How teacher-librarians can effectively support technology integration in 21st century schools

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How teacher-librarians can effectively support technology integration in 21st century schools

Abstract
Schools and the role of the teacher-librarian are rapidly changing as we begin the twenty-first century. This review examines the historical and current role of teacher-librarians, concepts of information literacy and technology integration, and how teacher-librarians can integrate these skills in twenty-first century schools. New technologies and how teacher-librarians can gain support for their new role are also examined.

Through an extensive literature review and synthesis of information, a series of five research questions are evaluated. This review shows that the teacher-librarian's role has changed dramatically in the last twenty-five years. By emphasizing information literacy and technology integration into both library programs and other curriculum areas, teacher-librarians can be more effective and efficient leaders in their schools. The key is for teacher-librarians to become more aggressive in advocating their knowledge, skills and abilities for meeting the changing demands.
HOW TEACHER-LIBRARIANS CAN EFFECTIVELY SUPPORT
TECHNOLOGY INTEGRATION IN 21ST CENTURY SCHOOLS

A Graduate Research Paper
Submitted to the
Division of Instructional Technology
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ABSTRACT

Schools and the role of the teacher-librarian are rapidly changing as we begin the twenty-first century. This review examines the historical and current role of teacher-librarians, concepts of information literacy and technology integration, and how teacher-librarians can integrate these skills in twenty-first century schools. New technologies and how teacher-librarians can gain support for their new role are also examined. Through an extensive literature review and synthesis of information, a series of five research questions are evaluated. This review shows that the teacher-librarian’s role has changed dramatically in the last twenty-five years. By emphasizing information literacy and technology integration into both library programs and other curriculum areas, teacher-librarians can be more effective and efficient leaders in their schools. The key is for teacher-librarians to become more aggressive in advocating their knowledge, skills and abilities for meeting the changing demands.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABSTRACT</td>
<td>iii</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>METHODOLOGY</td>
<td>5</td>
</tr>
<tr>
<td>ANALYSIS AND DISCUSSION</td>
<td>7</td>
</tr>
<tr>
<td>The Teacher-Librarian’s Changing Role</td>
<td>7</td>
</tr>
<tr>
<td>Information Literacy and Technology Integration</td>
<td>11</td>
</tr>
<tr>
<td>Impact Within School Systems</td>
<td>15</td>
</tr>
<tr>
<td>Types of Resources for Integration</td>
<td>19</td>
</tr>
<tr>
<td>Blogs</td>
<td>20</td>
</tr>
<tr>
<td>Podcasts</td>
<td>21</td>
</tr>
<tr>
<td>Wikis</td>
<td>23</td>
</tr>
<tr>
<td>Library Websites</td>
<td>25</td>
</tr>
<tr>
<td>Support from Administrators</td>
<td>26</td>
</tr>
<tr>
<td>CONCLUSION AND RECOMMENDATIONS</td>
<td>30</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>34</td>
</tr>
</tbody>
</table>
INTRODUCTION

Twenty-first century students are growing up in an information age with easy access to an abundance of information from all types of media. They are being exposed to this information long before they start school. To more effectively meet the needs and demands of this rapidly changing audience, twenty-first century schools must also change their educational approach and resources. This includes reevaluating the use of many different and rapidly changing forms of technology, as well as staffing changes. This review examines one of those staff changes, specifically the role of teacher-librarians and how they can help meet those changing needs more efficiently and effectively.

Inside and outside of the classroom, students are seeking out and spending large portions of their days using wikis, blogs, word-processing programs, spreadsheets, databases, chat rooms, and social networking websites for personal and academic purposes. These resources are influencing how our students interact with the world. Gwen Solomon, Director of techLEARNING.com and contributing editor for the journal, Technology and Learning, and Lynne Schrum, a professor and coordinator of elementary education at George Mason University, state: “The changing nature of information and the new ways our students understand and make sense of the world signal that we need new strategies and new tools for teaching and learning” (2007, p. 1).

As students walk through school hallways, they are taking pictures, text messaging, searching the Internet, checking emails, and calling friends on their cell phones. They are also accessing more information for school assignments through the Internet using search engines such as Google or Yahoo. With No Child Left Behind, schools are being held more and more accountable for what they are teaching, therefore it
is no longer as important to teach these students how to use technology as it is to teach them how to develop skills and strategies for learning in dynamic environments where information constantly changes (Kuhlthau, 1999, p. 7).

As the traditional keepers of information, it is only logical that teacher-librarians act as intermediaries between students, teachers, parents, and administrators to ensure that the information being gathered is accurate, appropriate, and properly interpreted. As such, the twenty-first century teacher-librarian is being called upon to introduce students to appropriate technology resources and to provide them with the skills they need to effectively gather and interpret the information that is available from various resources. As intermediaries, teacher-librarians can also play a key role in providing support for other teachers by helping them integrate these new forms of technology into their twenty-first century classrooms.

