

Using Library Standards to Inform Common Core Instruction

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The Common Core State Standards (hereafter CCSS) represent a concerted effort to unify the direction of American K-12 education. That nearly all states have adopted these learning guidelines signifies a shift toward a common level of knowledge and educational expectations for future generations. The CCSS, however, are not the only national set of learning standards for 21st century digital learners. Examining standards in like documents, and how they deal with skills and competencies similar to what the CCSS address, can help teachers and librarians identify concrete ways to implement and assess the CCSS in their classrooms.

The American Association of School Librarians' (AASL) *Standards for the 21st Century Learner* and the Association of College and Research Libraries' (ACRL) *Information Literacy Competency Standards for Higher Education* focus on students' ability to gather, synthesize, and evaluate information, and these competencies link directly to the CCSS' emphasis on digital information literacy. Further, library standards have been used in both K-12 and higher education to design and assess curricula related to digital literacy; therefore, they offer a lens through which educators invested in the CCSS can see how the information literacy skills of finding, evaluating, and using, digital information have been taught and assessed in recent years. As such, the environments in which library standards have been implemented and assessed provide excellent venues for considering how digital information literacy practices can inform CCSS implementation.

The CCSS represent technology as a skill rather than as a separate set of competencies. Technological skill and knowledge is named in the Anchor Standards, as students who are college and career ready “use technology and digital media strategically and capably” (Council

of Chief State School Officers [CCSSO] and National Governors Association [NGA] 2010, 7); how students can demonstrate this capability is woven throughout the Reading, Writing, Speaking, Listening, and Language content areas. The integration of technology gives teachers and school librarians the opportunity to blend the CCSS with the *Standards for the 21st Century Learner* while using a diverse technology toolkit to help students learn. By linking these standards, students can achieve the College and Career Readiness Anchor Standards of the CCSS and be equipped for the *Information Literacy Competency Standards for Higher Education* of the ACRL they will encounter in postsecondary life.

Before examining how information literacy skills have been taught and assessed, this chapter will consider the origins of the library standards to offer readers a better sense of their history. After providing this history, we walk through each step in the information literacy cycle, identify digital technologies that librarians and teachers can use to teach that step, and provide an “assessment in action” section that gives an example of an assignment using one of more of these technologies.

AASL and ACRL Standards [A]

The AASL has provided learning standards and benchmarks for its practitioners in library and information science since the publication of *School Libraries for Today and Tomorrow* in 1945. This first set of national school library standards gave school librarians guidelines and structure for their teaching. While this publication focused on differentiating between school librarians and public librarians, more recent iterations—*Standards for School Library Programs* (AASL 1960), *Standards for School Media Programs* (Joint Committee of the AASL and the Department of Audiovisual Instruction of the National Education Association 1969), *Media Programs: District and School* (AASL and Association for Educational Communications and

Technology [AECT] 1975), and *Information Power: Guidelines for School Library Media Programs* (AASL and AECT 1988, 1998)—have chosen to collectively address the growing availability of rich informational resources and new, educationally-significant technology developments. *Information Power* aimed to help students become skillful consumers and producers of information, grouping nine standards of student learning and performance around three categories: information literacy, independent learning, and social responsibility (AASL and AECT 1998). From these categories, the ACRL developed *Information Literacy Competency Standards for Higher Education*.

Published in 2000, the *Information Literacy Competency Standards for Higher Education* quickly became, and have remained, the benchmark for planning and assessing information literacy in institutions of higher learning. The committee responsible for the document built upon *Information Power*'s standards, bridging to what was being done in K-12 education by providing a college-level information literacy assessment map. Five standards, with accompanying performance indicators and assessment outcomes, outline the skillset information-literate students should have at the conclusion of their collegiate careers. The standards address the core principles of identifying, accessing, evaluating, and using information fluently and ethically (ACRL 2000).

Since the development of the ACRL standards, and in recognition of the changing nature of information literacy learning (particularly in technology use and digital resources), the AASL revised and expanded its standards to include the digital, visual, textual, and technological literacies now crucial for student success. *Standards for the 21st Century Learner* (2007), the AASL's most recent standards iteration, addresses students' skills, dispositions in action, responsibilities, and self-assessment indicators as related to their ability to inquire, think

critically, and gain knowledge; draw conclusions, make informed decisions, apply knowledge to new situations, and create new knowledge; share knowledge and participate ethically and productively as members of our democratic society; and pursue personal growth.

Assessing with Technology in the 21st Century Classroom [A]

The release of the CCSS postdates *Standards for the 21st Century Learner* and the AASL connected its standards to the new curricular guidelines. Noting that integrating school library standards with the CCSS gave students “the opportunity to be well-prepared as life-long learners facing the challenges of college and careers,” the AASL (2010) identified the school librarian’s role in co-teaching “tasks that integrate key critical thinking skills, technology and information literacy skills with subject area content” with classroom teachers. It is from this position that we consider how library instruction, either in a secondary school or higher education institution, inform CCSS implementation and assessment.

To best consider the different skills needed for digital learning, we will address information literacy in five distinct stages (see Figure 3.01):

- 1) determining information needs
- 2) accessing information
- 3) evaluating information
- 4) using information
- 5) ethically considering information use and access

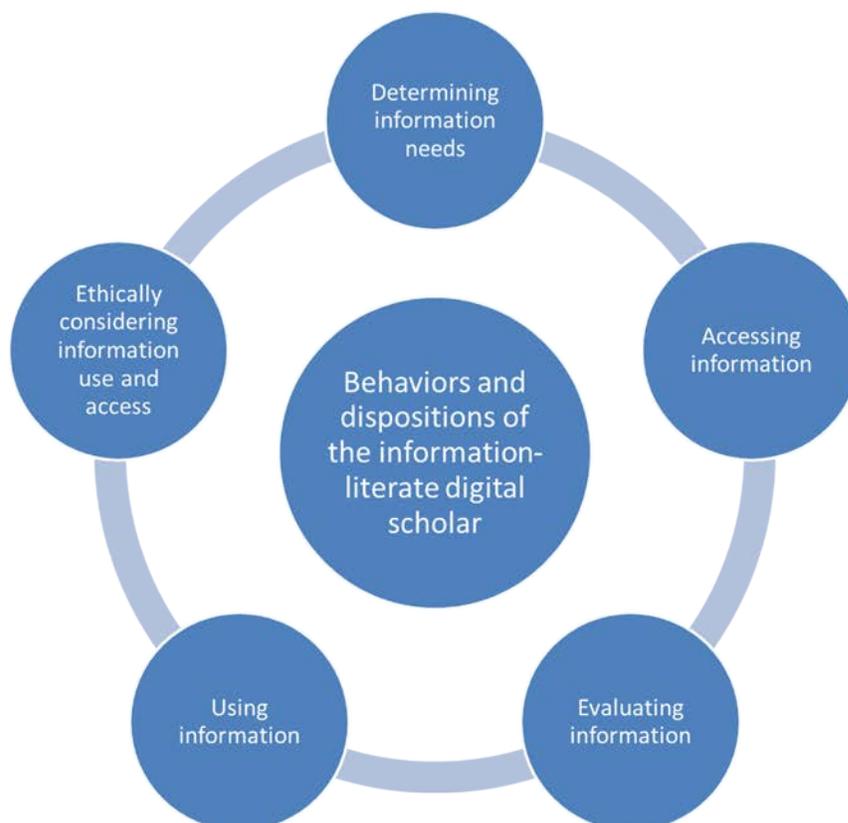


Figure 3.01: The information literacy cycle

Part of a broader cycle, these five stages require unique information literacy knowledge and skills while also reflecting the CCSS' digital literacies. Technology is a key component in each information literacy stage, and this chapter will suggest a variety of tools teachers can use to help students understand these concepts while illustrating just a few in detail. For a more detailed discussion on technology integration and the CCSS, see Amanda Stearns-Pfeiffer's chapter in this book, and for a complete list of tools suggested and URLs, see Table 3.01 at the conclusion of this chapter.

Determining Information Needs [B]

The cycle of the information literate student's information seeking begins by determining their information need, as represented in Figure 3.02.

