowledge. High productivity can be linked to the success or failure of a person in the workforce. Though currently not a focus of school, high productivity is never the less an important indicator in the “real world” and therefore important to schools and educators (Metiri Group, n.d.).

The level of education that No Child Left Behind mandates requires students to plan carefully and manage work efficiently (U.S. Department of Education, n.d.). This requires concentration on goals or assignments and an ability to focus on the task at hand. Students who can manage, and are prepared, can anticipate obstacles and utilize time wisely. These students are able to self-evaluate and reflect on completed work, giving them the ability to understand the rationale behind effective planning (Weis, 2004; Wilson, Cator and Soule, 2006).

The effective use of real-world tools is a skill set that involves students in using 21<sup>st</sup> century tools to collaborate, communicate, accomplish tasks, and solve problems (Learning Point Associates, 2004a). Choosing the correct tool for the work at hand involves ability and skill, and results in better and more effective outcomes such as construction of models and preparation of documents and products. The student who is capable of effectively using real-world tools can bridge theory to practice and understands that learning can be enhanced via the correct use of technology tools (Garrison, Jeung, & Inclan-Rodriguez, 2006; Metiri Group, n.d.).

According to Lemke (2002) there are learning benefits for students who create authentic products with technology tools. Such experiences and constructs provide students with insights into diverse domains of knowledge involving the tools they use. Students who have the capacity to create products relative to their learning can integrate technology, visual, and information literacies. These students also understand the way technology tools and skills meet their educational needs. In order to become fluent with technology, students must possess this skill set and integrate technology tools throughout the curriculum (Wilson, Cator, & Soule, 2006).

### **West Virginia and 21st Century Tools**

West Virginia and its educational leadership have recognized the importance of 21<sup>st</sup> century skills in the classroom. “Teaching students is not about how many facts can be memorized. Instead, students must be able to comprehend, problem solve, and communicate solutions...to compete on a global level,” states West Virginia superintendent of schools, Dr. Steven Paine (W. Va. Focuses on 21<sup>st</sup>-Century Learning, 2006, ¶ 3). In order to make this statement a reality, the West Virginia State Board of Education joined forces with the Partnership for 21<sup>st</sup> Century Skills and followed this by adopting the 21<sup>st</sup> Century Learners Strategic Work Plan. The plan consists of a series of tasks and steps that will support 21<sup>st</sup> century learning in West Virginia classrooms (West Virginia Department of Education, 2006d).

To better explain West Virginia’s affiliation with the Partnership for 21<sup>st</sup> Century Skills and the 21<sup>st</sup> Century Learners Strategic Work Plan, the Partnership for 21<sup>st</sup> Century Skills must first be examined. The Partnership for 21<sup>st</sup> Century Skills is a public-private organization formed in 2002 with the goal of creating a successful model of learning for

the 21<sup>st</sup> century by incorporating 21<sup>st</sup> century skills into the educational system. Members of the partnership include Adobe Systems Incorporated, American Association of School Librarians, Apple, AT&T Foundation, Blackboard, Cable in the Classroom, Cisco Systems, Corporation for Public Broadcasting, Davis Publications, Inc., Dell, Discovery Education, Education Networks of America, EF Education, ETS, Ford Motor Company Fund, Giant Campus, Intel Corporation, JA Worldwide, Knowledge Works, LEGO Group, Measured Progress, McGraw-Hill Education, Microsoft Corporation, National Education Association, Oracle Education Foundation, Pearson Education, PolyVision, SAP, SAS, Sesame Workshop, Texas Instruments, THINKronize, Thomson Gale, Verizon, and Wireless Generation. Key partners with the organization include U.S. Department of Education and Appalachian Technology in Education Consortium. Strategic Partners include Consortium for School Networking, International Society for Technology in Education, State Educational Technology Directors Association, and Tech Corps. These groups have come together to form the Partnership for 21<sup>st</sup> Century Skills in an attempt to help schools address the educational needs of the 21<sup>st</sup> century. The group has formed a unified vision for education and a framework for action whereby they outline six key elements of 21<sup>st</sup> century learning. The group also shaped a listing of 21<sup>st</sup> century tools necessary for success, 21<sup>st</sup> century assessments that yield results, and listed an information and communication technology framework. The Partnership for 21<sup>st</sup> Century Skills publishes reports and documents that expound on their vision and maintains a Website to help educators and businesses alike better understand the need for 21<sup>st</sup> century skills (Partnership for 21<sup>st</sup> Century Skills, n.d.a).

West Virginia State Board of Education adopted the Educational Technology for 21<sup>st</sup> Century Learners Strategic Work Plan, the brainchild of the West Virginia Department of Education, in December 2005. The Educational Technology for 21<sup>st</sup> Century Learners Strategic Work Plan was written as a tool to help the state better manage and infuse the goals and vision of the Partnership for 21<sup>st</sup> Century Skills. The Work Plan is a series of 17 tasks and action steps utilized to review the state's educational technology topography. The Work Plan is also used to develop recommendations to support 21<sup>st</sup> century learning throughout the state's 55 school systems (West Virginia Department of Education, 2006d).

Since joining the Partnership for 21<sup>st</sup> Century Skills and adopting the 21<sup>st</sup> Century Learners Strategic Work Plan, West Virginia has been recognized as a leader among states, with regard to technology introduction and integration (Editorial Projects in Education Research Center, 2006). In June of 2006, West Virginia, North Carolina, and Wisconsin each received an inaugural 21<sup>st</sup> Century Skills Practice of the Year Award (Partnership for 21<sup>st</sup> Century Skills Honors Recipients, 2006). The West Virginia Department of Education has also been recognized as the top school system for educational technology. In May of 2006, Education Week Magazine released its Technology Counts 2006 Report entitled *The Information Edge, Using Data to Accelerate Achievement*, naming West Virginia as the top state for computer access, data use, and technology capacity (Editorial Projects in Education Research Center, 2006). West Virginia is demonstrating that it recognizes technology and the tools that accompany it as important components in the educational landscape.

The Framework for High Performing 21<sup>st</sup> Century High Schools (West Virginia Department of Education, 2006a; 2006b; 2006c), written by the West Virginia Department of Education and currently in draft version only, places focus on the attainment of 21<sup>st</sup> century skills by West Virginia's secondary school students. An emphasis on 21<sup>st</sup> century content, as outlined in the draft document, helps educators ensure that West Virginia students are being exposed to relevant information and skills. The 21<sup>st</sup> century content outlined by the Partnership for 21<sup>st</sup> Century Skills (n.d.d) emphasizes the accomplishment of 21<sup>st</sup> century skills that include global awareness, economic and business literacy, civic literacy, and wellness awareness. These four significant, emerging areas are critical to success in workplaces of the 21<sup>st</sup> century and West Virginia schools are giving greater importance in the curriculum to these areas (Partnership for 21<sup>st</sup> Century Skills, n.d.a; West Virginia Department of Education, 2006a; 2006b; 2006c).

### **Need for 21<sup>st</sup> Century Tools**

In a digital world, students must learn to use 21<sup>st</sup> century tools in order to master the skills that are essential to life and vital to workplace productivity. Such proficiency of skills is often referred to as information and communication technologies literacy (ICT) (Eshet-Alkali & Amichai-Hamburger, 2004; Partnership for 21<sup>st</sup> Century Skills, n.d.a; U.S. Department of Education, n.d.). Defined by the Programme for International Student Assessment (PISA), ICT literacy is the ability of individuals to appropriately use technology and communication tools to “access, manage, integrate, and evaluate information; construct new knowledge; and communicate with others in order to participate effectively in society” (Partnership for 21<sup>st</sup> Century Skills, n.d.c, p. 11). The

definition of information and communication technologies literacy itself points to the importance of technology tools in the attainment of technology skills.

The International Society for Technology in Education (ISTE) has developed the National Educational Technology Standards for Students (NETS\*S), a list of principles that provides a framework for assisting schools and school systems in implementing technology rich goals and objectives. ISTE has long been a leader in recognizing the need for and advocating for 21<sup>st</sup> century skills (International Society for Technology in Education, 1998; Partnership for 21<sup>st</sup> Skills, n.d.a). However, by promoting 21<sup>st</sup> century skills, ISTE has also brought to recognition the importance of 21<sup>st</sup> century tools. ISTE has developed a general set of standards. These standards are based on ISTE's core belief that all students must have regular opportunities to use technology. ISTE feels that achievement of these objectives is tantamount for students. These standards offer a basis for learning, and a basis for teaching technology skills. It must be noted that all of the standards, within their descriptions, include technology tools as necessary elements for any student. ISTE, by including technology tools in their list of standards for students, indicates the important role that technology tools play in the pursuit of technology skills.

The standards within each of Table 2's six categories are to be introduced to students, reinforced for effectiveness, and mastered by students. The first standard, creativity and innovation, consists of demonstration, construction, and development of ideas and projects. It implies that students should demonstrate creativity and thinking by forming projects with the use of technology. The skills outlined in this category can be accomplished through the use of 21<sup>st</sup> century tools, tools that help students demonstrate their creativity and innovation. An example of tools that may be used in this category

include multimedia resources that support learning, i.e., word processing, interactive Websites, and multimedia encyclopedias (International Society for Technology in Education, 1998).

**Table 2: National Educational Technology Standards for Students**

Standard	Description
Creativity and Innovation	Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.
Communication and Collaboration	Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning, and contribute to the learning of others.
Research and Information Fluency	Students apply digital tools to gather, evaluate, and use information.
Critical Thinking, Problem-Solving, and Decision-Making	Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.
Digital Citizenship	Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
Technology Operations and Concepts	Students demonstrate a sound understanding of technology concepts, systems, and operations.

(International Society for Technology in Education, 1998).

The second NETS\*S addresses communication and collaboration concerning technology. ISTE deems it important for students to communicate effectively and work together in order to learn. Technology tools that would help accomplish this standard include computers, blogging, instant messaging, distance learning, and emailing (International Society for Technology in Education, 1998; Rivero, 2006).

The third NETS\*S involves digital tools that students use for research and information literacy. Such tools include many technology items across a wide spectrum: Internet, spreadsheets, databases, and online journals. Being productive with technology tools involves the use of many types of technology devices and software to reach a goal

(International Society for Technology in Education, 1998; Partnership for 21<sup>st</sup> Century Skills, n.d.b).

NETS\*S four requires students to use digital tools to problem solve and think critically. In the identification, collection, and analysis of information, students must become competent users of technology tools. Such tools include Webpages, blogs, databases, and instant messaging (International Society for Technology in Education, 1998).

Digital citizenship, NETS\*S five, is integral to students gaining an appreciation for and an understanding of the ethical use of technology. Students must learn the importance of being part of a global society and the benefits, along with responsibilities, that go along with being a member. By utilizing such technology tools as the World Wide Web and email, students can practice ethical and proper use of technology (International Society for Technology in Education, 1998).

The final NETS\*S advocates the student demonstrating an understanding of technology and its systems and operations. Students must become effective, efficient users of technology by choosing appropriate software to fit particular needs, using computer systems properly, and gaining an awareness of emerging technologies such as Web 2.0. Students must also be able to troubleshoot applications and systems in order to better utilize each (International Society for Technology in Education, 1998).

In a digital world, students must learn to use 21st century tools to master the learning skills essential to everyday life and scholarly productivity. This ability is referred to as Information Communication Technology (ICT). The instruments and mechanisms labeled as 21st century tools are diverse and varied. However, research tends



to agree on several types of digital technologies that should be called 21st century tools (DeWitt Wallace – Reader’s Digest Fund, n.d.; Fryer, 2005; International Society for Technology in Education, 1998; Logan, 2004; Lowe, 2001; Partnership for 21st Century Skills, n.d.c; n.d.d; Prestamo, 2000). These technologies, categorized by type of 21st century tool are included in Table 3.

**Table 3: 21<sup>st</sup> Century Tools**

Production Tools	Research Tools	Problem Solving Tools	Communication Tools	Information Processing Tools	Interpersonal Tools
Computers	Internet	Spreadsheets	Instant messaging	Word processing software	Distance learning
Handhelds	Databases	Desktop publishing	Telephony	Presentation software	Electronic learning
Networks	CD-Rom encyclopedias	Web development	Desktop video-conferencing	Database software	Web 2.0
Digital cameras		Decision support	Blogs	Video editing software	Web calendars
Scanners		Creating DVD’s	Podcasts		
Interactive whiteboards			Email		

Production tools are technology tools that aid students in the production of documents, projects, Webpages, and multimedia presentations. Research tools assist students in the attainment of information that aids in research for projects such as manuscripts, theses, and articles. Problem solving tools support students as they create unique ideas and concepts. Communication tools enable students to construct their opinions and thoughts and then share them with others, opening the door for discussion and conversation. Information processing tools facilitate the production of work such as text, multimedia presentations, and videos that highlight students’ knowledge and

abilities. Finally, interpersonal tools permit students to organize and plan, arrange and manage their time, their information, and their learning (Fryer, 2005; Hasan, 2000; Partnership for 21<sup>st</sup> Century Skills, n.d.a).

Immersion in technology tools is important for students to become 21<sup>st</sup> century learners and in order for students to function in a 21<sup>st</sup> century learning environment (Fryer, 2005). Students utilize these various tools for 21<sup>st</sup> century learning in a myriad of ways and in diverse manners. Digital portfolio construction requires students to archive documents and information, and then create resumes, personal statements, and a collection of work that can all be digitized. Communication via instant messaging and email is becoming commonplace as students incorporate technology tools into their 21<sup>st</sup> century learning environments (Dillon, 2006; Tiene & Luft, 2002).

One of the more pervasive items that 21<sup>st</sup> century skills mandate is critical thinking (Lemke, 2002; Partnership for 21<sup>st</sup> Century Skills, n.d.a). However, it is often difficult to align technology tools with critical thinking skills. Eshet-Alkali and Amichai-Hamburger (2004) wrote that digital technologies have a place in every aspect of learning. The ability of students to ethically and effectively use information located with a multitude of technology tools, i.e., Internet, databases, CD-ROMS, is vital to critical thinking. Constructing information located with these tools, and then using technology tools such as word processors and database software to help in the construction of the information, are vital to attaining critical thinking.

With 21<sup>st</sup> century tools, students become equipped to manage and create information in a variety of forms and using several types of media. Students become accountable for locating, interpreting and using appropriate types of information for

specific purposes. Problem solving becomes manageable and critical thinking becomes possible as students learn to structure and analyze situations and experiences with 21<sup>st</sup> century tools (Dillon, 2006). These tools enable students to understand various types of situations and various types of contexts. With the use of 21<sup>st</sup> century tools, students can make complex choices and comprehend how the outcomes of these choices connect and affect other decisions. New ideas can be developed and communicated via 21<sup>st</sup> century tools while students learn to collaborate and work productively with others (Fryer, 2005; Lankshear & Knobel, 2001; Partnership for 21<sup>st</sup> Century Skills, n.d.c).

A West Virginia Department of Education document, *Framework for High Performing 21<sup>st</sup> Century High Schools* (West Virginia Department of Education, 2006b) lists six elements of 21<sup>st</sup> century learning provided for educators in the state. One of these six elements involves using 21<sup>st</sup> century tools to gain ICT literacy. In a 21<sup>st</sup> century society, students must learn to use tools that are essential to life and workplace productivity. West Virginia revised its curricular Content Standards and Objectives (CSOs) for schools in 2007 to integrate 21<sup>st</sup> century skills and the 21<sup>st</sup> century tools that support these skills (West Virginia Department of Education, n.d.a). The newly revised CSOs will be in effect in July 2008 throughout West Virginia's school systems. One example of the newly reworked CSOs is taken from the 21<sup>st</sup> Century Reading and Language Arts Content Standards and Objectives for West Virginia Schools, second grade level: *RLA.S.2.3 Students will apply listening, speaking and media literacy skills and strategies to communicate with a variety of audiences and for different purposes* (West Virginia Department of Education, n.d.a, p. 20).

The accompanying performance indicators require the student to create a presentation using a form of technology. The important technology tools for West Virginia schools include information and communication technologies, multimedia and digital tools, access to online resources, and software and hardware (West Virginia Department of Education, n.d.a).

### **Role of the School Library Media Center**

The school library media center is quite often the hub of academic activity and scholarly research (Dewitt Wallace-Reader's Digest Fund, n.d.). In *Information Power: Guidelines for School Library Media Programs* (American Association of School Librarians and Association for Educational Communications and Technology, 1988) it is evidenced that school library media centers play an important role in the entire scope of education. Students and teachers in secondary schools rely on their school libraries for access to research materials, reading materials, and instructional materials that support the school's curriculum. Students and teachers find much needed support items such as data projectors, videos, and compact discs at their school library media center (Prestamo, 2000). Students are also more frequently turning to the library as the main source of 21<sup>st</sup> century tools, i.e., word processing software, database software, and computers. Teachers are using the school library media center as the point of access for computers and the Internet and as a source for database information. As a result, the school library media center has become not only the hub of academic research, but also the hub of technology and 21<sup>st</sup> century tools and is integral in helping students attain information skills (American Library Association, 2006; Hones, 1997; Lance, 2001).

A changing society with changing needs, coupled with the development of new technologies designed to meet the ever increasing information demands of individuals has led to a changing atmosphere in school library media centers. School media centers today house technology side-by-side with reading materials, supply needed assistance in using spreadsheets along with assistance in locating books, provide access to Internet based materials and information, and offer technology tools for students and teachers to produce materials (American Association of School Librarians, 1998; Humes, 1999). As a result, school library media centers have taken the responsibility for helping students utilize 21<sup>st</sup> century tools in pursuit of 21<sup>st</sup> century skills.

