Making Time to Teach Internet Literacy in the Elementary Classroom

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Abstract

The demands placed on today’s students are growing. They are not only expected to be competent in core subjects, but also to develop technological skills that are essential for success in the 21st century. Pressure is transferred to teachers as they seek to create dynamic environments in which a complex synthesis of knowledge can take place. The following study reveals the major components of 21st century technological skills. Major skills are organized into ten objectives, each of which was introduced through mini-lessons. Using this technique, 23 fourth grade students completed independent internet research to learn about food chains in their chosen environment. They compiled their learning into PowerPoint presentations that were shared on the classroom’s webpage. Students exhibited a high level of engagement throughout the unit, incorporating standards of technological literacy into their final products.
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Humans have spent over one million years developing the tools and skills necessary to adapt to their surroundings (Amato, 1997). They have also modified environments to make them more suitable for living. Those developments shape what has been done in subsequent generations. As the civil engineer Henry Petroski (1996) summarized, “the world of our everyday experience is shaped by the practice of engineering and technology, and the world shapes those activities in turn” (p.1).

Today’s technology is merely a subset of mankind’s ongoing evolutionary trend. Nanotechnology, computer technology, and networked digital infrastructure work together to strengthen previous advances while further changing the world around us and how we interact with it. Its intensity makes it an unavoidable part of our day-to-day lives. “As a society, we are not even fully aware of our conversant with the technologies we use every day… technology has become so user friendly it is largely ‘invisible’” (Pearson & Young, 2002, p. 8). We often think of technology as the illuminated screens of computers, cell phones, and televisions. We may even identify smaller devices such as coffee makers and alarm clocks. Often, the objects immediately noted are powered by some variation of electrical charge.

By widening our idea of what technology is to include materials and structures, additional elements of technology emerge. Items designed, developed, tested, and introduced through processes of innovation embody a secondary form of technology: they were created using a simple and/or complex set of tools.
Over the last 20 years, the manufacture and maintenance of modern technologies has been supported by a highly-developed digital infrastructure. The advent of the computer age has created a layer of new technology that, at once, complicates and simplifies the issue. Given the immensity and sophistication of the technologies in our lives, it becomes essential to have the skills and understanding to navigate through it.

Having knowledge of the structures and problem-solving processes underlying technologies can help casual and specialized users. The application of major elements of technology are often similar, be they structural, material, or procedural. Awareness of the systematic nature of technology is transferable.

Acknowledging the vast role technology plays in our society brings with it the call to prepare students with the skills and tools needed to navigate and extend technological terrain. Varying amounts of support for such teaching are implicated by concerns of financial constraint, pedagogical consensus, and the already-crunched schedule of the academic day. Nonetheless, to ignore educational technology is to deny students some of the most fundamental skills necessary for their assimilation into modern society.

While it is easy to be overwhelmed, it is necessary for teachers to identify and introduce themes and concepts from the world of technology into the classroom. This integration of theory and practice is mutually beneficial. The addition of technology education into existing curricular activities will assist students in experiencing it as a part of every day life. The use of technology will also enhance practices already in place while saving precious time in the classroom.
The following study focuses on the development of internet literacy skills in the elementary classroom. Three major elements of internet use were identified: searching using Boolean phraseology, evaluating source validity, and analyzing web page structure. From these elements, ten mini-lessons were created with the intention of developing students’ understanding of how to use the internet to gather and interpret information. The lessons were delivered embedded within an existing research project. Their success was evaluated through an application project in which students researched a specific content area and created their own webpage. Students were asked to journal about their learning throughout the unit, and completed a concluding survey reflecting their feelings about the mini-lessons. The results will serve as examples of how to incorporate technology education into existing classroom activities.
Literature Review

This look at the literature first describes research in the field of educational technology. It is here that an understanding of why educational technology is so important is developed. Statistics relating to the state of technological education in the U.S. will be explored along with frameworks currently in place. Several challenges face the integration of technology into classroom activities. These challenges will be addressed through the examination of technological literacy and its subset, internet literacy. Three themes will be identified and each will be related to the Standards of Technological Literacy (STL).

Educational Technology in the Classroom

The reoccurring theme found throughout literature was technology’s increasing role in today’s workplace. In order to succeed, employees are not only expected to use the technology in front of them, but also be able to do so with versatility. According to Van Heertum and Share (2006) teachers are charged with “creat[ing] ‘knowledge workers’ who are flexible, adaptable and creative” (p. 253). Faculty need to establish “seeds for future ‘learning organizations’ where collaboration, communities of practice, networks, and alternative assessments are stressed” (p. 253).

The inclusion of educational technology in the classroom increases the demands placed on already-busy classroom teachers. This increased responsibility can be daunting but rewarding as it reemphasizes teachers’ role in society as shapers of the future. In this case, an increase in student’s technological literacy, and ability to work with technology, will eventually increase the percentage of highly skilled laborers that are working to meet
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the needs of the knowledge economy (van heertum & share, 2006). as technology
shapes the country’s economy, knowledge of how it works, and competency using it may
enable one to increase their potential for success.

consideration of the role technology plays in the economy brought access issues
to the forefront as a matter of social equality. research indicated “that there was a
technology gap for students living in low socioeconomic areas. because u.s. citizens
now need to compete globally for technology based jobs, lack of technological skill
means even more disparity” (thomas, 2008, p. 13). this disparity is commonly referred
to as the digital divide. alvermann (2008) presented the theoretical opinion that teachers
“accept literacies for what they appear to be- something apart from formal schooling and
best not co-opted by us” (p. 9). she did so apart from noting that “not all young people
are able to participate in this exciting, socially networked world” (p. 10). taking this kind
of a hands-off approach may lead to a wider disparity between the haves and the have-
nots.

similarly, other researchers (pearson & young, 2002; bowman, 1997; thomas,
2008) have asked how students are supposed to compete in the highly-technical job
market if they are not guaranteed equal access and training through educational
institutions. for them, leaving technology education out of the classroom extends beyond
economic issues and into the realm of social inequality.

ensuring technological access to the nation’s diverse schools may not be the only
step to this aspect of equality. van heertum and share (2006) presented a different
perspective on technological equity by “argu[ing] that the movement can benefit
marginalized groups only if it moves beyond serving economic imperatives alone to cultivate creativity and critical reflection in youth” (p. 251). Thus, it is a teacher’s job to teach with technology not only to meet the needs of the economic world, but also to develop in students the seeds for future innovation.

The long-term effects of educational technology become significantly larger when considered in respect to student’s growing immersion in technology in day-to-day life. Technology touches everything they do including their social identities. Alvermann (2008) noted such immersion and commented, “Young people are tirelessly editing and remixing multimodal content they find online to share with others, using new tools to show and tell, and rewriting their social identities in an effort to become who they say they are” (p. 10). Immersed in a culture of fluid social identity and constantly uploaded information, the formal teaching of technology will help students make informed decisions. With the internet and other forms of technology, students are able to access the same resources as teachers. Unfortunately, if they were not taught how to evaluate and analyze web resources, they are not able to use them to the fullest potential. The implication for this wealth of information is that students are usually not able to read with the same critical eye as are their teachers (Fabos, 2008). Technology has played a growing role in society and consequently, society demands flexibility among and knowledge of a wide range of disciplines.

Frameworks in Place

In response to the growing importance of technology, a number of national, state, and local frameworks have been developed leading to a more unified curriculum. The
number of school districts including technology in their core curriculum has been on the rise. In a 2006-07 study conducted by ITEA, information was collected from 46 of 50 states. “The data indicat[ed] that 40 states (87%) includ[ed] technology education in their state framework” (Dugger, 2007, p. 15). Leading the way in the development and evaluations of standards and key performances in technological literacy has been the International Technology Education Association (ITEA) with the *Standards for Technologic Literacy* (2007) as their most widely-used document. ITEA (2000) defined this document as “20 standards that specify what every student should know and be able to do in order to be technologically literate. The benchmarks that follow each of the broadly stated standards at each grade level articulate the knowledge and abilities that will enable students to meet the respective standard” (p. 4). In addition to these standards and benchmarks, ITEA has developed tools for student assessment, professional development, and model curriculum materials for K-16 educational levels (Bronwyn, 2008).