Most teacher-librarians agree that their role within the school is changing and many wonder how those changes will affect the profession itself. In an article by Carol Kuhlthau (1999) within Barbara Stripling’s book, *Learning and Libraries in an Information Age*, Kuhlthau writes:

Information-age schools have to be restructured around an inquiry approach to learning rather than a transmission approach to teaching....In the information-age school, the library is an extension of the classroom, integrated into the curriculum, providing opportunities and resources for students to pursue their lines of inquiry and construct their own meaning. (p. 9–10)
To examine how teacher-librarians can more effectively encourage technology integration into schools, there are five important questions that need to be investigated. These include:

1. How has the teacher-librarian’s role changed in the past century?
2. What does a teacher-librarian mean by information literacy and technology integration?
3. How can teacher-librarians most effectively and efficiently integrate those skills and tools into school systems?
4. What types of resources can teacher-librarians use to achieve this integration?
5. How can teacher-librarians gain support from school administrators to meet the challenges of their new role?

This research paper examines each of the questions listed above by reviewing what has been published in various books, journals, and other resources (e.g., online). It examines the changing roles that teacher-librarians are facing and provides suggestions on how they can be more effective and therefore an asset to their school systems. Changes needed within school management to accommodate the twenty-first century teacher-librarian are also examined.

The results of this literature review can be used to help define the job description for the twenty-first century school librarians. This is important because currently there “…does not seem to be agreement among teacher-librarians about their role in education…even with the existence of national and state standards…” (Loertscher, 2006, ¶ 2). By clarifying the new job description for teacher-librarians, they will know what is expected of them and how to better communicate their role to administrators or other
teachers within the school. A key part of this alteration in the job description is the addition of supporting technology integration. This review provides specific examples of new technology resources that teacher-librarians can use to enhance information delivery, interpretation, and understanding. It also emphasizes the need for teacher-librarians to encourage technology integration within their classrooms and by other teachers. This is important because as schools and students change, a subset of people may begin to think that library programs are a thing of the past. To prove this notion is incorrect, teacher-librarians must show that there are many ways they can support student achievement and be of value to the entire school.
METHODOLOGY

To fully answer the research questions that were proposed above, many diverse but valuable resources were examined. The primary source of this information was the University of Northern Iowa Rod Library's online databases, accessed through Panther Prowler. These databases included InfoTrac, WilsonWeb, Education Full Text, and ERIC (Educational Resources Information Center). These resources allowed general keyword searching, as well as more extensive Boolean search statements. The initial keyword descriptors included: librarian, technology integration, roles, media specialist, and job description. Other keyword descriptors included: library instruction, curriculum, library skills, information literacy, school library, student learning, school achievement, and educational extension. Before initiating the literature search, a list of detailed criteria for evaluating the information used and cited throughout this report was developed. These criteria included:

1. What authority does the author have on the topic?
2. Is the information relevant, verifiable, and authentic to the topic?
3. How accurate, objective, and balanced is the article or information?
4. Is the information current? Was it published within the last ten years (1998 – 2008)?
5. Where else was the information used?
6. Is the article offered in a clear and organized manner?

Resources beyond the UNI online databases were also used throughout the search process. These included published works and resources obtained through Internet searches, especially using the Google Scholar search engine. The published works,
especially those cited in other research papers, which provided important information and were deemed worthy of reference, were included in this report. For references from the World Wide Web, the researcher knew that it was important to verify the information using the same criteria that was established for the online databases. This was critical because the researcher recognizes that anyone can publish information online, even when that information is false or misleading. A prudent degree of caution was exercised because the researcher wanted this review to be useful to other teacher-librarians, students, and administrators and also expects to use it as a starting point for more detailed research examining how technology integration is influencing the evolution of school libraries.
ANALYSIS AND DISCUSSION

The Teacher-Librarian’s Changing Role

Prior to the 1980s, the traditional role of the school librarian was to be the keeper of information. Libraries acted as solitary locations to store materials so that everyone would have access to them. Librarians were in charge of maintaining a current, comprehensive collection of materials including budgeting and checking resources in and out for students and teachers. School librarians were considered the keepers of information because they knew where the books were kept that could help students. School librarians also worked to help identify and locate resources and share information with students and staff. Traditionally, school librarians held a limited teaching role and would usually only teach students and teachers how to use the card catalog, locate materials in the library, skim read, and take notes (Kapitzke, 2001). This role and system of print-based informational management, retrieval, and use remained largely unchanged for thousands of years until two decades ago (Kapitzke, 2001, ¶ 3). By the end of the twentieth century, through school reforms and advances in technology resources librarians slowly saw their role and job title evolve to include more and more responsibilities.

Even in the 1980s the main role of school librarians was to be an individual who dispersed information to students, knew what materials to use, and where to find them. The majority of these sources revolved around printed materials. However, with the advancement of computer technology, school librarians became media specialists as library resources changed dramatically from strictly printed resources to suites of information containing both print and electronic sources, such as filmstrips and cameras.
(American Association of School Librarians [AASL] & Association for Educational Communication and Technology [AECT], 1998). Most of these original non-print resources have been replaced by an ever-increasing array of computer technologies. In response, administrators, teachers, and students began to see librarians as the people who could teach them not only about print resources but also technologies in other formats.

As the twenty-first century begins, school librarians are again seeing a change in their roles and responsibilities. They are becoming collaborative partners and teachers rather than simply resource persons (AASL & AECT, 1998). This change has been caused largely by the rapid integration of computer technology into student curricula and school districts in general. With this change in role and responsibility, job titles for school librarians have been changed to teacher-librarian to reflect the expanded role they play in the academic arena.