An indicator of the important role that school library media centers play in the educational area lies in student academic achievement. According to research (Lance, Rodney & Hamilton-Pennell, 2000), schools with well-staffed, well-funded school library media centers have students who achieve higher standardized reading test scores when compared with schools that have less-effective library media centers. Their research found that a positive relationship exists between the presence of adequate library media centers staffed with library media specialists and higher academic achievement. Earlier research (Lance, Welborn & Hamilton-Pennell, 1993) utilized fourth grade reading scores on the Colorado Student Assessment Program gleaned from 124 Colorado public schools serving grade four. The study also used 76 public schools serving grade seven and their reading scores on the same standardized test. Two-thirds of fourth graders who attended schools with school library media centers that emphasized student involvement with the library media center reported average or above percentages in reading at grade level, while almost three out of five elementary schools with less than adequate library media

centers, i.e., untrained staff, and smaller collections, reported below average percentages of grade level readers. The same year, over half of middle schools with well-utilized, student-involved media centers reported average or above percentages of seventh graders reading at grade level, while a similar proportion with less involved media center programs reported below average percentages of grade-level readers. As 21<sup>st</sup> century skills become more important, academic achievement will become more dependent upon the attainment of 21<sup>st</sup> century skills. The library media center will play a large role in the academic achievement of students as the students seek to increase their 21<sup>st</sup> century skills (Lance, Rodney, & Hamilton-Pennell, 2000).

### **Role of the School Library Media Specialist**

Literature has established the importance of school library media specialists (DeGroff, 1997; Lance, 2001; 2002). Research also indicates the important role of school library media specialists in a school setting. DeGroff (1997) surveyed 148 educators and school administrators in 57 schools across the nation about the role of school library media specialists. She found that teachers and administrators place high value on the library media specialist as information specialists and instructional consultant. Her research indicates that library media specialists are needed and valued.

The American Association of School Librarians and Association for Educational Communications and Technology (1998a) in its *Information Power: Building Partnerships for Learning - Roles and Responsibilities of the School Library Media Specialist* indicate four very important roles of the school library media specialist. First, as teacher, the library media specialist collaborates with other educators and with students to analyze lessons and information needs. As an instructional partner, the library

media specialist joins teachers to identify links between the curriculum and student needs. S/he helps bring together electronic and print resources to assist in learning outcomes and student achievement. As information specialist, the library media specialist provides leadership and expertise in acquiring information resources in a variety of formats. As program administrator, the library media specialist works collaboratively with educators and students to develop library media center policies and guide all activities of the library media center.

The role of the school library media specialist, however, is changing. Research from DeWitt Wallace – Reader’s Digest Fund (n.d.) in their evaluation of the national Library Power Program found that school library media specialists are discovering new ways to integrate information resources including technology resources, i.e., electronic databases, Internet, and digital media. School library media specialists are engaging students in meaningful activities utilizing 21<sup>st</sup> century tools such as CD-ROMs and the Internet. The role of technology specialist, according to the De-Witt Wallace – Reader’s Digest study, is quickly becoming an integral part of the library media specialist’s repertoire.

This changing role of the school library media specialist is also evidenced with Brewer and Milam’s (2005) research. Their survey of 1,571 kindergarten through twelfth grade library media specialists from all 50 states found that 67% of the respondents help plan technology programming at their school as being a part of the technology team. A little more than 40% provide instruction in technology resources to students and 81% instruct teachers how to train students in technology use as well. Their study indicated

that library media specialists' roles are changing and evolving, taking on more responsibilities concerning technology.

The roles of the school library media specialist are wide and varied. The school library media specialist must maintain the collection of the school library media center, advocate for student use of the library media center, work with teachers to best utilize information resources, and integrate various technology components into the school's curriculum. Today's school library media specialist assists educators in helping students use technology for many purposes. School library media specialists share ideas with media specialists and technology directors as a way to learn about current technology trends (Starkman, 2007). Library media specialists conduct workshops and model technology usage by doing online searches, using interactive whiteboards, creating DVD's, and utilizing other types of technology in an attempt to bring computers and technology into the mainstream of academia (Logan, 2004; Lowe, 2001). The school library media specialist facilitates the use of technology and, as such, must be prepared to utilize 21<sup>st</sup> century tools in pursuit of this end.

### **Helping Students Attain 21st Century Skills**

School library media specialists play an important role in helping students utilize 21<sup>st</sup> century tools (Lance, 2002). As schools change from passive learning environments to engaged learning environments, the role of the school library media specialist must adjust as well (Simpson, 1998). The school library media specialist must become more involved with the use and integration of technology as s/he evolves into a technology leader.



Lance (2001), long an advocate of school library media specialists and their importance in education, has defined the current responsibilities of school library media specialists by suggesting three main roles: 1.) a learner and teacher role, 2.) a provider of information role, and 3.) a program administrator role. These roles are based on the *Information Power* model (American Association of School Librarians and Association for Educational Communications and Technology, 1988; 1998b) and are imperative to the successful implementation of a school library media center. *Information Power: Building Partnerships for Learning* (American Association of School Librarians, 1998) advocates literacy standards for students and indicates that the role of school library media specialists is important in helping students and in assisting teachers in meeting the goals and objectives of a school's curriculum.

The first role, according to Lance (2001) is the role of the school library media specialist as a learner and teacher. With this role, the school library media specialist has become a creator of learning and a collaborator in teaching in the learning community. As the provider of information, the school library media specialist is vital in helping students locate information from a variety of sources, and assisting students in synthesizing the information for practical use. Information is available to students from diverse sources and students often turn to the school library media specialist for help in choosing viable, accurate sources and for understanding the various forms by which information can be found. As a program administrator, the librarian helps others in his/her school understand the uses of the school library media center and the means by which the school library media specialist can help with the many school curricular programs. Becoming involved with the curricular process and assisting teachers and

students in the learning process has made the school library media specialist vital to education and academic success (Lance, Rodney, & Hamilton-Pennell, 2000).

Studies indicate that students perform better academically when the library media specialist is an involved participant in the learning process (American Library Association, 2006; DeGroff, 1997; Simpson, 1998). The library media specialist is most usually knowledgeable about current research in teaching and skilled in applying these findings to a variety of learning situations. Working with the entire school community, the library media specialist often takes a leading role in working with policies and curriculum issues, helping all teachers and students use materials in the most effective manner.

### **Identified Skills for School Library Media Specialists**

As the literature indicates, school library media centers are important to student learning. As a result, the school library media specialist becomes vital to the success of secondary school students' achievement of 21<sup>st</sup> century skills. A professional library media specialist wears several hats – information specialist, teacher, and instructional consultant (DeGroff, 1997). With each of these roles, the advent of technology has brought with it many new challenges. As school library media specialists become the heart and soul of effective student use of technology tools, these same school library media specialists must learn and attain certain skills, skills that will enable these specialists to assist and support students' in their pursuit of 21<sup>st</sup> century skills. Turner (2005) determined 20 basic technology skills that every educator should possess. Tilke (1999) also indicated that school library media specialists must possess specific skills in order to help students learn in a technology rich environment. School library media

specialists use a variety of tools and equipment in performing daily tasks, thus attainment of basic technology skills is critical. “Technology illiteracy” (Turner, 2005) is no longer acceptable for the school library media specialist.

The technology skills that every library media specialist should possess, according to Tilke (1999) and Turner (2005) are indicated in Table 4. School library media specialists’ technology skills can be grouped into four main categories: management skills, information skills, software application skills, and hardware skills. Each of the categories indicates areas where school library media specialists need to possess skills that can better aid them in performing tasks and teaching students and teachers to use technology. Management skills point to a need for the school library media specialist to be able to direct, understand, and utilize data files, software, and digital resources. The information skills category lists skills that school library media specialists need in order to communicate information and data in a manner that others can readily understand and utilize. Skills in the software applications category include skills that enable the school library media specialist to create and dispense documents, spreadsheets, Webpages, and databases as tools of information and collaboration. Finally, skills in the hardware skills category are essential for school library media specialists to be able to manipulate and utilize computer components that aid in the creation of presentations, documents, and projects.

**Table 4: School Library Media Specialist Technology Skills**

Management Skills	Information Skills	Application Skills	Hardware Skills
File storage	Electronic presentation	Word processing	Computer network
File management	Communication	Spreadsheet	Digital camera
Educational copyright	Web navigation	Database	Scanner
Software installation	Digital learning	Website design	PDA
Software downloading	Technology integration	Email	
Assessing digital resources	Video conferencing		

(Turner, 2005)

The West Virginia Department of Education, recognizing the valuable skills and knowledge that school library media specialists provide, went one step further with its goals of providing technology integration specialists in public schools throughout the state with the EETT Grant (West Virginia Department of Education Office of Technology, n.d.a). In July 2006, the West Virginia Department of Education’s Office of Technology implemented an initiative to provide professional development for approximately 20 middle and/or high school library media specialists in order to “enhance their knowledge and skills in the integration of technology” (West Virginia Department of Education Office of Technology, 2007, ¶ 2). Brenda Williams, Executive Director of the Office of Instructional Technology wrote, “School library media centers have always been a central locale for information... The library media specialist has traditionally been a teaching staff member who had access to vast informational resources, along with having the skills to locate those resources... Thus, the library media specialist’s role must evolve as a key collaborator with teachers and students in

developing information literacy” (B. Williams, personal communication, April 16, 2007, ¶ 3). This thinking has led West Virginia to institute the Library Media Technology Integration Specialist Initiative. The goal of the Library Media Technology Integration Specialist Initiative is to provide school library media specialists in West Virginia’s secondary schools with 21<sup>st</sup> century skills and tools necessary to take on the mantle of a Technology Integration Specialist. In so doing, the library media specialist would establish a collaborative environment where s/he could reach out and aid the school and the students. The initiative with the West Virginia Department of Education’s Office of Technology is also giving the library media specialists an augmented role in the instructional process by helping to integrate West Virginia Standards for 21<sup>st</sup> Century Learning. Still maintaining their current roles as library media specialists, these trained Technology Integration Specialists also bring the added importance of technology integration in a consultative role. These trained specialists will also become a resource to other educators in the school (B. Williams, personal communication, April 16, 2007).

As technology continues to evolve, so must the technology skills of school library media specialists. Continued time and effort must be put forth by these specialists in order to maintain and continually improve technology skills so that, in turn, the school library media specialists can offer effective support to secondary students.

### **Conclusion**

Twenty-first century skills and 21<sup>st</sup> century tools are linked; one depends upon the other for ultimate achievement and success. However, both are rapidly evolving and changing, requiring educators and school systems to constantly advance in training techniques and technological preparation. This, in turn, requires secondary school library

media specialists to keep abreast of current trends, issues, and changes in order to provide the best, most effective assistance and tools to students.

It is impossible to predict what specific skills or tools will be essential for learning in future years. This makes it tantamount for students to acquire the skills and knowledge, the abilities and aptitudes that will enable them to learn to use next-generation technology and digital tools. School library media specialists must also maintain the skill sets that will enable them to continue to grow with the technology, and grow in ability to assist students.

In order to reveal if the technological needs of West Virginia secondary school students are being met, it must be determined if West Virginia Secondary Schools are providing the technology tools necessary for success. Often housed in the schools' library media centers, the integration of technology tools is frequently taught by the school library media specialist. It therefore becomes important to define the types of technology available in West Virginia secondary school library media centers. It is also important to ascertain the level of confidence school library media specialists have in using technology and to establish the frequency library media specialists assist students in using technology to accomplish schoolwork.

## **CHAPTER THREE: METHODS**

This chapter provides a description of the research procedures used in this quantitative study. The body of the research incorporated descriptive, quantitative survey research methods to determine the 21<sup>st</sup> century tools available in West Virginia secondary school library media centers, the confidence level of West Virginia secondary school library media specialists in using the 21<sup>st</sup> century tools, and the frequency of West Virginia secondary school library media specialists assisting students with 21<sup>st</sup> century tools. Wiersma (1991) advocates the use of a survey in garnering responses from a population in order to compare and contrast responses and gain an understanding of the research problem.

### **Research Design**

This quantitative study used a survey as a means to acquire data. Quantitative research concerns the quantifying of relationships that exist between variables. In the case of descriptive quantitative research, no changes are made to behaviors or conditions – research is conducted to examine variables as they exist (Hopkins, 2000; Wiersma, 1991). Quantitative data was collected via a self-reporting survey. An open-ended question was included to determine specific kinds of activities that school library media specialists assist students in completing using technology tools.

Quantitative methods were used to address three questions:

1. What 21<sup>st</sup> century tools are available in West Virginia secondary school library media centers?
2. To what extent are West Virginia secondary school library media specialists confident in utilizing 21<sup>st</sup> century tools?

3. How often do West Virginia secondary school library media specialists assist students in using 21<sup>st</sup> century tools?

Ancillary findings related to demographic data and written descriptions of activities provided by secondary school library media specialists are discussed where significant.

### **Population and Sample**

The population used for this study was West Virginia secondary school library media specialists drawn from the 2007-2008 West Virginia Department of Education database. The total population of West Virginia secondary school library media specialists is 227. For the research study to maintain a confidence level of 95% with a margin of error equal to 4.5%, an appropriate sampling size for the population is 154 (CustomInsight.com, n.d.). The entire population of 227 West Virginia secondary school library media specialists was surveyed. Of the 227 West Virginia secondary school library media specialists, 155 returned the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* following the first mailing and subsequent postcard reminder mailing. This represents 68% of the population. The return of the surveys resulted in a 95% confidence level with a 4.4% margin of error or a 99% confidence level with a 5.8% margin of error.

### **Instrumentation**

The quantitative data examined in this study were collected using a researcher-developed self-reporting survey. Items on the survey are related to 21<sup>st</sup> century tools and their use in West Virginia secondary school library media centers. A 7-point Likert scale was utilized for this survey. A Likert scale allows the researcher to pose questions that



compare the relative intensity of different items (Babbie, 2004). A 7-point scale was used because it has been researched to be a more sensitive scale than a Likert scale with fewer points (Diefenbach, Weinstein & O'Reilly, 1993).

An open-ended question was also included on the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools*. This type of question does not limit the respondent to a specific answer, but allows the respondent to give a reply that stems from personal experience (Hurlburt, 1994). The respondent is free to take his/her direction and to express what he/she personally has to say with an open-ended question. An open-ended question is often included on a survey in order to help the researcher “understand the points of view of others” (21). An open-ended question is important to the research for this study as a means of viewing the “big picture,” as a way to better grasp the need for and use of 21<sup>st</sup> century tools in West Virginia secondary school library media centers.

The *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* (Appendix A) consists of yes – no type questions to determine the types of technology tools available in West Virginia secondary school library media centers. With this section of the survey, West Virginia secondary school library media specialists were asked if specific technology tools are available in the school’s library media center and if there is access to other types of technology tools.

The *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* also contains close-ended items developed to research how confident West Virginia secondary school library media specialists are in using the technology tools. The confidence level of West Virginia secondary school library media specialists

has responses on a scale from 1 to 7 with 1=extremely unconfident, 2=mostly unconfident, 3=slightly unconfident, 4=slightly confident, 5=mostly confident, 6=confident, and 7=extremely confident.

West Virginia secondary school library media specialists were asked on the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* how often they assist students in using technology tools for assignments and projects. The frequency of assistance that West Virginia secondary school library media specialists have was measured using a scale from 1 to 7 with 1=never, 2=rarely (less than once a month), 3=monthly (at least once a month), 4=occasionally (more than once a month, 2-3 times), 5=weekly (at least once a week), 6=frequently (more than once a week, 2-4 times), and 7=daily.

One open-ended question was included on the survey. This question determined the kinds of activities that West Virginia secondary school library media specialists assist students in completing by using technology tools. Additional data was gathered by the inclusion of questions on the survey that determine poverty level of the school, degrees, and/or certifications of the school library media specialist, technology training, and the number of computers situated in the school library media center.

Survey respondents were ensured confidentiality. An identifying number was placed on the survey. Fowler (2002) stated that an identifying number can be included on the survey solely for the purpose of re-contacting respondents who do not return a survey after the initial mailing. This identifying number was explained to the library media specialists in the cover letter.

Validity is vital to any research project. Validity of measurement is the extent to which a measurement tool measures what it is supposed to measure (Wiersma, 1991). Any tool used to measure, i.e., surveys, questionnaires, must be free of bias and prejudice. Since the instrument used for this research was developed by the researcher, a panel of experts was asked to review the survey and help determine validity. A panel of experts (Appendix B) who was familiar with the research being conducted was used to view the survey and help validate the instrument via their comments and suggestions. The questions (Dillman, 1978, pp. 99-114) given the panelists are in Appendix C.

### **Data Collection Procedures**

Mail surveys were used with this research as a means of garnering responses to the research questions. Mail surveys are often the best-suited means of obtaining results from a wide variety of individuals when detailed information is important (Princeton Survey Research Associates International, n.d.). Mailings also stimulate higher response rates than do Internet or telephone surveys. Potentially, mailing surveys helps avoid problems caused by email surveys that can be misinterpreted as spam.

Dillman (1991; 2000) developed the Tailored Designed Method (TDM), an often-used approach to garnering responses from mail surveys, and an approach this research followed. The TDM is intended to assist researchers in designing mail surveys that result in a high rate of return. Dillman feels that, by compelling potential respondents that a question or problem exists that is of importance to them, and then, that their help is needed to find a solution, respondents will be more likely to return the surveys. TDM includes developing surveys or questionnaires that are respondent friendly, establishing up to five contacts with each respondent, including stamped return envelopes with each

survey, including personal correspondence in the form of a cover letter, and providing a token financial incentive (Dillman, 1991; 2000). The data collection procedures for this study incorporated four of the aforementioned methods.

