THE UNIVERSITY OF ALBERTA

VIRTUAL SCHOOL LIBRARIES:

MEETING THE INFORMATION NEEDS OF LEARNERS

BY

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Introduction

Technology Affects Teaching and Learning

As educators, we recognize the importance of preparing students for their roles in a society that has been profoundly affected by unprecedented changes in technology. Technology has redefined every aspect of our daily lives in society including our educational systems and teaching practices. Computers and the explosion of digitally accessible information have greatly influenced the ways students learn in the 21st century. Educators today must consider how new technologies are being integrated effectively into teaching and learning.

My Journey Towards Learning to Learn with Technology

During the first several years of my career as an English language arts teacher in the mid-1990s, my focus was not on the use of information technologies in education. Rather, as a new teacher I was challenged by the reality of classroom demands: addressing curriculum objectives, becoming familiar with a large quantity of recommended literature, and refining effective classroom management. Integrating technology into my English language arts courses seemed desirable but was not realistic for me. My comfort level and familiarity with certain technologies, including computers, was low. It was difficult for me to construct meaningful lessons that incorporated the use of technologies and information technologies. In retrospect, I realize that my early attempts to use information technologies were sporadic and contrived.

For many years I was painfully aware of a widening gap in my own understanding and effective use of information technologies in my teaching. When I finally had more time to focus on using these technologies, I did not know where to start.

It was not until my educational leave to study in the Teacher-Librarianship by Distance Learning (TL-DL) program in fall 2007 that I was presented with a unique learning opportunity to narrow this gap or "digital divide."

With some trepidation, I began on my own path of inquiry-learning by stepping into an online learning environment. I immediately set to work on challenging and improving my existing level of information and technology literacy skills such as effective computer use, navigating an online classroom environment (Vista/Blackboard), using the digital university library catalogue and databases, and using numerous Internet and Web 2.0 tools. I learned through the use of informational technologies that I had previously not known much about. Soon my attitude toward technology completely changed: I had overcome many of the fears that had previously held me back. My online learning experience redefined for me what it truly meant to be a lifelong learner and inspired new interest in how informational technologies supported students' learning.

An Interest in Virtual Libraries Begins

With this new motivation to delve deeper into how information technologies supported learning, I chose to examine virtual school library Web sites for one of my major projects in the *Introduction to Teacher-Librarianship* EDES 540 course.

When I first approached the topic of school library Web sites, it was from the standpoint of a novice: I knew nothing about designing Web sites. However, when I began my course work and online learning in the TL-DL program, I started to recognize the features of online libraries and Web sites that appealed to my own learning style. I began to develop a more critical eye for those Web site designs that were user-friendly and easy to navigate and those that were difficult to use effectively. This inspired me to

wish to understand more about the rationale and theories behind designing school library Web sites. I felt strongly that in my future role as a teacher-librarian, I would need to understand more about school library Web site design. Thus my initial interest in this topic was driven by my desire to gain greater knowledge about school library Web site design so that I might some day make improvements to an existing Web site or collaboratively create a site with the assistance of an IT teacher colleague. In this initial inquiry into school library Web site design, I analyzed an existing site, researched the characteristics of exemplary school library Web site design and content, interviewed staff and students about their opinions of the Web site, and made recommendations for improvements.

Looking Ahead: Further Inquiry

Since the completion of the web site evaluation project, new and more complex questions about school library Web sites have prompted me to further inquiry. Although I realized that good Web site design supported its usability, I wondered whether students were finding information effectively when they gained access to even the best-designed online school libraries. Were students' informational needs being met, or were other factors influencing their ability to find good information? Although virtual school libraries can enhance and support information literacies and learning, I recognized that a certain level of informational and technological literacy was required to navigate digital environments successfully.

Although this topic began with a narrow scope, it has now broadened. Many factors affect secondary students in successfully satisfying their informational needs when they consult the information technologies available to them such as virtual school

libraries. A closer look at the interrelatedness of virtual school libraries, information literacy, and technological literacy becomes critical in determining how effectively the informational needs of students are being met.

In this capping paper I address how virtual school libraries meet the information needs of secondary school students and thus support information literacy and learning.