A 2007 survey, completed by William E. Dugger, claimed that 42 states used STL “either at the state or local school district level” (p. 17). Compared with the results of previous years, this number indicated “an increase in the number of states that include technology education in the state framework may indicate that as a nation, we are placing increasing importance on technology education as part of the overall learning experience” (Dugger, 2007, p. 20). While this certainly may be the case, it was also noted that as the importance increased, the number of technology teachers on record decreased (Dugger,
2007). This indicated a shift of technological learning from specialized elective classes to integration into general education settings.

Challenges of Integrating Technology

Even with standardized frameworks already in place, the literature indicated numerous challenges ahead. Dillenbourg (2008) charged teachers with being unrealistic optimists focusing on a technology-infused tomorrow rather than on specific problems presently affecting development. McClintock (1986) noted the slow pace of classroom update and compared classrooms of the past with those of the present with the following statement, “Look… at the typical classroom of 1886 and compare it with one today: Not only are the functions still largely the same, but so too are the tools and procedures” (p. 208). Kastman Breuch (2002) identified institutionalized budgets and administrative red tape as another time-consuming limitation.

Overall, it appeared that there are two major reasons technology has not been more prevalent in educational institutions: time and money. The expenditures included in the school budgets were elaborated upon by several researchers (Brabazon, 2002; Roschelle, Pea, Hoadley, Gordin, & Means, 2000; McClintock, 1986). McClintock (1986) acknowledged that vast sums have been spent on education, but drew a distinction between spending and investing. He set forth the premise that more investments must be made within education, and part of this investing should provide teachers with ongoing, high-quality professional development. “Effective use of computers in the classroom requires increased opportunities for teachers to learn how to use the technology”
(Roschelle et al., 2000, p. 90). These ongoing opportunities require not only funding from state and local sources, but also time for the teachers’ training.

Noting the level of work that goes into digitizing classroom materials, McClintock (1986) decided to calculate the amount of time it would take to transfer classroom materials for one course to electronic formats. He determined that:

A significant amount of work will be required simply to prepare the information requisite for one small course; devising the computer-based tools of study that will enable students to master the information better than they could with print-based tools is left entirely out of the calculation. (p. 199)

The challenge described by McClintock reoccurs year after year. The importance of technology has been an apparent priority for over a decade; implementation, however, has been delayed by the many other new demands placed on teachers each year.

An evolved utilization of technology both for classroom experiences and as a teaching tool could lead to a complete overhaul of familiar education systems and teacher preparation programs. “The use of technology as an effective learning tool is more likely to take place when embedded in a broader education reform movement that includes improvements in teacher training, curriculum, student assessment, and a school’s capacity for change” (Roschelle, et al., 2000, p. 76). Technology as a tool can be infused into curriculums already in place. Teacher education programs, then, must teach the integration of subjects rather than the traditional practice of presenting curricula “as discipline-specific silos and literacy as institutionalized school-like reading and writing” (Alvermann, 2008, p. 16).
Technologically Enhanced Learning

The challenges presented reflect the genuine concern of teachers and administrators about the resources needed to develop quality uses of technology in the classroom. A thorough breakdown of the main issue into smaller component parts, will present change as a manageable endeavor.

As with many modern technologies, computer use in the classroom can do one of two things: enhance learning experiences, or simply electronically mimic traditional practices as was explained by Dillenbourg with the following quote. “It is true that learning technologies enables innovative methods, such as collective knowledge elaboration, but they are also employed to perpetuate the methods used for centuries” (Dillenbourg, 2008, p. 128-129). Through the use of software programs, students are able to “mix media in intellectually illuminating ways that are simply infeasible given the physical, logistical constraints of print” (McClintock, 1986, p. 205). The integration of data with pedagogical scenarios begins to expand the parameters of classroom experience (Dillenbourg, 2008).

The practice of linking multiple computers together to communicate and display shared data is referred to networking. “In a networked classroom, students use handheld devices that connect to the teacher’s laptop computer; the handheld devices and laptop both connect to a shared display screen” (Roschelle, Penuel, & Abrahamson, 2004, p. 50). Such classroom networks have been shown in 16 of 26 studies identified by Roschelle et al., 2004) to increase student engagement and participation. They can also
receive, analyze, and graph student input within milliseconds to provide nearly instantaneous feedback to the teacher and the student.

The combination of computers, computer networking, and internet access in curricula meets the four cognitively fundamental characteristics identified by Roschelle et al. (2000) as necessary for effective learning: “(1) active engagement, (2) participation in groups, (3) frequent interaction and feedback, and (4) connections to real-world contexts” (Roschelle et al., 2000, p. 79). This implies that classroom computer networking has the potential to provide new and valuable learning experiences for students.

While the ideas outlined above present exciting opportunities for classroom experiences, teachers must remember that they also create situations that require a high level of flexibility according to Dillenbourg (2008). This suggests that with the right professional development in place, sufficient practice, and plenty of patience, it is feasible for teachers to start infusing technology into their existing plans, even if it is the middle of the school year.

Technological Literacy

The introduction of technology into the classroom curriculum presents a new opportunity for teachers and students to develop their understanding of the principles and structures that underlie its systems. Whether one is cognizant of it or not, users of technology, specifically computers and the internet, have developed specialized ways of interacting with the screen. “Designing personal websites, gaming, and downloading songs require decoding and encoding a complex mix of images, words, sounds, symbols, and genre-specific syntax- content that is not taught in the typical language arts
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classroom” (Alvermann, 2008, p. 12). A deeper understanding of these literacy skills will help individuals interact with technology, especially when using it as a tool by which to maximize their knowledge.

Although immersed in technology, Pearson and Young (2002) stated that “available evidence shows that American adults and children have a poor understanding of the essential characteristics of technology, how it influences society, and how people can and do affect its development” (p. 8). This statement reiterates the need for today’s educators to reconfigure their understanding of immersion as literacy. It is necessary, perhaps even more necessary, to teach them how to analyze, and evaluate the abundance of information.

Technological literacy is a term that refers to the teaching of technological systems. Defined by the ITEA (2000), “a person that understands what technology is, how it is created, how it shapes society, and in turn is shaped by society is technologically literate” (p. 4).

Formal teaching in the area of technological literacy will transfer through application in related fields. Individuals who understand the underlying structure of technological systems will be able to learn new technologies and assess situations more quickly in order to deal with the unexpected (Bowman, 1996).

Much of a student’s interactions with computers are internet-based. The internet can be both a source of abounding information and a bearer of misinformation. Within technologic literacy is internet literacy. “Internet literacy is a subset of computer literacy, which is generally defined as the basic knowledge, skills and attitudes needed by all
citizens to be able to deal confidently with computer technology in their daily life” (Chou, Tsai, & Chan, 2007, p. 370). Teaching internet literacy has been compared to teaching informational text literacy. In both situations, a knowledge of how to read indexes, page scanning, and text organization play a key role in finding answers. While many adults take these skills for granted, “those who hold the expertise often forget how arduous, frightening and complicated it was to attain these abilities” (Kastman Breuch, 2002, p. 268). To relate to this statement, just think back to your own early internet-based research efforts… and then remember how far you have come.

*Introducing Internet Literacy in the Elementary Classroom*

Use of the internet in the elementary classroom has the potential to produce several overlapping outcomes. Teachers may tailor lessons in order to direct internet usage towards their goals. Bowman (1996) identified the internet’s social aspect as one that has potential to “promote community growth, and provide another step to developing a community of learners” (p. 123). Students may discuss various topics with others in the classroom and around the world by using online forums and messaging. Exposure to “a diversity of ideas” will also increase through the use of the internet (Bowman, 1996, p. 119).

Consideration of the possibilities that come with use of the internet also brings up concerns about how to navigate its vastness. Working internet literacy skills into the curriculum will help students complete smart searches. Likewise, they will also understand their findings from informational and critical perspectives. “Critical multiple literacy education provides powerful tools for students to navigate the complexity of a
more global, technologically complex and saturated world. They gain skills and knowledge in media and technology together with a more critical view of its profound influence” (Van Heertum & Share, 2006, p. 262).

When introducing internet literacy into instruction, Kastman Breuch (2002) proposed that it be done so “in a fully integrated manner –similar, really, to the way writing is viewed in writing-across-the-curriculum movements in composition” (p. 279). Brabazon (2002) presented the skills as being best taught informally; focusing on problem solving and communication within the system. Still others see the internet as a starting point for analyzing both online and offline texts. This would involve creating “an awareness of how, why, and in whose interest particular texts might work, alternative reading positions and practices for questioning and critiquing texts and their affiliated social formations and cultural assumptions” (Luke & Freebody, 1997, p. 218).