Consistent with the change in professional title, teacher-librarians now have a variety of roles (AASL & AECT, 1998) including providing numerous types of services to students, teachers, parents, and administrators. According to Information Power, the current job description for teacher-librarians contains four different roles and should be written to state that:

As [a] teacher, the library media specialist [LMS] collaborates with students...to analyze learning and information needs, to locate and use resources...as [an] instructional partner, the [LMS]...takes a leading role in developing policies, practices, and curricula...as [an] information specialist, the [LMS] provides leadership and expertise in acquiring and evaluating information resources in all formats...[and] as [a] program administrator, the [LMS] works collaboratively
with members of the learning community to define the policies of the library media program and to guide and direct all the activities related to it (AASL & AECT, 1998, p. 4-5).

Other authors, such as Serim (2003) and Doiron (1999), have described the changing role of teacher-librarians similarly, although they have used job titles such as information specialist and school library media specialist instead of teacher-librarian. Serim describes the teacher-librarian’s role as:

As a teacher, in collaboration with other educators, the information specialist assists members of the learning community with the integration of information literacy and information technology skills across the curriculum. As an instructional partner, the information specialist provides instructional leadership for educators and parents to integrate information literacy and technology experiences across the curriculum. As a program administrator, the information specialist develops, administers, assesses, and manages programs and facilities for the use of information resources and technologies. (2003, p. 82-83)

Doiron describes the teacher-librarian’s role as:

Teacher-librarians have four major components to the roles they play in the development of a school library program. They act as instructional leaders; they work in partnerships with classroom teachers to develop curriculum; they champion the cause of school libraries through various advocacy programs; and they manage a budget, a support staff and a set of learning resources. (1999, ¶ 2)

All three job descriptions show the increasing influence that teacher-librarians are expected to have within schools and on the students’ total learning experience.
Through school library programs, teacher-librarians help students make the same types of connections to information inside the school as the students do outside the classroom. A critical difference is that teacher-librarians can also help the students understand how to evaluate the information they are getting and to determine if it is accurate and reliable (Ellis & Lenk, 2001). Teacher-librarians provide a variety of resources not only to students but also to all members of the learning community. This includes technology integration, through which the teacher-librarian finds ways to collate with other teachers and helps them enhance their curricula by incorporating computers, Internet access, videos, and many other ever-changing technological resources into classrooms (Asselin, 2004).

Larry Cuban, in his book, *Teachers and Machines*, defines technology integration in a slightly different way. He states that it is “...any device available to teachers for use in instructing students in a more efficient and stimulating manner than the sole use of the teacher’s voice” (1986, p. 4). As Smith (2002) describes, an important reason for having modern school library programs is to enable teacher-librarians to improve the information literacy skills for both students and teachers. It is through this enhanced information literacy that they can locate, evaluate, and utilize the information resources more efficiently and effectively. In addition to these services, teacher-librarians and school library programs provide students and teachers with a resource center where they can access a wide variety of media, books, and technology. This is very important because as surprising as it may be to many college graduates, there are many learners who do not have access to even the simplest computer within their homes. Libraries and teacher-
librarians can thus provide the access needed to succeed in the twenty-first century technology age (Smith, 2002).

Teacher-librarians are now being called upon to provide information on a wide variety of available resources. Valenza (2007) provides the example of providing reliable links to Internet websites through the library so that students can complete homework assignments and teachers can develop more effective lesson plans. Teacher-librarians are called upon to create pathfinders, which are guides students and teachers can use to locate all types of information sources as they study specific topics. Teacher-librarians are also asked to teach students and other teachers how to use various computer programs in addition to being able to find books for them to read as well as guiding them to the information needed to improve a myriad of other skills (Valenza, 2007).

Information Literacy and Technology Integration

Having examined the teacher-librarian's role as it has changed over time, especially in the last twenty-five years, the next question to examine is what does information literacy and technology integration really mean. These terms can be defined in multiple ways, but one of the most important points to understand is that information is more than just the printed word (Mednick, 2002). Literacy now “...includes much more than a knowledge of the traditional language arts; it also involves interpreting and constructing in visual and other symbolic worlds....Literacy requires active listening to and active reading of both paper and electronic language-based verbal messages” (Valmont, 2003, p. 92). Informational literacy therefore includes being able to use and make meaning from multiple sources such as print materials, visual resources, and/or computers. It is also important to recognize that information literacy definitions are
continually changing as technology advances, economics change, and as state and national education standards are adjusted (Mednick, 2002).

Information literacy can reflect a person's abilities and skills (Mednick, 2002). It can also be defined as having the ability to recognize a need for information, and then being able to locate, evaluate, and effectively use that information in its various formats (Mednick, 2002). The AASL & AECT define an information literate student as:

One who masters the lifelong skills enabling him or her to become a discerning and effective user of information. It is not enough to access information; a student must be able to gather information efficiently and effectively, evaluate it critically, and then use and present it accurately and creatively. (Ellis & Lenk, 2001)

Similar to the AASL & AECT definition of an information literate student, Solomon and Schrum (2007) define twenty-first century information literate students as those being able to acquire new skills, including using new technologies, and most importantly who understand how to keep learning. This includes “...gathering, processing, analyzing, synthesizing, and presenting information as well as communicating and collaborating” (p. 20). Another way to define information literacy is: helping students develop “...the ability to construct one’s own meaning from an information-rich environment” (Kuhlthau, 1999, p. 7). Overall, an information literate student is one who can find and use information in an efficient and successful manner.