Literature Review

Redefining the Concept of Libraries

Characterized by an ever-evolving digital landscape, the 21st century has had a profound effect on schools and education. Education systems around the world are currently re-evaluating how to prepare students to be "literate citizens, lifelong learners, and contributing adults in a learning society" (Asselin, Branch, & Oberg, 2003, p. 5). School libraries have also had to adapt to technological and societal changes in order to meet the information needs of young people. In many schools this has meant extending the physical walls of the library by providing information that is accessible on line in digital or electronic formats. Digital accessibility to quality resources is especially important in reaching today's students: young people who have grown up surrounded by digital technologies and the Internet. Thus virtual school libraries have evolved as a result of new technologies, allowing students to have even greater access to information than they would with traditional libraries.

Virtual School Libraries and Information Literacy

Virtual School Libraries: A Definition. Virtual school libraries are often synonymously referred to as *digital libraries* (Edzan & Abdullah, 2004; Loertscher,

2007; Mardis, Hoffman, & Marshall, 2008; Valenza, 2005), *electronic information resources* (Neuman, 1997), *digital information resources* (Lippincott, 2005), and *virtual libraries* (Fitzgerald & Galloway, 2001). Virtual libraries are collections of information that is both digital and organized. Information found in digital libraries comes in various electronic formats such as images, video, audio, text, formatted documents, and interactive software (Hunter & Mardis, as cited in Edzan & Abdullah, 2004).

Virtual libraries allow patrons to access databases containing periodical articles and other scholarly information. Access is controlled through password entry, and patrons can log in from any computer at school or home. A virtual library can be understood as an extension of the physical library, accessible online. Valenza (2005) states that: "designed and maintained by school libraries, virtual libraries are multipage online resources devoted to the needs of their specific learning communities. From a home page, users access search engines, databases, references, and general library and school information" (para. 5).

   The Connection between Virtual School Libraries and Information Literacy.
According to Masullo and Mack (1996), virtual libraries will be the main tool for education in the 21st century because the Internet is emerging as a powerful tool in teaching, training, and exchanging information, thereby reflecting a new vision of learning in the educational process (Edzan & Abdullah, 2004). Virtual libraries "provide a critical venue for helping students learn concepts and skills that are essential in the information age: the ability to access, evaluate, and use information to build knowledge, to think critically, and to solve problems" (Neuman, 1997, para. 5).

Although virtual school libraries are centers for students to develop information literacy, several important skills, knowledge, and analytic abilities are necessary for their use. Fitzgerald and Galloway (2001) have identified several cognitive demands required for using virtual libraries. Users must have a level of technological literacy in order to access and manipulate the online environment. A minimal amount of domain knowledge is required for one to be able to choose an appropriate database that is best suited to the type of inquiry being conducted. They must also be able to adapt their searches to the varied interfaces provided by each individual database. Users must be skilled at problem-solving and be able to refine searches as necessary. Assessing the relevance of the information, critically evaluating the quality of the information, and making judgments about the information found are also important abilities for using virtual libraries successfully.

Many of the same cognitive demands described by Fitzgerald and Galloway (2001) are also recognized as indicators of information literacy by the Canadian School Library Association and the American Library Association. So it can be said that virtual school libraries support information literacy, and virtual school libraries require information literacy if they are to be used successfully.

Information Literacy: A Definition. The Canadian School Library Association and the American Library Association (ALA, 1989) both describe an information-literate citizen as someone who is committed to lifelong learning (Asselin et al., 2003). A framework for information literacy presented by the Canadian School Library Association describes the indicators and learning outcomes of an information literate citizen.

Works independently and collaboratively to solve problems; analyses information

critically in all its formats and in all media contexts; applies information

strategically to solve personal and social problems; makes decisions based on

accurate and current information; uses information and communication

technologies; respects information sources and diverse perspectives; honours

intellectual property and privacy rights; appreciates the aesthetic qualities of

various creative and scientific expressions; and, communicates effectively and

expressively using a variety of information and media formats. (p. 5)

The American Library Association (1989) further explains that information literacy is

demonstrated by one's ability to recognize when information is needed and how to locate,

evaluate, and use effectively the needed information.

Virtual School Libraries as an Educational Infrastructure

Information literacy and virtual school libraries are inextricably linked. Virtual

libraries help students become independent users of information (Fitzgerald & Galloway,

2001; Neuman, 1997) and thus are part of the "education infrastructure" (Edzan &

Abdullah, 2004). Virtual school libraries act:

as the foundation, or underlying set of components that can used to support

various forms of networked teaching and learning activities; and to the organized

collections of literary and artistic materials, in digital and other forms, needed to

carry out those activities on a global scale (Masullo, cited in Edzan & Abdullah,

2004, p. 14).

