



# **ICT Literacy Assessment**

## **Beyond Technical Competence: Literacy in Information and Communication Technology**

An Issue Paper from ETS

*Listening.  
Learning.  
Leading.*





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## Introduction

Ben, my son in the third grade, is participating in an “artifact box” project at his school. For the past several weeks, he and his teammates crafted clues — photos, word puzzles and elided newspaper headlines — that reveal the team’s state, town and school. They just traded boxes with another school and are researching those students’ clues. One is a picture of a bird; a quick visit to a teacher-suggested Web site reveals that it is the state bird of Idaho. Others similarly point to Idaho and are all revealed via searches of selected Web sites and, when all else fails, Google™.

These elementary school students, aided by their teachers, are doing an effective job of researching specific facts. But the situation is not the same in much of higher education, where the stakes are higher, the research needs are less clear and the students are working with much less support.

There is a growing consensus among faculty, curriculum directors and library services staff that, despite coming of age with the Internet and other technology, today’s college students might not have the Information and Communication Technology (ICT) literacy skills — the ability to effectively research and communicate using technology — necessary to navigate and make good use of the overabundance of information available today. Just because someone can navigate to a Web site, or even knows how to construct Web sites, it does not mean that the person can identify reliable, authoritative resources from the Web or know how to best interpret and communicate a Web site’s content via a well-supported argument. In other words, technological competence alone does not equal ICT literacy.

The risks for college students who leave higher education without ICT literacy skills are substantial. More than in the past, skills in researching and communicating information via technology are part of what is needed to function in society. In fact, U.S. Department of Labor projections indicate that eight of the ten fastest growing occupations in this country require “technological fluency” (Ellis, 2001). Even beyond the workplace, the ways in which we access and manage information and communicate with one another in everyday life — in the community, in schools and at home — have become increasingly technology-reliant. Whether one is gathering information about a political candidate using the Internet, communicating with a friend via e-mail, managing personal finances or looking up a book on a computerized catalogue at the library, the evidence of our technology- and information-centric society surrounds us. The costs of not being able to find and process information effectively via technology are real barriers in academia, the workforce and society.

The higher education community has not ignored issues of ICT literacy — far from it. Some higher education institutions, such as California State University as well as several national and regional accrediting agencies, identified “information literacy” as a critical outcome of higher education. This focus has led to changes in the teaching of information-handling skills; classroom faculty and librarians work together to create discipline-specific assignments that require critical use of information resources. Yet a persistent question is how to measure the effectiveness of such initiatives, both to demonstrate the progress required for accreditation and to help students and faculty identify learning needs.



## ICT Literacy

Any discussion of ICT literacy must begin with the concept of information literacy. As defined by the American Library Association, “To be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate and use effectively the needed information ...” (ALA, 1989). Information literacy includes many of the skills associated with conducting research and communicating information. In the past these might have been termed “library skills,” but with the Internet the skills are probably more often plied outside of the actual library building (although still using resources available from library staff). In addition, the information, as well as the tools used to manipulate and communicate it, takes broader forms. Information now comes in many guises — traditional print (e.g., books), online text, presentation slides, spreadsheets and other print and electronic materials.

ICT literacy is a specialization of information literacy, focusing on information competence as demonstrated through technology. Although demonstrated in this way, ICT literacy is not the same as technical competence — just being technologically savvy does not automatically lead to skillful use of information. For example, modern search engines make it easy to find information. You can access information via a few search terms entered into a library database or Web search engine. But what information are you getting in return? It might be relevant to your research, but is it authoritative? Is it timely? Is there pertinent information that you missed by not using better search terms or a more reliable source of information? ICT literacy focuses on the skills needed to use technology effectively when dealing with — and communicating — information.

Because many college students are familiar with technology, yet lack information-handling skills, the most pedagogically effective definition of ICT literacy combines both information literacy and technical competence:

*ICT literacy is the ability to appropriately use digital technology, communication tools, and/or networks to solve information problems in order to function in an information society. This includes having the ability to use technology as a tool to research, organize, and communicate information and having a fundamental understanding of the ethical / legal issues surrounding accessing and using information* (The National Higher Education Information and Communication Technology Initiative, 2004).