Integrating technology into an educational setting may make it easier to accommodate a wider variety of learning styles, abilities, and activities. However, it is also important to understand that technology is not just computers and/or the Internet.
According to Jane Healy (1998) in her book, *Failure to Connect*, technology is any tool or resource that helps students construct or complete an assignment more efficiently or effectively. Computers and the Internet are just two of the innovations that students are using. Therefore, even a chalkboard used to put notes up for students to copy could be considered a form of technology integration.

Traditionally, “information technology teachers, also known as technology specialists, [focused] on teaching students how to use the technology as opposed to how to use the information” (Herring, 2005). The Association of Educational Communications and Technology changed this focus when they defined instructional technology as, “...the theory and practice of design, development, utilization, management, and evaluation of processes and resources for learning” (Seels & Richey, 1994, p. 1). Focusing on technology integration rather than instructional technology changed the emphasis to teaching about a process of evaluating information rather than a presentation on a single product that may change over time. The “use of technological processes and resources to enhance learning rather than only to manipulate data supports the [teacher-librarians'] use of the full range of techniques and technologies to promote learning” (AASL & AECT, 1998, p. 54) and especially information literacy. The International Society of Technology in Education (ISTE) states that, “…effective integration of technology is achieved when students are able to select technology tools to help them obtain information in a timely manner, analyze and synthesize the information, and present it professionally” (ISTE, 2000, p. 6).

As mentioned before, twenty-first century teacher-librarians have a number of roles within a school environment. Within the roles of instructional partner, teacher, and
information specialist; teacher-librarians can “...ensure equitable access to information and technology for students of varying abilities and learning styles [by]...integrating information literacy into the curriculum through collaborating and sharing instruction with teachers and providing programming that benefits all students” (Everhart, 2007, 6). Through collaboration and integration of information literacy skills, students are taught to not accept everything they are reading on the Internet or in a book as inherently true, but rather to evaluate what they read for reliability, authenticity, and credibility (Doggett, 2000). In his video, Did You Know 2.0, Karl Fisch pointed out, “We are currently preparing students for jobs and technologies that don’t yet exist...in order to solve problems we don’t even know are problems yet...[in fact] one week’s worth of New York Times contains as much information as a lifetime’s worth of information in the 18th century.” Even then information is only raw data. Knowledge is more than just being aware of different facts; it is becoming familiar with the data and understanding it. Interpretation is what leads to knowledge, and without it raw facts are worthless (Doggett, 2000). Therefore, the goal of information literacy and technology integration is to help students“...develop learning strategies...[that] enable them to make the most intelligent choices and decisions about information they encounter” (Valmont, 2003, p. 7).
Impact Within School Systems

After examining the changing roles for teacher-librarians and defining information literacy and technology integration, the next step is to look specifically at how a teacher-librarian can impact school systems. Kathleen Smith, principal of Cherry Creek High School in Greenwood Village, Colorado, believes, “...raising student achievement takes focused, intense, continual efforts founded in research, supported by the entire learning community, and fostered through a climate conducive to inquiry, discovery, and challenge” (2002, ¶ 2). Teacher-librarians bring important benefits to schools because of their unique viewpoint and skill set. A teacher-librarian “…knows the curriculum content and the teaching strategies in each classroom” (Donham, 2005, p. 35). Teacher-librarians’ association with all teachers “...tends to focus on what is being taught, with what, and how” (p. 35). Donham continues by noting that:

Participation in curriculum involves not only being a part of the planning process, but also being a part of the implementation....Most important, in each case, the [teacher-librarian] is working with teachers – not working in isolation. Also, in each case, the expertise that the [teacher-librarian] offers is different from the classroom teacher’s – it is the expertise of a specialist. Finally, in each case, the [teacher-librarian] is taking initiative – not merely responding to a specific request by providing materials.

The worst-case scenario is for the [teacher-librarian] to be included in curriculum planning meetings, but to fail to contribute in unique and useful ways. Being on committees is not enough (p. 37 – 38).

Collaboration between teachers and teacher-librarians, in the fullest sense, means
that they will work together to plan, design, teach, and evaluate instructional events for
students (Doll, 2005, p. 4). According to Donham (2005), teacher-librarians have the
...advantage of serving the entire school community – all grades, all subjects. By
working in collaboration with teachers throughout the school, he or she can share
knowledge of the total system with others and help teachers broaden their view of
their students’ total school experience. As schools move away from textbook-
based learning, the need for coordination is greater. Teachers are designing
instruction based on curriculum goals, but the potential is great for gaps and
redundancy. Collaboration helps counteract both of those concerns. (p. 115)

In Paula Warnken’s (2004) article, she quotes Ross Todd as stating, “...for
librarians to be effective facilitators in the instructional process, they must ‘understand
new technologies and employ them as they work in a learner-centered environment that
develops students’ knowledge and skills to manage, process, and use the enormous
variety, quantity, and quality of information’” (Todd’s study (as cited in Warnken),
2004).