The focus of internet literacy should be placed on the tools and techniques which are transferable to other areas of learning. Brabazon (2002) asserted that “the greatest difficulty emerging from internet studies theorists is that scholars focus overtly on the technology ‘itself’ rather than a critical, interrogative approach” (p. 57). This same opinion was echoed by industry partners who unanimously agreed “there were no specific ‘tools’ that students should learn, for they acknowledged that tools vary widely from workplace to workplace. However, they collectively voiced the expectation that students understand technologies and have the aptitude to learn them quickly” (Kastman Breuch, 2002, p. 268). This emphasis on process can be addressed through formal classroom instruction.
Often, students work independently on a computer. These experiences are valuable as long as they are paired with directed instruction. Teacher-directed computer activities help promote understanding and analysis of internet content, especially when meaningful results are expected. According to Kastman Breuch (2002) students’ use of technology should be paired with a critical reflection of their work and experiences with that technology.

This review of the literature focused on three major subsets within internet literacy which enhance students’ research skills. The topics were identified through an evaluation of research in the fields of education, and educational technology. The ability to conduct complex information searches, to evaluate and analyze the results, and to be able to read through webpages using highly developed literacy skills stand at the forefront as helpful for most students. These three specific areas directly influenced the ten mini-lessons that were developed for the elementary classroom.

**Complex Information Searches**

According to Roschelle et al. (2000), “More and more students will have to learn to navigate through large amounts of information” (p. 77). One of the most intricate aspects of internet literacy is the ability to use complex search engines and phrases to find the desired information. Standards 12 and 17 of the *STL* referred to this ability. In the section titled, *Abilities for a Technological World*, Standard 12 charged students to “develop the abilities to use and maintain technological products and systems” and more specifically, “to use computers to access and organize information”; Benchmark F (ITEA, 2007, p. 128). Under another section, *The Designed World*, Standard 17 states,
“students will develop an understanding of and be able to select and use information and
communication technologies” and that “information can be acquired and sent through a
variety of technological sources, including print and electronic media”; Benchmark E
(ITEA, 2007, p. 169).

While students may already be familiar with using the internet to find specific
applications such as games and virtual worlds, the search for information proves
somewhat more difficult and time-consuming. When choosing to conduct an academic
search, students must understand the qualities of a database and what different databases
will provide. Additionally, thoughtful consideration of the Boolean language will help
students conduct specific and more successful searches. One researcher explained the
kinesthetic way he taught the searching language to his students:

First, I stand eight students in front of the class, telling them that they represent
the total pool of Internet web sites containing information on cats and dogs. I tell
three students that they are websites containing information on cats, the next three
represent websites on dogs, and the last two contain information on both cats and
dogs. Then, after a quick explanation of what basic Boolean operators and and or
are supposed to do, I use the operators to have specific sets of “student web sites”
step forward from the pool. (McPherson, 2005, p. 70)

The exercise explained above is a perfect example of a ten minute mini-lesson which can
be infused before or interjected into a scheduled research session. The visual impact of
the lesson is sure to stay with students as they translate their skills to their work.


Evaluating Sources

Once students complete a successful internet search, they must sort through websites and evaluate them. These skills are referred to in Standard 17 of the Designed World section of the STL which stated, “Students will develop an understanding of and be able to select and use information and communication technologies.” Benchmark D proposes, “The processing of information through the use of technology can be used to help humans make decisions and solve problems” (ITEA, 2007, p. 169).

Through an evaluation of website content, the class may discuss the credentials and perspectives of authors of online content. Through these experiences, students can be formally coached to evaluate, analyze, and synthesize information (Faigley, 1999). These higher-order thinking skills will help students “critically reflect on the underlying messages and representations of popular media” (Van Heertum & Share, 2006, p. 254).

Envision for a moment the cats and dogs exercise described above. The simple act of giving each ‘page’ a URL will add a new dimension to the exercise. Now the class will have a new means by which to evaluate the results of their search. Another technique could be to give each ‘page’ a summary, or, if resources permit, putting kids on computers to actually conduct the ‘cats and dogs’ search (McPherson, 2005). As Alvermann (2008) so eloquently states, student’s “engagement with these kinds of ideological messages and materials is central to their becoming the critical readers and writers we say we value” (p. 17). We are reemphasizing preexisting literacies through the teaching of internet literacy. In an elementary classroom, internet literacy skills will also transfer back to initial literacy practices.
Analyzing the Content and Structure of a Webpage

If a search yields credible results, students may begin to analyze the content of individual web pages. This is where a third skill emerges: the ability to read the structure and content of a webpage. As noted by McPherson (2005), “Many skills required on the Internet are identical or very similar to those required to successfully interact with and comprehend information in books” (p. 70). In both cases, students are learning to read the content and structure of the page. Knowledge of such skills will also help students when preparing their own content for publication on the internet.

Design Standard 8 in the STL asks students to develop an understanding of the attributes of design. Included in Benchmark D, this would entail consideration of “such factors as the desired elements and features of a product or system or the limits that are placed on the design” (ITEA, 2007, p. 94). These considerations may prove useful to helping students understand why information, presented in a certain way, will lead readers in a predetermined direction. Another standard that fits this aspect of internet literacy is under the heading “Abilities for a Technological World” is Standard 12, which states, “Students will develop the abilities to use and maintain technological products and systems; Benchmark G: Use common symbols, such as numbers and words, to communicate key ideas” (ITEA, 2007, p. 128).

The ability to dissect a webpage can be divided into two main tasks: (1) reading the structure of the page ie: color, design, and perspective, and (2) reading the content of the page ie: main ideas, images, sounds, producing a synthesis of a whole picture. Research indicated that size, color, and placement on the screen can tell readers what is
meant through what is shown (Alvermann, 2008). Helping students understand these design elements will enable them to better understand their interpretation of the information found on the page.

“Most web page designers will not argue the necessity for clearly organizing web site content” (McPherson, 2005, p. 69), and this organization, as noted earlier, may be easily related to that of an informational text. As with an informational text, certain literacy skills will help students read what is presented. One such skill is the ability to find main ideas on a page. This can be done in several ways such as scanning for headings, looking at images, and reading through navigation bars. When reading online one must cross-contextualizing text and other multimedia to fully understand the kinds of meanings being made and stored” (Alvermann, 2008). Teaching students to synthesize information enables them to see a clearer picture of what is being discussed. Eventually, they will achieve web page literacy to the point that they will be able to process the idea of the whole page within seconds before scanning through for specific ideas.

Summary

In the modern literate world, it is necessary for students to develop fluency of both print and electronic texts. If teachers stick strictly to the formalized teaching of print-based texts “we may find ourselves schooling young people in literacy practices that disregard the vitality of their literate lives and the needs they will have for their literate and social futures” (Lewis & Fabos, 2005, p. 493). Immediate steps must be taken to incorporate technology into the classroom. While this challenge may seem daunting in scope, it can be scaled down through an analysis of the whole in search of specific parts
that will fit into preexisting classroom experiences. While introducing technology into the classroom teachers must continue to infuse their admiration of the topic and excitement into the lesson (Dillenbourg, 2008) while looking for signs of success on the faces and in the work of their students.
Methodology

The participating class was one of three 4th grade classes in one of seven elementary schools in the Webster Central School District. The teacher was looking for ideas and support to integrate technology into her classroom. The project was intended for students to research and present a topic, and thus, the project was fused with an approaching science unit on food webs.

Participants

The unit took place over 12 days. The days were spread out over six weeks, averaging two days per week. The fourth grade class was comprised of 24 students; 12 girls and 12 boys. The students’ ages range from 9-11 years old. Five of the students have IEP’s with accommodations with reading, writing, and mathematics. Two students immigrated to the United States this year from Canada, and while proficient in English, continue to adapt culturally to the classroom environment.

Apparatus

The classroom was equipped with two desktop computers. One was intended for use by the teacher and the other for the students. The classroom teacher shared her computer with the students when necessary throughout this project. Additionally, a laptop cart was available for use throughout this project. Included on the cart were laptop computers, a LCD projector, printer, and network cable. The cart consists of 25 Intel Centrio Duo laptops, allowing all students to work independently on their own computer. The district computers ran on the Windows XP operating system, with Internet Explorer
as the default browser. When working as a whole group, an Epson projector was used to display findings on the board.