Nurturing Learning Environments. Virtual school libraries should be a "safe and nurturing information environment" and ideally, the first place students and teachers start an inquiry (Loerstcher, 2007, p. 109). Like physical school libraries, virtual libraries can be customized to meet the needs of their users. Virtual school libraries should be "relevant landscapes for learners" where information chaos has been "tamed." (Valenza, 2005, para. 40). Well-designed interfaces that are age-appropriate can help create order out of large amounts of information, thus enhancing learning potential for students. An ideal virtual library infrastructure should have varying levels of personalization to meet the individual needs of users (Edzan & Abdullah, 2004; Loertscher, 2007). A virtual library should support teaching and learning (Edzan & Abdullah, 2004) by helping both teachers and students to "obtain accurate information; collect, store and organize information in digital format; publish and share electronic resources; and learn how to use IT tools to obtain information on local contents" (para. 8).

However, a virtual school library can be effective only if it is being used. As Lippincott (2005) and Valenza (2007) point out, the Internet rather than virtual libraries is still typically the first point of entry for students' research. Although students are inherently drawn toward using digital technologies, they tend to gravitate to the digital landscapes they perceive as most efficient.

Characteristics of the Net Generation That Affect Their Learning

For technologies to be used effectively, virtual libraries must be designed to meet the unique needs of their users (Lippincott, 2005; Johnson, 2007). Young people today, often referred to as *Net Gen*, have unique characteristics that affect their learning styles and needs.

The Net Generation has grown up with information technology. The aptitudes, attitudes, expectations, and learning styles of Net Gen students reflect the environment in which they were raised—one that is decidedly different from that which existed when faculty and administrators were growing up. (Educause, 2005, para. 1)

Net Gen students are predominantly visual learners who rely strongly on visual cues (Lippincott, 2005; Valenza, 2007). When using digital information resources, students avoid text-intensive sites in favour of those with bullets and graphic content.

Net Gen students are concerned about saving time and want instant responses to their information requests. This explains the attraction of the Internet, where search engines such as Google are perceived as immediate and responsive. Net Gen students are not always interested in the formal instruction that is important and necessary for them to become more effective searchers of information technologies, that is, unless they perceive that it will help them save time (Weiler, cited in Valenza, 2007). Students using virtual school libraries require some formal instruction to achieve library usability, but this comes into conflict with the patience and learning styles of many young people, who are experiential learners and prefer to work things out for themselves (Lippincott, 2005).

Another characteristic of Net Gen students is that they typically do not plan ahead when they initiate a search for information. Rather than identify keywords and synonyms in advance, they instead rely on a natural language style for their search terms. This approach may work sometimes in Google, but not in all types of search tools. Students do not know how to rectify weak search terms and tend to repeat this flawed searching strategy (Valenza, 2007).

Students today are drawn toward "collaborative seamless environments" (Valenza, 2007, p. 229) where their academic, social, creative, and entertainment landscapes merge. In these environments, students are able to multitask all their interests simultaneously. Valenza (2007) points out that this makes it less likely that they will want to leave a favourite search tool such as Google and go to a separate Web portal such as a scholarly database to complete a specific task. Therefore, information-seeking behaviours in young adults are affected by more than only their cognitive abilities. Therefore, the characteristics of Net Gen must be taken into consideration in the design of virtual school libraries if they are going to be used effectively.

The Digital Divide: Reasons Why Students Have Trouble Using Virtual School Libraries

  Ineffective Use Limits Information Access. For many reasons, students may not be able to use virtual school libraries effectively. Effective use is about how well students understand their own information needs and their ability to navigate complex information environments. Neuman states that: "to succeed in the broader environment of the digital library, students will clearly need to develop a sophisticated understanding of the nature of information and of the ways it can be organized and explored" (1997, para. 19).

Several reasons have been identified as contributing to ineffective or non-use of virtual libraries. These have been referred to as "digital divide" (Mardis et al., 2008), "disconnect" (Lippincott, 2005), or "disparity" (Neuman, 1997). Students may lack the technical skills and sophisticated vocabulary needed for proficient performance in a digital search environment. Virtual school libraries offer access to a variety of search

options including the Internet, reference tools, and academic databases. However, many students have no understanding of varied information systems and effective search strategies. All this affects their access to the content of virtual school libraries and impedes students in locating information successfully (Fitzgerald & Galloway, 2001; Valenza, 2007).