As multiple contacts are important for gaining a high rate of response to mailed surveys, two contacts by first class mail with an additional special contact were completed. The initial contact included a cover letter, one copy of the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* with directions for completion, and a stamped return envelope.

The cover letter (Appendix D) followed the design outlined in Dillman's (1991) method. The first paragraph outlined the purpose and importance of the study. The second paragraph gained the respondent's confidence through explanation of the selection process and defining the importance of his/her response. The third paragraph ensured confidentiality of the respondent and explained approval by the Marshall University Institutional Review Board from the Office of Research Integrity (Appendix G). This paragraph also explained the identifying number on the survey as a means of sending follow-up surveys to those who did not respond to the initial survey. The fourth paragraph stressed, again, the basic justification for the study and provided respondents the opportunity to receive additional information regarding the study. Respondents who desired additional information were asked to place their name and address on the back of the return envelope, rather than on the survey, to make certain confidentiality was maintained. A two-week period was given to the respondents for return of the surveys.

A reminder (Appendix E) was sent five days after the initial questionnaire mailing to communicate the importance of returning the survey (Dillman, 1978). A replacement

survey with a cover letter (Appendix F) was planned three weeks following the first mailing, but it was not needed due to the high rate of initial returns.

### **Data Analysis**

Quantitative data were analyzed using percents, modes, medians, and standard deviations.. A nonparametric test, Kruskal-Wallis, was used to test for significance and mean rank scores were analyzed to determine areas of greatest significance. Qualitative data from one open-ended item was tracked using Microsoft Excel. This allowed the researcher to sort and filter for like answers and/or themes. The data were analyzed to determine the types of 21<sup>st</sup> century tools available in West Virginia secondary school library media centers, to determine the confidence level of West Virginia secondary school library media specialists with the use of 21<sup>st</sup> century tools, and to determine how often West Virginia secondary school library media specialists assist students in using 21<sup>st</sup> century tools. Data from the open-ended question were analyzed to determine emergent categories and to find out the kinds of activities school library media specialists are assisting students with that require the use of 21<sup>st</sup> century tools. Salent and Dillman (1994) stated that open-ended questions give the researcher more insight into the survey results. Additional data based on demographic information was reported as ancillary findings, when significant.

### **Summary**

This quantitative research is a systematic inquiry that provides information that can be used to determine the types of 21<sup>st</sup> century tools available to West Virginia secondary school students via the school library media center. Twenty-first century tools are essential for attainment of 21<sup>st</sup> century skills, which, in turn, are essential for student

success and achievement (Brewer & Milam, 2005; Lance, 1990; 2002; Pearlman, 2006).

Data from this research should help educators better understand the role of the West Virginia secondary school library media specialists with regard to the use and integration of 21<sup>st</sup> century tools by examining the confidence level of said library media specialists.

This research also indicates the frequency that school library media specialists assist students in using 21<sup>st</sup> century tools and provides some examples of the types of activities that students are completing with the school library media specialists' help.

## CHAPTER FOUR: FINDINGS

Chapter four presents the findings collected from surveys in this quantitative research study. The comprehensive literature review indicated the need for secondary students to utilize 21<sup>st</sup> century tools in pursuit of the attainment of 21<sup>st</sup> century skills, skills that enable student to achieve in a global society (North Central Regional Educational Laboratory, 2002b). The review of literature also pointed to the important role of the secondary school library media center as a location for 21<sup>st</sup> century tools utilization, causing the secondary school library media specialist to become vital in assisting students in their use of 21<sup>st</sup> century tools (American Library Association, 2006; Brewer & Milam, 2005). As a result, this study sought to determine the types of 21<sup>st</sup> century tools found in West Virginia secondary school library media centers. This study also determined the confidence level of West Virginia secondary school library media specialists in utilizing 21<sup>st</sup> century tools. Lastly, this study established how often West Virginia secondary school library media specialists assist students in using 21<sup>st</sup> century tools.

The subsequent three research questions were used to determine:

1. What 21<sup>st</sup> century tools are available in West Virginia secondary school library media centers?
2. To what extent are West Virginia secondary school library media specialists confident in utilizing 21<sup>st</sup> century tools?
3. How often do West Virginia secondary school library media specialists assist students in using 21<sup>st</sup> century tools?

The survey contained 24 technology tools with three categories of questions for each tool. The first category – Part I, Available Column - required participants to indicate if a particular technology was or was not available in the school library media center. This category addressed the first research question, “What 21<sup>st</sup> century tools are available in West Virginia secondary school library media centers?” The second category - Part I, Level of Confidence Column - asked participants to rate their level of confidence in using each technology tool and addressed the second research question, “To what extent are West Virginia secondary school library media specialists confident in utilizing 21<sup>st</sup> century tools?” The third category – Part I, Frequency Assisting Students Column - asked participants to indicate how often they assist students in using each technology tool. This category addressed the research question, “How often do West Virginia secondary school library media specialists assist students in using 21<sup>st</sup> century tools?” The data from the survey were analyzed using SPSS 13.0. Descriptive statistics were calculated for each of the 24 technology tool questions on the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools*. The following sections outline the major findings of the study through analyses of each research question.

### **Population and Sample**

The population for this study consisted of West Virginia secondary school library media specialists. The total population of 227 West Virginia secondary school library media specialists provided by the 2007-2008 West Virginia Department of Education database was surveyed. CustomInsight.com (n.d.) indicated that an appropriate return rate for the population was 154 for a 95% confidence level with a 4.5% margin of error. Of the 227 West Virginia secondary school library media specialists, 155 returned the *West*



*Virginia Secondary School Library Media Specialist Survey of Technology Tools*

following the first mailing and subsequent postcard reminder mailing. This represents 68% of the population. This return rate resulted in a 95% confidence level with a 4.4% margin of error or a 99% confidence level with a 5.8% margin of error.

### **Major Findings**

Major findings are reported in this section as they correspond with each of the research questions. The researcher-developed survey instrument, *West Virginia Secondary School Library Media Specialist Survey of Technology Tools*, was used to address all of the research questions. Questions relating to demographic data provided ancillary findings.

The researcher-developed instrument included one open-ended question as a means of establishing the types of activities West Virginia secondary school library media specialists were helping students complete with the use of technology tools. The *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* included four demographic questions. Finally, the survey included one question to determine any type of technology training that West Virginia secondary school library media specialists would like to attend.

***Research Question One: What 21<sup>st</sup> century tools are available in West Virginia secondary school library media centers?***

A *yes-no* response was used in the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* to obtain West Virginia secondary school library media specialists' responses to the presence of technology tools in school library media centers. A *yes* response indicated that the technology tool was accessible from the

school's library media center, while a *no* response meant that the technology tool was not available in the school's library media center. Frequencies and percentages were calculated for each of the 24 technology tools in Part I, Available Column using SPSS 13.0.

The number of respondents to each technology tool varied from 146 to 152 due to the nature of a self-reporting survey. Table 5 presents the frequency distribution for presence of 21<sup>st</sup> century technology tools. It was found that 100% of respondents have computers with Internet access and word processing software. Over 90% of respondents indicated the presence of presentation software (97%), spreadsheet software (97%), email (93%), and electronic encyclopedias (91%). Between 70% and 85% of those surveyed revealed the presence of online databases (83%), database software (82%), multimedia projectors (82%), and desktop publishing software (73%). Between 50% and 65% of respondents indicated the presence of digital cameras (65%), interactive whiteboards (65%), flatbed scanners (60%), CD/DVD creation software (54%), and distance learning (53%). Twenty-five percent to 47% of those surveyed specified the existence of video editing software (47%), wikis (46%), blogs (42%), instant messaging (37%), Web authoring software (31%), electronic classroom responders (28%), and podcasts (25%). Only 15% of respondents indicated the presence of handhelds.

**Table 5: Frequency Distribution for Technology Tools Presence**

Tool	<i>N</i>	<i>f</i>	<i>P</i>
Computer	152	152	100%
Internet	152	152	100%
Word Processing Software	150	150	100%
Presentation Software	151	147	97%
Spreadsheet Software	150	146	97%
Email	152	142	93%
Electronic Encyclopedia	150	137	91%
Online Database	152	126	83%
Database Software	146	120	82%
Multimedia Data Projector	151	123	82%
Desktop Publishing Software	149	109	73%
Digital Camera	152	99	65%
Interactive Whiteboard	151	98	65%
Flatbed Scanner	150	90	60%
CD/DVD Creation Software	149	81	54%
Distance Learning	150	80	53%
Video Editing Software	150	71	47%
Wiki	147	67	46%
Blog	148	63	42%
Instant Messaging	149	55	37%
Web Authoring Software	146	45	31%
Electronic Classroom Responders	148	41	28%
Podcast	147	36	25%
Handheld	150	22	15%

Respondents were given the opportunity to list additional technology tools on the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools*. Table 6 illustrates the technology tools added by respondents. Of the 88 responses to this portion of the survey – Part I, Column A – 16 (18%) listed some type of electronic card catalog as another kind of technology tool located in the school library media center.

DVD player was listed by six (7%) of the 88 respondents as a type of technology tool found in the school library media center. Five (6%) of the 88 respondents noted that the library media center contained mobile presenters. Document camera and *Accelerated Reader* software were each listed by five (6%) of the 88 respondents.

**Table 6: Frequency Distribution for Additional Technology Tools Presence**

Tool	<i>N</i>	<i>f</i>	<i>P</i>
Electronic Card Catalog	88	16	18%
DVD Player	88	6	7%
Mobile Presenter	88	5	6%
Document Camera	88	5	6%
<i>Accelerated Reader</i>	88	5	6%

***Research Question Two: To what extent are West Virginia secondary school library media specialists confident in utilizing 21st century tools?***

The *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* used a 7-point Likert scale to ascertain school library media specialists perceptions of the level of confidence each had with regard to specific 21<sup>st</sup> century technology tool usage. The 7-point Likert scale was as follows: 1 = “extremely unconfident”; 2 = “mostly unconfident”; 3 = “slightly unconfident”; 4 = “slightly confident”; 5 = “mostly confident”; 6 = “confident”; and 7 = “extremely confident.” Space was provided for respondents to list additional technology tools not included on the survey and then to rate their confidence use levels for those tools as well.

To answer research question two, “To what extent are West Virginia secondary school library media specialists confident in utilizing 21<sup>st</sup> century tools?” mode and median scores for the 24 technology tools in Part I, Level of Confidence Column were

calculated using SPSS 13.0. Table 7 illustrates the percentage of respondents related to each confidence level for each tool.

**Table 7: Confidence Levels**

Tool	Extremely Unconf.	Mostly Unconf.	Slightly Unconf.	Slightly Conf.	Mostly Conf.	Conf.	Extremely Conf.
Computer	1%	1%	1%	2%	12%	37%	48%
Handheld	26%	15%	6%	17%	16%	12%	9%
Flatbed Scanner	5%	5%	2%	11%	16%	24%	37%
Digital Camera	5%	1%	2%	8%	11%	32%	41%
Multimedia	4%	1%	4%	10%	12%	32%	36%
Data Projector							
Interactive Whiteboard	11%	10%	7%	21%	23%	16%	13%
Word Processing Software	0%	0%	0%	1%	7%	33%	59%
Presentation Software	1%	1%	3%	6%	12%	32%	45%
Spreadsheet Software	5%	4%	12%	18%	25%	14%	21%
Database Software	25%	10%	15%	14%	19%	8%	9%
Video Editing Software	26%	13%	9%	19%	10%	11%	12%
Desktop Publishing Software	11%	6%	7%	16%	18%	18%	24%
Web Authoring Software	34%	14%	9%	15%	18%	4%	6%
CD/DVD Creation Software	19%	6%	8%	12%	13%	18%	23%
Electronic Encyc.	1%	1%	1%	1%	9%	28%	58%
Email	1%	0%	0%	1%	3%	19%	76%
Internet	1%	0%	0%	0%	3%	17%	80%
Online Database	5%	0%	4%	5%	10%	28%	49%
Blog	22%	9%	11%	17%	17%	8%	17%
Podcast	39%	16%	8%	18%	11%	6%	3%
Wikis	28%	9%	9%	17%	12%	8%	16%
Distance Learning	27%	4%	7%	14%	14%	8%	26%
Instant Messaging	14%	6%	5%	10%	14%	12%	40%
Electronic Classroom Responders	37%	15%	9%	9%	8%	11%	12%

Table 8 shows the mode and median scores and standard deviations for the level of confidence using each 21<sup>st</sup> century technology tool. The number of respondents varied by technology tool from 108 to 153. Modes reveal how confident the majority of respondents are in using each technology tool. A mode of 7 indicates that the majority of school library media specialists are “extremely confident” in using the Internet, email, word processing software, electronic encyclopedia, computers, multimedia data projectors, presentation software, online databases, digital cameras, flatbed scanner, instant messaging, desktop publishing software, and CD/DVD creation software. A mode of 5 indicates that the majority of respondents were “mostly confident” with using spreadsheet software and interactive whiteboards. A mode of 1 indicates that the majority of library media specialists are “extremely unconfident” in using distance learning, blogs, wikis, video editing software, handhelds, database software, electronic classroom responders, Web authoring software, and podcasts.

To account for variation in levels of confidence across respondents, other measures of central tendency were reviewed. When median use is considered, school library media specialists are “extremely confident” (7.00) in using the Internet, email, word processing software, and electronic encyclopedias. A median of 6.00, “confident” in using computers, multimedia data projectors, presentation software, online databases, digital cameras, flatbed scanners, and instant messaging, was found. A median of 5.00 indicates respondents are “mostly confident” in using desktop publishing software, CD/DVD creation software, spreadsheet software, and interactive whiteboards. A median of 4.00 shows “slightly confident” in using distance learning, blogs, wikis, video editing software, and handhelds. A median of 3.50 indicates a confidence level between 3,

“slightly confident” and 4, “slightly unconfident” in using database software. A median of 3.00 specifies “slightly unconfident” in using Web authoring software. A median of 2.00 indicates respondents are “mostly unconfident” in using electronic classroom responders and podcasts.

**Table 8: Technology Tools Level of Confidence Descriptive Data**

Technology Tools	<i>N</i>	<i>Mode</i>	<i>Mdn</i>	<i>SD</i>
Internet	151	7	7.00	0.670
Email	147	7	7.00	0.731
Word Processing Software	149	7	7.00	0.664
Electronic Encyclopedia	144	7	7.00	1.071
Computer	153	7	6.00	0.974
Multimedia Data Projector	139	7	6.00	1.554
Presentation Software	146	7	6.00	1.225
Online Database	138	7	6.00	1.548
Digital Camera	133	7	6.00	1.510
Flatbed Scanner	129	7	6.00	1.692
Instant Messaging	110	7	6.00	2.190
Desktop Publishing Software	131	7	5.00	1.957
CD/DVD Creation Software	122	7	5.00	2.210
Spreadsheet Software	147	5	5.00	1.695
Interactive Whiteboard	132	5	5.00	1.828
Distance Learning	120	1	4.00	2.337
Blogs	118	1	4.00	2.111
Wiki	117	1	4.00	2.192
Video Editing Software	116	1	4.00	2.103
Handheld	108	1	4.00	2.071
Database Software	132	1	3.50	1.975
Electronic Classroom Responders	105	1	2.00	2.231
Web Authoring Software	112	1	3.00	1.928
Podcast	108	1	2.00	1.800
Cumulative	-	7	6.00	0.528

Respondents were given the opportunity to add additional technology tools on the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* and rate their confidence in using them on the Likert scale. Table 9 represents the additional technology tools, and the mode and median, along with the standard deviation

concerning respondents' confidence levels for each additional technology tool. There were 88 responses to this portion of the survey – Part I, Column B. A mode of 7 indicates the majority of respondents are “extremely confident” in using electronic card catalogs, DVD players, mobile presenters, and *Accelerated Reader* software. A mode of 5 shows the majority of respondents are “mostly confident” in using document cameras. A median between 6.00 to 7.00 shows that, on average, school library media specialists are “confident” to “extremely confident” in using these five additional tools.

**Table 9: Additional Technology Tools Level of Confidence Descriptive Data**

Tool	<i>N</i>	<i>Mode</i>	<i>Mdn</i>	<i>SD</i>
Electronic Card Catalog	16	7	7.00	0.900
DVD Player	6	7	7.00	0.408
Mobile Presenter	5	7	6.50	0.957
<i>Accelerated Reader</i>	5	7	7.00	0.000
Document Camera	5	5	6.00	1.527
Cumulative		7	7.00	0.664

A cumulative mode (7) calculated across all 24 of the 21<sup>st</sup> century technology tools (Table 8) indicates that the majority of school library media specialists are “extremely confident” in their use of technology tools. A cumulative median (6.00) calculated across all 24 of the 21<sup>st</sup> century technology tools indicates that on average school library media specialists are “confident” using technology tools. A cumulative mode (7) calculated for the additional technology tools indicates the responding school library media specialists are “extremely confident” in utilizing the additional technology tools. The cumulative median (7.00) for the additional technology tools indicates, on average, responding school library media specialists are “extremely confident” in using the additional technology tools.



***Research Question Three: How often do West Virginia secondary school library media specialists assist students in using 21st century tools?***

The *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* utilized a 7-point Likert scale to determine West Virginia secondary school library media specialists perceptions of how often they assist students in using 21<sup>st</sup> century technology tools. The 7-point Likert scale was as follows: 1 = “never”; 2 = “rarely (less than once a month)”; 3 = “monthly (once a month)”; 4 = “occasionally (2-3 times a month)”; 5 = “weekly (once a week)”; 6 = “frequently (2-4 times a week)”; and 7 = “daily.” Space was provided for the respondents to list additional technology tools which were not contained in the survey and then to rate their level of frequency in assisting students with those tools as well.