While the focus of this project was to develop internet literacy skills in students, it was not necessary to use computers on all days at all times. Several of the techniques we employed were completed with standard classroom materials: poster board, post-it notes, and notebooks. The laptop cart was used for 6 of the 11 days of the action research project. Other days were spent working in small groups, or as a class using a projector.

To prepare for this unit, lesson plans were developed (see Appendix A), each defining the focus of the lesson, work time, and journal entry. Students were to complete one journal entry per day (see Appendix B) with the exception of the first day. This journal contributed to the grading process, and also helped make teachers aware of any concepts or procedures students were struggling with.

*Instruments and Procedures*

The goal of this project was to introduce internet literacy to the curriculum through a series of ten carefully designed mini-lessons. The idea was to demystify classroom technology by making the introduction manageable, and easy to integrate into an existing classroom unit project. The mini-lessons were generated directly from the three areas identified through research as most influential on students’ internet literacy: the ability to complete complex information searches, evaluating the resulting sources, and analyzing the content and structure of individual web pages.

Students used their research to create an informative and thoughtfully designed presentation in Microsoft PowerPoint. From their main page containing general
information, students linked to supporting pages focusing on different parts of the food chain. The pages were linked using action buttons programmed as hyperlinks, and the project was saved as a slideshow. This met the classroom teachers’ desire to familiarize students with PowerPoint, while also allowing students to utilize their new skills in designing a format similar to a web page.

After deciding to work with the food chains curriculum, mini-lessons were introduced in a spiral pattern. The first lesson was an introduction to the project, the second began the pattern by focused on searching, the third on evaluation, and the fourth on analyzing web page content and structure. Lessons five, six, and seven then repeated this pattern as did lessons eight, nine, and ten. Each iteration brought with it the reinforcement and extension of previous lessons.

As mentioned above, the lessons were designed to be short. The work was completed within a 45 minute timeframe, and a maximum of 20 minutes per session was devoted to the internet literacy lesson. The other half of the time would be structured planning and research time for students. It was our intent that the second half of each class would be used by students to work on their unit project: the creation of a food chain presentation.

Students’ technologic abilities were surveyed (see Appendix B) before technology objectives were introduced. These surveys allowed the teachers to better understand how and with what frequency students have used technology in the past. This information determined the focus of mini-lessons to meet the needs of a wide array of experiences. Also, a better understanding of students’ comfort level with computers also emerged.
Finally, the surveys were used at the beginning of the unit to help students see the complexity of the abilities they already have and build a foundation on which the mini lessons would build.

After completion of the introductory survey, Lesson 1 introduced students to the three areas of focus in internet literacy. Techniques employed by students while browsing the internet were explored through a simulation (see Appendix C), and the class began generating a list of keywords which would be useful in researching food chains. This list would be saved and served as a springboard for the next lesson as well as a resource for independent research time. The lesson was not categorized, but rather was used as an introduction to the integration of technology into the unit plan.

The spiral nature of the research unit began with lesson two. By referring back to the list of keywords, a guided role-play taught students the basics of Boolean phraseology (see Appendix D). They learned how to format the structure of their wording to produce more acute search results, and began adding new words to a page for individual keywords in their research notebook. A short interruption followed this lesson as New York State 4th Grade Math standardized testing took place over the next week.

When class reconvened, students began learning techniques that would help them evaluate their search results. The area of focus for this mini-lesson was the URL source that could be found in the toolbar. As a class, students repeated the previous lesson’s role-playing, but now were assigned URL’s. The class worked together to evaluate and explain which websites would be most beneficial to their learning.
As students learned how to conduct more specific searches, and evaluate their results, they also began to learn how to most effectively read a webpage. The first lesson of this category focused on common webpage text structures. Students explored the use of toolbars, menu options, and screen tips as a way by which to search through web pages.

The second iteration of searching techniques exposed students to several of the thousands of search engines that are available. We began with commonly used engines such as askkids.com, kids.yahoo.com, and answers.com, looking beyond the standard search box into specialized search services such as images, definitions, and video clips. Next, the use of web page descriptions was introduced as a way by which students can evaluate a list of web pages at a glance. To build on their knowledge of text structure, students learned about the text elements involved in an informative webpage: text, pictures, captions, and hyperlinks. These were also elements we were looking for in their final presentations.

Three weeks into the project, students began to fine tune the information in their presentations. The third and final iteration of mini-lessons began by demonstrating the Edit: Find technique that could be used to search individual web pages for specific words and phrases. This helped students find the specific information and details they needed. To stress the importance of evaluating web pages, some pseudo pages were presented, and ideas were brainstormed as a class how to verify the validity of web site content. Finally, the last mini-lesson helped students tweak their presentations by teaching them about the subtleties of color selection and image and text placement.
On the final day of the unit, students presented their finished Power Point slides to an audience of their peers. The presentations were videotaped and converted to a digital format in order for them to be posted on the classroom webpage. The slides were also uploaded to the district’s server and connected to the classroom’s homepage.
Results

Considering the scope and complexity of the unit, the project was a tremendous success for several reasons. Even though the unit spanned two months, students remained engaged and excited through the final day of the project. Their self-confidence conducting research on the internet rose, as can be seen through a comparison of their Pre Unit and Post Unit Surveys (see Table 3), and most importantly, their final projects show a complex synthesis of independent multi-modal learning.

Motivation

Classroom observations showed student motivation to be high throughout most of the unit. Each day as the researcher entered the classroom, students asked if they would be working on computers today. Even on days when the laptop cart was not used, students showed high levels of engagement as they learned about different aspects of computer literacy.

A chart was designed which assigned student pairs to specific laptop computers (see Table 4). Students were assigned a color: blue or yellow. Each day the laptop cart was used, one student was designated the typist and the other held the Computer Manual (see Appendix G) describing how to complete specific tasks. Teacher observations recorded a high level of student engagement in both roles. Occasionally, the typist’s job was overtaken by the unassigned partner. When this was observed, a verbal notice was given, and the roles were returned to their assigned members.
A comparison of the Pre Unit and Post Unit Surveys (see Table 3) showed no change in the self-confidence of students’ ability to find and evaluate reliable internet resources. At the onset of the project, 77% of students believed themselves to be very good at finding information on the internet, 50% were confident of their website evaluation skills, and 59% thought of themselves as very good at determining whether or not a webpage contained relevant information. After the ten mini-lessons were presented, the Post Unit survey (see Appendix E) showed the exact same percentages. It should be noted that although these numbers stayed the same, there were fluctuations in the number of students who felt a little bit comfortable, or did not feel comfortable at all with their developing internet literacy skills.

Mini-Lessons

Overall, the mini-lessons were well-received by students. There was a high correlation between the topics presented, and their presence in student’s work. The students gained comfort and familiarity with internet searching techniques, and the toolbar features in Microsoft PowerPoint. This was evident by a decrease in questions regarding these skills as the unit progressed. Rather than seeking approval from a teacher, the students began to move towards independent learning as they experimented with different search phraseology and editing techniques. Even though Pre-Unit and Post-Unit Survey results indicated that over 50% of students prefer learning about computers
by just doing it, the visual presentation of the material on the Epsom projector proved futile for unintuitive skills such as using the Ctrl + C keys to copy text.

As the unit proceeded, mini-lessons were adapted. Of the ten planned mini-lessons, two were eliminated and replaced with more relevant topics. In order to better understand the concept of website reliability in the Evaluating 3 Lesson, the class discussed the differences between a wiki and a website. Students were encouraged to use websites with .edu or .org domains for their research project. The Searching 3 Lesson was skipped altogether as it was not relevant to most students’ work.

As the unit’s end neared, it was decided that three extra days were needed to finish research, present, and provide crucial closure to the unit. This was due in part to the introductory nature of the project; throughout the year students have used classroom computers solely to practice rote mathematical operations. Because this unit was their first time engaged in classroom research on laptop computers, it took them slightly longer than anticipated to begin their research and develop the necessary operational skills.

**Final Product**

The confidence and engagement of the students appeared in their final PowerPoint presentations. Students stood in front of the class and presented their specific food chain to their classmates. When students began their work, they used a food chain template. This template contained pre-programmed action buttons. Each pair of students inserted text and images on all of their slides according to the template design. After all information was inserted, students explored the design options PowerPoint provides.
They chose a design that was interesting to them, and in most cases, one which aligned with their food chain environment.