Information That is Too Complex. The information found through virtual libraries is often more complex than high school students' level of knowledge and abilities (Neuman, 1997); many virtual libraries are designed for a university-level audience. As a result, virtual libraries are not seen as part of students' "digital home" (Lippincott, 2005), which will limit how often they are used. As Neuman points out, a range of resources is required to meet the needs of a range of users. Subject-specific digital resources are needed that include academic information written for a high school student audience and not for adults.

The Lure of the Internet and Google. The Internet is typically the first point of entry for student search queries, as it appears more simplistic and responsive for searching (Fitzgerald & Galloway, 2001; Lippincott, 2005; Valenza, 2007). Students find searching through library systems more time-consuming. They must make separate searches of the online catalog and every database of potential interest, after first identifying which databases might be relevant. Net Gen students want immediate answers to their information requests, and this does not fit with their preferences (Lippincott, 2005).

In addition, Net Gen students rely heavily on graphic cues to guide them toward information and what they perceive as relevant resources (Lippincott, 2005). Visual and

graphic cues are not commonly found in the search systems of academic databases, and this may be another deterrent to students' use of them.

A Lack of Understanding How Information is Categorized. Students have difficulty making effective choices for the databases that will best help them with their information searches. Students tend not to understand how information is categorized. They do not know under which academic discipline their topics fall and thus cannot find the proper category or database to search (Fitzgerald & Galloway, 2001). This may be a result of not having enough subject knowledge before beginning their search.

A Lack of Hypertext Literacy Affects Ability to Navigate. The Internet can be deceptive for students: it gives them a false sense of their access to quality information because the information seems so abundant. Coupled with their difficulty in defining exactly what kind of information they need, this can lead them off on a tangent in the world of hypertext on the Internet.

The interconnectedness of the Internet requires *hypertext literacy* for one to make meaning successfully from the abundance of linkable information available. Scott and O'Sullivan (2007) point out that hypertext literacy, which is the interpretation of semiotic symbols, requires a specific knowledge structure. Students must be able to interpret the navigation information on their screen. Scott and O'Sullivan (2007) found that many high school students could not effectively navigate hypertext and tended to conduct searches randomly by trial and error rather than taking a systematic approach. This impedes students' ability consistently and successfully to meet their information needs.

A Lack of Keyword Searching Ability. Many students lack the sophisticated vocabulary necessary for using a keyword-searching system successfully (Fitzgerald &

Galloway, 2001; Neuman, 1997; Valenza, 2007). Adolescents tend to have a limited

ability to generate keywords and synonyms, especially when conducting a search for a

topic with which they have little familiarity. Students do not know how to break down a

topic and create a search string (Neuman, 1997; Scott & O'Sullivan, 2007; Valenza,

2007). As a result, they might not even be aware that they have missed critical

information on their search topic.

   A Lack of Technical Knowledge. A lack of technical knowledge also leads to

challenges (Fitzgerald & Galloway, 2001; Mardis et al., 2008; Ramaley & Zia, 2005) as

students tend to use more of a trial-and-error approach in their searching. They cannot

always identify how to recreate the steps necessary to conduct successful searches. Many

students do not understand information systems knowledge, that is, being able to

differentiate between how and when to use the Internet, databases, and the online public

access catalog (OPAC)(Fitzgerald & Galloway, 2001; Valenza, 2007). They tend to

approach an Internet search engine such as Google and an academic database such as

ProQuest in the same manner. They do not recognize the different protocols by which

each information system works.

   A Lack of Opportunity to Use Virtual School Libraries in School Assignments.

Also related to the confusion about the uses of various information systems is teachers'

lack of experience with information technologies. Teachers who feel ill equipped and

inexperienced with information technologies tend to avoid using them with their students

(Mardis et al., 2008; Ramaley & Zia, 2005). As a result, many school assignments and

activities follow a more traditional design that does not encourage self-directed inquiry

and student engagement (Donham, 2007; Neuman, 1997; Ramaley & Zia, 2005; Valenza,

2007). Students are not exposed to learning situations that help them to address how and

when to use the various information technologies available. This may perpetuate the

problem of students resorting to only one informational technology such as the Internet

and thus limiting their access to quality information.

Information Overload and Information "Satisficing." Other barriers to the

effective use of virtual libraries include the frustrations students often feel with

information overload (Battleson, 2001; Scott & O'Sullivan, 2007; Valenza, 2007). They

tend to stop searching when they perceive that what they have found is "good enough," a

concept referred to as information "satisficing" (Simon, cited in Valenza, 2007, p. 227).