As twenty-first century school administration pressures teachers to incorporate
more technology into their classrooms, teacher-librarians, through their educational
background, have the special training in both information and instructional technology
that are needed to accomplish this goal (Ellis & Lenk, 2001). As Sandra Doggett (2000)
pointed out in her book, *Beyond the Book*,

Integration of technology into the library media curriculum means infusing
technology into the school-wide curriculum. [Teacher-librarians] have been trying
to integrate library skills into content curriculum for many years, because they
realize skills taught in isolation do not become incorporated into students' lives.

(p. 26)

Teacher-librarians can help facilitate and guide teachers' decisions in the use of meaningful technologies ensuring that students' experiences with technology will help them reach higher cognitive levels of thinking and reasoning (Donham, 2005). The teacher-librarian can also provide in-service training on new technologies, team-teach in order to reduce teacher anxiety, and provide facilities and assistance to students with their learning exercises.

Donham (2005) provided several specific action strategies that teacher-librarians can use to more effectively integrate technology and information literacy skills into school systems. She suggested that teacher-librarians: demonstrate interest in what teachers are teaching, maintain current awareness of new software and hardware, develop a written information literacy skills curriculum, participate in curriculum development projects, maintain current awareness of trends in the various content areas, and participate in long-range curriculum planning and evaluation.

Donham continued by suggesting that teacher-librarians can demonstrate an interest in what other teachers are teaching by sharing curriculum-oriented articles with staff, encouraging and joining interdisciplinary units, attending curriculum related parent meetings, and familiarizing themselves with local, state, and national standards in all curriculum areas. Teacher-librarians will also be more effective if they maintain a current awareness of new software and hardware resources by embracing the role of technology advocate and facilitator, helping teachers to set criteria in selecting appropriate ways to use technology so that it encourages higher-order thinking (information literacy –
analysis, synthesis, and evaluation). Teacher-librarians can also maintain an awareness of new technologies by encouraging or providing teachers preview opportunities of new technologies, as well as offering in-service trainings (2005).

Donham then suggested that teacher-librarians develop a written information literacy curriculum, share it with other teachers, and work with them to identify units into which these skills can be integrated. Donham (2005) makes sure to point out that students need to practice skills many times, in multiple contexts, and therefore teacher-librarians should ensure that no part of the information skills curriculum is addressed only once. By participating in long-range curriculum planning and evaluation, as well as in curriculum development projects, teacher-librarians can provide many services to their colleagues. These services may include literature searches on topics of interest and assisting other staff members with the location of instructional materials. The services may also involve designing activities that are sensitive to various learning styles and intelligences or simply providing information about what is being taught at other grade levels or in other classes (Donham, 2005). Teacher-librarians can also exploit their knowledge of children’s or young adult literature to develop truly thematic literature units. Finally, Donham explains that to maintain a current awareness of trends in curriculum and various content areas, teacher-librarians should continually read or at least skim articles from a variety of journals. They should also attend professional conferences outside of the library field and become familiar with local, state, and national guidelines for all content areas. By following many of the suggestions provided by these authors, utilizing information literacy skills, and “embracing, exploiting, and sharing new technologies”
As leaders in the school and technology field, teacher-librarians should not resist the technology that students are already using. “Embracing, exploiting, and sharing new technologies [are] an effective way for the teacher-librarian to promote the position’s vast contributions to the school” (Herring, 2005, ¶ 22). After looking at the roles of teacher-librarians, definitions of information literacy and technology integration, the next step is to look at specific examples of how a teacher-librarian can support technology integration.

Joyce Valenza, a high school teacher-librarian in Erdenheim, Pennsylvania, believes a technology rich library would “provide access [to] developmentally appropriate and relevant databases, portals, and websites” (¶ 4). This would include e-books, audio-books, blogs, open-source software, streaming media, podcasts, streaming video, and Wiki-books. She also states that the librarian would “have the skills to create a blog or web site, … be thinking about interactive services [to] provide online, … [and] learn new ways to promote reading, downloadable audiobooks, … [create] digital book-talks, … [and] work through tele-collaboration” (Valenza, 2007). Blogs, podcasts, wikis and library websites are just a few of the ways that teacher-librarians can do this. For those who may not be familiar with these new resources, brief descriptions of the four resources are given below.
**Blogs**

One of the most recent technology resources that teacher-librarians are helping to integrate into schools and library programs are web logs, also known as blogs. Blogs or blogging is generally described as an online journal, or web log, that...

...consists of personal commentaries on issues the author deems important. It can contain text, images, and links related to information on other blogs, Web pages, and media. Readers can reply easily and thus participate in a discussion in which they share knowledge and reflect on the topic. (Solomon & Schrum, 2007, p. 55)

Catherine Poling, assistant principal in Frederick County, Maryland, believes that blogging within a classroom setting allows greater comprehension and communication between students and teachers as well as being able to build deeper understanding across curriculum areas (Richardson, 2006). In other words, blogs can be used to enhance students' typing, writing, and communication skills. More than just helping students work on their typing or writing skills, blogging can be infused across the curriculum. It can be integrated into a science course to record experimental data, or language students can create conversations with native speakers. Blogs could also be used in a physical education course where students record their daily diet or exercise. The best thing is that blogging helps to infuse writing skills in every aspect of the learning environment (Richardson, 2006). Blogs can be used in foreign language classes where students would work with other students across the globe to learn about different cultures. Students not only enjoy the blogging experience in schools, but it also helps keep them actively engaged in the learning. Students are seeking this tool out on their own terms in places
such as Facebook or MySpace, which are interactive, social networking sites being used by many youth on a daily basis.