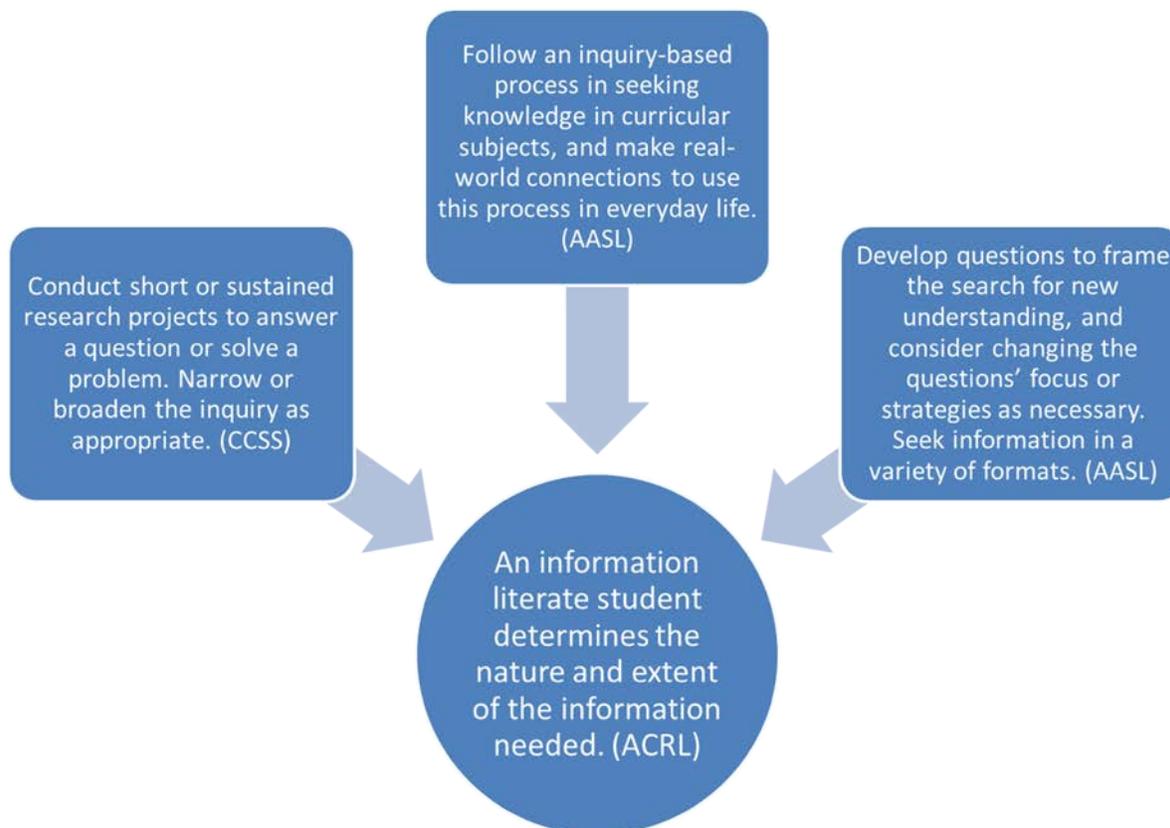


Figure 3.02: Determining information need represents the first step in a student’s information-seeking process.

In the CCSS, this step is a part of how students “conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate” (CCSSO and NGA 2010, W.9-10.7 and W.11-12.7, 46). These standards directly connect to the AASL and ACRL standards that address how students determine their information need and nature of their search. The AASL standards (2007) state that students should “follow an inquiry-based process in seeking knowledge in curricular subjects, and make the real-world connection for using this process in [their] own life” (4). This involves developing and refining “a range of questions to frame the search for new understanding,” demonstrating “adaptability by changing the inquiry focus, questions, resources, or strategies when necessary,” and seeking “information... in a variety of formats” (4, 7).

Similarly, the ACRL standards begin with the cogent expression of an information need, noting that an “information literate student determines the nature and extent of the information needed” (8).

Two learning tools and assessment techniques that school and academic librarians have used at this first stage cycle are concept mapping and think-pair-share exercises. These activities help students form their research question and identify keywords for finding information on their topic. These strategies can also be used to learn and develop the skills and dispositions identified in the CCSS.

[Sidebar begin] Concept mapping tools: Inspiration, Webspiration, Prezi, Mindomo, Text2MindMap, DebateGraph; Think-pair-share tools: Padlet (formerly Wallwisher), Pinterest, Learnist, Wikis, Blogs **[Sidebar end]**

Concept Mapping [C]

The process of mind- or concept-mapping has long been acknowledged as a useful tool for initial “pre-research” inquiry, as well as a strategy for refining or altering one’s research questions (Markham, Mintzez, and Jones 1994; Novak 2010; Schick 1991; Sherrat and Schlaback 1991). This learning activity is certainly familiar to English Language Arts (ELA) teachers, and it is an essential tool to visualize brainstorming and connect ideas. However, as students venture increasingly into the digital realms and use technology to represent their learning, librarians and ELA teachers must consider how concept mapping can be represented and fostered in technology-rich ways.

Many technology tools exist to facilitate the concept mapping process and make it an electronically collaborative endeavor (Bennett 2013). Traditional software- or subscription-based tools such as Inspiration and Webspiration help students map their thinking. Online concept

mapping tools allow students to see others' thinking, share their own thoughts, and receive feedback from others on their own work. There are free tools available online, including Text2MindMap and DebateGraph, that represent information in a traditional concept or mind map format. Other more social tools exist that can accomplish that same end. Students may already be familiar with web 2.0 tools that generate word clouds and other visual concept representations; by bringing these tools into the classroom, teachers and librarians can initialize the research and writing process as a structured activity, either independently or in groups. Other options for concept mapping include those that engage deeper visual literacies. Prezi and Mindomo, for instance, allow for more creative expression; in such resources, students are able to include images, video clips, or external files to support and develop their initial ideas. Finished products using any of these tools can be graded to provide qualitative assessment of a student's invention process. This formative assessment can provide direction and assistance in adjusting ideas early in a student's research and writing process.

Assessment in Action [D]

At Oakland University, a concept map assessment was conducted as part of information literacy instruction in Studio Art classes. Students began with a thesis question or rough idea and then used Prezi to draw out the main keywords and possible related concepts through mapping. In this instructional situation, Prezi proved to be an ideal tool because it allowed art students to integrate images and even videos into their concept maps. They could draw visual representations including their own photography or material from one of the library's art databases. Students submitted rough draft concept maps outlining their artistic research needs to the library faculty member; based on the students' Prezi concept maps, the faculty member then provided guidance on further ideas for exploration as well as recommended library resources

(see Figure 3.03). Such an activity could be easily transferred into an ELA classroom for a variety of learning topics, particularly with support of a school librarian.