In order to answer research question three, “How often do West Virginia secondary school library media specialists assist students in using 21<sup>st</sup> century tools?” mode and median scores for the 24 technology tools in Part I, Frequency Assisting Students Column were calculated using SPSS 13.0. Table 10 illustrates the percentage of respondents related to how often school library media specialists assist students with each tool.

**Table 10: Frequency Assisting Students**

Tool	Never	Rarely	Monthly	Occasion- ally	Weekly	Frequently	Daily
Computer	1%	1%	2%	5%	5%	19%	68%
Handheld	81%	12%	1%	2%	0%	2%	2%
Flatbed Scanner	35%	18%	11%	18%	5%	5%	10%
Digital Camera	35%	13%	9%	15%	12%	6%	9%
Multimedia Data Projector	30%	13%	6%	15%	15%	9%	11%
Interactive Whiteboard	45%	12%	10%	9%	13%	7%	3%
Word Processing Software	5%	7%	1%	7%	9%	26%	44%
Presentation Software	7%	8%	7%	17%	19%	15%	27%
Spreadsheet Software	24%	23%	9%	19%	13%	6%	6%
Database Software	56%	17%	5%	11%	2%	5%	3%
Video Editing Software	55%	16%	8%	10%	6%	1%	4%
Desktop Publishing Software	34%	16%	12%	16%	10%	6%	6%
Web Authoring Software	77%	9%	5%	4%	2%	1%	3%
CD/DVD Creation Software	51%	12%	16%	11%	6%	2%	3%
Electronic Encyclopedia	11%	9%	6%	17%	17%	22%	17%
Email	44%	13%	7%	3%	10%	8%	16%
Internet	5%	3%	4%	7%	9%	18%	54%
Online Database	17%	6%	6%	15%	16%	17%	23%
Blog	71%	10%	6%	3%	5%	1%	3%
Podcast	82%	7%	6%	5%	1%	0%	0%
Wiki	64%	11%	9%	6%	3%	3%	4%
Distance Learning	60%	9%	4%	5%	4%	3%	15%
Instant Messaging	78%	6%	3%	3%	4%	1%	6%
Electronic Classroom Responders	70%	8%	6%	7%	5%	3%	1%

Table 11 shows the mode, median, and standard deviations for each technology tool based on how often school library media specialists assist students. The number of respondents varies by technology tool from 102 to 152. Modes reveal how often the majority of respondents assist students in using each technology tool.

A mode of 7 indicates the majority of school library media specialists assist students “daily” with computers, the Internet, word processing software, presentation software, and online databases. A mode of 6 shows the majority of school library media specialists “frequently (2-4 times weekly)” assist students with electronic encyclopedias.

A mode of 1 indicates that the majority of school library media specialists “never” assist students with the use of multimedia data projectors, spreadsheet software, digital cameras, email, flatbed scanners, desktop publishing software, interactive whiteboards, distance learning, CD/DVD creation software, video editing software, database software, wikis, electronic classroom responders, blogs, instant messaging, Web authoring software, handhelds, and podcasts.

**Table 11: Technology Tools Frequency Assisting Students Descriptive Data**

Tool	<i>N</i>	<i>Mode</i>	<i>Mdn</i>	<i>SD</i>
Computer	151	7	7.00	1.182
Internet	152	7	7.00	1.731
Word Processing Software	149	7	6.00	1.799
Presentation Software	144	7	5.00	1.869
Online Database	140	7	5.00	2.124
Electronic Encyclopedia	144	6	5.00	1.939
Multimedia Data Projector	138	1	4.00	2.131
Spreadsheet Software	145	1	3.00	1.832
Digital Camera	131	1	3.00	2.052
Email	142	1	3.00	2.353
Flatbed Scanner	124	1	2.00	1.987
Desktop Publishing Software	128	1	2.00	1.895
Interactive Whiteboard	130	1	2.00	1.891
Distance Learning	120	1	1.00	2.268
CD/DVD Creation Software	121	1	1.00	1.632
Video Editing Software	117	1	1.00	1.666
Database Software	133	1	1.00	1.635
Wiki	119	1	1.00	1.657
Electronic Classroom Responders	108	1	1.00	1.458
Blogs	118	1	1.00	1.521
Instant Messaging	113	1	1.00	1.698
Web Authoring Software	111	1	1.00	1.338
Handheld	102	1	1.00	1.172
Podcast	106	1	1.00	0.864
Cumulative		1	2.00	0.358

To account for variation in how often school library media specialists assist student with 21<sup>st</sup> century technology tools, additional measures of central tendency were calculated. Median scores reveal that on average, school library media specialists assist students “daily” (7.00) with computers and Internet access. A median of 6.00 shows that on average, school library media specialists “frequently (2-4 times a week)” assist students with word processing software. A median of 5.00 suggests that on average “weekly (once a week)” assistance of students with presentation software, online databases, and electronic encyclopedias is being carried out by school library media specialists. A median of 4.00 indicates that on average “occasionally (2-3 times a month)” school library media specialists assist students with multimedia data projectors. A median of 3.00 specifies that on average, school library media specialists assist students “monthly (once a month)” with spreadsheet software, digital cameras, and email. A median of 2.00 indicates that school library media specialists on average “rarely (less than once a month)” assist students with flatbed scanners, desktop publishing software, and interactive whiteboards. A median of 1.00 shows that on average, school library media specialists “never” assist students with distance learning, CD/DVD creation software, video editing software, database software, wikis, electronic classroom responders, blogs, instant messaging, Web authoring software, handhelds, and podcasts.

Some respondents listed additional technology tools on the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* and, where applicable, rated how often they assisted students with 21<sup>st</sup> century technology tools, using the Likert scale. Table 12 represents the additional technology tools, the mode, median, and standard deviation for each. There were 88 responses to this portion of the

survey – Part I, Column C. A mode of 7 indicates the majority of school library media specialists assist students “daily” with electronic card catalogs, mobile presenters, and *Accelerated Reader* software. A mode of 5 shows the majority of school library media specialists assist students “weekly (once a week)” with DVD players. A mode of 1 indicates the majority of school library media specialists “never” assist students with document cameras. A median of 7.00 shows that on average, school library media specialists assist students “daily” with electronic card catalogs and *Accelerated Reader* software. A median of 3.50 indicates that on average, school library media specialists assist students with DVD players and mobile presenters between “monthly (once a month)” and “occasionally (2-3 times a month).” A median of 1.00 shows that on average, school library media specialists “never” assist students with the use of document cameras.

**Table 12: Additional Technology Tools Frequency Assisting Students Descriptive Data**

Tool	<i>N</i>	<i>Mode</i>	<i>Mdn</i>	<i>SD</i>
Electronic Card Catalog	16	7	7.00	0.900
Mobile Presenter	6	7	3.50	0.408
<i>Accelerated Reader</i>	5	7	7.00	0.957
DVD Players	5	5	3.50	0.000
Document Camera	5	1	1.00	1.527
Cumulative		7	5.00	0.581

A cumulative mode (1) calculated across all 24 of the 21<sup>st</sup> century technology tools (Table 11) indicates that the majority of school library media specialists “never” assist students with the use of technology tools. A cumulative median (2.00) shows that

on average, school library media specialists “rarely (less than once a month)” assist students in using technology tools. A cumulative mode (7) calculated for the additional tools (Table 12), regarding how often school library media specialists assist students, indicates that the majority of those school library media specialists who responded assist students “daily.” The cumulative median (5.00) for additional technology tools shows that on average, school library media specialists who listed additional technology tools assist students “weekly (once a week).”

### ***Technology Activities***

Part II of the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* asked respondents to, “Please describe one or two activities (involving technology tools) that you help students complete.” One school library media specialist wrote, “Students often need help with locating information on the Internet.” Another school library media specialist responded, “I work with eighth graders doing research about an American icon. Their research is presented via Windows Movie Maker.” Finally, one school library media specialists answered, “I help students prepare research papers using online databases, Internet, and PowerPoint...”

Table 13 illustrates categories of responses to the open-ended question. The 155 respondents listed 188 activities. Of these 188 activities, 73 (39%) involved helping students conduct some type of research. Seventy-two (38%) of the 188 activities included assisting students with presentations. The 188 activities also included 17 (9%) instances of helping students with typing papers.

**Table 13: Technology Activities**

Activity	<i>N</i>	<i>P</i>
Research	73	39%
Presentations	72	38%
Typing papers	17	9.0%

Table 14 shows technology tools that were used to complete the majority of student assisted activities. Sixty-four (34%) of the activities described by library media specialists involved the use of Microsoft PowerPoint. Another 54 (29%) used the Internet. Microsoft Word was listed in 25 (15%) of the 188 activities.

**Table 14: Technology Tools Used for Student Activities**

Tool	<i>N</i>	<i>P</i>
<i>Microsoft PowerPoint</i>	64	34%
Internet	54	29%
<i>Microsoft Word</i>	25	15%

### **Ancillary Findings**

The *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* collected demographic data from survey respondents. Demographic data included poverty level of the school, degrees held by the school library media specialists, technology training received by the school library media specialists, current employment position of the school library media specialists, the presence of or lack of a computer lab in school library media centers and the number of computers in school library media center computer labs.

Demographic data were analyzed across groups. By utilizing the Kruskal-Wallis test, it was determined if any statistically significant differences existed between the

technology tools section in Part I of the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* and the demographic data. The Kruskal-Wallis test is a nonparametric test equivalent of a one-way analysis of variance between ranks. The value  $p < 0.05$  was used to determine statistical significance.

Statistical significance regarding the presence of select 21<sup>st</sup> century tools was found based on all five demographic factors: poverty level, educational degree, number of technology trainings attended, employment position, and existence of a computer lab in the school library media center. Statistical significance regarding confidence of library media specialists in using select 21<sup>st</sup> century technology tools was found based on all five demographic factors: poverty level, educational degree, number of technology trainings attended, employment position, and existence of a computer lab in the school library media center. Statistical significance regarding how often library media specialists assist students with select 21<sup>st</sup> century technology tools was found based on three of the demographic factors: number of technology trainings attended, employment position, and existence of a computer lab in the school library media center.

### ***Poverty Levels***

The demographic data regarding poverty level of the school – Part III, Question 1 - was analyzed using descriptive statistics (Table 15). Results indicate that out of 149 respondents, 32 (21%) worked in schools with low poverty (less than 35% of the school's population), 63 (42%) worked in schools with a medium poverty level (35-50%), and 48 (32%) worked in high poverty schools (50-75% of the student population). Seven respondents (5%) out of 149 indicated very high poverty, poverty above 75% of the school's population.



**Table 15: Poverty Levels**

Poverty Level	<i>N</i>	<i>f</i>	<i>P</i>
Low Poverty (poverty levels below 35%)	149	32	21%
Medium Poverty (poverty levels between 35-50%)	149	63	42%
High Poverty (poverty levels between 50-75%)	149	48	32%
Very High Poverty (poverty levels above 75%)	149	7	5%

Based on poverty level, Kruskal-Wallis revealed statistical significance related to presence of one of the 24 technology tools – online databases (p=0.014). Table 16 displays the results of Kruskal-Wallis across all 24 of the 21<sup>st</sup> century technology tools.

**Table 16: Kruskal-Wallis Significance Poverty Level and Technology Tool Presence**

Tool	<i>Chi-Square</i>	<i>df</i>	<i>Sig</i>
Computer	0.000	3	1.000
Handheld	2.321	3	0.509
Flatbed Scanner	5.611	3	0.132
Digital Camera	0.168	3	0.983
Multimedia Data Projector	7.763	3	0.051
Interactive Whiteboard	3.271	3	0.352
Word Processing Software	0.000	3	1.000
Presentation Software	4.296	3	0.231
Spreadsheet Software	1.772	3	0.621
Database Software	2.779	3	0.427
Video Editing Software	3.365	3	0.339
Desktop Publishing Software	6.229	3	0.101
Web Authoring Software	1.906	3	0.592
CD/DVD Creation Software	2.936	3	0.402
Electronic Encyclopedia	7.381	3	0.061
Email	1.990	3	0.574
Internet	0.000	3	1.000
Online Database	10.606	3	0.014*
Blog	1.983	3	0.576
Podcast	3.957	3	0.266
Wiki	4.502	3	0.212
Distance Learning	4.411	3	0.220
Instant Messaging	1.750	3	0.626
Electronic Classroom Responders	1.586	3	0.663

\* Significant at the 0.05 level

Further analysis of mean rank scores (Table 17), reveals that presence of online databases increases as poverty level decreases.

**Table 17: Kruskal-Wallis Mean Ranks Poverty Level and Technology Tool Presence**

Tool	Poverty Level	<i>N</i>	Mean Rank
Online Database Presence	low poverty (poverty levels below 35%)	30	81.13
	medium poverty (poverty levels between 35-50%)	62	77.76
	high poverty (poverty levels between 50-75%)	44	66.09
	very high poverty (poverty levels above 75%)	10	56.80
Total		146	

Based on poverty level, Krsukal-Wallis revealed statistical significance related to level of confidence using one of the 24 technology tools – distance learning ( $p=0.012$ ).

Table 18 displays the results of Kruskal-Wallis across all 24 of the 21<sup>st</sup> century technology tools.

**Table 18: Kruskal-Wallis Significance Poverty Level and Confidence Level**

Tool	<i>Chi-Square</i>	<i>df</i>	<i>Sig</i>
Computer	0.920	3	0.820
Handheld	3.289	3	0.349
Flatbed Scanner	0.084	3	0.994
Digital Camera	0.936	3	0.817
Multimedia Data Projector	3.751	3	0.290
Interactive Whiteboard	1.168	3	0.761
Word Processing Software	4.269	3	0.234
Presentation Software	2.076	3	0.557
Spreadsheet Software	1.629	3	0.653
Database Software	1.703	3	0.636
Video Editing Software	1.770	3	0.622
Desktop Publishing Software	1.738	3	0.629
Web Authoring Software	1.448	3	0.694
CD/DVD Creation Software	0.950	3	0.813
Electronic Encyclopedia	3.539	3	0.316
Email	0.780	3	0.854
Internet	0.710	3	0.871
Online Database	2.812	3	0.422
Blog	2.046	3	0.563
Podcast	2.212	3	0.530
Wiki	5.986	3	0.112
Distance Learning	11.023	3	0.012*
Instant Messaging	4.587	3	0.205
Electronic Classroom Responders	0.489	3	0.921

\*Significant at the 0.05 level.

Further analysis of mean rank scores (Table 19) reveals that confidence in use of distance learning is higher for school library media specialists in “high” and “very high” poverty schools.

**Table 19: Kruskal-Wallis Mean Ranks Poverty Level and Confidence Level**

Tool	Poverty Level	<i>N</i>	Mean Rank
Distance Learning Level of Confidence	low poverty	26	60.58
	medium poverty	44	46.66
	high poverty	39	69.63
	very high poverty	8	69.94
	Total	117	

Kruskal-Wallis revealed no statistical significance between poverty level and how often school library media specialists assist students in using 21<sup>st</sup> century technology tools.

### ***Educational Degrees***

Part III, Question 2 of the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* asked school library media specialists to indicate degree(s) and/or certification(s). Analyses of the highest degree given were used for calculations (Table 20). Out of 154 respondents, 47 (31%) hold Bachelor Degrees, 102 (67%) indicated possession of a Masters Degree, one (1%) respondent each indicated Education Specialist Degree, Doctorate, and library media specialist certification.

**Table 20: Educational Degrees**

Degrees	<i>N</i>	<i>f</i>	<i>P</i>
Bachelor of Arts / Bachelor of Science	154	47	31%
Master of Arts / Master of Science	154	102	67%
Education Specialist Certification	154	1	1%
Doctorate of Philosophy / Doctorate of Education	154	1	1%
Library Media Specialist Certification	154	1	1%

Five respondents specified “other” degrees, including: Masters of Science in Library Science (2), Technology Integration Specialist Library Media (1), Physical Education (1), and National Board Certification (1).

Based on educational degree, Kruskal-Wallis revealed statistical significance related to presence of one of the 24 technology tools – electronic classroom responders ( $p=0.040$ ). Table 21 illustrates the results of Kruskal-Wallis across all 24 of the 21<sup>st</sup> century technology tools.

**Table 21: Kruskal-Wallis Significance Educational Degree and Technology Tool Presence**

Tool	<i>Chi-Square</i>	<i>df</i>	<i>Sig</i>
Computer	0.000	4	1.000
Handheld	0.539	4	0.970
Flatbed Scanner	2.366	4	0.669
Digital Camera	2.182	4	0.702
Multimedia Data Projector	2.302	4	0.680
Interactive Whiteboard	1.682	4	0.794
Word Processing Software	0.000	4	1.000
Presentation Software	3.688	4	0.450
Spreadsheet Software	0.161	4	0.997
Database Software	2.456	4	0.653
Video Editing Software	3.893	4	0.421
Desktop Publishing Software	1.375	4	0.848
Web Authoring Software	5.315	4	0.257
CD/DVD Creation Software	5.426	4	0.246
Electronic Encyclopedia	0.745	4	0.946
Email	0.341	4	0.987
Internet	0.000	4	1.000
Online Database	2.816	4	0.589
Blog	4.732	4	0.316
Podcast	9.143	4	0.058
Wiki	3.497	4	0.478
Distance Learning	4.327	4	0.364
Instant Messaging	6.283	4	0.179
Electronic Classroom Responders	10.015	4	0.040*

\*Significant at the 0.05 level.