Students may stop searching before they have found quality information.

Inability to Critically Evaluate Digital Information. Critically evaluating

information requires being able to determine the relevance, authenticity, and validity of

information and its source (Asselin et al., 2003). Today's students are motivated to

complete tasks quickly, but often spend more time searching than analyzing and

evaluating what they find. They often seem unable to evaluate the digital information

they find critically. In studies conducted by Schacter, Chung, and Dorr (cited in Valenza,

2007) and Fitzgerald and Galloway (2001), it was found that most middle-years and high

school students did not seem to question the credibility or reliability of information that

they found on the Internet. Fitzgerald and Galloway noted that this also applied to high

school students using information from a scholarly database. In this sense, not critically

evaluating digital information sources shows a deficiency in students' information

literacy skills. Students will not be able to meet their information needs if they do not

understand how to evaluate the credibility of the sources.

Addressing the Reasons. Although many young people feel comfortable using information technologies, it has become more apparent that their searching abilities and understanding of search environments is weak (Valenza, 2007). Information literacy skills such as keyword searching and understanding how information is organized need to be taught explicitly to students. In addition, more attention must be paid to students' levels of technological literacy such as the ability to differentiate between how to navigate the Internet, databases, and OPAC. Students can use quality information in virtual school libraries only if they can access it. Both information and technological literacies must be taught if students are to become more independent seekers of information.

School assignments need to be designed around the teaching of information literacy in all areas of the curriculum, not only in specific classes (Scott & O'Sullivan, 2007). If this were done, students would be better equipped to fulfill the cognitive demands of virtual libraries (Fitzgerald & Galloway, 2001). Although many of these barriers can be addressed through explicitly teaching information literacy skills to students, difficulties can also be minimized through careful and thoughtful design of virtual school libraries.

The Design of Virtual School Libraries Supports Learning and Information Literacy

Designing Virtual School Libraries with the Users in Mind. It is important that the goals of the virtual library be clearly identified when addressing its design. Therefore, the virtual library Web site design should "begin with the end in mind" (Covey, cited in Braxton, 2004, para. 4). As Baumbach (2005) indicates, virtual school

libraries should be designed to empower the behaviours you wish to see in the users: the behaviours of information literate citizens.

Learning and information literacy in a virtual library is supported by its design elements. Information studies and instructional technology provide insights into how components of this environment might be designed to support learning (Neuman, 1997). A closer look at both simple and complex principles of design can help inform the design for virtual school libraries to become optimally usable.

Elements of Exemplary Web Site Design. Web site design relates mainly to what a user *sees* or experiences when accessing a Web page. Visual appeal for someone navigating a Web site is of primary importance in design. Based on the professional and research literature that I examined, the following are some of the most commonly identified elements of *design* that should be considered for an exemplary virtual school library Web site (Heit, 2007).

- o the *target audience* is identified through a mission statement (Baumbach, 2005; Clyde, 2000);

- o the *format* of the virtual school library Web site allows the user to explore and find out about both the online and in-library resources (Baumbach, 2005); access empowers the behaviours of the users (Warlick, 2005);

- o there is *visual appeal* through the consideration of Web page layout, typefaces, colours, keywords, and standard templates (Baumbach, 2005; Clyde, 2000; Minkel, 2002; Regan, 2003; Riccardi, Easton, & Small, 2004; Warlick, 2005);

- o the *organization* of information found in the virtual library allows for easy scan-ability (Regan, 2005);

o   there are *no distracting features* such as slow-loading pages, flashing pictures,

and pointless clip art (Baumbach, 2005; Fleming & Levie, cited in Neuman, 1997;

Minkel, 2002);

o   the virtual library is *user-friendly and easy to navigate* through navigation bars

and links and requires few clicks to perform tasks (Battleson, Booth, & Weintrop,

2001; Riccardi et al., 2004);

o   there are *regular changes and updates* (Baumbach, 2005; Minkel, 2002);

o   the Web site is *accessible* to users with disabilities (Regan, 2003);

o   there are interesting or *unique features* that make the Web site stand out (Jurokski,

2004; Warlick, 2005);

o   the Web site is *credible* in supplying contact information (Jurkowski, 2004;

Riccardi et al., 2004).

It is difficult to find consistency when it comes to the design of virtual school libraries

(Clyde, 2000). Ideally, each virtual school library is designed to meet the specific needs

of its users.