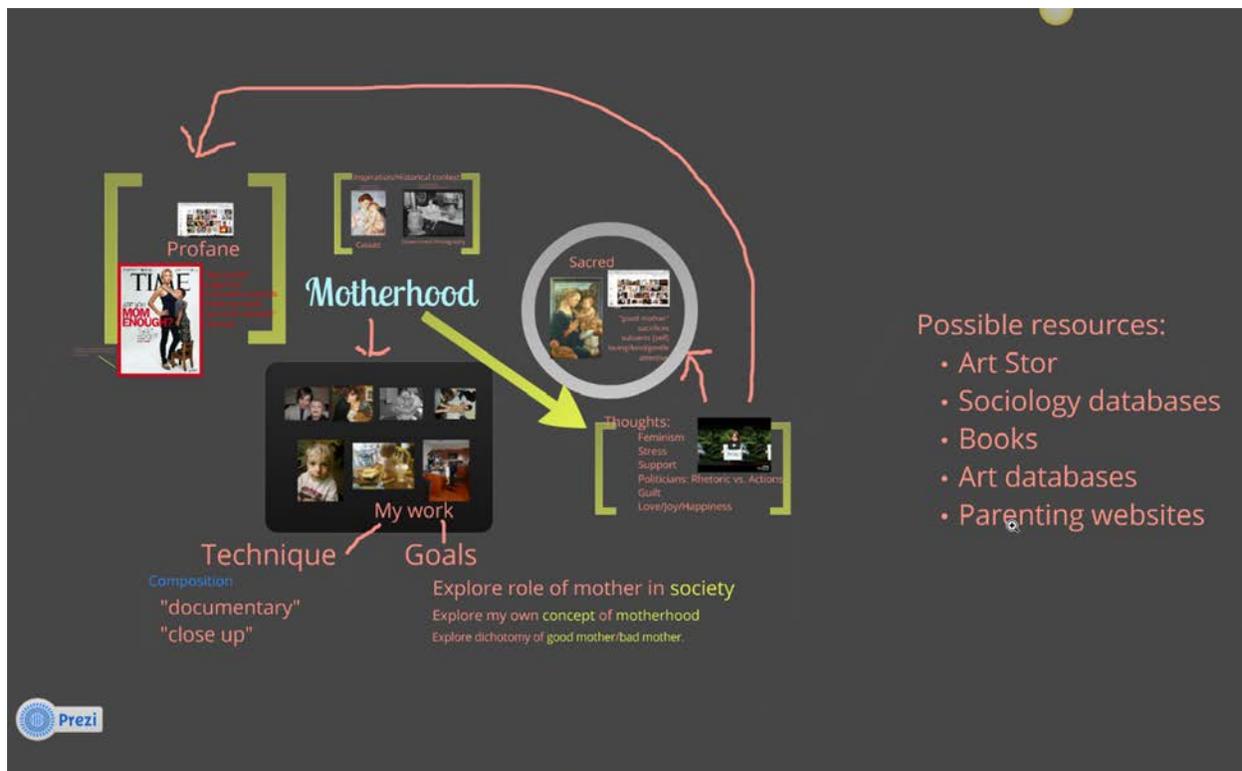


Figure 3.03 This prezi illustrates the various research avenues a learner can explore for the topic of motherhood and art and demonstrates the defining of a research question.

Think-Pair-Share Brainstorming [C]

Another brainstorming strategy familiar to teachers is think-pair-share (Lyman 1981; King 1993; Kagan 1994). This active learning technique can be used effectively to foster class discussion, opinion sharing, and idea generation, but it can also be used to further a student's own understanding of his or her research topic and push his or her information-seeking further. Digital tools such as Padlet (formerly Wallwisher), Pinterest, and Learnist as well as wikis and blogs and other reflective writing technologies more generally--may serve the same purpose, allowing students to structure their terms and test them out while also soliciting feedback from their peers. These types of activities provide for excellent self- and peer-assessment, as students

can immediately assess the effectiveness of their chosen keywords and adjust their information queries accordingly (Naslund and Giustini 2008; Byrne 2010; Burkett 2011).

Assessment in Action [D]

A think-pair-share activity done in collaboration with an 8th grade ELA class and the school media specialist at Clarkston Junior High School asked students to use Padlet (called Wallwisher at the time) to engage in discussion around ideas and information. This simple tool allowed them to respond both to the teacher's prompt and to their peers' thinking in short, yet meaningful, ways. And, importantly, Padlet allowed the teacher to moderate comments *before* they were published, so only appropriate contributions made it on the class wall. In such a way, teachers can assess students' understanding of keyword searching and help them develop a comprehensive and well-rounded search strategy with synonyms and like phrases. They can also determine students' comfort with and ability to use technology to for research and writing activities.

Connecting to College and Career Readiness [C]

Both concept mapping and think-pair-share techniques—by asking students to apply, discuss cogently, put in writing, and visualize their own research directions—make the process of determining an information need more concrete. At the same time, these activities also open the door for students to understand others' assertions and arguments. In accomplishing these objectives, students meet the CCSS Anchor Standards for Reading in learning to “analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole,” and “delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence” (CCSSO and NGA 2010, Anchor

Standards for Reading #3 and #8, 35). The process of outlining or mapping another’s arguments, and participating in collaborative discussion around a topic or issue, gives students a chance to reflect upon a reading, analyze the content, and ensure that main ideas are understood.

Furthermore, these skills prepare students for information seeking after high school.

Accessing Information [B]

The second stage in the information literacy learning cycle deals with access. Once students have determined their information need, they need to search for, find, and retrieve the information related to their search, as illustrated in s Figure 3.04.

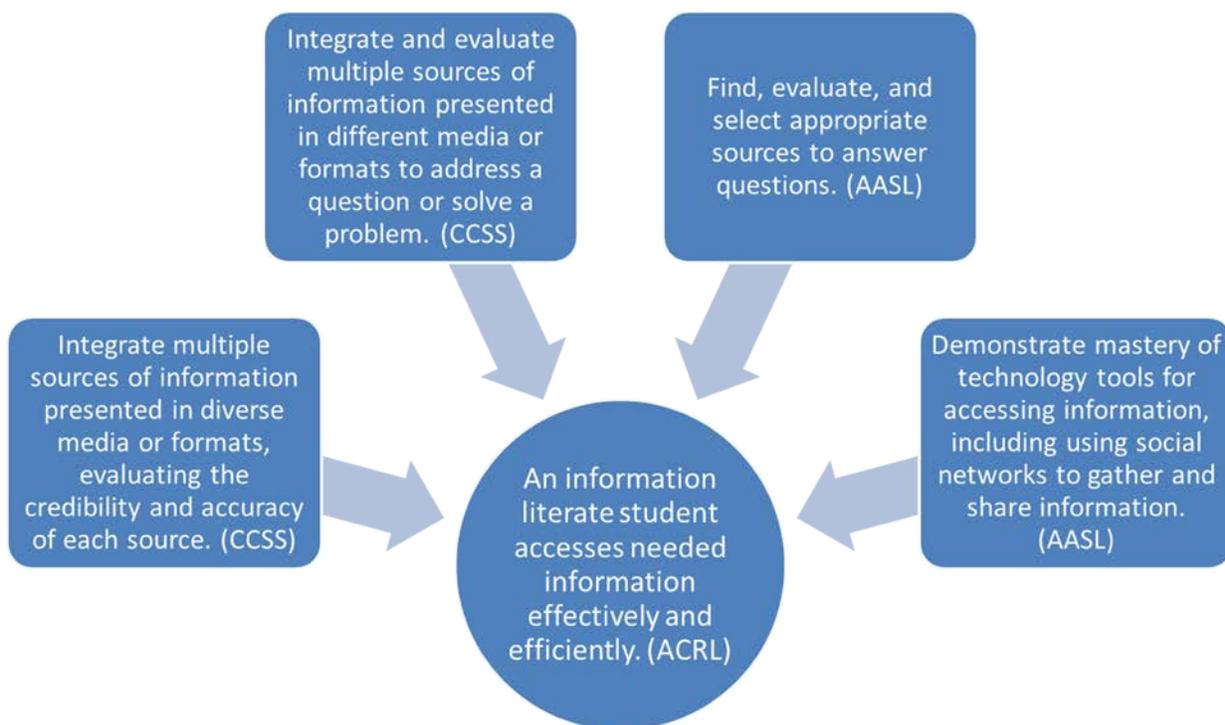


Figure 3.04: The process of accessing information comes once a student has determined his or her area of inquiry or information needs.

Access in the CCSS is addressed as students’ skills to “integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally)

evaluating the credibility and accuracy of each source” and “integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem” (CCSSO and NGA 2010, SL.9-10.2 50 and RI.11-12.7, 40). Similarly, ACRL (2000) standards note that the “information literate student accesses needed information effectively and efficiently” (9), while AASL (2007) standards call on librarians to teach students to “find, evaluate, and select appropriate sources to answer questions” (4). These standards, and their respective performance indicators, deal with constructing and implementing effective search strategies to find the best sources and then choosing and retrieving the most appropriate source of information (whether a subscription database, a website, a book, or other media). This step involves students demonstrating their “mastery of technology tools for accessing information and pursuing inquiry,” and may ask students to “use social networks and information tools to gather and share information” (4, 7). Information pathfinders and online quizzes have been used to teach these skills in library instruction; these activities can be easily transferred to the secondary ELA classroom.