Further analysis of mean rank scores (Table 22) reveals that presence of electronic classroom responders increases as the level of educational degree increases. However, the number of respondents for Education Specialist, Doctorate, and Library Media Specialist is too low for significance.

**Table 22: Kruskal-Wallis Mean Ranks Educational Degree and Technology Tool Presence**

Tool	Educational Degree	<i>N</i>	Mean Rank
Electronic Classroom Responders Presence	BA/BS	44	65.68
	MA/MS	98	74.69
	EDS	1	125.00
	PhD/EdD	1	125.00
	LMS Certification	1	125.00

Based on educational degree, Kruskal-Wallis revealed statistical significance related to school library media specialist confidence in using one of the 24 technology tools – CD/DVD creation software ( $p=0.035$ ). Table 23 displays the results of Kruskal-Wallis across all 24 of the 21<sup>st</sup> century technology tools.

**Table 23: Kruskal-Wallis Significance Educational Degree and Confidence Level**

Tool	<i>Chi-Square</i>	<i>df</i>	<i>Sig</i>
Computer	3.447	4	0.486
Handheld	8.019	4	0.091
Flatbed Scanner	4.183	4	0.382
Digital Camera	5.883	4	0.208
Multimedia Data Projector	6.289	4	0.179
Interactive Whiteboard	3.454	4	0.485
Word Processing Software	2.497	4	0.645
Presentation Software	3.117	4	0.538
Spreadsheet Software	6.683	4	0.154
Database Software	6.126	4	0.190
Video Editing Software	7.062	4	0.133
Desktop Publishing Software	7.003	4	0.136
Web Authoring Software	6.948	4	0.139
CD/DVD Creation Software	8.593	4	0.035*
Electronic Encyclopedia	3.131	4	0.546
Email	0.962	4	0.915
Internet	0.850	4	0.932
Online Database	6.823	4	0.146
Blog	6.783	4	0.148
Podcast	5.187	4	0.269
Wiki	3.733	4	0.443
Distance Learning	2.155	4	0.707
Instant Messaging	6.207	4	0.184
Electronic Classroom Responder	4.404	4	0.354

\*Significant at the 0.05 level.

Further analysis of mean rank scores (Table 24) indicates higher degree equates to greater level of confidence in using CD/DVD creation software, although the *N* values of 1 for Education Specialist, Doctorate, and Library Media Specialist are rather small for generalizability.

**Table 24: Kruskal-Wallis Mean Ranks Educational Degree and Confidence Level**

Tool	Educational Degree	N	Mean Rank
CD/DVD Creation Software Level of Confidence	BA/BS	37	69.39
	MA/MS	80	54.51
	EDS	0	-
	PhD/EdD	1	106.00
	LMS Certification	1	106.00
	Total	119	

Kruskal-Wallis revealed no statistical significance between educational degree and how often school library media specialists assist students in using the 21<sup>st</sup> century technology tools.

### ***Technology Training***

Respondents to the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* were asked to indicate types of technology training that they had received – Part III, Question 3, “Please indicate any technology training that you have received.” Table 25 presents the frequency of *yes* responses and the percent of library media specialists who received specific types of technology training. This demographic data was analyzed using descriptive statistics. With 154 responses, 49 (32%) received technology training in an undergraduate course. Graduate level technology training accounted for 87 (57%) responses. One hundred thirty-four (87%) indicated they had received technology training through continuing education opportunities. Of the respondents, 38 (28%) participated in technology integration specialist training. Twenty-six (17%) of 154 respondents specified receiving training from the *Intel Teach* program. Of the responses, 57 (37%) indicated technology training received from West Virginia Department of Education 21<sup>st</sup> century training opportunities.



**Table 25: Technology Training**

Training	<i>N</i>	<i>f</i>	<i>P</i>
Undergraduate Courses	154	49	32%
Graduate Courses	154	87	57%
Continuing Education	154	134	87%
Technology Integration Specialist Training	154	38	25%
Intel Teach Program	154	26	17%
WVDE Sponsored 21 <sup>st</sup> Century Training	154	57	37%

Data was also analyzed concerning technology training to determine the number of technology trainings West Virginia secondary school library media specialists had attended. Table 26 illustrates these findings.

**Table 26: Number of Technology Trainings**

	<i>N</i>	<i>f</i>	<i>P</i>
No Trainings Attended	154	3	2%
1 Training Attended	154	37	24%
2 Trainings Attended	154	40	26%
3 Trainings Attended	154	36	23%
4 Trainings Attended	154	27	18%
5 Trainings Attended	154	8	5%
6 Trainings Attended	154	3	2%

Respondents identified “other” technology training experiences, including: self-training (1), Phase 9 (1), RESA sponsored training (1), staff development (1), and training as a virtual school contact (1).

Based on technology training incidences, Kruskal-Wallis revealed statistical significance related to presence of four of the 24 technology tools – interactive whiteboards ( $p=0.047$ ), video editing software ( $p=0.001$ ), blogs ( $p=0.000$ ), and wikis ( $p=0.002$ ). Table 27 shows the results of Kruskal-Wallis across all 24 of the 21<sup>st</sup> century technology tools.

**Table 27: Kruskal-Wallis Significance Technology Training and Technology Tool Presence**

Tool	<i>Chi-Square</i>	<i>df</i>	<i>Sig</i>
Computer	0.000	5	1.000
Handheld	4.056	5	0.541
Flatbed Scanner	10.995	5	0.051
Digital Camera	4.123	5	0.532
Multimedia Data Projector	9.404	5	0.094
Interactive Whiteboard	11.252	5	0.047*
Word Processing Software	0.000	5	1.000
Presentation Software	4.373	5	0.497
Spreadsheet Software	2.191	5	0.822
Database Software	7.218	5	0.205
Video Editing Software	21.633	5	0.001*
Desktop Publishing Software	6.494	5	0.261
Web Authoring Software	5.790	5	0.327
CD/DVD Creation Software	5.021	5	0.413
Electronic Encyclopedia	3.014	5	0.698
Email	3.013	5	0.698
Internet	0.000	5	1.000
Online Database	3.885	5	0.566
Blog	29.590	5	0.000*
Podcast	4.349	5	0.500
Wiki	19.019	5	0.002*
Distance Learning	8.116	5	0.150
Instant Messaging	6.528	5	0.258
Electronic Classroom Responders	2.194	5	0.822

\*Significant at the 0.05 level.

Further analysis of mean rank scores (Table 28) reveals that school library media specialists attending four to five trainings had more access to interactive whiteboards and video editing software in their school library media centers. School library media specialists attending five to six trainings had more access to blogs and wikis in their school library media centers.

**Table 28: Kruskal-Wallis Mean Ranks Technology Training and Technology Tool Presence**

Tool	Training Incidence	<i>N</i>	Mean Rank
Interactive Whiteboard Presence	1 training	37	70.20
	2 trainings	39	64.19
	3 trainings	35	72.70
	4 trainings	25	91.18
	5 trainings	8	90.81
	6 trainings	3	75.50
	Total	147	
Video Editing Software Presence	1 training	35	61.44
	2 trainings	39	60.96
	3 trainings	35	80.21
	4 trainings	26	97.46
	5 trainings	8	84.13
	6 trainings	3	62.83
	Total	146	
Blog Presence	1 training	35	62.57
	2 trainings	37	53.68
	3 trainings	35	81.09
	4 trainings	26	86.31
	5 trainings	8	105.00
	6 trainings	3	114.00
	Total	144	
Wiki Presence	1 training	35	66.06
	2 trainings	37	54.96
	3 trainings	34	81.56
	4 trainings	26	83.50
	5 trainings	8	84.19
	6 trainings	3	111.00
	Total	143	

Based on technology training incidences, Kruskal-Wallis revealed statistical significance related to confidence in using nine of the 24 technology tools – computers ( $p=0.038$ ), multimedia data projectors ( $p=0.008$ ), interactive whiteboards ( $p=.0044$ ), presentation software ( $p=0.011$ ), video editing software ( $p=0.001$ ), electronic encyclopedias ( $p=0.024$ ), online databases ( $p=0.001$ ), blogs ( $p=0.001$ ), and wikis ( $p=0.001$ ). Table 29 displays the results of Kruskal-Wallis across all 24 of the 21<sup>st</sup> century technology tools.

**Table 29: Kruskal-Wallis Significance Technology Training and Confidence Level**

Tool	<i>Chi-Square</i>	<i>df</i>	<i>Sig</i>
Computer	11.767	5	0.038*
Handheld	3.443	5	0.632
Flatbed Scanner	10.482	5	0.063
Digital Camera	8.405	5	0.135
Multimedia Data Projector	15.682	5	0.008*
Interactive Whiteboard	11.399	5	0.044*
Word Processing Software	9.524	5	0.090
Presentation Software	14.811	5	0.011*
Spreadsheet Software	6.244	5	0.283
Database Software	8.895	5	0.113
Video Editing Software	21.471	5	0.001*
Desktop Publishing Software	10.367	5	0.065
Web Authoring Software	7.333	5	0.197
CD/DVD Creation Software	4.254	5	0.513
Electronic Encyclopedia	12.971	5	0.024*
Email	9.795	5	0.081
Internet	5.598	5	0.347
Online Database	19.623	5	0.001*
Blog	20.837	5	0.001*
Podcast	5.278	5	0.383
Wiki	20.926	5	0.001*
Distance Learning	5.765	5	0.330
Instant Messaging	9.231	5	0.100
Electronic Classroom Responder	7.198	5	0.206

\*Significant at the 0.05 level.

Further analysis of mean rank scores (Table 30), reveals that more technology training is indicative of greater confidence in using 21<sup>st</sup> century technology tools related to four of the nine tools – computers, multimedia data projectors, presentation software, and blogs.

**Table 30: Kruskal-Wallis Mean Ranks Technology Training and Confidence Level**

Tool	Training Incidence	<i>N</i>	Mean Rank
Computer Level of Confidence	1 training	37	65.69
	2 trainings	39	69.44
	3 trainings	35	77.17
	4 trainings	27	92.31
	5 trainings	8	62.63
	6 trainings	3	114.00
	Total	149	
Multimedia Data Projector Level of Confidence	1 training	35	56.47
	2 trainings	34	60.56
	3 trainings	30	68.42
	4 trainings	27	85.83
	5 trainings	7	81.86
	6 trainings	3	112.50
	Total	136	
Interactive Whiteboard Level of Confidence	1 training	32	56.75
	2 trainings	33	54.92
	3 trainings	28	66.95
	4 trainings	26	84.08
	5 trainings	7	72.14
	6 trainings	3	63.67
	Total	129	
Presentation Software Level of Confidence	1 training	34	61.10
	2 trainings	38	60.26
	3 trainings	33	76.89
	4 trainings	27	88.44
	5 trainings	7	75.29
	6 trainings	3	111.00
	Total	142	
Video Editing Software Level of Confidence	1 training	26	39.71
	2 trainings	24	48.90
	3 trainings	28	59.80
	4 trainings	26	79.13
	5 trainings	7	54.93
	6 trainings	2	59.25
	Total	113	
Electronic Encyclopedia Level of Confidence	1 training	35	57.20
	2 trainings	35	65.06
	3 trainings	33	77.41
	4 trainings	27	84.31
	5 trainings	7	65.71
	6 trainings	3	100.00
	Total	140	
Online Database Level of Confidence	1 training	32	53.11
	2 trainings	36	58.51
	3 trainings	31	74.19
	4 trainings	26	86.15
	5 trainings	7	95.64
	6 trainings	3	54.83
	Total	135	

Tool	Training Incidence	<i>N</i>	Mean Rank
Blog Level of Confidence	1 training	24	41.79
	2 trainings	27	47.19
	3 trainings	30	58.32
	4 trainings	23	75.63
	5 trainings	7	71.79
	6 trainings	3	95.50
	Total	114	
Wiki Level of Confidence	1 training	25	49.20
	2 trainings	25	39.76
	3 trainings	27	56.83
	4 trainings	26	73.31
	5 trainings	7	69.57
	6 trainings	3	96.50
	Total	113	

Based on technology training incidences, Kruskal-Wallis revealed statistical significance related to how often school library media specialists assist students with the use of three of the 24 technology tools – interactive whiteboards ( $p=.0017$ ), presentation software ( $p=0.015$ ), and instant messages ( $p=0.012$ ). Table 31 displays the results of the Kruskal-Wallis across all 24 of the 21<sup>st</sup> century technology tools.

**Table 31: Kruskal-Wallis Significance Technology Training and Assisting Students**

Tool	<i>Chi-Square</i>	<i>df</i>	<i>Sig</i>
Computer	7.07	5	0.215
Handheld	6.132	5	0.294
Flatbed Scanner	5.324	5	0.378
Digital Camera	6.673	5	0.246
Multimedia Data Projector	10.830	5	0.055
Interactive Whiteboard	13.755	5	0.017*
Word Processing Software	4.332	5	0.503
Presentation Software	14.107	5	0.015*
Spreadsheet Software	2.732	5	0.741
Database Software	7.829	5	0.166
Video Editing Software	9.949	5	0.077
Desktop Publishing Software	6.405	5	0.269
Web Authoring Software	3.794	5	0.579
CD/DVD Creation Software	7.975	5	0.158
Electronic Encyclopedia	6.896	5	0.228
Email	5.824	5	0.324
Internet	7.585	5	0.181
Online Database	9.844	5	0.080
Blog	9.979	5	0.076
Podcast	4.934	5	0.424
Wiki	6.907	5	0.228
Distance Learning	7.698	5	0.174
Instant Messaging	14.692	5	0.012*
Electronic Classroom Responder	4.482	5	0.482

\*Significant at the 0.05 level.

Further analysis of mean rank scores (Table 32) reveals that more incidences of training results in more instances of school library media specialists assisting students with using the three 21<sup>st</sup> century technology tools.

**Table 32: Kruskal-Wallis Mean Ranks Technology Training and Assisting Students**

Tool	Training Incidence	N	Mean Rank
Interactive Whiteboard Frequency Assisting Students	1 training	32	53.89
	2 trainings	31	54.11
	3 trainings	27	67.91
	4 trainings	26	83.19
	5 trainings	8	62.63
	6 trainings	3	76.17
	Total	127	
Presentation Software Frequency Assisting Students	1 training	32	66.59
	2 trainings	38	55.66
	3 trainings	32	73.95
	4 trainings	27	90.67
	5 trainings	8	65.19
	6 trainings	3	96.00
	Total	140	
Instant Message Frequency Assisting Students	1 training	24	45.50
	2 trainings	31	51.90
	3 trainings	25	67.80
	4 trainings	20	56.80
	5 trainings	7	49.57
	6 trainings	3	75.33
	Total	110	

***Future Technology Training***

On the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools*, in Part III, Question 6, respondents were asked to indicate types of technology training that would be beneficial. The 155 survey respondents listed 225 types of technology training. Several school library media specialists identified technology tools and requested training on strategies for effective use. Table 33 illustrates the most frequently listed requests. Twenty-nine (13%) indicated a desire to attend training involving interactive whiteboards. Twenty-four (11%) suggested podcast training. Seventeen (8%) listed training for Webpage development. Additionally, 11 (5%) listed technology training related to two technology tools, blogs and handhelds, while 10 (4%) of the indicated that technology training for wikis would be beneficial.



**Table 33: Technology Training**

Type of Technology Training	<i>N</i>	<i>P</i>
Interactive whiteboard	29	13%
Podcast	24	11%
Webpage development	17	8%
Blog	11	5%
Handheld	11	5%
Wiki	10	4%

***Employment Position***

Part III, Question 4 of the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* collected demographic data regarding the employment position of the respondents by asking, “Please indicate your current positions(s).” Table 34 displays the frequency of *yes* responses and the percent of West Virginia secondary school library media specialists’ employment positions. With 154 respondents, 106 (69%) indicated that they hold the position of full-time school library media specialist at the school, 43 (28%) are library media specialist and teacher at the school, and 2 (1%) are a library media specialist at more than one school.

**Table 34: Employment Position**

Position	<i>N</i>	<i>f</i>	<i>P</i>
Full-Time Library Media Specialist at this school	154	106	69%
Library Media Specialist and Teacher at this school	154	43	28%
Library Media Specialist at this school and another school	154	2	1%

Respondents identified “other” employment positions, including: substitute library media specialist (1), split position as school library media specialist and Wilson Reading coach (1), half-time adult education (1), library media specialist and systems

operator (1), library media specialist and sixth grade library skills teacher (1), and library media specialist and technology integration specialist (1).

Based on employment position, Kruskal-Wallis revealed statistical significance related to presence of seven of the 24 technology tools in school media centers - multimedia data projectors ( $p=0.003$ ), interactive whiteboards ( $p=0.017$ ), database software ( $p=0.005$ ), video editing software ( $p=0.033$ ), desktop publishing software ( $p=0.021$ ), electronic encyclopedias ( $p=0.017$ ), and podcasts ( $p=0.007$ ). Table 35 displays the results of Kruskal-Wallis across all 24 of the 21<sup>st</sup> century technology tools.