Loertscher (2007) and Edzan and Abdullah (2004) suggest designing virtual

school libraries such that they are flexible and mindful of the unique needs of each

learning community. Loertscher proposes a vision for a flexible and multilayered virtual

school library design that would act as the digital hub of a school. This proposed virtual

school library would include an intranet like those found in corporate environments,

where e-mailing and instant messaging could take place in a protected environment. In

the school library intranet, students could create personal and customized pages, which

would contain features suited to the needs of their academics and interests. The virtual

school library would contain a collection of digital resources that would include a

reference collection such as encyclopaedias and standard databases, a curriculum

collection such as e-textbooks, and an elastic collection such as a specific database

subscription for short-term information needs. Access to the Internet would exist through

varying levels of filtered access. Loertscher's vision of an ideal virtual school library

takes into account the needs and interests of its users, while also creating an environment

that supports information literacy skills.

The Content of Virtual Libraries Supports Learning and Information Literacy

Learning and information literacy are supported through the features or content of

a virtual school library. Content is closely related to design: one must follow the other.

Visual appeal, ease of navigation, and *quality information* must coexist in order for

students to find value in using virtual school libraries.

The following are the most commonly identified features or *content* elements that

must considered for an exemplary virtual school library Web site (Heit, 2007).

- o The *library home page* is a starting point with clearly organized options so that
  the user can find an appropriate starting point to begin a task (Valenza, 2005);

- o *Basic information* about the library is available such as the names of library staff,
  contact information, library hours, and policies (Baumbach, 2005);

- o All *links* on the Web site are active (Riccardi et al., 2004);

- o *Searching options* such as subject-specific search tools, subject portals, and
  databases are available and described according to their functions so that the user
  knows what is useful for meeting varied kinds of information needs (Baumbach,
  2005; Jurkowski, 2004; Minkel, 2002; Valenza, 2005);

o *quality databases* and reference tools are available (Valenza, 2005);

o *Ethical use of information* is supported with examples and links for students (Baumbach, 2005; Valenza, 2005);

o *Information-sharing* is available for teachers and students through archives, wikis, and blogs (Baumbach, 2005; Braxton, 2004; Jurkowski, 2004; Minkel, 2002; Valenza, 2005);

o *Help* is available through instructional links or e-mail (Valenza, 2005);

o *Pathfinders* are available to help start and guide students' research (Minkel, 2002; Warlick, 2005).

Virtual libraries can provide more than one type of resource to students in a single location (Edzan & Abdullah, 2004; Loertscher, 2007). Because they contain multimedia formats, virtual school libraries provide opportunities to appeal to various learning styles. This flexibility of the digital library greatly increases students' engagement and learning opportunities (Ramaley & Zia, 2005). Many of the design and content features identified in this research have direct connections to the learning styles and characteristics of Net Gen students.

Concluding Thoughts on a Review of the Literature

Virtual school libraries are nurturing learning environments where students can enhance their information literacy skills. However, a certain level of information literacy is required for them to use virtual school libraries successfully.

Students today prefer to satisfy their informational needs through multimedia formats such as those attainable through virtual school libraries and the Internet. However, there is a disconnection when it comes to their ability to *mine* them

successfully for quality information. Educators need to be aware of the barriers that affect students' levels of information literacy and their successful use of digital environments. An understanding of the learning styles and characteristics of today's students is important to finding solutions to this problem.

The design and content features of virtual school libraries can foster learning and support information literacy in high school students. The information technologies of virtual school libraries are most successful when they are designed to meet the characteristics, preferences, and interests of their users. Therefore, libraries must evolve and shift (Valenza, 2007) to meet the information needs of students on their terms.

The remainder of this capping paper addresses how improving information literacy improves virtual school library use; the role of educators and teacher-librarians in fostering more effective use of virtual school libraries in order to meet the informational needs of students; and some considerations for approaching the design of a virtual school library.

Reflection and Sharing

Improving Information Literacy Improves Virtual School Library Use

Virtual school libraries are becoming a standard part of our educational infrastructure. Virtual school libraries provide a critical venue for students to learn information literacy skills. However, it is also apparent that students require a certain level of the important skills, knowledge and analytic abilities which are necessary to effectively utilize a virtual school library.