Library blogs offer "...many opportunities for creating authentic and motivating text-based reading and writing contexts for students...[and] it is within these real-world learning contexts that teacher-librarians can assist their students to develop a foundation of safe, critical, and informed online information literacy skills and practices" (McPherson, 2006a, ¶ 6). For example, blogs can connect students with their favorite authors. Many young adult authors are keeping blogs to give their readers an insight to who the author is, how he or she writes, tips on writing, and lessons in censorship (Lesesne, 2006). Through collaboration, teacher-librarians and teachers can use blogs to "...develop students' information literacy skills around units of inquiry....For example, students can research and post their own information, insights, and reflections on a particular event, critical question, novel study, author, family history, science experiment, and the like" (McPherson, 2006a, ¶ 7). Teacher-librarians can also use blogs to "help develop students' online critical-thinking skills" (McPherson, 2006a, ¶ 5). An important caution, however, is to recognize that blogs tend to be highly personal. Therefore, when students are using them to conduct research, it is important to make sure they understand what it means to be information literate, otherwise they may "...find [a blog with] a topic [that] may contain...subjective or inaccurate information" (Solomon & Schrum, 2007, p. 56).

Podcasts

Podcasts provide a second resource that teacher-librarians can use to help improve student learning in schools. "The word podcast comes from combining the words Ipod
with broadcast” (Lamb & Johnson, 2007, ¶ 3). Podcasts are easy to make and a great way for teacher-librarians to promote information literacy and technology integration skills to teachers in all curriculum areas. Podcasts are basically the digital creation and distribution of radio shows via the Internet (Lamb & Johnson, 2007). What makes them different from audio files is the distribution methodology. Podcasts use RSS (Real Simple Syndication) feeds. This allows those who have subscribed to a specific podcast service access to new content as soon as it is uploaded (Richardson, 2006). Since the technology required to create podcasts is easily accessible to schools, podcasts are a great way to get students to actively participate in the entire learning process. Another benefit for schools that use podcasts is the students’ ability “...to replay the audio of traditionally delivered information (even a teacher’s lecture), to review or catch up” in class (Solomon & Schrum, 2007, p. 57). Podcasting also provides a technology through which any “...student who has difficulty reading...may find podcasts as a way to access high-quality information” (Lamb & Johnson, 2007, ¶ 34). Adam (2007) adds that podcasting is a great way to help students connect with each other and with home. “It's a way for us to give students a voice--one that can be heard locally and around the world” (Adam, 2007, ¶ 1).

Podcasts can be used across the curriculum, anywhere from math to English or from music class to a foreign language course. Podcasts can be used to encourage and engage students in learning, and to teach them a creative form of presenting information that they have learned. Teacher-librarians are in a unique position to use podcasts both in promoting the library program and in helping to promote podcasting to students and other teachers. They can help come up with ideas or ways podcasts can be integrated into a
particular class or help students find the information needed to create their own podcast. “For example, book reviews make great podcasts. Just imagine, instead of merely writing up a book review, giving kids the opportunity to literally say just what they think” (Adam, 2007, ¶ 1). According to Michael Stephens, Judy Hauser, an Information Media Consultant with Oakland Schools in Waterford, Michigan, finds using podcasts in the school library especially interesting because: “We [teacher-librarians] want...educators to know that students can make announcements, read their own stories, interview people, and do other kinds of audio shows...so that [students] are learning technology skills along with other assignments” (Stephens, 2007, ¶ 10).

**Wikis**

Teacher-librarians are always on the lookout for ways to introduce and reinforce student information skills. Wikis are a third resource that they can use to help integrate information literacy skills into the twenty-first century school. “A Wiki is a collection of web pages that are linked to each other, and reflect the collaborative works of many authors” (Beldarrain, 2006, p. 4). Twenty-first century students prefer to stay connected to their friends and peers, and to work in pairs or groups rather than alone (Beldarrain, 2006). By helping teachers integrate wikis into their curricula, teacher-librarians help students stay connected and allow them to work collaboratively. This is an important skill that many employers say they want from twenty-first century learners. In fact many employers are encouraging the use of wikis within the work environment to keep track of projects and as a way to encourage collaboration between employees (Richardson, 2006, p. 65).
Teachers can use wikis as a way to keep track of or share resources with each other and in their own classes. According to Richardson (2006, p. 65), “…students are not only learning how to [write and] publish content; they are also learning how to develop and use all sorts of collaborating skills” when teachers use wikis in the classroom. Similarly, according to Lamb and Johnson (2007, ¶ 1) the “…collaborative writing projects allow [students] the opportunity to exercise their minds and apply essential information skills to authentic activities.”