**Table 35: Kruskal-Wallis Significance Employment Position and Technology Tool Presence**

Tool	<i>Chi-Square</i>	<i>df</i>	<i>Sig</i>
Computer	0.000	2	1.000
Handheld	0.461	2	0.794
Flatbed Scanner	3.908	2	0.142
Digital Camera	4.677	2	0.096
Multimedia Data Projector	11.357	2	0.003*
Interactive Whiteboard	8.198	2	0.017*
Word Processing Software	0.000	2	1.000
Presentation Software	1.386	2	0.500
Spreadsheet Software	0.056	2	0.972
Database Software	10.440	2	0.005*
Video Editing Software	6.796	2	0.033*
Desktop Publishing Software	7.734	2	0.021*
Web Authoring Software	2.326	2	0.313
CD/DVD Creation Software	4.682	2	0.096
Electronic Encyclopedia	8.093	2	0.017*
Email	0.801	2	0.670
Internet	0.000	2	1.000
Online Database	3.938	2	0.140
Blog	5.469	2	0.065
Podcast	9.895	2	0.007*
Wiki	2.640	2	0.267
Distance Learning	1.233	2	0.540
Instant Messaging	0.825	2	0.662
Electronic Classroom Responders	0.813	2	0.666

\*Significant at the 0.05 level

Further analysis of mean rank scores (Table 36), reveals that full-time library media specialists have access to more of the seven technology tools than do library media specialists who also teach classes at the school. The number of respondents for the employment position of library media specialist at this school and another school was too low to determine generalizability.

**Table 36: Kruskal-Wallis Mean Ranks Employment Position and Technology Tool Presence**

Tool	Employment Position	<i>N</i>	Mean Rank
Multimedia Data Projector Presence	full-time library media specialist at this school	109	77.64
	library media specialist and teacher at this school	37	68.50
	library media specialist at this school and another school	2	14.50
	Total	148	
Interactive Whiteboard Presence	full-time library media specialist at this school	109	78.78
	library media specialist and teacher at this school	37	64.50
	library media specialist at this school and another school	2	26.50
	Total	148	
Database Software Presence	full-time library media specialist at this school	107	76.43
	library media specialist and teacher at this school	35	59.81
	library media specialist at this school and another school	2	84.50
	Total	144	
Video Editing Software Presence	full-time library media specialist at this school	108	78.47
	library media specialist and teacher at this school	37	62.84
	library media specialist at this school and another school	2	39.00
	Total	147	
Desktop Publishing Software Presence	full-time library media specialist at this school	107	77.99
	library media specialist and teacher at this school	37	61.43
	library media specialist at this school and another school	2	56.50
	Total	146	
Electronic Encyclopedia Presence	full-time library media specialist at this school	109	76.63
	library media specialist and teacher at this school	36	65.71
	library media specialist at this school and another school	2	80.00
	Total	147	
Podcast Presence	full-time library media specialist at this school	107	74.69
	library media specialist and teacher at this school	35	62.73
	library media specialist at this school and another school	2	126.50
	Total	144	

Based on employment position, Kruskal-Wallis revealed statistical significance related to school library media specialist confidence in using one of the 24 technology tools – handhelds ( $p=0.019$ ). Table 37 displays the results of the Kruskal-Wallis across all 24 of the 21<sup>st</sup> century technology tools.

**Table 37: Kruskal-Wallis Significance Employment Position and Confidence Level**

Tool	<i>Chi-Square</i>	<i>df</i>	<i>Sig</i>
Computer	2.241	2	0.326
Handheld	7.903	2	0.019*
Flatbed Scanner	5.349	2	0.069
Digital Camera	4.331	2	0.115
Multimedia Data Projector	2.682	2	0.262
Interactive Whiteboard	3.566	2	0.168
Word Processing Software	4.688	2	0.096
Presentation Software	5.660	2	0.059
Spreadsheet Software	4.693	2	0.096
Database Software	3.473	2	0.176
Video Editing Software	3.338	2	0.188
Desktop Publishing Software	4.960	2	0.084
Web Authoring Software	1.072	2	0.585
CD/DVD Creation Software	3.889	2	0.143
Electronic Encyclopedia	0.355	2	0.837
Email	1.357	2	0.507
Internet	1.190	2	0.552
Online Database	0.384	2	0.825
Blog	3.243	2	0.198
Podcast	4.771	2	0.092
Wiki	0.497	2	0.780
Distance Learning	0.764	2	0.683
Instant Messaging	1.889	2	0.389
Electronic Classroom Responders	2.644	2	0.267

\*Significant at the 0.05 level.

Further analysis of mean rank scores (Table 38) reveals that full-time school library media specialists are more confident in using handhelds than are school library media specialists who also teach classes. The number of respondents for library media specialists who split the position with another school is too low for generalizability.

**Table 38: Kruskal-Wallis Mean Ranks Employment Position and Confidence Level**

Tool	Employment Position	<i>N</i>	Mean Rank
Handheld Level of Confidence	full-time library media specialist at this school	77	57.98
	library media specialist and teacher at this school	27	43.61
	library media specialist at this school and another school	2	14.50
	Total	106	

Based on employment position, Kruskal-Wallis revealed statistical significance related to how often school library media specialists assist students in using one of the 24 technology tools – presentation software ( $p=0.018$ ). Table 39 displays the results of Kruskal-Wallis across all 24 of the 21<sup>st</sup> century technology tools.

**Table 39: Kruskal-Wallis Significance Employment Position and Assisting Students**

Tool	<i>Chi-Square</i>	<i>df</i>	<i>Sig</i>
Computer	3.799	2	0.150
Handheld	0.458	2	0.795
Flatbed Scanner	3.559	2	0.169
Digital Camera	2.689	2	0.261
Multimedia Data Projector	4.750	2	0.093
Interactive Whiteboard	3.354	2	0.187
Word Processing Software	2.990	2	0.224
Presentation Software	7.984	2	0.018*
Spreadsheet Software	4.001	2	0.135
Database Software	2.466	2	0.291
Video Editing Software	5.374	2	0.068
Desktop Publishing Software	3.694	2	0.158
Web Authoring Software	0.654	2	0.721
CD/DVD Creation Software	1.673	2	0.433
Electronic Encyclopedia	0.144	2	0.931
Email	1.375	2	0.503
Internet	0.916	2	0.633
Online Database	1.541	2	0.463
Blog	0.119	2	0.942
Podcast	0.597	2	0.742
Wiki	2.129	2	0.345
Distance Learning	1.974	2	0.373
Instant Messaging	1.248	2	0.536
Electronic Classroom Responder	1.901	2	0.386

\*Significant at the 0.05 level.

Further analysis of mean rank scores (Table 40), reveals that school library media specialists who also teach classes assist students more often with presentation software than do full-time school library media specialists. The number of respondents for school library media specialists who split their position between two schools was too low for generalizability.

**Table 40: Kruskal-Wallis Rank Means Employment Position and Assisting Students**

Tool	Employment Position	<i>N</i>	Mean Rank
Presentation Software Frequency Assisting Students	full-time library media specialist at this school	105	68.30
	library media specialist and teacher at this school	34	82.88
	library media specialist at this school and another school	2	10.75
	Total	141	

### ***Computer Lab***

The *West Virginia Secondary School Library Media Specialist Survey of Technology Tools*, Part III, Question 5, asked respondents to indicate the existence of or non-existence of a computer lab in school library media centers. Of the 152 survey respondents 127 (84%) indicated the presence of a computer lab in school library media centers. Respondents were asked, “Does your library media center contain a computer lab? If yes, how many computers are in the lab?” The average number of computers within a school library media center computer lab is 24.

Based on presence of a computer lab, Kruskal-Wallis revealed statistical significance related to presence of four of the 24 technology tools in school library media centers - spreadsheet software ( $p=0.001$ ), video editing software ( $p=0.014$ ), wikis ( $p=0.002$ ), and distance learning ( $p=0.012$ ). Table 41 displays the results of Kruskal-Wallis across all 24 of the 21<sup>st</sup> century technology tools.



**Table 41: Kruskal-Wallis Significance Computer Lab and Technology Tool Presence**

Tool	<i>Chi-Square</i>	<i>df</i>	<i>Sig</i>
Computer	0.000	1	1.000
Handheld	0.147	1	0.701
Flatbed Scanner	2.241	1	0.134
Digital Camera	0.041	1	0.840
Multimedia Data Projector	2.216	1	0.137
Interactive Whiteboard	0.611	1	0.434
Word Processing Software	0.000	1	1.000
Presentation Software	3.390	1	0.066
Spreadsheet Software	10.198	1	0.001*
Database Software	3.092	1	0.079
Video Editing Software	6.017	1	0.014*
Desktop Publishing Software	0.472	1	0.492
Web Authoring Software	2.750	1	0.097
CD/DVD Creation Software	3.322	1	0.068
Electronic Encyclopedia	0.693	1	0.405
Email	1.842	1	0.175
Internet	0.000	1	1.000
Online Database	0.315	1	0.575
Blog	1.583	1	0.208
Podcast	1.101	1	0.294
Wiki	9.987	1	0.002*
Distance Learning	6.359	1	0.012*
Instant Messaging	0.256	1	0.613
Electronic Classroom Responder	0.007	1	0.934

\* Significant at the 0.05 level.

Further analysis of mean rank scores (Table 42) reveals that the presence of a computer lab in a school library media center results in more access to all four of the technology tools where statistical significance was found.

**Table 42: Kruskal-Wallis Rank Means Computer Lab and Technology Tool Presence**

Tool	Computer Lab	<i>N</i>	Mean Rank
Spreadsheet Software Presence	no	24	66.38
	yes	122	74.90
	Total	146	
Video Editing Software Presence	no	24	56.75
	yes	122	76.80
	Total	146	
Wiki Presence	no	23	50.93
	yes	120	76.04
	Total	143	
Distance Learning Presence	no	24	56.29
	yes	122	76.89
	Total	146	

Based on presence of a computer lab, Kruskal-Wallis revealed statistical significance related to school library media specialist confidence in using one of the 24 technology tools – distance learning ( $p=0.049$ ). Table 43 displays the results of Kruskal-Wallis across all 24 of the 21<sup>st</sup> century technology tools.

**Table 43: Kruskal-Wallis Significance Computer Lab and Confidence Level**

Tool	<i>Chi-Square</i>	<i>df</i>	<i>Sig</i>
Computer	1.126	1	0.270
Handheld	0.056	1	0.813
Flatbed Scanner	0.534	1	0.463
Digital Camera	0.033	1	0.855
Multimedia Data Projector	0.012	1	0.914
Interactive Whiteboard	0.818	1	0.366
Word Processing Software	0.607	1	0.436
Presentation Software	0.066	1	0.798
Spreadsheet Software	0.053	1	0.817
Database Software	1.343	1	0.246
Video Editing Software	0.215	1	0.643
Desktop Publishing Software	0.114	1	0.736
Web Authoring Software	0.710	1	0.399
CD/DVD Creation Software	0.469	1	0.494
Electronic Encyclopedia	0.490	1	0.484
Email	0.115	1	0.735
Internet	0.042	1	0.837
Online Database	0.274	1	0.601
Blog	0.409	1	0.523
Podcast	0.289	1	0.591
Wiki	0.728	1	0.393
Distance Learning	3.890	1	0.049*
Instant Messaging	0.796	1	0.372
Electronic Classroom Responder	0.605	1	0.437

\* Significant at the 0.05 level.

Further analysis of mean rank scores (Table 44), reveals that school library media specialists have a greater level of confidence using distance learning when there is a computer lab in the library media center.

**Table 44: Kruskal-Wallis Mean Ranks Computer Lab and Confidence Level**

Tool	Computer Lab	<i>N</i>	Mean Rank
Distance Learning Level of Confidence	no	15	42.87
	yes	101	60.82
Total		116	

Based on presence of a computer lab, Kruskal-Wallis revealed statistical significance related to how often school library media specialists assist students with three of the 24 technology tools - computers ( $p=0.002$ ), presentation software ( $p=0.001$ ), and wikis ( $p=0.043$ ). Table 45 displays the results of Kruskal-Wallis across all 24 of the 21<sup>st</sup> century technology tools.

**Table 45: Kruskal-Wallis Significance Computer Lab and Assisting Students**

Tool	<i>Chi - Square</i>	<i>df</i>	<i>Sig</i>
Computer	9.333	1	0.002*
Handheld	0.115	1	0.734
Flatbed Scanner	2.153	1	0.142
Digital Camera	0.102	1	0.750
Multimedia Data Projector	0.125	1	0.724
Interactive Whiteboard	0.001	1	0.977
Word Processing Software	3.028	1	0.082
Presentation Software	11.344	1	0.001*
Spreadsheet Software	3.519	1	0.061
Database Software	0.005	1	0.942
Video Editing Software	0.610	1	0.435
Desktop Publishing Software	2.707	1	0.100
Web Authoring Software	1.097	1	0.295
CD/DVD Creation Software	1.638	1	0.201
Electronic Encyclopedia	0.004	1	0.953
Email	3.193	1	0.074
Internet	3.258	1	0.071
Online Database	1.938	1	0.164
Blog	2.020	1	0.155
Podcast	0.208	1	0.648
Wiki	4.086	1	0.043*
Distance Learning	1.039	1	0.308
Instant Messaging	1.782	1	0.182
Electronic Classroom Responder	0.571	1	0.450

\* Significant at the 0.05 level.

Further analysis of mean rank scores (Table 46) reveals that school library media specialists assist students more often with computers, presentation software, and wikis when there is a computer lab in the school library media center.

**Table 46: Kruskal-Wallis Rank Means Computer Lab and Assisting Students**

Tool	Computer Lab	N	Mean Rank
Computer Frequency Assisting Students	no	24	53.73
	yes	123	77.96
	Total	147	
Presentation Software Frequency Assisting Students	no	22	44.27
	yes	118	75.39
	Total	140	
Wiki Frequency Assisting Students	no	15	44.33
	yes	101	60.60
	Total	116	

### Summary

Presented in this chapter were the statistical analyses of data collected via the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* given to West Virginia secondary school library media specialists. A comprehensive review of related literature revealed the importance of school library media centers and the important role of the school library media specialist (American Library Association, 2006; Brewer & Milam, 2005). Literature findings also revealed the need for students to attain 21<sup>st</sup> century skills, skills that require the use of technology tools (North Central Regional Laboratory, 2002b). Therefore, secondary school library media centers become important in students' attainment of 21<sup>st</sup> century skills due to the presence of technology tools in the media centers.

Research question one asks, "What 21<sup>st</sup> century tools are available in West Virginia secondary school library media centers?" It was found that 100% of respondents have computers with Internet access and word processing software. Over 90% of respondents have presentation software, spreadsheet software, email, and

electronic encyclopedias. Between 70% and 85% of school library media specialists have online databases, database software, multimedia projectors, and desktop publishing software. Between 50% and 65% of school library media specialists have digital cameras, interactive whiteboards, flatbed scanners, CD/DVD creation software, and distance learning. Twenty-five percent to 47% of school library media specialists have video editing software, wikis, blogs, instant messaging, Web authoring software, electronic classroom responders, and podcasts. Less than 15% of respondents have handhelds.

Research question two asks, “To what extent are West Virginia secondary school library media specialists confident in utilizing 21<sup>st</sup> century tools? The cumulative mode across all 24 of the 21<sup>st</sup> century technology tools indicates that the majority of school library media specialists are “extremely confident” in their use of technology tools. A cumulative median calculated across all 24 of the 21<sup>st</sup> century technology tools shows that on average school library media specialists are “confident” using technology tools. Analysis of confidence for individual tools reveals that the majority of library media specialists are “Extremely Confident” in using Internet, email, word processing software, electronic encyclopedia, computer, multimedia data projector, presentation software, online database, digital camera, flatbed scanner, instant messaging, desktop publishing software, and CD/DVD creation software. The majority of library media specialists are “Confident” in using spreadsheet software and interactive whiteboard. The majority of respondents indicated “Extremely Unconfident” in using the remaining nine 21<sup>st</sup> century technology tools.

Research question three asks, “How often do West Virginia secondary school library media specialists assist students in using 21<sup>st</sup> century tools?” The cumulative

mode calculated across all 24 of the 21<sup>st</sup> century technology tools shows that the majority of school library media specialists “never” assist students with the use of technology tools. A cumulative median shows that on average, school library media specialists “rarely (less than once a month)” assist students in using technology tools. Analysis of time spent assisting students based on individual tools reveals “daily” assistance with computer, Internet, word processing software, presentation software, and online databases. The majority of library media specialists responded “frequently (2-4 times weekly)” when asked how often they assist students using electronic encyclopedias. The majority of respondents indicated “never” in regard to assisting students with the 18 remaining 21<sup>st</sup> century technology tools. Written comments show that West Virginia secondary school library media specialists are helping students with research, presentations, and typing activities with use of the Internet, *Microsoft Word*, and *Microsoft PowerPoint*.



## CHAPTER FIVE: SUMMARY AND DISCUSSION

### Introduction

A current review of literature indicates that students' attainment of 21<sup>st</sup> century skills is important to academic achievement (Jobs for the Future, n.d.; Partnership for 21<sup>st</sup> Century Skills, n.d.b). In order to attain 21<sup>st</sup> century skills, the proper use of technology tools becomes valuable to students, as technology tools are often key to attaining 21<sup>st</sup> century skills (Partnership for 21<sup>st</sup> Century Skills, n.d.a). Literature indicates that 21<sup>st</sup> century technology tools such as computers, data projectors, and interactive whiteboards are often housed in school library media centers (Prestamo, 2000). As these tools are frequently located in school library media centers, the school library media specialist plays an important role in students successfully using 21<sup>st</sup> century tools. School library media specialists must be able to use technology tools and help students use technology tools in order to assist students in the attainment of 21<sup>st</sup> century skills (American Association of School Librarians and Association for Educational Communications and Technology, 1998b). This chapter presents conclusions regarding the types of technology tools located in West Virginia secondary school library media centers, West Virginia secondary school library media specialists' confidence in using technology tools, along with the library media specialists' frequency in assisting students in the use of technology tools. Implications and recommendations for further study originating from the findings of the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* are also presented in this chapter.