When presenting, one student was assigned the job of the navigator and the other as the speaker. Each group had the responsibility of clicking through their own show, while orally presenting the information to the class. Classmates were encouraged to ask questions and comment on the presentations. All students were polite and supportive throughout this process.

_Evaluation_

To evaluate the effectiveness of the Food Chain Unit, final products and student achievement were examined. As students worked in homogenous groups, each could be evaluated in comparison to their standard level of achievement.

It was determined that high achieving students continued to excel in their work throughout the unit. This success was evident in the timely manner within which they completed high-quality work. It was apparent in groups of high achieving students, that extra time was dedicated to both creating a detailed and realistic food chain, and summarizing text in their own words.

Lower achieving students did better than expected. They encouraged each other to have patience with the technology, and mastered several new skills within the timeframe. A few students who have been shy throughout the year seemed to open up as they worked with their partner. One hurdle to several students was their inability to type. While most students did fine copying and pasting text from the internet into their presentation, they had difficulty retyping the text in their own words. Text that was taken verbatim from the
internet was apparent in several presentations. This called into question student’s actual understanding of the material. Although it seemed questionable at first, it was determined that these traits did indeed fit the technology objectives as students were learning to traverse the internet in search of relevant information.

An unexpected benefit of using PowerPoint was the presentations students gave on the final days of the unit. Students had spent the past month researching one food chain, and they were now able to learn about several others. Since some groups chose similar environments as their classmates, this provided a great opportunity to compare and contrast results. Additionally, since the materials were posted on the classroom website, the class may refer back to the presentations, as a class, or individually, for future learning.
Discussion

As the unit progressed, several implications arose which could be further explored in the future. For the most part, mini-lesson topics were an important factor in student achievement. Since all students have access to a computer at home and most also have access to the internet, it was important for them to have guidance to accompany their independent recreational usage. Many students indicated at the onset of the unit that they learn best by just doing it. This reoccurring theme was both beneficial, and at some times, an obstacle.

Metacognition

When first beginning research, the Pre-Unit Survey reflected a relatively high level of confidence. Most students thought themselves able to complete complex searches and evaluate the results. When given a laptop and encouraged to find information, many students exhibited a comparatively high level of anxiety and uncertainty. Even though some of the initial mini-lesson experiences were somewhat of a review for students, they also seemed to serve as a framework to explicitly demonstrate skills that were implicit to most students. For example, while many students routinely used search engines to find their favorite game sites on the internet, they were not consciously aware of all the steps they were executing to complete the search. When asked to write a letter to Bob, the imaginary hermit, describing how to find their favorite website, they were faced with the reality that even a seemingly natural action, such as using a computer mouse, is actually a learned skill.
Transferring these realizations to searching and the understanding of Boolean phraseology helped develop in students the sense that internet literacy is an area in which one can always grow. They began using their searching and evaluation skills to find accurate, interesting information about their topics.

**Systematic Learning**

An unexpected area of difficulty in this unit was the complexity of the subject matter. The students were using the internet; a complex web of interrelated resources, to research a food chain; a complex string of interrelated organisms. The overlap of these two systems caused both opportunities and limitations for the students. In regards to the development of internet literacy skills, the food chain unit provided the perfect avenue to explore the multi-faceted nature of the World Wide Web. Students were able to click through pages and explore food chains through hyperlinks. Once an environment was identified and an organism within the ecosystem was selected, an investigation into that organism’s diet and/or predators often led to usefully connected information. This way of learning can be directly related to the energy flow in a food chain; when one organism is investigated, one can not help but to learn about the others around it.

While the subject matter allowed for complex relationships to develop in student’s understanding, it also proved to be an obstacle to many students’ learning. In retrospect, it may have been more straightforward to introduce internet literacy through the study of a more unified topic. An interesting approach may have been to assign students different parts of the food chain: producers, primary consumers, secondary consumers, or decomposers. They would then be assigned to find as many animals that fit
into their category as possible in the allotted time. Further study of the differences in each approach could weigh the benefits of each.

Content

At the onset of the study, planning allotted 45 minutes at the beginning of the day solely for the study of 4th Grade Science content. An hour at the end of the day would be dedicated to the development of internet literacy and student research skills. This amounted to almost two hours of time per session, three sessions per week. Realistically, six hours per week cannot easily be spent on one study. When the project was carried out, the classroom teacher decided to forgo the 45 minute content study at the beginning of the day. Because of this, research time became both time to develop internet literacy, as well as time to make content connections in individual groups. Little time was spent developing the concept of what a food chain is, and connecting this to the project. This has both positive and negative implications.

A positive aspect of this approach was the independent nature of student learning. Rather than setting out key areas of focus, students constructed their understandings of food chains as they went. Through their development of the PowerPoint slides, students understood that each plant/animal attained its’ energy from the plant/animal on the slide before it. This basic concept was well developed in most groups.

Unfortunately, overlying ecosystem trends were not touched upon. For instance, even though students understood the energy transfer from one animal to another, they were not introduced to the idea that energy is lost in each transfer. Another main point that was not covered was the number of animals at each level of the food chain. Because
energy is lost in each transfer, the number of producers in a food chain is always greater than the primary consumers, the number of primary consumers is always greater than secondary consumers, and so on. While the benefits of this approach can be argued with a constructivist pedagogy, it was the researcher’s opinion that the independent construction of ideas would have been stronger if it had been complemented by direct teacher instruction.

Grouping

The responsibility of forming groups was placed solely in the hands of the classroom teacher. Since she knows the students best, she was able to group them into complementary pairs. Just before the first day of the unit, one student moved to another school. The odd number of students created one group of three throughout the project. It was an interesting twist created, and allowed for further analysis of the experience.

The group of three students seemed the least complimentary group in the class. Students often disagreed and rarely maintained their daily role. With three students in a group, and one computer per group, the two students not using the computer were seldom on-task. Often times, one of the two students was interacting with a neighboring group, and another was daydreaming.

This brought up new questions for the research. Considering the motivation, engagement, and growth of students throughout the project, might it be beneficial to give each student their own laptop computer? If this was tested, it could be arranged in one of two ways: individual students could work on their own research and create their own PowerPoint, or groups could assign each individual an aspect of the research project to
work on. In the case of the group of three students, the second scenario might be beneficial as it would allow each student to work on a different part of their African Desert food chain. The difficulty of this scenario would be transferring data between computers, making a wiki or other web 2.0 technology more of an attractive presentation method.

Support

Research supported several outcomes of this learning experience. As noted in much of the literature, and specifically in a study carried out by Robert McClintock (1986), the initial integration of technology into preexisting classroom routines takes a tremendous amount of time. Additionally, there was little on-the-spot support available to the classroom teacher. Reportedly, the school shares a technology specialist with three other elementary schools in the district. The sparse support, and lack of technological leadership was presented by William Dugger (2007) as a major reason many teachers do not use technology in their classrooms. Considering these conditions, it was necessary, as Dillenbourg (2008) suggested, to have increased flexibility throughout the unit. The class was under both time and material constraints, and made accommodations, when needed, to complete the process in a timely manner.

As was discussed previously, the combination of content and process in the food chain unit allowed for complex synthesis of information. McClintock (1986) detailed higher-order thinking skills possible with computer technology that were previously infeasible. This became apparent as students found complex connections within web pages. The networked web-like structure of the internet allowed students to make more
meaningful connections between the topics they were learning. Transcribing the material into a clear, concise presentation, demanded students struggle with information. Alvermann (2008) suggested these complex processes lead to greater understanding. It was clear the students were actively engaged in the learning they were a part of. Roschelle, Penuel, and Abrahamson (2004) have shown increased engagement in over half of the studies they have completed. More over, the engagement students experienced seemed to last throughout the entire unit, spanning more than a months time.
Conclusion

While there are several different avenues for future action that arose from this research project, many of the outcomes are ones that would be beneficial to repeat, revise, and reteach. The students learned powerful searching and evaluating skills as they engaged in real-world researching. At the 4\textsuperscript{th} grade level, these students are beginning to explore the world of scholarly work. Their engagement in independent research, synthesis, and presentation of information helped students construct their understanding of food chains within an ecosystem.
References