Integrating Information Literacy in All Areas of Curriculum. The teaching of information literacy is the responsibility of all educators. Therefore, students should be given the opportunity to develop information literacy skills in all of their school programs. The outcomes and indicators of these skills are being reflected in new content area curricula in Canadian schools. The Canadian School Library Association (CSLA) clearly identifies the learning outcomes and indicators of an information literate person. One learning outcome identified by CSLA is that an information literate person is someone who: "uses information for decision-making" (Asselin et al., 2003, p. 15). This outcome can be recognized by one of the indicators, which is described as a person who: "knows how information is organized in all information and media resources" (Asselin et al., 2003, p. 15). If students are going to be able to achieve these learning outcomes and indicators, information literacy needs to be addressed in all content areas of the curriculum, and not just in computer-related courses.

Changing Teaching Practices. As new curriculums are brought into our schools, educators must find new ways address information literacy. For many educators, previous teaching practices must be altered to reflect the needs of today's students. Virtual school library use should be integrated into information literacy instruction. School assignments that focus on improving information literacy skills can allow students more opportunities to learn how to effectively use virtual school libraries. This will also help address the problems typically associated with students using the Internet (Google) as their primary resource to find information. However, some educators may feel overwhelmed with integrating information technologies into their teaching practices if they are not confident in their own skills and abilities in information technologies.

The Implications for Educators and Teacher-Librarians

Educators and teacher-librarians have important roles to play in fostering more effective use of virtual school libraries in order to better meet the informational needs of students.

Teacher Education in Technological Literacy. One issue to address is that of teachers' use of information technologies. Many teachers who are not comfortable with technology tend to steer away from utilizing or integrating technology with their teaching. This can have a negative impact on ensuring that students are given opportunities within their school course work to learn to use virtual school libraries.

Kadijevich (2006) and other researchers show that attention must be brought towards developing *teacher attitude* towards computer use. One way he suggests to develop a positive computer attitude in teachers may be through a type of mentorship program between teachers. Teacher-librarians are in a key role to provide this kind of leadership to teachers who are struggling with their own effective use of computers and technologies. Teacher-librarians can use the findings from this kind of research to set up individual support for teachers, which will in turn, support students in their effective use of information technologies.

Net Gen Needs Interventions. Educators need to understand their learners and the goals of learning. In this way, we can then create environments that enhance learning and information literacy. The effective use of virtual school library must take into account its users and their characteristics which affect their learning: "learning science indicates that successful learning is often active, social, and learner-centered" (Oblinger & Oblinger, 2005, para.16).

Some characteristics of Net Gen students are that they: gravitate towards the use of information technologies; want instant and quick responses to inquiries; are poor planners; are multi-taskers; are visual learners; prefer experiential learning; and see their academic, social, creative and entertainment landscapes merging together online.

The online digital environment and social connectedness that Net Gen students are drawn towards can correspond with a constructivist view of learning. Constructivist theory views learning as a social activity, where information seeking is both a social and academic event (Valenza, 2007, p. 229). Therefore, interventions such as coaching, modeling, and feedback are necessary components in successful information seeking (Valenza, 2007, p. 229). While virtual school libraries may appear to be "one-stop shopping" centers of information, students still require interventions to support the gaps in their searching and content knowledge.

These just-in-time interventions can occur online and offline. Kuhlthau's *Zones of Intervention for Librarians* (1994) outlines and describes times when students need intervention during times of uncertainty. Educators and teacher-librarians can plan for team approaches, peer discussions, and coaching at critical times during student inquiry projects. Explicit instruction through mini-lessons and interventions can provide students with the scaffolding for more successful inquiry and information seeking.

Interventions can also occur online, through design features in virtual school libraries. Design features, such as help links, teacher-librarian email addresses, and blogs or forums for questions, all provide just-in-time support for student learning. This can provide the necessary interventions to move students past a difficulty which may impede their information seeking or understanding. We need to create new and improved

learning landscapes – a balance between intervention and independence (Valenza, 2007, p. 230).

What Teacher-Librarians Can Do. Teacher-librarians play an important role in improving information literacy and the more effective use of virtual school libraries. First and foremost, teacher-librarians need to be dedicated users of their school's own virtual library (Fitzgerald & Galloway, 2001).

One way teacher-librarians can offer leadership is by providing their school community with an information search model. An information search model, such as *The Inquiry Model* (Alberta Learning, 2004), provides an instructional model for teachers. An information search model outlines the skills and strategies that need to be taught explicitly in each phase of the process. Additionally, an information search model acts as a guide for students to understand the various phases involved in conducting an inquiry.