## Research Questions

Quantitative methods were used to answer the following questions:

1. What 21<sup>st</sup> century tools are available in West Virginia secondary school library media centers?
2. To what extent are West Virginia secondary school library media specialists confident in utilizing 21<sup>st</sup> century tools?
3. How often do West Virginia secondary school library media specialists assist students in using 21<sup>st</sup> century tools?

In addition to these questions, the study gathered demographic data from respondents, including poverty levels of schools, educational degrees, amount of technology training, and current employment positions.

## Methods

This quantitative study used a researcher developed survey as a means to garner statistics and data regarding West Virginia secondary school library media specialists' assessments of the types of technology tools found in school library media centers, their confidence in using technology tools, and their frequency in assisting students with the use of technology tools. The researcher developed survey, *West Virginia Secondary School Library Media Specialist Survey of Technology Tools*, was sent to all secondary school library media specialists in West Virginia as identified by the West Virginia Department of Education.

A *yes-no* response was used in the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* to determine West Virginia secondary school library media specialists' responses to the presence of technology tools in school

library media centers. A *yes* response indicated the presence of the technology tool and a *no* response meant that the technology tool was not found in the school's library media center.

The *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* used a 7-point Likert scale to determine the perceptions of West Virginia secondary school library media specialists regarding the level of confidence each had with specific technology tool usage. The 7-point Likert scale was as follows: 1 = "extremely unconfident"; 2 = "mostly unconfident"; 3 = "slightly unconfident"; 4 = "slightly confident"; 5 = "mostly confident"; 6 = "confident"; and 7 = "extremely confident." The *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* also utilized a 7-point Likert scale to determine West Virginia secondary school library media specialists' perceptions of the frequency assisting students in using technology tools. The 7-point Likert scale was as follows: 1 = "never"; 2 = "rarely (less than once a month)"; 3 = "monthly (once a month)"; 4 = "occasionally (2-3 times a month)"; 5 = "weekly (once a week)"; 6 = "frequently (2-4 times a week)"; and 7 = "daily."

The researcher developed survey included one open-ended question to determine the types of activities West Virginia secondary school library media specialists were helping students complete with technology tools. The *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* included four demographic questions regarding school poverty levels, educational degrees, technology training, and employment position. Finally, the survey included one question to determine future technology training needs of respondents.

Data were analyzed using SPSS 13.0. Descriptive statistics were used to illustrate frequencies, modes, medians, and standard deviations. Frequencies were calculated for the first research question to determine the yes frequency regarding presence of technology tools. The modes, medians, and standard deviations were analyzed for the research questions pertaining to level of confidence using technology tools and frequency assisting students with technology tools. Kruskal-Wallis nonparametric testing was utilized to determine significance and to identify mean rank scores among the research questions and the demographic information. This study used a p value of  $<.05$  to determine significance.

The open-ended question regarding assisting students with projects involving the use of technology tools and the final question regarding types of future technology trainings needed by the respondents were both analyzed using *Microsoft Excel* to filter and compare data. The data were examined to identify themes in written responses.

### **Demographics**

The population for this study consisted of West Virginia secondary school library media specialists. The total population of 227 West Virginia secondary school library media specialists was surveyed. The population was provided by the 2007-2008 West Virginia Department of Education database of West Virginia teachers. A target return rate of 154 for a 95% confidence level with a 4.5% margin of error was calculated using CustomInsight (n.d.). All 227 West Virginia secondary school library media specialists were sent surveys and 155 returned the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools*. This represents a 68% return rate, resulting in a

95% confidence level with a 4.4% margin of error or a 99% confidence level with a 5.8% margin of error.

### **Discussion of Findings**

Presented in this chapter are the statistical analyses of data collected via the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* given to West Virginia secondary school library media specialists. A comprehensive review of related literature revealed the importance of school library media centers and the important role of the school library media specialist (American Library Association, 2006; Brewer & Milam, 2005). Literature findings also revealed the need for students to attain 21<sup>st</sup> century skills, skills that require the use of technology tools (North Central Regional Laboratory, 2002b). Therefore, secondary school library media centers become important in students' attainment of 21<sup>st</sup> century skills due to the presence of technology tools in the media centers.

#### ***Research Question One***

Research question one asks, "What 21<sup>st</sup> century tools are available in West Virginia secondary school library media centers?" It was found that 100% of respondents have computers with Internet access and word processing software. Over 90% of respondents have presentation software, spreadsheet software, email, and electronic encyclopedias. Between 70% and 85% of school library media specialists have online databases, database software, multimedia projectors, and desktop publishing software. Between 50% and 65% of school library media specialists have digital cameras, interactive whiteboards, flatbed scanners, CD/DVD creation software, and distance learning. Twenty-five percent to 47% of school library media specialists have video

editing software, wikis, blogs, instant messaging, Web authoring software, electronic classroom responders, and podcasts. Only 15% of respondents have handhelds.

The findings point to the need for some technology tools in West Virginia secondary school library media centers in order to have available 21<sup>st</sup> century tools for student use in the attainment of 21<sup>st</sup> century skills. Handhelds were found in only 22 (15%) of 150 respondents' library media; podcasts in 36 of 147 (25%); electronic classroom responders in 41 (28%) of 148. However, 14 (58%) of 24 technology tools were found to be located in 60% or more of the respondents' library media centers. It appears that 100% of the respondents indicated the presence of computers with Internet, however 25% to 47% indicated the absence of wikis, blogs, and podcasts, all 21<sup>st</sup> century technology tools. In this case, it may be that West Virginia school library media specialists do not recognize some of the technology tools.

### ***Research Question Two***

Research question two asks, "To what extent are West Virginia secondary school library media specialists confident in utilizing 21<sup>st</sup> century tools? The cumulative mode across all 24 of the 21<sup>st</sup> century technology tools indicates that the majority of school library media specialists are "extremely confident" in their use of technology tools. A cumulative median calculated across all 24 of the 21<sup>st</sup> century technology tools shows that on average school library media specialists are "confident" using technology tools. Analysis of confidence for individual tools reveals that the majority of library media specialists are "extremely confident" in using Internet, email, word processing software, electronic encyclopedia, computer, multimedia data projector, presentation software, online database, digital camera, flatbed scanner, instant messaging, desktop publishing

software, and CD/DVD creation software. The majority of library media specialists are “Confident” in using spreadsheet software and interactive whiteboard. The majority of respondents indicated “extremely unconfident” in using the remaining nine 21<sup>st</sup> century technology tools.

Data analyses indicated that a mode score of 7, “extremely confident” was calculated for 54% of the technology tools on the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* and was the cumulative mode score for all technology tools. This is encouraging.. However, mode scores of 1, indicating “extremely unconfident,” were found to be true in using 38% of the technology tools listed on the survey. This indicates a need for West Virginia secondary school library media specialists to receive help and training in becoming more confident in the use of many types of technology tools associated with 21<sup>st</sup> century skills.

### ***Research Question Three***

Research question three asks, “How often do West Virginia secondary school library media specialists assist students in using 21<sup>st</sup> century tools?” The cumulative mode calculated across all 24 of the 21<sup>st</sup> century technology tools shows that the majority of school library media specialists “never” assist students with the use of technology tools. A cumulative median shows that on average, school library media specialists “rarely” (less than once a month)” assist students in using technology tools. Analysis of time spent assisting students based on individual tools reveals “daily” assistance with computer, Internet, word processing software, presentation software, and online databases. The majority of library media specialists responded “Frequently (2-4 times weekly)” when asked how often they assist students using electronic encyclopedias. The

majority of respondents indicated “never” in regard to assisting students with the 18 remaining 21<sup>st</sup> century technology tools. Written comments show that West Virginia secondary school library media specialists are helping students with research, presentations, and typing activities using basic technology tools, such as the Internet, *Microsoft Word*, and *Microsoft PowerPoint*

Discovering that 75% of the technology tools listed on the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* received a mode score of 1 is indication of the need for help and training of West Virginia’s school library media specialists in the area of assisting students with the use of technology tools. Students need assistance to use the technology tools if they are to become proficient in the knowledge of 21<sup>st</sup> century tool utilization. School library media specialists are key to helping students understand the importance of 21<sup>st</sup> century tools in 21<sup>st</sup> century skills attainment (Prestamo, 2000). With training and information regarding how students can best integrate 21<sup>st</sup> century technology tools into class activities, West Virginia’s school library media specialists will be equipped to help students use these technology tools effectively..

### ***Comparing Confidence Level and Frequency Assisting Students***

When comparing West Virginia school library media specialist use of technology tool confidence levels to their frequency levels assisting students with technology tools, it is discovered that technology tool confidence and frequency often overlap. School library media specialists have at the same time a mode of 1, “extremely unconfident” with technology use and a mode of 1, “never” assisting students with technology tools for the following 21<sup>st</sup> century tools: distance learning, video editing software, database software,



wikis, electronic classroom responders, blogs, Web authoring software, handhelds, and podcasts. Database software is present in 82% of all respondents' library media centers and distance learning is present in 53% of respondents' library media centers. Less than 50% of the respondents' school library media centers contain video editing software, wikis, electronic classroom responders, blogs, Web authoring software, handhelds, and podcasts.

These statistics indicate that a majority of the school library media centers have database software and distance learning, but the school library media specialists need training in order to confidently use these tools and frequently help students use them. Training with 21<sup>st</sup> century technology tools will increase confidence in use and the frequency of assisting students. School library media specialists listed the kinds of technology training they would like offered. The most frequently requested types of technology training involved interactive whiteboards, podcasts, Webpage development, blogs, handhelds, and wikis.

### ***Ancillary Findings***

Statistical significance regarding the presence of the 24 technology tools in West Virginia secondary school library media centers was found for online databases and poverty level, revealing the availability of online databases increases as poverty level decreases. Statistical significance was found for the presence of electronic classroom responders and educational degree indicating that a higher educational degree means a greater level of confidence in using electronic classroom responders. Statistical significance was indicated for interactive whiteboards, video editing software, blogs, and wikis and the number of technology trainings attended by school library media

specialists, revealing that school library media specialists who attend more training have more access to these tools. Statistical significance was found for the presence of multimedia data projectors, interactive whiteboards, database software, video editing software, desktop publishing software, electronic encyclopedias, and podcasts, and employment position, revealing that full-time school library media specialists have more access to these technology tools. Finally, statistical significance was found for the presence of spreadsheet software, video editing software, wikis, and distance learning and the existence of a computer lab in the school library media center, indicating that more of these technology tools are located in school library media centers that have computer labs.

Statistical significance related to West Virginia secondary school library media specialists' confidence in using the 24 technology tools was found for distance learning and poverty level, revealing that confidence is higher for school library media specialists in "high" and "very high" poverty schools. Statistical significance relating to confidence level was found for CD/DVD creation software and educational degree, indicating school library media specialists are more confident using this technology tool when they have a higher educational degree; however, the *N* for the higher levels of degree, i.e., Education Specialist, Doctorate, and Library Media Specialist was too small to be considered significant. Statistical significance regarding confidence level was found for computers, multimedia data projectors, interactive whiteboards, presentation software, video editing software, electronic encyclopedias, online databases, blogs, and wikis and the number of technology trainings attended by school library media specialists. More training is indicative of greater confidence in using computers, multimedia data projectors,

presentation software, and blogs. Statistical significance relating to level of confidence was found for handhelds and employment position, indicating that confidence in use of handhelds is higher for full-time school library media specialists. Statistical significance relating to level of confidence was found for distance learning and the existence of a computer lab in the school library media center, showing the presence of a computer lab in a school library media center leads to higher confidence in use of distance learning for school library media specialists.

Statistical significance based on how often West Virginia secondary school library media specialists assist students with 24 technology tools was found related to interactive whiteboards, presentation software, and instant messaging and number of technology trainings attended by school library media specialists, revealing that training may increase how often school library media specialists assist students with these technology tools. Statistical significance based on how often school library media specialists assist students was found for presentation software and employment position, showing half-time school library media specialists assist students more often than other employment positions. Statistical significance based on how often school library media specialists assist students was found for computers, presentation software, and wikis and the existence of a computer lab in the school library media center, indicating school library media specialists assist students more frequently with these tools when a computer lab is present in the school library media center.

### **Findings Related to the Literature**

Findings from this study paralleled the reviewed literature. Analyses of data gathered as a result of this study provided connections to the reviewed literature

involving the important role West Virginia secondary school library media centers play in housing 21<sup>st</sup> century tools. Findings of this study also supplied connections to the literature with regard to West Virginia secondary school library media specialists and their role in assisting students in the completion of assignments using technology tools. Data from this study related to the reviewed literature by indicating that West Virginia secondary school library media specialists possess technology skills necessary to effectively utilize many 21<sup>st</sup> century tools.

### ***Presence of 21<sup>st</sup> Century Technology Tools***

Reviewed literature revealed that the school library media center has become the academic hub of technology and 21<sup>st</sup> century tools (American Library Association, 2006; Lance, 2001). The West Virginia Department of Education in, 1996, established the SUCCESS Initiative as a means of providing quality technology tools in West Virginia's secondary schools. SUCCESS – now called Tools for Schools Secondary - provides technology tools that help prepare students in grades seven through 12 to succeed in post-secondary education or successful job placement (West Virginia Department of Education Office of Technology, n.d.b). These 21<sup>st</sup> century technology tools are often located in school library media centers as the library media center is a common place for students to find and use technology (Lance, 2002). Results from this study indicated that West Virginia secondary school library media centers play an important role in students' use of technology tools by being the location where these technology tools can be accessed. Findings indicated that of the 24 technology tools listed on the survey, 14 of them were found in 60% or more of the library media centers, demonstrating the important role that school library media centers play in providing needed 21<sup>st</sup> century

tools to students. However, the fact that the 10 remaining tools are available in less than 60% of media centers is also an indication of the lack of readiness, and need for additional resources in many secondary school library media centers in West Virginia. As the literature indicates, these tools are needed to provide necessary 21<sup>st</sup> century technology tools to students.

### ***West Virginia School Library Media Specialist Role and Confidence with 21<sup>st</sup> Century Technology Tools***

In July 2006, the West Virginia Department of Education's Office of Technology implemented an initiative that provided training for secondary school library media specialists in order to "enhance their knowledge (of) and skills (with)... technology" (West Virginia Department of Education Office of Technology, 2007, ¶ 2). The West Virginia Library Media Technology Integration Specialist Initiative is evidence of the important role technology plays in the job of a school library media specialist. The West Virginia Department of Education recognizes the important role the school library media specialist plays with technology by providing additional training for these individuals in order to help them use 21<sup>st</sup> century technology tools effectively. DeGroff (1997) surveyed educators and school administrators concerning the role of school library media specialists. She found that teachers and administrators place high value on the library media specialist as information specialist and instructional consultant. Her research indicates that library media specialists are needed and valued.

It then becomes imperative for West Virginia's school library media specialists to gain confidence in using 21<sup>st</sup> century technology tools. Tilke (1999) and Turner (2005) indicated technology skills that all library media specialists should possess. These skills

include using 21<sup>st</sup> century technology tools in the library media center to aid in the daily functions of the school library media specialist. “Technology illiteracy” (Turner, 2005) is no longer acceptable for the school library media specialist.

West Virginia school library media specialists’ confidence in using 21<sup>st</sup> century technology tools was measured on the *West Virginia Secondary School Library Media Specialist Survey of Technology Tools* via respondents rating of their confidence level in using specific technology tools. West Virginia library media specialists indicated being “Extremely confident” in Web navigation, communication, word processing, digital resources acquisition, file storage, file management, electronic presentation, databases, digital cameras, and flatbed scanners. As this study indicates, West Virginia school library media specialists are confident in using many 21<sup>st</sup> century technology tools. Out of the 24 technology tools, school library media specialists were “extremely unconfident” using nine of them – distance learning, blogs, wikis, video editing software, handhelds, database software, electronic classroom responders, Web authoring software, and podcasts.

#### ***West Virginia School Library Media Specialists Assist Students with Technology Tools***

School library media specialists are becoming more adept with 21<sup>st</sup> technology tools as their roles are evolving to include assisting students with technology. *Information Power: Building Partnerships for Learning* (American Association of School Librarians and the Association for Educational Communications and Technology, 1998) stated that school library media specialists are integrating technology tools with student activities and assignments. Research from the Dewitt-Wallace Reader’s Digest Fund (n.d.) found that school library media specialists are using technology in ways that support the school

curriculum. Brewer and Milam's research (2005) illustrated that library media specialists' roles are changing and evolving, taking on more responsibilities with regards to technology as 40% of the school library media specialists in their study helped students use technology. Eight-one percent of the school library media specialist in the Brewer and Milam study trained teachers in the use of technology so that these teachers could then help students. These findings are evidence of the important role of school library media specialists in assisting students with the use of 21<sup>st</sup> century technology tools.

West Virginia school library media specialists indicated in the open-ended question that they were assisting students with 21<sup>st</sup> century technology tools in the creation of projects and completion of activities. However, the activities that they listed involved mostly the use of word processing software, presentation software, and Internet. Also, statistics from the survey found that the cumulative mode calculated across all 24 technology tools shows that the majority of school library media specialists "never" assist students with the use of technology tools. Though literature indicates that school library media specialists are assisting students with 21<sup>st</sup> century technology tools, West Virginia's school library media specialists indicate that they assisting students with traditional technology tools, i.e. computers and Internet, but not with the full range of 21<sup>st</sup> century technology tools covered in the literature.