Although students must be taught information literacy skills that emphasize evaluating credibility and authenticity when using wikis to gather information, the overall benefits of using them in schools outweighs the downfalls. As McPherson (2006b) summed up:

Wikis offer teacher-librarians and students new, dynamic, collaborative, and recursive writing spaces. Teacher-librarians can use these spaces to strengthen social ties among students, as well as teach students that wikis can go well beyond informal [text-message] writing. By integrating this new writing context into the school library curriculum, we validate the use of wikis in our students’ lives, open up opportunities to help students become motivated and powerful writers, encourage students to express themselves using a multitude of communication formats, and expose them to the social dynamics of collaborative writing (¶ 13). These examples show that no matter how teachers and teacher-librarians choose to use wikis, they can indeed be powerful tools that help students learn and develop many different skills.
Library Websites

Many twenty-first century students “...go online to meet friends, seek information, and find out what they need to know” (Solomon & Schrum, 2007, p. 30). Therefore, a vibrant way to promote the library media program is to establish a web-presence for these learners. A web-presence “…is much more than a static library web page, a web presence provides ongoing, virtual connection with students, teachers, administrators, parents and community members” (Lamb & Johnson, 2008, ¶ 1).

According to Baumbach (2005), such a library web site can contain information for teachers and students including links to “…databases provided by the school, state, or district…announcements of special events and calendars…book reviews by students, teachers and library staff…webquests, web treasure/scavenger hunts and infoquests…copyright guidelines and citation generation tools…information literacy and research process models and tool” (¶ 8). Baumbach (2005) continues on to say that teacher-librarians may also choose to include library policies, “…downloadable forms and tools, including collaborative planning for teachers, suggestions [forms], book reviews…parent and family resources…[and] ask a librarian e-mail form, or links to live library help (local or state).”

In response to the many roles teacher-librarians have within a school environment, a web-presence can help them when they are pulled in multiple directions. For example, while “comparing different versions of Cinderella [with one class]…members [of another class] might be using a pathfinder on your library web site to investigate alternative forms of energy” (Lamb & Johnson, 2008, ¶ 1). According to Solomon and Schrum, “students come to school knowledgeable about the web and its
potential, are comfortable using it and expect learning in school to be more like learning
on their own” (2007, p. 30). This makes having a web-presence all the more important for
a school library media program.

Twenty-first century students are very social, and therefore they enjoy interacting
with others. “One way to help [students] navigate...electronic (virtual) libraries is to be
there ourselves. An instant response is what they want and need” (Meier, 2008, ¶ 1). This
can be done by incorporating chat features within the library website. With a chat feature,
students can use the site to ask questions from the librarian, when he/she is online.
“Libraries are already institutions grounded in helping their users, and chats...can be
another bridge to communication” (Meier, 2008, p. 48).

Finally, trained as information specialists, teacher-librarians can “...organize both
the search for resources, as well as the information that is retrieved” (Serim, 2003, p. 98)
within a website. By providing resources to the learning community, such as links to help
teachers with lesson planning or to help students find information for an assignment;
teacher-librarians are able to have a significant impact on the school environment.
Kathleen Smith, principal of Cherry Creek High School near Denver, Colorado, supports
this concept of impacting school environments by stating, “…school library media
centers...can and should be hubs for increased student achievement and positive focused
school reform” (Smith, 2002, ¶ 2).

Support from Administrators

In order for teacher-librarians to do their job and adequately prepare students to
be successful in the information age, they must have the support of teachers and
administrators. According to Ferdi Serim (2003), a board member of the Consortium for
School Networking, “...many teachers and administrators do not yet realize that librarians...have precisely the training and skills needed to implement information literacy skills in the curriculum” (p. 82). Kathleen Smith, principal of Cherry Creek High School in Greenwood Village, Colorado, believes that leveraging the power of the library media center is one of the most effective and efficient ways to increase student achievement and love of learning (Smith, 2002). Therefore she advocates that “the school goal [should be] entwined with the library media program of helping students gather the information [needed] to be lifelong learners and effective users and evaluators of ideas and information in both their academic and personal lives” (Smith, 2002, ¶ 10).

To gain support, the best thing teacher-librarians can do is to advocate for the library media program. Teacher-librarians can help other teachers and administrators understand their role and what it means to collaborate (Farmer, 2007). As stated previously, collaboration is more than just merely providing resources for teachers (which is still a large part of the teacher-librarians’ role). It is in working with teachers, administrators, parents, and students to promote information literacy and technology integration into the school environment (Doll, 2005). Teacher-librarians can advocate for the library media program by communicating through newsletters, websites, and notices within the school and to parents. The teacher-librarian can also advocate for support through annual circulation reports and budgetary reports to principals. This will keep them up-to-date on library issues and help promote various school or library activities (Doiron, 1999).

Farmer (2007) explains how teacher-librarians can help administrators and therefore gain support for the library media program. Teacher librarians can “contribute
to the school's vision and the administrator's role through research, instruction, and collaboration” (p. 56). Farmer continues to explain that through their knowledge of resources, teacher-librarians can help administrators by handling, evaluating, and organizing the flood of information now available. They can also help administrators identify content and learning gaps as well as links between coursework and other activities within the school. Information literacy itself crosses subject domains and reaches from preschool to college. Overall, teacher-librarians can gain support from administrators by demonstrating that the two positions share a vision for the school and by searching for ways to provide equitable access to all resources for all individuals in the school.

Administrators can also leverage the power of the library media program by understanding the role of not only the program but also the teacher-librarian within the school community (Farmer, 2007). Teacher-librarians are the only staff members who work with everyone in the school, including students and other teachers. Therefore, they have the most comprehensive view of the entire curriculum. “Without the cooperation of the principal in terms of scheduling (supporting the desire for active involvement with the entire staff) and designing appropriate staff development activities, the [teacher-librarian's] talents often go unrealized” (Serim, 2003, p. 99).