Appendix A

Lesson Plan

<table>
<thead>
<tr>
<th>Date: February 25, 2009</th>
<th>Focus: Introduction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Students filled out a survey a few weeks ago that told a little bit about their background with computers and using the internet. Today, the project will be introduced, and the nature of technology will be explored.</td>
</tr>
<tr>
<td></td>
<td>• Students will be given 5 minutes to write out detailed instructions about how to find their favorite website.</td>
</tr>
<tr>
<td></td>
<td>• Two or three volunteers will be asked to find the website using only these instructions.</td>
</tr>
<tr>
<td></td>
<td>• The class will discuss the intricate nature of the world wide web, we will discuss some of the things we see as “givens” and introduce the 3 areas of internet literacy we will explore.</td>
</tr>
<tr>
<td><strong>Work time:</strong></td>
<td>• Today will be a whole group work time. As a class, we will generate a list of keywords about our topic.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date: February 27, 2009</th>
<th>Focus: Searching 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>We will use our lists of keywords to explore Boolean phraseology. In other words, how do we use the words to conduct an accurate search? The focus will be on the words “and” and “or”.</td>
</tr>
<tr>
<td></td>
<td>• Ask for 10 student participants to come to the front of the room.</td>
</tr>
<tr>
<td></td>
<td>• Each participant will be a “web page” and will have a card denoting what kind of web page they are</td>
</tr>
<tr>
<td></td>
<td>• Search ___ and ____</td>
</tr>
<tr>
<td></td>
<td>• Search ___ or ____</td>
</tr>
<tr>
<td><strong>Work time:</strong></td>
<td>• Today project details will be discussed and group formations will be assigned. Students will be asked to work in a group to decide on a food chain/web environment, and begin brainstorming searchable phrases.</td>
</tr>
<tr>
<td><strong>Journal:</strong></td>
<td>• Students will add at least 5 new keywords and search phrases to their journals.</td>
</tr>
</tbody>
</table>
Date: March 10, 2009

Focus: Evaluation 1

Description:
Today we will conduct a search and begin evaluating the results. The parts of the URL will be explored along with the most commonly used endings.

• What are the common URL endings? What do they stand for? What does this mean about their credibility?
• We will replicate the previous role play, but today, in addition to having a ‘topic’ each volunteer will have a URL. The class will need to choose, and explain why certain pages are better than others.

Work time:
• With their partners, students will decide on a title for their presentation. They will also develop a guiding question.

Journal:
• Students will write their topic and guiding question and explain why it is important to them.

Date: March 11, 2009

Focus: Websites 1

Description:
Today, website structure will be explored. A few different websites will be used as examples of how a page is generally set up. The toolbar lists main ideas, and smaller ideas are categorized underneath. This can be helpful to know when looking for information.

• Go through some examples.
• Notice similarities and differences.
• Discuss some ways students can organize their own pages.

Work time:
• Each group will prepare their presentation. They will insert the Title and Authors of their presentation on Slide 1.
• Students will use the computers and research their topics. They are responsible for identifying the main ideas within their topic.

Journal:
• Students will identify (3-10) the main ideas within their topic.
Date: March 13, 2009  
Focus: Searching 2  
Description:  
As students begin to do the bulk of their research, it is helpful to know which search engines perform which tasks. Today we will explore a couple of the most popular kid-friendly educational search engines out there.

- Kidsaks.com  
- Yahoo! kids  
- Yahoo! scholar (etc.)  

Work time:  
- Show kids how to add new slides.  
- Have them add one slide per main topic.  
- Title each Slide.  
- Students will research and add relevant information to their slides  

Journal:  
- Students will write slide titles on post it notes and keep them in their journals for the next class.

Date: March 17, 2009  
Focus: Evaluating 2  
Description:  
How do we know if a website answers our question reliably?  

- Point out to students the web page descriptions that show up when we search.  
- Who writes the descriptions?  
- Visit the page and look for a date.  
- Do the links work?  

Work time:  
- With their partner, students will decide the structure of their web-page today. They will use the post it notes to show how the pages will connect to one another.  

Journal:  
- Draw a site map showing the links between pages.
Date: March 18, 2009
Focus: Website 2
Description: 
What elements make up a webpage? Most sites use a combination of text and pictures. Show students how captions can be helpful. What else can we add?

- Show a few examples, and ask students to discuss how the elements of certain web pages add to or subtract from their overall appearance.

Work time:
- Copying images from another website (right click, copy, paste)
- Inserting hyperlinks: show how (they can hyperlink as they work today).
- Pages should be pretty much all set, so now content should be added.

Journal:
- What questions do you still have about using the internet?

Date: March 20, 2009
Focus: Searching 3
Description: 
Students are working heavily on their research and might be at the point of fine-tuning their content. Today, they will learn a technique that allows them to search within the text of a single web page.

- Using the Edit menu option on their Internet browser, students are able to ‘Find’ a certain word or phrase.
- Use this sparingly as it will only help with specific spellings/tenses/etc.

Work time:
- Research time
- Discuss amount of text on a page.

Journal:
- Write down one more burning question about your topic. Where might you be able to use this information?
### Date: March 24, 2009

**Focus:** Evaluating 3

**Description:**
Why is all of this evaluating so important? Did you know that some people actually publish false information online purposely? Show the kids some examples of pseudo-text, and ask them how they can tell if the information is true.

**Work time:**
- Reinforce the structure of the page
- Only today and tomorrow left of work time
- Check in with EVERYONE

**Journal:**
- How do you like working with PowerPoint?

---

### Date: March 25, 2009

**Focus:** Website 3

**Description:**
Finally, we will talk about color scheme and style. Explore some sample web pages that have both good and bad qualities.

**Work time:**
- Together, students will be shown how to insert a color scheme. This scheme will remain consistent throughout their entire presentation. Font tweaking and whatnot is up to the students.
- Finish researching
- Brief them on presentation techniques.

**Journal:**
- Can we print slide handouts from the laptops? If so, journal time can be spent doing that, and handouts placed in the journal for Friday reference.
### Pre Unit Survey

Please fill in the blank or circle the choice that best answers the question:

<table>
<thead>
<tr>
<th>Question</th>
<th>Choice Options</th>
</tr>
</thead>
</table>
| 1. When did you first use a computer?                                    | ○ This year (4th grade)  
○ Last year (3rd grade)  
○ Second grade  
○ First grade  
○ Kindergarten  
○ Before Kindergarten                                                     |
| 2. Where did you first use a computer?                                   | ○ At school  
○ At home  
○ At the library  
○ At a family member’s house  
○ At a friend’s house                                                      |
| 3. How do you learn best about computers?                                | ○ With help from my parents  
○ By watching a friend  
○ With help from a teacher  
○ I just do it                                                             |
| 4a. Do you have a computer at home? (circle one)                          | Yes  
No |
| 4b. Do you have the internet at home?                                    | Yes  
No |
| 5. About how many hours a day do you use a computer?                      | ○ None  
○ Less than one hour  
○ 1-2 hours  
○ 3 or more hours                                                        |
| 6. What do you use?                                                       | Word processing……..Yes  
No  
Email....................Yes  
No  
Internet..................Yes  
No  
Games.....................Yes  
No  
Chat.......................Yes  
No  
Other:  ___________________________  
___________________________ |
I feel confident…

Not at all  A little bit  Very good  Not sure

Searching:

1. I can find information on the internet:

2. I use search engines like Google, or Yahoo:

3. Scenario: You just got home from your Aunt Molly’s house. She has a new puppy. You thought he was so cute, and want to find out what kind of dog he is. What would you type in to an internet search box to find the answer?

Evaluating:

4. When I see a list of websites, I know which ones are good:

5. I know when a website has the information I need:
6. Scenario: After you type in the search for your Aunt Molly’s dog, a list of websites comes up. How do you decide which one to look at first? (please explain)

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Websites:

7. I can scan a page for information:

[ ]  [ ]  [ ]  [ ]

8. I know how toolbars work:

[ ]  [ ]  [ ]  [ ]

9. Scenario: Which of the following best describes how you read through a webpage?

[ ] I read from the beginning to find what I want.
[ ] I look at the pictures first.
[ ] I skim through and look for keywords.