### **Implications for Action**

Kruskal-Wallis Mean Ranks Employment Position and Confidence Level Results garnered from this study provide valuable information that could be used to direct West Virginia policy and help guide decisions made by the West Virginia Department of Education 21<sup>st</sup> Century skills initiative, creators of professional development for

educators, designers of library media courses for institutions of higher learning, and local school districts. Technology integration is a key component of the West Virginia Content Standards and Objectives (West Virginia Department of Education, n.d.a). As such, the proper, effective use of technology tools is essential for student success. West Virginia secondary school library media specialists are important factors in students utilizing these tools. Results from this survey will help policymakers and administrators plan for successful trainings and instruction, prepare for effective utilization of technology funds, and propose appropriate legislation to ensure continued support of 21<sup>st</sup> century tools integration.

### ***Implications for Increasing Availability of 21<sup>st</sup> Century Tools***

Availability of 21<sup>st</sup> century tools is tantamount to the successful attainment of 21<sup>st</sup> century skills. Less than 50% of the respondents indicated their school library media centers had video editing software, wikis, blogs, instant messaging, Web authoring software, electronic classroom responders, podcasts, and handhelds. Though the survey found computers with Internet in 100% of West Virginia secondary school library media centers, the school library media specialists still indicated in many cases that wikis, blogs, and podcasts were not in their library media centers. Wikis, blogs, and podcasts are associated with the Internet, therefore awareness of 21<sup>st</sup> century technology tools must also be addressed with West Virginia's school library media specialists. Funding is essential in order to ensure the presence of necessary 21<sup>st</sup> century tools. Policymakers must continue to provide support for the funding of technology tools in West Virginia's secondary schools. The state's collaboration with the Partnership for 21<sup>st</sup> Century Skills indicates a commitment to the continued support of technology in schools, and this



collaboration should continue, as it is vital to successful implementation of 21<sup>st</sup> century tools in West Virginia’s classrooms.

Individuals with vested interest could use the following recommendations to assure availability of 21<sup>st</sup> century technology tools in West Virginia secondary school library media centers.

1. Ensure that higher poverty schools’ library media centers have appropriate types of 21<sup>st</sup> century tools available for use by students and staff.
2. Continue and improve financial support at state and district levels for the purchase of 21<sup>st</sup> century tools placed in West Virginia secondary school library media centers.

### ***Implications for Increasing 21<sup>st</sup> Century Tool Confidence Level***

Data analyses regarding the confidence level of surveyed West Virginia secondary school library media specialists in using technology revealed that West Virginia school library media specialists are “extremely unconfident” in using 9 of the 24 technology tools. The data indicates a need for West Virginia secondary school library media specialists to receive help in the effective use and integration of technology tools. Training is an important component in assisting West Virginia’s school library media specialists in becoming confident in using 21<sup>st</sup> century technology tools. Trainers should be aware that the library media specialists are “extremely confident” in using many technology tools and “tap into” this confidence to introduce new technology tools and new means of integration.

Ancillary findings indicate the need for technology training. Incidences of technology training attended by West Virginia secondary school library media specialists

were found to have an effect on confidence in using 21<sup>st</sup> century technology tools. Professional development and continuing education provided by the West Virginia Department of Education and local school districts is necessary in helping West Virginia secondary school library media specialists become confident in using technology tools identified as components of 21<sup>st</sup> century skills and learning. Institutions of higher education must include technology training as part of their curriculum regarding school library media courses. Training should be specific and timely, relating to particular needs of the library media specialists. In this manner, West Virginia secondary school library media specialists will receive the skills and abilities necessary to effectively carry out their jobs.

Individuals with vested interest could use the following recommendations to help increase the confidence level of West Virginia secondary school library media specialists in using 21<sup>st</sup> century technology tools.

1. Provide relevant hands-on technology training involving 21<sup>st</sup> century tools at appropriate times at local school district and state levels for West Virginia secondary school library media specialists.
2. Develop procedures for technology expenditures to ensure inclusion of appropriate levels of funding for technology related professional development.
3. Design a long-term, comprehensive plan that involves all stakeholders at the state and district level for technology related professional development with continuous revision of the plan. This plan must include technology integration and involve school library media specialists and teachers.

4. Designate resources for the West Virginia Department of Education to provide Web-based technology training opportunities for West Virginia secondary school library media specialists and teachers.
5. Provide opportunities for institutions of higher education to collaborate with the West Virginia Department of Education in developing courses in technology integration.
6. Design a wiki for West Virginia secondary school library media specialists to share ideas, questions, and accomplishments as a means of nurturing continued dialogue concerning integration of technology.

***Implications for Increasing Frequency Assisting Students with 21<sup>st</sup> Century Tools***

According to this study, school library media specialists “never” assist students with 18 of the 24 technology tools. In order for students to properly use technology tools, they must first be made aware of the technology tools’ presence and understand the purpose and role of technology tools. Teachers and school library media specialists must also understand how technology tools can have an impact on the education of students and how to correctly integrate technology tools into school curriculum. School districts and the West Virginia Department of Education should provide technology training opportunities for teachers and school library media specialists to learn correct implementation and integration of 21<sup>st</sup> century technology tools. Institutions of higher education must realize the important role technology tools play in the education of West Virginia children and include technology integration strategies in all curriculum courses and in library media specialist training courses.

Individuals with vested interest could use the following recommendations to help increase the frequency that West Virginia school library media specialists are assisting students with 21<sup>st</sup> century technology tools.

1. Design summer academies for students at the district level to introduce 21<sup>st</sup> century technology tool use, implementation, and integration. Students need 21<sup>st</sup> century technology tool awareness so they understand the role of technology tools and how to implement them for educational purposes.
2. Develop recognition opportunities to identify and celebrate unique and effective technology integration activities carried out by West Virginia secondary school library media specialists.
3. Provide technology academies for library media specialists at the district level to introduce effective ways to involve students in utilizing 21<sup>st</sup> century technology tools and to model effective techniques of student assistance for using 21<sup>st</sup> century technology tools.

### **Recommendations for Further Research**

“The library media specialist’s role must evolve as a key collaborator with teachers and students in developing information literacy” (West Virginia Department of Education, 2007, ¶ 3) – literacy which requires the use of 21<sup>st</sup> century tools. This study provided insight and information into current attitudes and perceptions of West Virginia secondary school library media specialists regarding 21<sup>st</sup> century tools. The study also raises questions that require continued research and investigation. Recommendations for further research involve:

1. The study did not survey secondary school library media specialists outside West Virginia. Further research could examine technology tools related to library media specialists in other states to compare results with the findings from this study.
2. The study did not survey elementary school library media specialists in West Virginia. Further research could examine the presence of technology tools, the confidence level of technology tool use, and the frequency in assisting students with technology tool use at the elementary level to determine technology training needs. By addressing technology training needs at the elementary level, technology training needs at the secondary level could possibly change in focus and frequency.
3. The study did not survey West Virginia secondary school students to determine the ways they are utilizing 21<sup>st</sup> century technology tools. Further research could examine frequency of use and type of use of 21<sup>st</sup> century technology tools by West Virginia secondary school students, along with the types of 21<sup>st</sup> century skills these students are obtaining.
4. The study did not ask West Virginia secondary school media specialists if and how frequently they assist teachers and administrators in the use of technology tools. Further research could examine the types of activities library media specialists are helping teachers and administrators carry out.
5. Further research could examine principals' and teachers' perceptions of the roles of school library media specialists and school library media centers.
6. West Virginia secondary school library media specialists were found infrequently to assist students with technology tools. Further research could examine in depth

factors involved in assisting students with technology tools, i.e. training, funding, time.

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## APPENDICES

## **Appendix A: Survey**

# West Virginia Secondary School Library Media Specialist Survey of Technology Tools

## Part I. Following is a list of technology tools.

In the **Available Column**, please circle **yes** if the tool is available in or accessible from your library media center or circle **no** if it is not.

In the **Level of Confidence Column**, please rate to what extent you are confident in using each tool on a scale of 1 to 7:

- 1=extremely unconfident
- 2=mostly unconfident
- 3=slightly unconfident
- 4=slightly confident

- 5=mostly confident
- 6=confident
- 7=extremely confident

In the **Frequency Assisting Students Column**, please rate how often you help students use each tool on a scale of 1 to 7:

- 1=never
- 2=rarely (less than once a month)
- 3=monthly (once a month)
- 4=occasionally (2-3 times a month)

- 5=weekly (once a week)
- 6=frequently (2-4 times a week)
- 7=daily

Technology Tools	Available		Level of Confidence							Frequency Assisting Students						
	Yes	No	1	2	3	4	5	6	7	1	2	3	4	5	6	7
1. Computer(s)																
2. Handheld(s) (Palm, iPod, etc.)																
3. Flatbed Scanner(s)																
4. Digital Camera(s)																
5. Multimedia Data Projector(s)																
6. Interactive Whiteboard(s)																
7. Word Processing Software (MS Word, etc.)																
8. Presentation Software (MS PowerPoint, etc.)																
9. Spreadsheet Software (MS Excel, etc.)																
10. Database Software (MS Access, etc.)																
11. Video Editing Software (MS Movie Maker, etc.)																
12. Desktop Publishing Software (MS Publisher, etc.)																
13. Web Authoring Software (MS FrontPage, etc.)																
14. CD or DVD Creation Software																
15. Electronic Encyclopedias (CD, Online, etc.)																
16. Email																
17. Internet																
18. Online Databases (EbscoHost, etc.)																
19. Blogs																
20. Podcasts																
21. Wikis																
22. Distance Learning (WV Virtual School, etc.)																
23. Instant Messaging																
24. Electronic Classroom Responders																
<b>Please list below any other technology tools available in the media center.</b>																
25. Other: _____	Yes	No														
26. Other: _____	Yes	No														
27. Other: _____	Yes	No														

**Part II. Please describe one or two activities (involving technology tools) that you help students complete.**

**Part III. Please complete the following:**

**1. Indicate the poverty level status of your school (please select one):**

- Low poverty (poverty levels below 35%)  
 Medium poverty (poverty levels between 35-50%)  
 High poverty (poverty levels between 50-75%)  
 Very high poverty (poverty levels above 75%)

**\*poverty level is calculated as the percentage of students approved for free or reduced-price lunch**

**2. Please indicate your degree(s) and/or certification(s) including your major or area of concentration:**

- B.A. / B.S.                       Ed.S.                       Library Media Specialist Cert.  
 M.A. / M.S.                       Ph.D. / Ed.D.                       Other \_\_\_\_\_

**3. Please indicate any technology training that you have received:**

- Undergraduate Courses                       Continuing Education                       Intel Teach Program  
 Graduate Courses                       TIS Training                       WVDE Sponsored 21<sup>st</sup> Century Training  
 Other \_\_\_\_\_

**4. Please indicate your current position(s):**

- Full-Time Library Media Specialist at this school  
 Library Media Specialist and Teacher at this school  
 Library Media Specialist at this school and another school  
 Other \_\_\_\_\_

**5. Does your library media center contain a computer lab?     Yes                       No**

**If yes, how many computers are in the lab? \_\_\_\_\_**

**6. Please indicate types of technology training that you would find beneficial:**

**Thank you for participating in this study.**

If you have lost or misplaced the return envelope, please mail to:

Kim Sigman    1 Alba Drive    Winfield, WV 25213

## **Appendix B: Panel of Experts**

### **Panel of Experts**

- Mary Beckelhimer, Director of Technology, Putnam County Schools, Winfield, WV
- Dixie Billheimer, Director of Principal Programs and Instructional Technology, West Virginia Center for Professional Development, Charleston, WV
- Chris Deluca, Computer Specialist, Putnam County Schools, Winfield, WV
- Robert Hull, Assistant Superintendent, Putnam County Schools, Winfield, WV
- Edna Meisel, Assistant Professor, Marshall University Graduate College, South Charleston, WV
- Dale Slack, Computer Curriculum Specialist, Putnam County Schools, Winfield, WV

## **Appendix C: Content Validity Questions**



### **Content Validity Questions**

1. Will the words be uniformly understood?
2. Do the questions contain abbreviations or unconventional phrases?
3. Are the questions too vague?
4. Is the question too precise?
5. Is the question biased?
6. Is the question objectionable?
7. Is the question too demanding?
8. Is it a double question?
9. Does the question have a double negative?
10. Are the answer choices mutually exclusive?
11. Has the researcher assumed too much knowledge?
12. Has too much been assumed about respondent behavior?
13. Is the question technically accurate?

(Dillman, 1978, pp. 99-114).

## **Appendix D: Cover Letter for Survey**

DATE

NAME

ADDRESS

Dear,

My name is Kim Sigman and I am a Marshall University doctoral student majoring in Curriculum and Instruction. I am writing to ask your help with a study of West Virginia secondary school library media specialists being conducted as part of the requirements for completing my doctorate. Your opinions will be very important to the success of the study.

It is my understanding that you have experience as a middle/junior high school or high school librarian or library media specialist. Your name was selected randomly from a list of West Virginia secondary school librarians or library media specialists. The survey will ask you about the availability of 21<sup>st</sup> century tools in your library/media center, your confidence in using these tools, and your frequency in helping students use these tools.

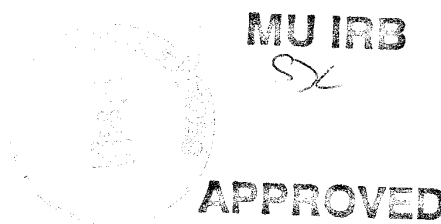
Your answers are completely confidential. Data will be reported in aggregate form only with no identification of individuals. The identifying number on the survey will only be used as a method to send follow-up surveys to non-responders. When you return your completed survey, your name will be deleted from the mailing list. Your name is not connected to your answers in any way. This survey is voluntary and you may decline to participate without penalty. If you have any questions concerning your rights as a research participant, you may contact the Marshall University Office of Research Integrity at (304) 696-7320.

Results from the survey will be used to help make decisions regarding the availability and use of 21<sup>st</sup> century tools. If you would like to receive more information about the results of the survey, please write your name and mailing address on the return envelope, not the survey, to ensure confidentiality. If you have additional questions, you may contact me at 304-586-3784, 304-552-8688 or by email at [ksigman@access.k12.wv.us](mailto:ksigman@access.k12.wv.us).

Please answer all questions as honestly and accurately as possible. Please return all responses by DATE in the enclosed, stamped self-addressed envelope. Please accept my gratitude in advance for your cooperation and timely participation in this research study.

Sincerely,

Kim Sigman



## **Appendix E: Postcard Reminder**

DATE

Dear Library Media Specialist,

Last week a survey seeking your input regarding 21<sup>st</sup> century tools in your library media center was mailed to you. Your name was randomly chosen from a list of West Virginia librarians. If you have already completed and returned the survey, please accept my genuine thanks. If you have not returned the survey, please do so by DATE. I am especially grateful for your input because when individuals are willing to share experiences and opinions, an understanding of the important role technology tools play in our schools' media centers and with our schools' children can be gleaned. If you did not receive a survey, or if it was misplaced, please contact me at 304-586-3783 or by email at [ksigman@access.k12.wv.us](mailto:ksigman@access.k12.wv.us) and another survey will be sent to you.

Thank you,  
Kim Sigman

MU IRB  
SDC

APPROVED

**Appendix F: Cover Letter for Replacement Survey**

DATE

NAME  
ADDRESS

Dear,

Approximately three weeks ago I sent a survey to you that required your input on the types of 21<sup>st</sup> century tools in your library media center, your confidence in using the tools, and your frequency in helping students use the tools. If you have already returned the survey, please disregard this letter.

The results of the survey will be very useful to state leaders and others. While your participation is voluntary, your response will greatly increase the strength of the study. Although I sent surveys around the state, it is important to hear from everyone in the sample so that the results are representative of the entire state.

Protecting the confidentiality of every person is important to this study. The survey identification number is printed on the corner so that I can check your name off the mailing list when it is returned. The list is then destroyed so that individual names cannot be connected to the results in any way. Your participation is purely voluntary and there is no penalty for declining to participate.

I hope that you will fill out and return the survey by DATE using the stamped, self-addressed envelope. Please contact me at 304-586-3783 or by email at [ksigman@access.k12.wv.us](mailto:ksigman@access.k12.wv.us) if you have any questions or would like additional information about this study. Thank you very much for taking time from your busy schedule to help with this important study.

Sincerely,

Kim Sigman

MU IRB

SDC

APPROVED

## **Appendix G: Marshall Institutional Review Board Documents**





Office of Research Integrity  
Institutional Review Board

Friday, February 29, 2008

Lisa A. Heaton, Ph.D.  
Education and Professional Development  
100 Angus E. Peyton Dr.  
South Charleston, WV. 25303

RE: IRB Study # EX08-0088    **At:** Marshall IRB 2

Dear Dr. Heaton:


**Protocol Title:**  
West Virginia Secondary School Library Media Specialist Survey of Technology Tools

**Expiration Date:** 2/27/2009  
**Our Internal #:** 4533  
**Type of Change:** (Other) Exempted  
**Expedited ?:**   
**Date of Change:** 2/29/2008  
**Date Received:** 2/29/2008  
**On Meeting Date:**

**Description:** In accordance with 45CFR46.101(b)(2), the above study and informed consent were granted Exempted approval today by the Marshall University IRB#2 Chair for the period of 12 months. The approval will expire 2/27/09. A continuing review request for this study must be submitted no later than 30 days prior to the expiration date. This study is for student Kim Sigman.

The purpose of this survey study is to ascertain the types of 21st century tools available in school library media centers, how comfortable school library media specialists are in using the tools, and how often school library media specialists help students use the tools so that effective learning can occur.

Respectfully yours,

  
Stéphen D. Cooper, Ph.D.  
Marshall University IRB #2 Chairperson

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