Even the most well-designed virtual school library can not be used effectively if students are not aware of how it can be beneficial to their information seeking. Teacher-librarians can give orientations to the virtual school library by using mini-lessons. Teacher-librarians can make the virtual school library environment more inviting by helping students become acquainted with and proficient in the use of one database at a time. After students become comfortable with the interfaces from one database, they will be able to see how their searching skills can be transferred over to other databases (Fitzgerald & Galloway, 2001).

The more effective use of virtual school libraries can be encouraged through collaborative lesson planning between teachers and teacher-librarians. Teacher-librarians can help teachers find areas of their curriculum where an inquiry-based approach to

teaching could be integrated. Inquiry learning allows students opportunities to explore a topic of their own interest, within a curricular theme, and conduct research. Inquiry-based approaches to teaching allows for students to learn and practice the skills of information literacy. Teacher-librarians can help guide and model the various phases of the inquiry projects by teaching mini-lessons in which they address the types of skills that are needed.

The Internet can not be ignored as relevant resource for our students to find information. Along with the other types of resources found in a virtual school library, various Internet search engines can provide students with another avenue to conduct a search inquiry. However, teacher-librarians can provide leadership to teachers and students by addressing more effective Internet searching strategies. Educators must continue to work diligently with students in this area in order to improve their abilities to search, retrieve, evaluate, analyze, synthesize and reflect on the information they find on the Internet.

Considerations for Designing Virtual School Libraries

Asking the Right Questions. It becomes apparent that the design of a virtual school library goes well beyond simply linking Internet pages, databases, and other search tools on a web site. It requires considerable thought and planning in order to meet the needs of those who are the primary users of it. Ideally, virtual school libraries are planned to meet the specific needs and abilities of its users. Virtual school libraries should be designed to empower the behaviours of information literate citizens.

Students today will use virtual school libraries, if they have been created in such a way that they perceive to be useful. There are several factors to then consider. The

following are some important considerations proposed by Valenza (2007) when we

consider library change:

> Young information seekers are most successful when they are interacting with
>
> systems designed for them, when they have effective system feedbacks and
>
> graphic visualizations. As we watch young users interact with interfaces, both
>
> those we develop and those we pay others to develop, we need to evaluate their
>
> supports. Are those interfaces customized to address the specific learning issues
>
> of the groups of teens we serve? Are they engaging? Attractive? Cool?
>
> Interactive? Do they offer content-sensitive support and instruction as well as
>
> compensations for vocabulary, spelling, and knowledge gaps?
>
> Do these interfaces support teens as they develop schema to make sense of
>
> their information options and the information landscape? What can we do to fix
>
> them? How can we lobby others to improve them? Can we help make these
>
> resources as easy to use as Google? Can we help students find the best search
>
> tools for a task? And once they are there with that perfect tool, can we help them
>
> move to the best resources to the top of their results lists? Can we make our own
>
> sites – and the databases we invest in – real student destinations? (p. 231)

Valenza's questions urge teacher-librarians and educators to closely examine how

students are working within digital environments. There is a great deal of responsibility

in this task: it requires us to know more about the digital environment than we previously

have. We have to become effective virtual school library users ourselves. We need to

form a critical eye for the design of search tools and search environments so that we can

evaluate their usefulness for our students. We also need to develop awareness for the reasons why students may not be able to successfully use virtual school libraries.

The Future of Virtual School Libraries. Important dialogues need to occur between school divisions, administrators, teachers and teacher-librarians in order to ensure that students are being provided with learning landscapes which will effectively serve our educational goals. It is imperative that all parts of a school community come together with a shared vision for student learning. If information literacy is to be focus in our schools, then we need to coordinate and unify our efforts to create opportunities for this to happen. Funding for the digital infrastructure, technological supports from experts, professional development for teachers, collaborative curriculum planning, and explicit instructional opportunities for students, are all necessary components for more effective virtual school library use.

Conclusion. I was inspired to learn more about virtual school libraries and information literacy as a result of my own desire to become a more effective seeker of information. As a future teacher-librarian, I believe that I will have a unique way of demonstrating my enthusiasm for information seeking with my students. This research experience has allowed me the opportunity to gain a more in-depth understanding of: what virtual school libraries can offer students and teachers; how design and content greatly impact the usability of virtual school libraries; the skills and strategies of more effective searching; the connection between virtual school libraries and information literacy; and, the reasons that can affect why students have difficulty in successfully utilizing virtual school libraries. I believe that virtual school libraries are becoming a very significant part of our current and future educational infrastructure. It is important

that educators are prepared to use virtual school libraries to further the goals of education;

that is, to foster lifelong learning and create information literate citizens.

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