Beyond scheduling and staff development activities, principals “…must take an active role in… the library” (Harrison, 2000, ¶ 6) by supporting the teacher-librarian’s role in multiple ways. This includes promoting collaboration between teachers and teacher-librarians by providing professional development time as well as putting teacher-librarians on curriculum or school improvement committees. “Principals must also
provide [teacher-librarians] with leadership tools such as a flexible schedule, clerical support, and adequate technology and funding” (Everhart, 2007, ¶ 8). Finally, principals should also model the use and integration of technology resources to other teachers. This can be done by providing the monetary support it takes to run a school library program and by becoming more knowledgeable of the role that teacher-librarians can have within a well-functioning school system (Everhart, 2007).

Finally, teacher-librarians can often gain support from administrators by helping them promote changes in curriculum and policy. To do so, teacher-librarians must help change the way people in their profession are perceived. Teacher-librarians “…will no longer be the gatekeepers of information, but the key masters – opening the doors of knowledge” (Mednick, 2002, p. 14). By acknowledging the pivotal role of the principal, teacher-librarians should continually work to establish an open, honest, and good working relationship with the principal and other school administrators (Doll, 2005).
CONCLUSIONS AND RECOMMENDATIONS

Teacher-librarians are an integral part of the twenty-first century and can effectively support technology integration and information literacy by knowing and understanding their role within the school. This includes being able to define what technology integration is and how it fits into information literacy, as well as knowing how to effectively and efficiently integrate those things. It is also important for teacher-librarians to know and use various technology resources within the library as well as helping other teachers find ways to use these new technologies in their classrooms. Finally, teacher-librarians cannot be important assets for meeting the rapidly changing needs of twenty-first century schools if they do not advocate for the library program and gain support from others, including administrators, parents, and the students.

Teacher-librarians have not always held the position they now hold. Their job descriptions and roles have changed and will continue to evolve as new technologies are developed. It is important that teacher-librarians are willing and able to take on leadership roles and responsibilities. This includes joining curriculum committees or building improvement committees. Teacher-librarians have a unique role in the school as one of the few professionals that works with all teachers, students, and curriculum areas. They have been trained to use a variety of resources, and therefore, they can use their expertise to help improve student achievement scores and truly impact everyone's learning.

The second focus of this review is that while a majority of teacher-librarians know and understand what information literacy and technology integration mean and how to implement them, they also need to be able to explain these ideas in such a way that others in the school environment can clearly understand them as well. All too often
teachers and teacher-librarians have the same goals or ideas, but are using different vocabulary and therefore believe they are trying to achieve different results. By being knowledgeable about information literacy and technology integration, teacher-librarians can make the connections between the different vocabularies within assorted curriculum areas. Through information literacy and technology integration, teacher-librarians can help others learn about different technology resources and how to utilize them in their classrooms and can teach students how to use the different resources to accomplish personal as well as academic goals or projects. Through technology literacy and integration, teacher-librarians can provide websites or a single library website with resources for students and teachers that many of them may not know exist. Together by being able to connect information literacy and technology integration to other terms that teachers may use, and by being able to demonstrate or give ideas of how to use new resources, teacher-librarians can truly impact and help to improve curriculum needs in a school environment.

The third point is that as teacher-librarians, it is important to expose students and staff to a wide variety of media, book, and technology resources in order to encourage the use of information literacy skills to enhance the total learning experience. The best way to do this is through collaboration with teachers in the various curriculum areas. Since, teacher-librarians work with everyone in the educational environment, they can easily recognize when there are gaps or overlaps in curriculum. It is important to remember that everyone has something to contribute, and therefore working together for the betterment of students should always be the main goal. Overall, teacher-librarians play a supportive role in schools. With school achievement scores so important in today’s schools and
technology being pushed more and more, teacher-librarians must actively seek out ways to collaborate with others as well as integrate technology and information literacy skills.

The fourth research question was to identify specific examples of new technologies that teacher-librarians can use in schools. The resources identified were blogs, podcasts, wikis, and library websites. These are merely four of the resources now available, but the main concept to remember is that teacher-librarians need to be willing to learn about the new technologies and find ways to incorporate them into their own classroom as well as helping others to use them. As mentioned before, teacher-librarians should be leaders within a school and part of being a leader is being willing to continually learn and figure out new ways to use resources.

Finally, even with the best of intentions teacher-librarians cannot do their job to the best of their abilities if they do not have the support of others. Teacher-librarians should continually be advocating for the library program through newsletters, program planning documents, budget requests, and conversations. Teacher-librarians can provide support to administrators and in the process administrators should be willing to promote the knowledge, training, skills, and abilities of teacher-librarians. It is only through a mutual working relationship that teacher-librarians will help others to understand, recognize, and fully utilize a teacher-librarian within the school environment.

In summary, armed with the knowledge of how their role has changed, the definitions of information literacy and technology integration, effective and efficient ways to work with others and a variety of new technology resources, teacher-librarians have much to offer. Through active advocating and continually looking for ways to impact schools through technology integration teacher-librarians will make a huge impact
on their students as well as in their twenty-first century school.
REFERENCES