If you have any comments or questions, or want to explain any of your answers, please write them below:

Thank you for filling out this survey. Your answers will help us understand your use of the computer, and how comfortable you feel using the internet.
Appendix C

Browsing Simulation

You have been hired to teach "Bob the Hermit" how to use the internet. In the space below, please describe to him how to find your favorite webpage. Describe each step, Bob may have never used a computer before. You have 5 minutes.
Appendix D

Boolean Phraseology

A suggestion here is to develop these online skills away from the computer. I have established the foundations of grade-6 students’ advanced Google searches without ever turning on a computer. How? First, I stand eight students in front of the class, telling them that they represent the total pool of Internet web sites containing information on cats and dogs. I tell three students that they are web sites containing information on cats, the next three represent web sites on dogs, and the last two contain information on both cats and dogs. Then, after a quick explanation of what basic Boolean operators and and or are supposed to do, I use the operators to have specific sets of “student web sites” step forward from the pool.

For example, when I search for cat web sites, five student web sites should step forward—all but the three dog web sites. A search for cats and dogs will bring the two web sites on cats and dogs forward (thus narrowing the search), whereas a search for cats or dogs will bring all eight student web sites forward (thus expanding the search). I then explain that double quotes around the words hairless cats will bring forward only abilities to use Boolean operators to focus those sites with that exact phrase. After re- their online searches without being dis- peting this activity several times, I then en- tracted by the computer. Combined with courage students to write out Boolean keywords (also generated offline), many stu- expressions using keywords from their cur- dents are delighted with the speed and ac- rent research projects. The intention is to vi- curacy at which they can identify Internet visually and experientially develop students’ information using their computers.

(McPherson, 2005, p. 70)
Appendix E

Post Unit Survey

Please fill in the blank or circle the choice that best answers the question:

1. How do you learn best about computers?
   - With help from my parents
   - By watching a friend
   - With help from a teacher
   - I just do it

2. About how many hours a day do you use a computer?
   - None
   - Less than one hour
   - 1-2 hours
   - 3 or more hours

3. What do you use?
   - Word processing………Yes  No
   - Email……………………Yes  No
   - Internet…………………Yes  No
   - Games…………………Yes  No
   - Chat………………….. Yes  No
   - Other: ___________________________
           ___________________________

I feel confident…

Not at all  A little bit  Very good  Not sure
4. I can find information on the internet:  

5. I use search engines like Google, or Yahoo:  

6. When I see a list of websites, I know which ones are good:  

7. I know when a website has the information I need:  

8. I can scan a page for information:  

9. I know how toolbars work:
<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. Did you enjoy working with PowerPoint?</td>
<td>Always, Most of the time, Not really, Not at all</td>
</tr>
<tr>
<td>11. If you had three more weeks, do you think…</td>
<td>Your presentation would have <em>better</em> information, Your presentation would have <em>more</em> information, You might dilly-dally</td>
</tr>
<tr>
<td>12a. Did Miss Bansbach’s food chain website help you?</td>
<td>Yes, No</td>
</tr>
<tr>
<td>12b. How many times did you visit it to use the links?</td>
<td>Once a day, Once a week, Only once</td>
</tr>
<tr>
<td>12c. Did you ever visit the website from home?</td>
<td>Yes, No</td>
</tr>
</tbody>
</table>
Appendix F

Computer Directions

---

**Starting a New PowerPoint**

1. Click on the "Start" button on the bottom left.
2. Select "Programs."
3. Click on "Microsoft PowerPoint."
4. The program will open.

**Starting a new PowerPoint (continued)**

1. **Click on "File" Menu.**
2. **Click on "Open.**
3. **Click on "Desktop," then "My Computer."
4. Click on "my-web" and then on "Biosphere."
5. Open "food chains" or "food webs" depending on your assignment.

(continued on next page)
Saving for the First Time

As soon as you begin working on your slide, you should save your work. Here's how:

1. Go to the "File" menu and select "Save As".
2. Click on "Save Back", "06-09", and the folder with "YOUR name" on it.
3. Type your last name and your partner's last name in the "File Name" box. Make sure the "Save as type" is set to (.ppt).
4. Then click on "Save".

Opening your PowerPoint

1. Open PowerPoint from the Start menu (the main slide, below are some steps for "Opening a New PowerPoint")
2. Go to the "File" menu and select "Open".
3. Click on "Save Back", "06-09", and "YOUR Name".
4. Select your document, and click on "Open".

Saving your PowerPoint

These directions will help you save if you have already saved for the first time.

1. Go to the "File" menu and select "Save".
2. The computer will save your document automatically.
3. If you are ready to quit Microsoft PowerPoint after saving, click on the X in the upper right hand corner.

Inserting New Slides

1. Click on the "Insert" toolbar, click on "New Slide".
2. Keep doing this until you have one slide for each main point.
3. You'll see all your slides in the "Slide Toolbar".

Click to add title

Click to insert...
Copying Images

Let's say you are surfing the internet, and you see a picture you would like to use for your PowerPoint presentation. If you use the picture for educational purposes (such as making a presentation about food webs and/or food chains for your present class) you are legally able to copy the picture without violating copyright laws. Here's how:

1. With the Internet browser open AND your PowerPoint window open "Right-click" on the picture:

   ![Right-click icon]

   (Look on next page for more directions)

2. Select the option "Copy":

   ![Copy option]

3. Go back to your PowerPoint presentation, and from the "Edit" menu, click "Paste":

   ![Paste option]

4. If you need to make the picture bigger or smaller, just click on it and drag the corners.

Inserting Hyperlinks

1. With your PowerPoint document open, under the "Slide Show" toolbar, click on "Action Buttons" and click the button you want
2. Use your mouse to click and drag the button where you want it
3. A pop-up will automatically appear on your screen:
   a. Make sure "Hyperlink To" is selected
   b. Press the arrow, scroll down, and click on "Slide"
   c. Look through the slides, and select the slide you want to link to
   d. Click "OK" to insert the hyperlink

4. You can edit the hyperlink whenever you want by right clicking on it and changing the settings.

Adding Design

Once the major parts of your page are in place, you can jazz it up a little!

1. Under the "Format" toolbar, select "Slide Design"

   ![Slide Design options]

2. A window will pop up on the right side of your screen
3. Click on "Design templates" to select a background you like
4. Click on "Color Schemes" to select colors you like
5. Please do not use any "Custom Animations"
Printing Handouts

Before presenting, you will print out your slides, here's how:

1. Click on the "file" menu and click on "print"

2. A pop-up menu will appear:
   a. Click on "Handouts"
   b. Click on the arrow next to "Slides per page"
   c. Select 3 slides per page
   d. Click "OK" to print
Table 1

*Student’s Response to Pre-Unit Survey*

*Question is followed by number and percentage of responses out of twenty-two*

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. When did you first use a computer?</td>
<td>4&lt;sup&gt;th&lt;/sup&gt; Grade</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>3&lt;sup&gt;rd&lt;/sup&gt; Grade</td>
<td>1</td>
<td>4.5%</td>
</tr>
<tr>
<td></td>
<td>2&lt;sup&gt;nd&lt;/sup&gt; Grade</td>
<td>2</td>
<td>9.1%</td>
</tr>
<tr>
<td></td>
<td>1&lt;sup&gt;st&lt;/sup&gt; Grade</td>
<td>3</td>
<td>13.6%</td>
</tr>
<tr>
<td></td>
<td>Kindergarten</td>
<td>6</td>
<td>27.3%</td>
</tr>
<tr>
<td></td>
<td>Before Kindergarten</td>
<td>10</td>
<td>45.5%</td>
</tr>
<tr>
<td>2. Where did you first use a computer?</td>
<td>At school</td>
<td>3</td>
<td>13.6%</td>
</tr>
<tr>
<td></td>
<td>At home</td>
<td>16</td>
<td>72.7%</td>
</tr>
<tr>
<td></td>
<td>At the library</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>At a family member’s house</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>At a friend’s house</td>
<td>3</td>
<td>13.6%</td>
</tr>
<tr>
<td>3. How do you learn best about computers?</td>
<td>With help from my parents</td>
<td>5</td>
<td>22.7%</td>
</tr>
<tr>
<td></td>
<td>By watching a friend</td>
<td>3</td>
<td>13.6%</td>
</tr>
<tr>
<td></td>
<td>With help from a teacher</td>
<td>2</td>
<td>9.1%</td>
</tr>
<tr>
<td></td>
<td>I just do it</td>
<td>12</td>
<td>54.5%</td>
</tr>
<tr>
<td>4a. Do you have a computer at home?</td>
<td>Yes</td>
<td>22</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>4b. Do you have internet at home?</td>
<td>Yes</td>
<td>20</td>
<td>90.0%</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>2</td>
<td>9.1%</td>
</tr>
</tbody>
</table>
5. About how many hours a day do you use a computer?