Table 1 presents a further specification of ICT literacy, highlighting the information literacy skills as used in digital environments. Overall, this definition focuses on the *cognitive* aspects of ICT literacy: Are people thinking critically about information when they use technology? Are they being effective problem solvers?



**Table 1**  
**Components of ICT Literacy\***

Proficiency	Definition
<b>Define</b>	Using ICT tools to identify and appropriately represent an information need
<b>Access</b>	Collecting and/or retrieving information in digital environments
<b>Manage</b>	Using ICT tools to apply an existing organizational or classification scheme for information
<b>Integrate</b>	Interpreting and representing information, such as by using ICT tools to synthesize, summarize, compare and contrast information from multiple sources
<b>Evaluate</b>	Judging the degree to which information satisfies the needs of the task in ICT environments, including determining authority, bias and timeliness of materials
<b>Create</b>	Adapting, applying, designing or inventing information in ICT environments
<b>Communicate</b>	Communicating information properly in its context (audience, media) in ICT environments

\*As defined on page 18 of the Educational Testing Service's 2003 report, *Succeeding in the 21st Century: What Higher Education Must Do to Address the Gap in Information and Communication Technology Proficiencies*. It is available at [www.ets.org/ictliteracy/succeeding1.html](http://www.ets.org/ictliteracy/succeeding1.html).

This definition is consistent with many extant definitions of information literacy, such as the standards published by the Association of College & Research Libraries (ACRL, 2000). It targets a key information-handling problem of students in higher education: Students often can use the technology, but do not think critically when locating, evaluating and processing the information.



## Literacy for the 21st Century

In her recent article in *Change* magazine, Patricia Senn Breivik, a noted author on the subject of information literacy, argues that even with a wealth of information available to them, today's graduates are not more adept at information skills or more informed than their less information-rich predecessors: "What is growing ever more obvious is that today's undergraduates are generally far less prepared to do research than were students of earlier generations, despite their familiarity with powerful new information-gathering tools" (Breivik, 2005, pg 22). It is as if the Internet, in making information accessible and convenient, has paradoxically led to a *decrease* in the critical thinking skills needed to deal with information. This trend is troubling as these skills have become more central to both academic and everyday life.

ICT literacy represents a 21st century definition of literacy. Just as the ways in which information is stored, organized and disseminated have changed dramatically in recent years, so must our definition of literacy change to include the knowledge and skills required in today's globally connected world. In his work with the International ICT Literacy Panel, literacy researcher Irwin Kirsch observed, "While traditional (reading and writing) literacy and numeracy skills have become a currency for full participation in our society, the future will increasingly require each of us to demonstrate these traditional competencies through the use of technology" (Educational Testing Service, 2003).

Accordingly, a 21st century definition of literacy must include not only the ability to read and write, but also the knowledge and skills related to the use and application of information and communication technologies — ICT proficiencies that will enable individuals to function successfully in today's (and tomorrow's) world.

What is urgently needed, then, is an assessment program that will make it possible to determine whether (or to what extent) college students have obtained the combination of technical and cognitive skills needed to be productive members of an information-rich, technology-based society.



## ICT Literacy Assessment

In January 2005, Educational Testing Service, in collaboration with the National Higher Education ICT Initiative, launched a new assessment of ICT literacy. This assessment was designed to support initiatives to improve ICT literacy on college campuses. It is unique in its focus on information-handling skills in the context of technology (Katz et al., 2004), rather than either pure information literacy (e.g., O'Connor, Radcliffe and Gedeon, 2001; Cameron, 2004) or technical certification.

The ETS® ICT Literacy Assessment can help higher education improve the ICT literacy of its students in several ways.

**Support institutional ICT literacy initiatives.** While some institutions have been successful in getting ICT literacy initiatives off the ground, others have had trouble convincing their administrations of the educational need. Part of the problem is that although there have been a good deal of claims about the lack of ICT skills among college students, there is little actual data. A few studies documented the lack of information literacy skills at particular institutions (e.g., Caravello, Borah, Herschman and Mitchell, 2001), but even these data might seem irrelevant to school officials if their own institution was not involved in the study. Assessment data gathered from a representative sample can provide concrete evidence of weaknesses (or strengths) in the ICT literacy skills of a particular institution's students and help convince decision makers of the need for an institution-wide ICT literacy initiative.

**Guide curricula innovations and evaluate curricula changes.** Results from the ETS ICT Literacy Assessment describe the ICT literacy skills of an individual student or a student population. This description can suggest skills that need additional emphasis in ICT-related courses. In addition, appropriately comparing overall student performance before and after delivery of particular curricula can contribute to evaluation of their effect on students' ICT literacy skills. For example, by summarizing student scores, departments can examine assessment results across years as part of a research program to determine the effects of embedding ICT skills into their curricula. At an institutional level, assessment results comparing entry-level students to more senior students can provide information on the success of ICT education programs.

**Guide individual learning.** Assessing an individual's proficiency in ICT helps inform whether, and in what way, a person would benefit from ICT literacy instruction. Such instruction might be needed to prepare for a certain major, for upper division instruction, to transfer from a community college to a four-year institution or for a job. Instruction might focus on basic ICT literacy skills or target specific aspects of these skills: (See Table 1 on page 6).

**A "stake in the ground" for what ICT skills look like.** When considering approaches to implementing ICT literacy instruction on their campuses, institutions use definitions of ICT literacy that range from traditional information literacy to basic computer skills. The ETS ICT Literacy Assessment represents a concrete instance of ICT literacy standards that can focus a campus on improving the particular information competencies that its students lack.



The screenshot displays a simulated software interface for the Higher Education ICT Literacy Assessment. The interface is titled "Higher Education ICT" and shows a progress indicator of "0:37", "1 of 3" sections, and "1 of 48" questions. The main task area is titled "Articles Database" and contains a search bar with the text "earthquake safety in California" and a "Search" button. Below the search bar, there are several filtering options under the heading "Limit your search":

- Publication Type:** None Applied
- Document Type:** None Applied
- Publication Dates:** January (Month) [ ] (Year) TO January (Month) [ ] (Year)
- Peer reviewed:**
- Text with Graphics:**

Below these filters, there are two options under the heading "Expand your search":

- Also search within the full text of the article
- Automatically "OR" search terms

On the left side of the interface, there is a "Scenario" and a "Task" section. The scenario describes finding information from pamphlets and government publications about earthquake safety in California. The task asks the student to construct a search that efficiently returns the information needed, listing several search engine features and requirements.

**Figure 1.** In the ETS ICT Literacy Assessment, students demonstrate their skills at handling information through interaction with simulated software. In this example task, students develop a search query as part of a research assignment on earthquakes.

**A model of possible assignments.** The assessment reflects what educators recommend for information literacy and ICT literacy instruction: an integration of information literacy into specific disciplines (e.g., Rockman & Associates, 2004). It presents each scenario-based task in the context of an academic or workplace assignment, or personal information need (Figure 1). These “assignments” reflect the types of coursework that require critical use of information resources and information literacy skills in the context of technology. In this way, the test provides examples of assignments that classroom faculty should create for their students to practice ICT literacy skills.



## Conclusions

In the classroom project described earlier, Ben and his teammates had to know more than just technology to do well. Entering a URL into a browser and clicking on hyperlinks was not the intent of the task. They had to think about what type of information they needed to find, what types of Web sites might provide that information, how to locate the information they needed and how to decide if they found what they were looking for. In other words, their project helped them improve their ICT literacy.

ICT literacy focuses on the critical thinking and problem solving that we do when dealing with information in digital environments. It consists of the research and communication skills that occur in the context of technology. Whereas these skills are often gained through education, they extend well beyond academic life to the workplace and other real-world pursuits that help us function in an information- and technology-rich society.

Yet there is a growing consensus that students leave higher education without these 21st century literacy skills. The role of the ETS ICT Literacy Assessment is to document the lack of student literacy skills and help inform educators who seek to improve the ICT literacy of their students. ICT literacy, as defined in this article, addresses the “new illiteracy” concerns of higher education in a way that attention solely to technology competence would not.

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For more information call **1-800-745-0269** or visit **[www.ets.org/ictliteracy](http://www.ets.org/ictliteracy)**.



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