[Sidebar begin] Information Pathfinders: Wikis, Google sites, other school sponsored webpage creation tools; Online quizzes: Google forms, Survey Monkey, course management systems

[Sidebar end]

Information Pathfinders [C]

To effectively choose sources from which to access information, students must be aware of the options available and understand how they are used. In their personal lives or in their academic research, students often begin an information-seeking process with Wikipedia or Google, and such tools can help develop students’ thinking about a question, idea, or topic (Head and Eisenberg 2009; Purdy 2009; McClure 2011). However, getting students beyond these

understanding-gathering tools and into the meaty world of databases and scholarly information—and making these resources as simple and uncomplicated as possible (Purdy 2012)—is a skill that needs to be taught and practiced. Information pathfinders can simplify these resources and push students’ information seeking further since they give students broader access to information and ask them to assess these resources.

Pathfinders can provide lists of both written and printed research resources for students. However, using digital tools can transform the learning resource. A web-hosted pathfinder or resource page allows students to access the information immediately and continue their learning anywhere, anytime. Pathfinders also aid students’ integration of “multiple sources of information... in order to address a question or solve a problem” (CCSSO and NGA 2010, 40) which classroom teachers can use to achieve the CCSS’ aim of students “read[ing] and comprehend[ing] complex... information texts independently and proficiently” by the end of high school (Anchor Standard for Reading #10, 35). Teachers wishing to employ this learning tool have a variety of digital options at their disposal: a school web design platform or a wiki that provides a free and simple interface on which they can design and build a skeleton of research resources could be used. From there, the ELA teacher, the school librarian, or even the students in the course can build and identify informational resources available (Kuntz 2003; O’Sullivan and Scott 2000; Koechlin and Zwan 2008).

Assessment in Action [D]

To illustrate how pathfinders can be implemented, we offer one instance of how they have been used at the secondary level. For US history research on World War II, the school librarian at Clarkston Junior High School created a shared, online learning guide in Wikispaces, a wiki creation site, as shown in Figure 3.05. This tool was dynamic and flexible, and students

and other teachers could add information or comments as they accessed the provided resources or found new, related research. If so interested, the teachers involved could assess students' ability to access and evaluate the information they shared with their classmates, specifically through students' brief description of *why* they shared a resource in the wiki. Secondary ELA teachers can consider using such a digital pathfinder as a skeleton for non-fiction research projects, or even to scaffold students' understanding of a text. When reading *The Great Gatsby*, for instance, a teacher could create a basic pathfinder with links to relevant information about Long Island, the Jazz Age, Prohibition, and other topics, and, as students found additional resources, they could add them to this informational repository and build collective knowledge.

The screenshot shows the homepage of the 'World War II Research Resources Wiki'. The page has a blue header with a small image of soldiers. Below the header is a red sidebar with navigation options: Wiki Home, Recent Changes, Pages and Files, Members, Manage Wiki, and a search box. The main content area is white and contains the following text:

home [Edit] [0] [0] [5] ...

Welcome to the World War II Research Resources Wiki!
 Here, you'll find resources collected by [Ms. Nichols](#) that you can use when researching your selected topic. This site will be updated periodically as more information is found!

What do I do?
 It's EASY! To get started, all you need to do is:

- Click on a page along the left side to see more information or resources for a particular topic.
- Select a site to visit, and see if it fits your needs!

Can't find what you're looking for?
 These sites are great, all-purpose World War II resources:

- [Finding Dulcinea's World War II Web Guide](#)
- [World War II Timeline](#), hosted by the University of San Diego
- [Internet Public Library \(ip2\)'s World War II Pathfinder](#)
- [Gale Virtual Reference Library](#) (need a password outside of school)
- [InfoTrac Junior Edition](#) (need a password outside of school)
- [GPO Monthly](#) (need a password outside of school) - government documents
- [PBS.Com's The War Resources](#)
- [Library of Congress Experiencing the War: Veterans' History Project](#)
- [Grolier World War II Commemoration](#)
- [WWII in Color](#)
- [America from the Great Depression to World War II](#) (image database)
- [World War II Database](#) (not an academic database)

In this pathfinder, the school librarian and classroom teachers can help students access appropriate research resources. This idea can be taken a step further by asking students to contribute resources as well or to provide comments on the resources available.

Online Quizzes [C]

Once discussions regarding access have occurred, formal assessment tools can determine and measure students' growth in assessing information. Using tests as assessment tools have been widely used in information literacy instruction, with more and more online components being created to track student progress (Mulherrin and Abdul-Hamid 2009). Learning management systems such as Moodle with built-in data storage and analysis tools provide tools for online tests, but web-based tools such as Google Forms, Survey Monkey, and Microsoft Access databases could also serve this purpose.

Assessment in Action [D]

Oakland University Library uses an online quiz administered during the first-year writing course to determine students' ability to access information appropriately. Students receive instruction in keyword searching strategies and database use and then complete an online course component designed within Moodle, the university's course management system. The online portion of the course includes a final exam that students must pass in order to earn library credit for their writing course; the questions include assessment of students' keyword strategies and approaches to accessing information. The student response data is stored and can be accessed by library faculty to assess learning outcomes and track whether changes need to be made; this data can also be shared with teachers to further improve or supplement instruction. Such a learning experience can be duplicated in the ELA classroom within a course management system or free online survey tool such as those mentioned previously.

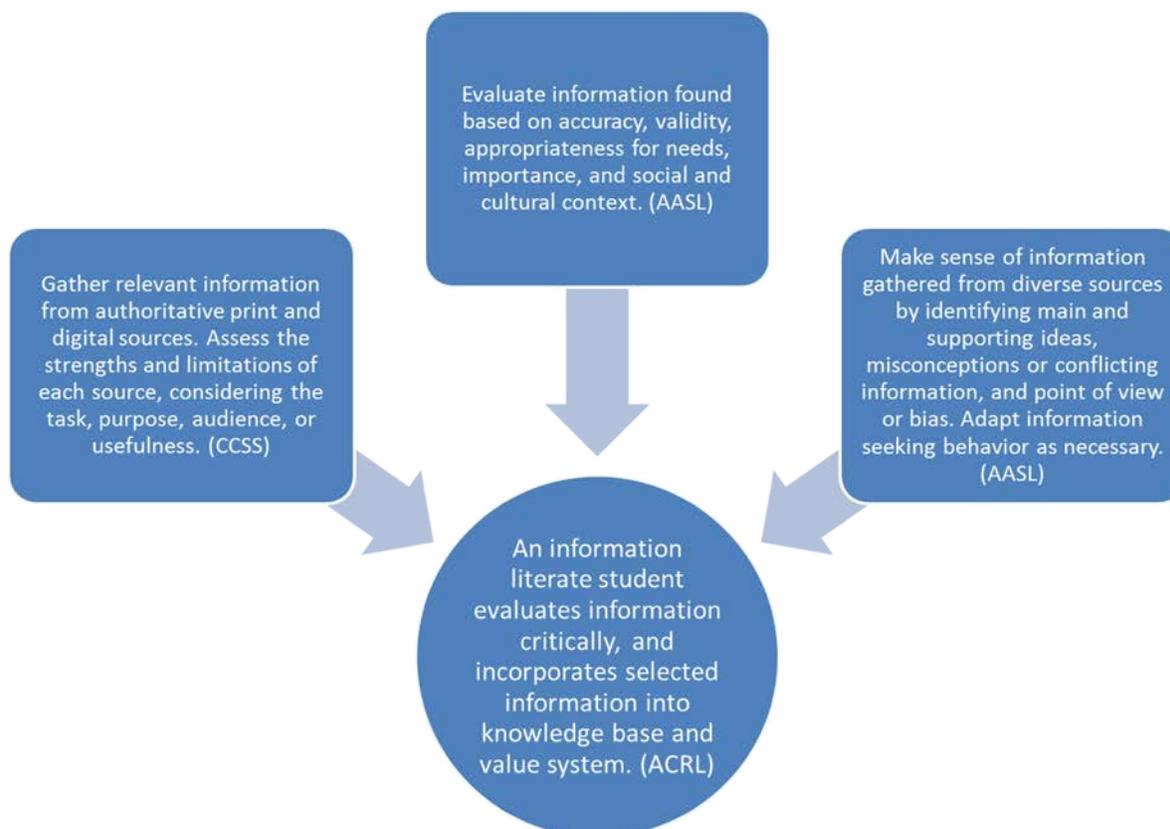
Connecting to College and Career Readiness [C]

These learning activities and assessment techniques help prepare students for life after high school. Broadly, they are part of the CCSS' aim to teach students to "conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of

the subject under investigation” and “gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source” (CCSSO and NGA 2010, Anchor Standards for Writing #7 and #8, 41). Specifically, information pathfinders and resource evaluations help students “evaluate a speaker’s point of view, reasoning, and use of evidence and rhetoric,” while online quizzes help students “evaluate information presented in diverse media and formats” (Anchor Standard for Writing #3, 48). Through the use of technology tools integrated into these processes, students are equipped to become digital scholars.

Evaluating Information [B]

The third stage in the information seeking cycle involves evaluating information. In this stage, students interpret and consider the information accessed for their research topic or question, as shown in Figure 3.06.



Evaluating information is the crucial third step in the information-seeking process, as it asks

students to make their own determinations of whether information retrieved is valid to their research question.

The CCSS consider evaluation by asking students to “gather relevant information from multiple authoritative print and digital sources” and assess “the strengths and limitations of each source in terms of the task, purpose, and audience” or “the usefulness of each source in answering the research question” (CCSS and NGA 2010, W.9-10.8 and W.11-12.8, 46). Similarly, the AASL (2007) standards state that students should learn to “evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context,” that they need to “make sense of information gathered from diverse sources by identifying misconceptions, main and supporting ideas, conflicting information, and point of view or bias,” and they must “monitor [their] own information-seeking processes for effectiveness and progress, and adapt as necessary” (4, 6). The ACRL (2000) standards also require that an “information literate student evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system” (11). In library instruction, these standards have been addressed and assessed through research journals and resource/website evaluations. In the classroom, such strategies can be used to meet the CCSS.

[Sidebar begins] Research Process Journals: Google Forms, Google Docs, Dropbox, Blogs, VoiceThread; Website and Resource Evaluations: sample websites, Wikipedia, Blogs, Google Forms, Survey Monkey **[Sidebar ends]**

Research Process Journals [C]

Research journals or research logs give educators insight into students’ information-seeking behavior and can function as a formative evaluation tool. More than a bibliography,

these documents represent an account of a student's research process and can provide a glimpse into their information literacy strengths and struggles. A research journal or log details the "step-by-step... moves [a student] made to find their sources" and helps to ensure that "students are using multiple research platforms" (Peele and Phipps 2007). These can be paper-and-pencil assignments, but digital technology can make the process more engaging for the next digital scholar. Collaboration tools including Google Drive, Dropbox, and Microsoft Office 365 allow students and teachers to participate in a dialogue around the research evaluation process; other students, collaborating teachers, or school librarians can also offer their thoughts, and see others' thinking made visible.

Another technology tool that could be used to a similar end in the classroom is a blog, where students can post regularly on their information findings. This tool allows teachers and students to offer probing, insightful, or meaningful questions. Both the student and the teacher can view the progression of the work, thinking, and the evaluation process at the end of the unit or semester. Blogs also situate the student's thinking in the public discourse around academic ideas and learning (Harris 2006; Lamb and Johnson 2006).

Alternately, the research journal can be approached as a visual object. Instead of creating a citation list with comments, a tool like VoiceThread allows a creator to share images, presentation slides, or videos related to the research need then comment on it with drawings, voiceovers, or text. Others can participate in this dialogue in the same ways, and students can learn from new and diverse perspectives on presenting research (Sprankle 2009).

Assessment in Action [D]

Oakland University librarians have used research journals to generate individualized feedback on student projects. During subject-focused class sessions, students received an

overview of library resources in their major area as well as guidance on locating books in the catalog or other discovery tool. They then individually located examples of several different types of resources—books, scholarly articles, and images—that related to their research. From this research, they submitted a research journal, including citation information for each item, where and how it was located, and why the item was useful to their project. Figure 3.07 shows the journal structure for the assignment. These entries provided multiple levels of assessment for the teacher, with glimpses into the student’s keyword strategies, choice of and ability to efficiently use resources to access information, and evaluation of information. The research journals were created in Google Drive or word processing software, and then shared with the teacher, who commented directly on the files for students to see.

SA 381 – Advanced Photography

Research Journal Assignment

Using what you learned during the library session today, locate at least six sources of interest and create a research journal entry for each source. Please include at least one book, one scholarly journal article, one news article, one website, and one Artstor image.

Each entry should include:

- The source citation information, using Chicago style.
- Indicate how you located this item: library catalog search, database search, or browsing.
- A sentence or two summarizing the item: What is the book or article about? What is the image? If using a book, feel free to focus on a particular section that pertain to your interests.
- After summarizing the source, write a paragraph evaluating it using the guidelines in the “Evaluating Sources” handout on your course page. If the source is an image, evaluate the quality of composition, light, etc. |
- After summarizing and evaluating the source, add a final paragraph detailing how the item fits into your artistic goals and interests. How is this relevant, or how do you hope to use the information for your future projects?

The citations should be organized alphabetically, by author’s last name.

Figure 3.07: These structured guidelines for a research journal ask students to consider and evaluate their own information-seeking behaviors, as well as the resources they use.

Resource and Website Evaluation [C]

Resource and website evaluation skills are critical components of school librarians’ instruction on information evaluation skills, and they provide a means by which students’ knowledge and ability to evaluate that information can be assessed (Kral 2007; Kuiper, Volman and Terwel 2005; Schrock 2013). Such activities connect directly to the CCSS’ aims of teaching students to “assess the strengths and limitations of each source in terms of the task, purpose, and audience” (CCSSO and NGA 2010, 46). Technology tools are essential to teaching and assessing these evaluative skills. Students must *use* technology to access online information; in fact, some websites exist solely for the purpose helping teach students evaluative skills (see, for instance,

the Pacific Northwest Tree Octopus or Feline Reactions to Bearded Men websites)¹, and these may serve as good starting points. However, students may think that such exercises are silly or irrelevant.

In lieu of these resources, teachers might consider using information online that students frequently use: a school page, a local newspaper, or even a Wikipedia entry. From there, students can evaluate content based on the central tenets of website evaluation: accuracy, authority, objectivity, currency, and coverage. To then assess students' ability to evaluate websites, technology tools including blogs, online journals, or online forms can be used. Each of these tools enables educators to determine a student's knowledge level in terms of evaluation, and what additional support, scaffolding, or further information students need to advance their knowledge and meet standards.

Academic libraries have used such practices to help students determine author bias and distinguish scholarly/academic and popular sources of information. In academic library instructional sessions, informal class discussions can provide a vehicle for this assessment. Increasingly, though, library faculty are embedded in online courses and are able to take advantage of online discussion forums within the learning management system to facilitate a conversation about how students are evaluating information. Such environments have the advantage of allowing students to discuss with their peers the relevance, authority, and perceived usefulness of information and get feedback from each other. This discussion could be recreated through a social networking or course management site.

Assessment in Action [D]

An information evaluation assessment strategy librarians have employed effectively at Oakland University is to ask students to work in pairs or small groups to use and evaluate a

subject database and then present their findings to their peers by demonstrating the resource to the entire class. The student groups receive a worksheet (which teachers can provide digitally through an online form or webpage) that guides them through questions to ask as they conduct searches in the database, including those on audience, content, and general usability and usefulness (Burkhardt and McDonald 2010). The teacher can decide upon the resources for evaluation prior to class, based on the research projects the students are working on and what resources may be new to students. These resources may include highly specialized databases, eBook collections, or authoritative websites (e.g., government publications) that will provide support for their needs. The students' presentations of their findings to their peers allow for the teacher to assess how effectively students are using the resource, correct any misinformation about structure and features, suggest search term refinements, and provide further guidance.

Connecting to College and Career Readiness [C]

As students critically examine the content and intended goals of information sources, and reflect on the sources for research journals or online resource evaluations, they put into practice the skill of assessing “how point of view or purpose shapes the content and style of a text” (CCSSO and NGA 2010, 46). Furthermore, these evaluation skills ensure students “integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words” (Anchor Standard for Reading #7, 35). When teachers and librarians consider the range of majors and future employment today's students will pursue, the ability to critically evaluate information is essential. Consider the *Project Information Literacy* findings that employers place “a high premium on graduates' abilities for... identifying the best solution for all the information they had gathered” (Head 2012, 3). Teaching students to consider, process,

check, and make value judgments about the information they find helps prepare them for a diverse array of future employment environments.

Using Information [B]

The fourth step of the information seeking cycle involves information use. While determining, accessing, and evaluating information are important to information literacy, using information is the stage that has the most concrete implications for students' lives. Through synthesizing information, they have determined their need for, accessed appropriately through multiple means of investigation, and evaluated for appropriateness and validity, students should be able to tangibly demonstrate learning in meaningful ways (see Figure 3.08).

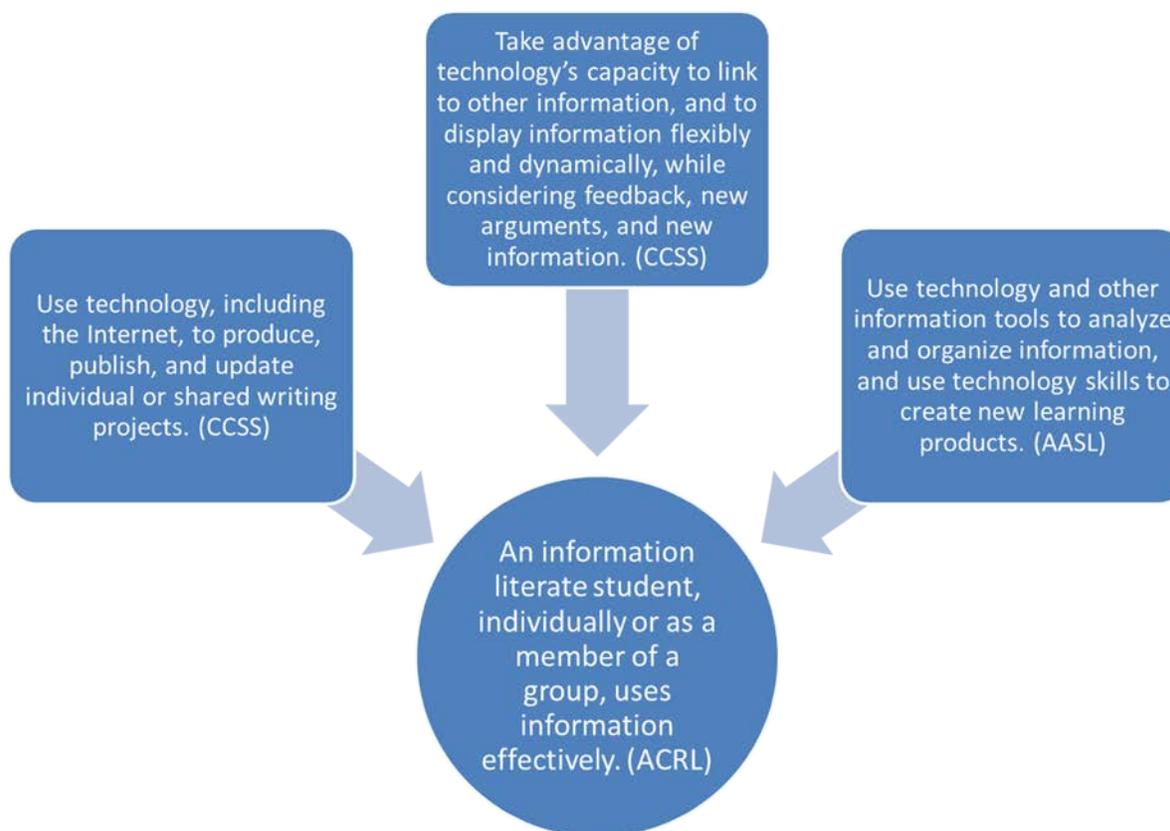


Figure 3.08: Using information, the fourth step in the information-seeking process, represents the critical point where students must take the information found and transform it into a representation of their knowledge and understanding.

The CCSS ask students to “use technology, including the internet, to produce, publish, and update individual or shared writing products,” which relates to information use, both in terms of students “taking advantage of technology’s capacity to link to other information and to display information flexibly and dynamically” and when considering how to use “ongoing feedback, including new arguments or information” (CCSSO and NGA 2010, W.9-10.6 and W.11-12.6, 46). The AASL (2007) learning standards directly link to these goals, stating that the 21st century information literate student will “use technology and other information tools to analyze and organize information” and will “use the writing process, media and visual literacy, and technology skills to create products that express new understandings” (5). Similarly, the ACRL (2000) standards require that an “information literate student, individually or as a member of a group, uses information effectively to accomplish a specific purpose” (13). Because these standards represent a culmination of the previous information-seeking stages, assessment strategies often center on significant projects: online collaborative learning projects through Web 2.0 tools or social media resources, or online portfolios composed of digitally-rich learning products.

[Sidebar begins] Social and Collaborative Tools: Wikis, VoiceThread, Google Drive, Podcast and video creation tools; Digital Portfolio Tools: Google Sites, Weebly, Wix, WordPress, proprietary web design software (e.g., Dreamweaver) **[Sidebar ends]**

Social and Collaboration Tools [C]

There are a variety of social and collaborative tools that allow students to connect the information they carefully accessed and evaluated with broader learning communities. When using these tools to demonstrate learning, students can see connections, correlations, and real-world implications of their information. Wikis are tools that present a social and collaborative

learning opportunity where students can make their process of determining, accessing, and evaluating information visible. A wiki's design, which is built around collaboration, fosters group work in synthesizing information. A wiki provides an opportunity for students to create new, meaningful, communal knowledge rather than work in silos (Hamilton 2012; Lundin 2009). Other social and collaborative tools that students can use to make meaning and demonstrate their use of information include Google Docs' shared file interface, or VoiceThread, which allows students to use technology tools "to analyze and organize information" and to "create products that express new understandings" through audio and visual means (AASL 2007, 5).

Assessment in Action [D]

In a classroom-school library collaborative lesson at Wylie E. Groves High School, eleventh grade ELA students used VoiceThread in groups to illustrate how they learned about a global issue or problem. They used images and video to demonstrate their information-seeking process and then pushed their learning further by synthesizing this information with their own opinions about how to best solve the problem. Their classroom teacher, school librarian, and fellow students all engaged in a dialogue around each of these global issues and commented on students' learning, thinking, understanding, and synthesizing within each VoiceThread. This learning project became a powerful way to consider global issues through the students' eyes.

Digital Portfolios [C]

An electronic version of the traditional hard copy compilation of a student's work, digital portfolios can store meaningful artifacts of learning, which students can use throughout their educational careers. Digital portfolios offer students the opportunity to create digitally-rich learning projects and illustrate a specific instance where technology can be used to infuse the research paper with 21st century digital literacies. While formulating and writing an extended,

culminating research paper is an important academic skill, more digitally-rich representations of learning offer students the opportunity to transform information with tools that relate to 21st century skills and dispositions. This may mean creating a video or podcast with tools that offer real-world learning and a connection to resources students will encounter in post-secondary life (Cambridge, Cambridge, and Yancey 2009).

The act of grouping and sorting their texts can help students reflect on their own learning process and allow others to see the progression of students' work. Such learning projects offer students the opportunity to “[take] advantage of technology’s capacity to link to other information and to display information flexibly and dynamically” by allowing them to represent how they use, and have used, information in a variety of ways (CCSSO and NGA 2010, 46).

Digital portfolios can be created with a variety of resources. Free web design tools, such as Weebly, Google Sites, Wix, or WordPress, are ideal for this type of project, but digital portfolios can also be created using proprietary software and housed on school servers, which give educational entities a greater measure of control. Such projects give students hands-on experience in crafting their own digital identity, and in creating this online persona, they can learn about maintaining control of the information they share – or choose not to share – with others.

Assessment in Action [D]

As a part of a collaborative ELA unit, a secondary school librarian worked with students to create digital portfolios in Google Sites. Each student created and maintained his or her own page and shared it with the classroom teacher and librarian for review (see a sample in Figure 3.09). Students used these portfolios as a repository for their digitally-rich learning projects they created throughout the course of classroom units or projects, and they also worked to make these

digital portfolios appropriate for viewers outside of the classroom (e.g. parents, future employers). As these portfolios developed over the course of a term, they became a tool students and the classroom teacher used to share and discuss students' work at parent-teacher conferences. In doing so, the portfolios presented a meaningful representation of student learning to parents and later to administrators. In this case, digital portfolios illustrated how students used information and how their use of information had grown, changed, shifted, and been shaped over the course of a project and a class. This assignment could be expanded to an examination of a student's growth throughout a grade level or an educational career (Scharf, Elliot, Huey, Briller, and Joshi 2007; Purcell 2011).

The screenshot displays a digital portfolio interface for Christina H. The header is dark green with the title "Christina H's ePortfolio" on the left and a search bar on the right. Below the header is a navigation menu with buttons for "Welcome!", "Reference Letter" (which is highlighted in yellow), "My Resume", "Unit 1: The Holocaust", "Unit 2: Creative Writing", "Unit 3: Animal Farm", and "Unit 4: Argumentative Writing".

The main content area is titled "Reference Letter" and contains the following text:

This is a reference letter from the media specialist at my school, Ms. Amanda Nichols:



April 14, 2013

To Whom it May Concern:

I have known Christina for one year in my capacity as the media specialist at Clarkston Junior High School. Christina has been a frequent visitor to the media center during her time at CJHS, and she has even volunteered to assist us in daily operations (book shelving, straightening up, creating displays). I also know Christina as a student, through my work with her academic classes. Based on my experience working with Christina in an academic setting, I find her to be an intelligent, engaged, and thoughtful student.

Christina has a number of strengths to offer an employer. Christina is always interested in supporting others. For example, this year, she initiated a food drive in the media center to clear students' library fines. All food donated was then given to the local food bank.

In conclusion, I would highly recommend Christina, based on my interactions with her and her academic performance. She will be a positive addition to your organization. If you should ever need any additional information you can feel free to contact me by email at

At the bottom of the page, there is a footer with the text: "Page 9 | Home | About | Contact | Privacy Policy | Powered By: Growth Mindset"

Figure 3.09: This sample digital portfolio illustrates the features a student can employ to show and share or her work from a course, a school year, or an academic career. Students can also

integrate professional information, such as this letter of recommendation, and use this as a resource when job searching.

Connecting to College and Career Readiness [C]

Digital portfolios with digitally-rich learning products and the social and collaborative tools that demonstrate students' use of information highlight how students “integrate and evaluate content presented in diverse formats and media” (CCSSO and NGA 2010, Anchor Standards for Reading #7, 35). Furthermore, they ask students to “use technology, including the internet, to produce and publish writing” (Anchor Standards for Reading #6, 41), and “make strategic use of digital media ... to express information and enhance understanding” (Anchor Standards for Reading #5, 48). Portfolios initially created in secondary schools can continue to be developed at the college or university level, where students are increasingly encouraged to create online learning artifacts. Such projects, then, can not only satisfy graduation requirements, but also provide a showpiece of a student's exemplary work for potential employers.

Ethical Considerations of Information Access and Use [B]

Underlying each information seeking area, though, are the ethical responsibilities and considerations students must learn and demonstrate to be a well-rounded, information literate digital scholar. The final stage of the cycle, then, as shown in Figure 3.10, involves the ethical access and use of information.

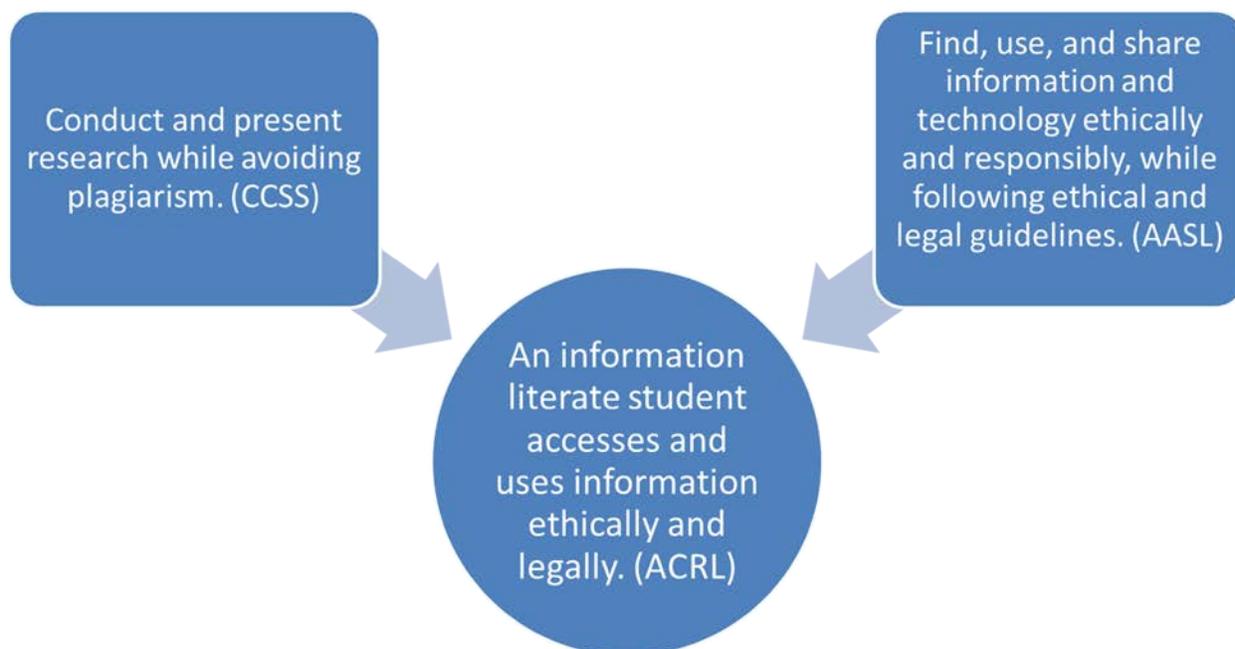


Figure 3.10 Underlying all previous information-seeking steps, students’ understanding of ethical practices and use of information is a critical skill they must master to be effective digital scholars.

The CCSS assert that students should conduct and present research while “avoiding plagiarism and overreliance on any one source and following a standard format for citation” (CCSSO and NGA 2010, W.9-10.8 and W.11-2.8, 46), and both the AASL and the ACRL standards identify the ethical considerations as a foundation on which future information-seeking behavior can be built. The AASL (2007) standards require that students “use information and technology ethically and responsibly” (6). This involves students following the “ethical and legal guidelines in gathering and using information (4); of particular relevance to teachers of the next digital scholar, these ethics include “safe... behaviors in personal electronic communication in interaction” (7). Academic libraries are increasingly responsible for educating students about the

ethics of information, including teaching students about the ethics of plagiarism, copyright, and responsible information access and sharing. Teachers and librarians, then, must teach to the standard that an “information literate student understands many of the economic, legal, and social issues surrounding the use of information and accesses and uses information ethically and legally” (ACRL 2000, 14). This expectation specifically links to school and academic libraries’ work in teaching and assessing ethical information literacy behaviors with citation tools, plagiarism instruction, and online tutorials and quizzes.

[Sidebar begins] Citation Tools: RefWorks, EasyBib, NoodleTools, Son of Citation Machine, CiteULike, Diigo; Online Tutorials: Camtasia, Captivate, Screencast-o-matic, Jing, Screencastle, Screenr **[Sidebar ends]**

Citation Management Tools [C]

Citation management tools can help to encourage the ethical use of information. Such tools can be used for instruction and assessing student knowledge and understanding. Citation generators abound; not only can these tools assist students with learning the laborious process of proper citation methods, but also they can help students organize sources. By providing students with examples of citations for online or print research, images, or other informational works, students can begin to understand what citation entails. In addition, the frequency of errors from these tools provides ample fodder for a discussion on how a correct citation should appear and why it is dangerous to rely fully on computer-generated shortcuts.

Assessment in Action [D]

Research assignments provide opportunities to assess students’ use of citation tools because many of the available options offer sharing capabilities. RefWorks, the tool used at Oakland University, has a RefShare feature available that allows users to create folders that may

be accessed and edited by others. CiteULike is another, more social, citation tool teachers and students can use to collaborate and develop ethical behaviors. This resource, along with Diigo, follows the logic of folksonomies and offers students the opportunity to share collected research with others. CiteULike's tagging feature allows users to see what words or authors are most or least frequently used. Through exposure to peers' examples, this feature can help students expand or better focus their research. This feature also helps teachers determine whether a student or group of students is on the right track with an assignment (Yorke-Barber, Ghiculescu, and Possin 2009; Grenhow 2009).

Online Tutorials [C]

Online learning objects such as demonstration videos and interactive lessons allow students to learn about and consider ethical uses of information. Videos created with free screencasting tools, including Screencast-o-matic, Jing, Screencastle, or Screenr, can help "flip the classroom" and take content instruction into the online realm. More robust proprietary tools are also available in Adobe Captivate or TechSmith's Camtasia Studio. By sharing these resources online, teachers can frame class periods as a time to practice and explore, rather than an opportunity to "sit and get." Students can then practice building ethical information.

Assessment in Action [D]

Oakland University's librarians created a short online course on avoiding plagiarism that included not only a final exam, but also provided opportunities for students to answer questions with feedback throughout the course, and a place for them to practice the crucial skill of paraphrasing (see Figure 3.11). Housed within Moodle with the final exam recorded into a Microsoft Access database, the course allowed for multiple levels of assessment, as students were able to receive immediate feedback as they worked through the material and faculty were

able to access the results of students' paraphrasing practice and final exam (Greer et al. 2012). Such a course unit could be replicated as a unit or learning module in a secondary classroom and presents a collaborative opportunity for the teacher and school librarian to work together to achieve both CCSS and AASL learning standards.

Figure 3.11: Oakland University's Plagiarism Tutorial provides librarians and instructors a structured and scaffolded means to teach students about ethical uses of information, and then to assess students' understanding. Such a course could be replicated as a module or unit in any course management system.

Connecting to College and Career Readiness [C]

Teaching students' ethical information literacy behaviors prepares them for the rigorous academic research of a college career and the appropriate use of information in whatever career they choose. Citation tools require students to consider how they "draw evidence from literary or informational texts to support analysis, reflection, and research," while also illustrating their

ability to accurately and ethically “gather relevant information from multiple print and digital sources... and integrate the information while avoiding plagiarism” (CCSSO and NGA 2010, 41), an essential skill for any learner advancing into postsecondary education, where the ramifications of plagiarism and academic dishonesty are well-known. However, as cases of inappropriate attribution and plagiarism have become more prevalent in many working environments (e.g., Jayson Blair of *New York Times* fame, or James Frey’s *A Million Little Pieces*), knowing how to properly cite and credit others’ work has also become an essential skill for any student seeking a 21st century job.

Visions for the Future

How the AASL and ACRL standards have been taught and assessed provides a vision for how the CCSS can be implemented in today’s classrooms. The technology used and recommended throughout the information seeking cycle present viable resources for teaching students to “use technology and digital media strategically and capably” (CCSSO and NGA 2010, 7). However, they may not exist in the classrooms of tomorrow. In fact, these tools may be replaced with options altogether new and innovative. In considering how to best equip the next digital scholar, the future of K-12 technology should be considered, too—and there are several shifts on the horizon that could affect how learning happens (for further prognostications, see Walker et al. 2011).

At a very basic level, learning environments are increasingly virtual, and thereby increasingly personal. Loertscher and Koechlin’s (2012) “virtual learning commons,” in which a whole school is digitally engaged in a learning community, is not far off. And as learning communities develop online, students’ own learning may become increasingly individualized. This development will certainly change the types of technology used to teach students how to

determine, access, evaluate, and use information in ethical ways--think adaptive tests or targeted online learning assessments. These may come in massive online open courses, the MOOCs that are shaking higher education's long-settled paradigms; they may simply take the form of assessments that move beyond Google-able questions into deeper, more authentic learning quests. Whatever the tools, such virtual learning environments and dynamic learning objects can help achieve the true aims of the CCSS, AASL, and ACRL standards, creating the next generation of digital scholars.

Information Literacy Stage	Assessment Strategy	Tool	URL
Determining information need	Concept maps	Inspiration	www.inspiration.com
		Webspiration	www.nywebspiration.com
		Prezi	www.prezi.com
		Mindomo	www.mindomo.com
		Text2MindMap	www.text2mindmap.com
		DebateGraph	www.debategraph.org
	Think-pair-share	Padlet	www.padlet.com
		Pinterest	www.pinterest.com
		Learnist	www.learn.ist
		Wikis	www.wikispaces.com
Accessing information	Information Pathfinders	Blogs	www.blogger.com , www.edublogs.org
		Wikis	www.wikispaces.com
		Google Sites	sites.google.com
	Online Quizzes	School-provided web creation tools	Contact your school or district's technology department for specific resources available
		Google Forms	Located within drive.google.com
		Survey Monkey	www.surveymonkey.com
		Course Management Systems	Examples include Blackboard and Moodle
Evaluating information	Research Journals	Google Forms	Located within drive.google.com
		Google Docs	Located within drive.google.com
		Blogs	www.blogger.com , www.edublogs.org
		Dropbox	www.dropbox.com
		VoiceThread	www.voicethread.com
		Sample websites for evaluation	Pacific Northwest Tree Octopus: www.zapatopi.net/treeoctopus/ ; or, Feline Reactions to Bearded Men: www.improbable.com/airchives/classical/cat/cat.html ; others at Kathy Schrock's Sites to Use for Demonstrating Critical Evaluation: www.schrockguide.net/critical-evaluation.html
	Website and Resource Evaluation	Wikipedia	wikipedia.org
		Blogs	www.blogger.com , www.edublogs.org
		Google Forms	Located within drive.google.com
		Survey Monkey	www.surveymonkey.com
Using information	Social and Collaborative tools	Wikis	www.wikispaces.com
		VoiceThread	www.voicethread.com
		Google Drive	drive.google.com
		Podcast/video creation tools	Free resources include audacity.sourceforge.net (podcasting), www.animoto.com (videos), www.photopeach.com (photo slide shows), and www.xtranormal.com (animated videos)
		Proprietary web design software	Contact your school or district's technology department for specific resources available
	Digital Portfolios	Google Sites	sites.google.com
		Weebly	education.weebly.com
		Wix	www.wix.com
		WordPress	www.wordpress.com or www.wordpress.com/classrooms
		Proprietary web design software	Contact your school or district's technology department for specific resources available
Ethically considering information use and access	Citation tools	RefWorks	www.refworks.com
		EasyBib	www.easybib.com
		NoodleTools	www.noodletools.com
		Son of Citation Machine	www.citationmachine.net
		CiteULike	www.citeulike.org
		Diigo	www.diigo.com
	Online Tutorials	Camtasia	www.techsmith.com/camtasia.html
		Captivate	www.adobe.com/go/trycaptivate
		ScreenCast-o-matic	www.screencast-o-matic.com
		Jing	www.techsmith.com/jing.html
ScreenCastle	www.screencastle.com		
Screenr	www.screenr.com		

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¹ These amusing internet hoax sites may be found (as of May 2013) at <http://zapatopi.net/treeoctopus/> and <http://www.improbable.com/airchives/classical/cat/cat.html>, respectively.