<table>
<thead>
<tr>
<th>Hours</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>4</td>
<td>18.2%</td>
</tr>
<tr>
<td>Less than 1 hour</td>
<td>9</td>
<td>40.9%</td>
</tr>
<tr>
<td>1-2 hours</td>
<td>7</td>
<td>31.8%</td>
</tr>
<tr>
<td>3 or more hours</td>
<td>2</td>
<td>9.1%</td>
</tr>
</tbody>
</table>

6. What do you use?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word processing</td>
<td>9</td>
<td>40.9%</td>
</tr>
<tr>
<td>Email</td>
<td>7</td>
<td>31.8%</td>
</tr>
<tr>
<td>Internet</td>
<td>16</td>
<td>72.7%</td>
</tr>
<tr>
<td>Games</td>
<td>17</td>
<td>77.3%</td>
</tr>
<tr>
<td>Chat</td>
<td>7</td>
<td>31.8%</td>
</tr>
</tbody>
</table>

7. I can find information on the internet.

<table>
<thead>
<tr>
<th>Ability</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>A little bit</td>
<td>5</td>
<td>22.7%</td>
</tr>
<tr>
<td>Very good</td>
<td>17</td>
<td>77.3%</td>
</tr>
<tr>
<td>Not sure</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>

8. I use search engines like Google and Yahoo!

<table>
<thead>
<tr>
<th>Ability</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>A little bit</td>
<td>6</td>
<td>27.3%</td>
</tr>
<tr>
<td>Very good</td>
<td>16</td>
<td>72.7%</td>
</tr>
<tr>
<td>Not sure</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>

9. When I see a list of websites, I know which ones are good.

<table>
<thead>
<tr>
<th>Ability</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>1</td>
<td>4.5%</td>
</tr>
<tr>
<td>A little bit</td>
<td>8</td>
<td>36.4%</td>
</tr>
<tr>
<td>Very good</td>
<td>11</td>
<td>50%</td>
</tr>
<tr>
<td>Not sure</td>
<td>2</td>
<td>9.1%</td>
</tr>
</tbody>
</table>
10. I know when a website has the information I need.

<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>A little bit</th>
<th>Very good</th>
<th>Not sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>0</td>
<td>9</td>
<td>13</td>
<td>0</td>
</tr>
</tbody>
</table>

11. I can scan a page for information.

<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>A little bit</th>
<th>Very good</th>
<th>Not sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>0</td>
<td>1</td>
<td>20</td>
<td>1</td>
</tr>
</tbody>
</table>

12. I know how toolbars work.

<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>A little bit</th>
<th>Very good</th>
<th>Not sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.2%</td>
<td>4</td>
<td>5</td>
<td>9</td>
<td>4</td>
</tr>
</tbody>
</table>
Table 2

Student’s Response to Post-Unit Survey

Question is followed by number and percentage of responses out of twenty-two

<table>
<thead>
<tr>
<th>1. How do you learn best about computers?</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>With help from my parents</td>
<td>4</td>
<td>18.2%</td>
</tr>
<tr>
<td>Brother or sister</td>
<td>2</td>
<td>9.1%</td>
</tr>
<tr>
<td>With help from a teacher</td>
<td>2</td>
<td>9.1%</td>
</tr>
<tr>
<td>I just do it</td>
<td>14</td>
<td>63.3%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. About how many hours a day do you use a computer?</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>2</td>
<td>9.1%</td>
</tr>
<tr>
<td>Less than one hour</td>
<td>12</td>
<td>54.5%</td>
</tr>
<tr>
<td>1-2 hours</td>
<td>6</td>
<td>27.3%</td>
</tr>
<tr>
<td>3 or more hours</td>
<td>2</td>
<td>9.1%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. Will you visit Miss B.’s site to share info at home?</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>18</td>
<td>81.8%</td>
</tr>
<tr>
<td>Maybe</td>
<td>1</td>
<td>4.5%</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
<td>13.6%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4. I can find information on the internet.</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>A little bit</td>
<td>5</td>
<td>22.7%</td>
</tr>
<tr>
<td>Very good</td>
<td>17</td>
<td>77.3%</td>
</tr>
<tr>
<td>Not sure</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5. I use search engines like Google and Yahoo!.</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>A little bit</td>
<td>7</td>
<td>31.8%</td>
</tr>
<tr>
<td>Very good</td>
<td>15</td>
<td>68.2%</td>
</tr>
<tr>
<td>Not sure</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>
6. When I see a list of websites, I know which ones are good.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>A little bit</td>
<td>9</td>
<td>40.9%</td>
</tr>
<tr>
<td>Very good</td>
<td>11</td>
<td>50%</td>
</tr>
<tr>
<td>Not sure</td>
<td>2</td>
<td>9.1%</td>
</tr>
</tbody>
</table>

7. I know when a website has the information I need.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>1</td>
<td>4.5%</td>
</tr>
<tr>
<td>A little bit</td>
<td>8</td>
<td>36.4%</td>
</tr>
<tr>
<td>Very good</td>
<td>13</td>
<td>59.1%</td>
</tr>
<tr>
<td>Not sure</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>

8. I can scan a page for information.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>A little bit</td>
<td>5.5</td>
<td>25%</td>
</tr>
<tr>
<td>Very good</td>
<td>15.5</td>
<td>70.5%</td>
</tr>
<tr>
<td>Not sure</td>
<td>1</td>
<td>4.5%</td>
</tr>
</tbody>
</table>

9. I know how toolbars work.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>1</td>
<td>*4.8%</td>
</tr>
<tr>
<td>A little bit</td>
<td>5</td>
<td>*23.8%</td>
</tr>
<tr>
<td>Very good</td>
<td>14</td>
<td>*66.7%</td>
</tr>
<tr>
<td>Not sure</td>
<td>1</td>
<td>*4.8%</td>
</tr>
</tbody>
</table>
10. Did you enjoy working with PowerPoint?

<table>
<thead>
<tr>
<th>Always</th>
<th>12</th>
<th>54.5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most of the time</td>
<td>9</td>
<td>40.9%</td>
</tr>
<tr>
<td>Not really</td>
<td>1</td>
<td>4.5%</td>
</tr>
<tr>
<td>Not at all</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>

11. If you had three more weeks, do you think…

<table>
<thead>
<tr>
<th>You would have better information</th>
<th>7</th>
<th>31.8%</th>
</tr>
</thead>
<tbody>
<tr>
<td>You would have more information</td>
<td>9</td>
<td>40.9%</td>
</tr>
<tr>
<td>You might dilly-dally</td>
<td>6</td>
<td>27.3%</td>
</tr>
</tbody>
</table>

12a. Did the classroom food chain website help you?

<table>
<thead>
<tr>
<th>Yes</th>
<th>18</th>
<th>81.8%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A little</td>
<td>2</td>
<td>9.1%</td>
</tr>
<tr>
<td>No</td>
<td>2</td>
<td>9.1%</td>
</tr>
</tbody>
</table>

12b. How many times did you visit it?

<table>
<thead>
<tr>
<th>Once a day</th>
<th>11</th>
<th>50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Once a week</td>
<td>5</td>
<td>22.7%</td>
</tr>
<tr>
<td>Only once</td>
<td>4</td>
<td>18.2%</td>
</tr>
</tbody>
</table>

12c. Did you visit the website from home?

<table>
<thead>
<tr>
<th>Yes</th>
<th>9</th>
<th>40.9%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>13</td>
<td>59.1%</td>
</tr>
</tbody>
</table>
Table 3

Comparison of Pre-Unit and Post-Unit Student Surveys

How do you best learn about computers?

About how many hours per day do you use a computer?
I can find information on the internet:

<table>
<thead>
<tr>
<th></th>
<th>Pre-Unit</th>
<th>Post-Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>A little bit</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Very good</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>Not sure</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

I use search engines like Google or Yahoo!

<table>
<thead>
<tr>
<th></th>
<th>Pre-Unit</th>
<th>Post-Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>A little bit</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Very good</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>Not sure</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>

When I see a list of websites, I know which ones are good:

<table>
<thead>
<tr>
<th></th>
<th>Pre-Unit</th>
<th>Post-Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>A little bit</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Very good</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>Not sure</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>
I know when a website has the information I need:

I can scan a page for information:

I know how toolbars work: