

Technology? Skills Every Student Needs

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All workshop handouts can be found at: www.doug-johnson.com	
See also Skills for the Knowledge Worker < www.doug-johnson.com/dougwri/skills-for-the-knowledge-worker.html >	
Mankato Schools Information Literacy Curriculum < www.rschooldtoday.com/mankatoaps/ILcurr	

List one way each of the following occupations might use information to complete tasks and solve problems:

1. Truck driver
2. Physician
3. Piano player
4. Farmer
5. Banker
6. Salesperson
7. Small business owner
8. Mechanic
9. Architect
10. Custodian

The Technology? Skills Every Student Needs. (Synopsis)

The world in which our students will all be working and living will be different from our own. This workshop outlines

- What's happening outside school in the workplace?
- What skills does every student need to be a productive citizen?
- What curriculum best teaches them those skills?
- How will schools change as a result?The

workshop looks at pragmatic change strategies that will help assure that all student become "information literate" and looks at real ways schools are implementing those changes.

From the video:

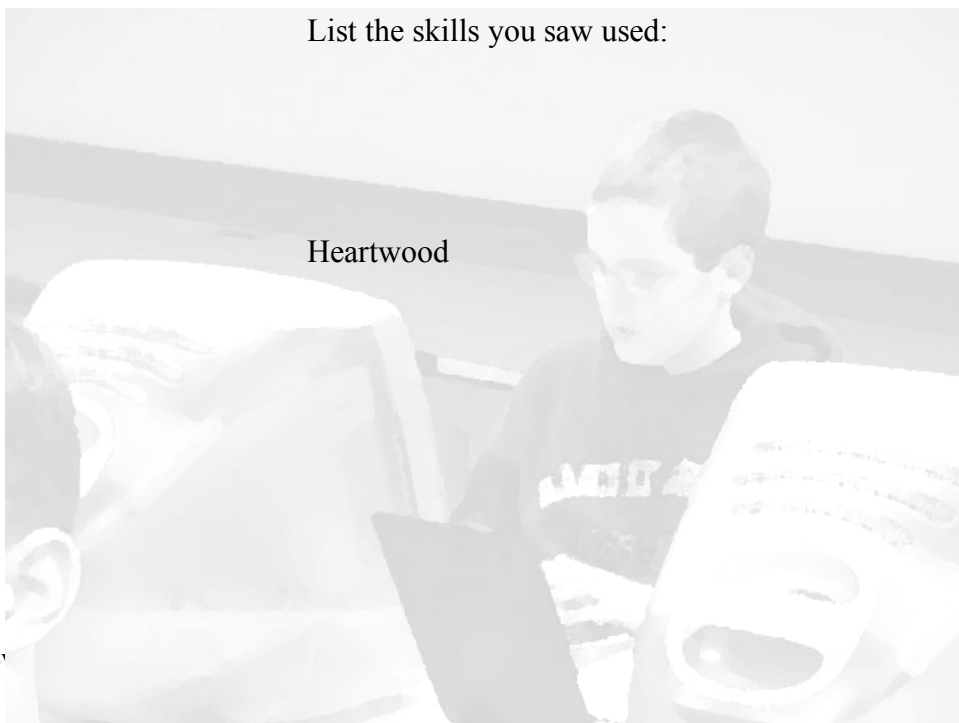
List the technologies you saw:

List the skills you saw used:

How are these companies different?

Bascombe

Heartwood



Computer Skills for Information Problem-Solving: Learning and Teaching Technology in Context

by Michael B. Eisenberg and Doug Johnson *March 2002*

Complete article is at <www.doug-johnson.com/dougwri/computer-skills-for-information-problem-solving.html>

There is clear and widespread agreement among the public and educators that all students need to be proficient computer users - students need to be "computer literate." However, while districts are spending a great deal of money on technology, there seems to be only a vague notion of what computer literacy really means.

- Can the student who operates a computer well enough to play a game, send e-mail or surf the web be considered computer literate?
- Will a student who has used computers in school only for running tutorials or an integrated learning system have the skills necessary to survive in our society?
- Will the ability to do basic word processing be sufficient for students entering the workplace or post-secondary education?

Clearly not. In too many schools, many teachers and students still use computers only as the equivalent of expensive flash cards, electronic worksheets, or as little more than a typewriter. The productivity side of computer use in the general content area curriculum is neglected or grossly underdeveloped (Moursund, 1995).

Recent publications by educational associations are advocating for a more meaningful use of technology in schools. (ISTE, 2000) Educational technologists are clearly describing what students should know and be able to do with technology. They are advocating integrating computer skills into the content areas - that computer skills should not be taught in isolation and that separate "computer classes" do not really help students learn to apply computer skills in meaningful ways. There is increasing recognition that the end result of computer literacy is not knowing how to operating computers, but to use technology as a tool for organization, communication, research, and problem-solving. This is an important shift in approach and emphasis. And it's a shift with which library media specialists have a great deal of familiarity.

Library media specialists know that moving from isolated skills instruction to an integrated approach is an important step that takes a great deal of planning and effort. Over the past 25 years, library media professionals have worked hard to move from teaching isolated "library skills" to teaching integrated information skills. Effective integration of information skills has two requirements:

- (1) the skills must directly relate to the content area curriculum and to classroom assignments, and
- (2) the skills themselves need to be tied together in a logical and systematic information process model.

Schools seeking to move from isolated computer skills instruction will also need to focus on both of these requirements. Successful integrated information skills programs are designed around collaborative projects jointly planned and taught by teachers and library media professionals. Computer skills instruction can and should be imbedded in such a curriculum. Library media specialists, computer teachers, and classroom teachers need to work together to develop units and lessons that will include both computer skills, general information skills, and content-area curriculum outcomes.

A meaningful, unified computer literacy curriculum must be more than a "laundry list" of isolated skills, such as:

- knowing the parts of the computer
- writing drafts and final products with a word processor
- searching for information using the Internet.

While these specific skills are important for students to learn, the "laundry list" approach does not provide an adequate model for students to transfer and apply skills from situation to situation. These curricula address the "how" of computer use, but rarely the "when" or "why." Students may learn isolated skills and tools, but they will still lack an understanding of how those various skills fit together to solve problems and complete tasks. Students need to be able to use computers flexibly, creatively and purposefully. All learners should be able to recognize what they need to accomplish, determine whether a computer will help them to do so, and then be able to use the computer as part of the process of accomplishing their task. Individual computer skills take on a new meaning when they are integrated within this type of information problem-solving process, and students develop true "computer literacy" because they have genuinely applied various computer skills as part of the learning process.

The curriculum outlined on pages 3-5, "Computer Skills for Information Problem-Solving," demonstrates how computer literacy skills can fit within an information literacy skills context (American Association of School Librarians, 1998). The baseline information literacy context is the Big Six Skills process (see sidebar and Eisenberg & Berkowitz cites). The various computer skills are adapted from the International Society for Technology in Education's (ISTE) *National Educational Technology Standards* and the Mankato Area Public Schools (Mankato Schools Information Literacy Curriculum Guideline). These basic computer skills are those which all students might reasonably be expected to authentically demonstrate before graduation.

Some computer literacy "skills" competencies which are *not* in this information processing model, and which may or may not be important to have stated include:

- knowing the basic operation, terminology, and maintenance of equipment
- knowing how to use computer-assisted instructional programs
- having knowledge of the impact of technology on careers, society, and culture (as a direct instructional objective)
- computer programming

Listing computer skills is only a first step in assuring all our children become proficient information and technology users. A teacher supported scope and sequence of skills, well designed projects, and effective assessments are also critical. Many library media specialists will need to hone their own technology skills in order to remain effective information skills teachers. But such a curriculum holds tremendous opportunities for library media specialists to become vital, indispensable staff members, and for all children to master the skills they will need to thrive in an information rich future.

Computer Skills for Information Problem-Solving: A Curriculum Based on the Big Six Skills Approach

copyright Michael B. Eisenberg, Doug Johnson & Robert E. Berkowitz

1. Task Definition:

The first step in the information problem-solving process is to recognize that an information need exists, to define the problem, and to identify the types and amount of information needed. In terms of technology, students will be able to:

- A. Use e-mail, real-time communications (e.g., listservs, newsgroups, instant messaging services, chat rooms, IP telephony), desktop teleconferencing, and groupware on the Internet and local area networks to communicate with teachers regarding assignments, tasks, and information-problems.
- B. Use e-mail, real-time communications (e.g., listservs, newsgroups, instant messaging services, chat rooms, IP telephony), desktop teleconferencing, and groupware on the Internet and local area networks to generate topics and problems and to facilitate cooperative activities among groups of students locally and globally.
- C. Use e-mail, real-time communications (e.g., listservs, newsgroups, instant messaging services, chat rooms, IP telephony) desktop teleconferencing, and groupware on the Internet and local area networks to generate topics and problems and to facilitate cooperative activities with subject area experts locally and globally
- D. Use computerized graphic organization, brainstorming or idea generating software to define or refine the information problem. This includes developing a research question or perspective on a topic.

2. Information Seeking Strategies:

Once the information problem has been formulated, the student must consider all possible information sources and develop a plan for searching. Students will be able to:

- A. Assess the value of various types of electronic resources for data gathering, including databases, CD-ROM resources, commercial and Internet online resources, electronic reference works, community and government information electronic resources.
- B. Assess the need for and value of primary resources including interviews, surveys, experiments, and documents that are accessible through electronic means.
- C. Identify and apply specific criteria for evaluating computerized electronic resources.
- D. Identify and apply specific criteria for constructing meaningful original data gathering tools such as online surveys, electronic interviews, or scientific data gathering tools such as probes, meters, and timers.
- E. Assess the value of e-mail, real-time communications (e.g., listservs, newsgroups, instant messaging services, chat rooms, IP telephony) desktop teleconferencing, and groupware on the Internet and local area networks as part of a search of the current literature or in relation to the information task.
- F. Use a computer to generate modifiable flow charts, time lines, organizational charts, project plans (such as Gantt charts), and calendars which will help the student plan and organize complex or group information problem-solving tasks.
- G. Use handheld devices such as personal digital assistants (PDAs or electronic slates) to track contacts, create to-do lists, and schedules.

3. Location and Access:

After students determine their priorities for information seeking, they must locate information from a variety of resources and access specific information found within individual resources. Students will be able to:

- A. Locate and use appropriate computer resources and technologies available within the school library media center, including those on the library media center's local area network, (e.g., online catalogs, periodical indexes, full-text sources, multimedia computer stations, CD-ROM stations, online terminals, scanners, digital cameras).
- B. Locate and use appropriate computer resources and technologies available throughout the school including those available through local area networks (e.g., full-text resources, CD-ROMs, productivity software, scanners, digital cameras).

- C. Locate and use appropriate computer resources and technologies available beyond the school through the Internet (e.g., newsgroups, listservs, WWW sites, ftp sites, online public access library catalogs, commercial databases and online services, and other community, academic, and government resources).
- D. Know the roles and computer expertise of the people working in the school library media center and elsewhere who might provide information or assistance.
- E. Use electronic reference materials (e.g., electronic encyclopedias, dictionaries, biographical reference sources, atlases, geographic databanks, thesauri, almanacs, fact books) available through local area networks, stand-alone workstations, commercial online vendors, or the Internet.
- F. Use the Internet or commercial computer networks to contact experts and help and referral services.
- G. Conduct self initiated electronic surveys conducted through e-mail, listservs, newsgroups and online data collection tools.
- H. Use organizational systems and tools specific to electronic information sources that assist in finding specific and general information (e.g., indexes, tables of contents, user's instructions and manuals, legends, boldface and italics, graphic clues and icons, cross-references, Boolean logic strategies, time lines, hypertext links, knowledge trees, URLs etc.) including the use of:
 1. search tools and commands for stand-alone, CD-ROM, and online databases and;
 2. search tools and commands for searching the Internet such as search engines, meta search tools, bots, directories, jump pages, and specialized resources such as those that search the Invisible Web.
 3. specialized sites and search tools commands that limit searches by date, location, format, collection of evaluated sites or other criteria.

4. Use of Information:

After finding potentially useful resources, students must engage (read, view, listen) the information to determine its relevance and then extract the relevant information. Students will be able to:

- A. Connect and operate the computer technology needed to access information, and read the guides and manuals associated with such tasks.
- B. Know and be able to use the software and hardware needed to view, download, decompress and open documents, files, and programs from Internet sites and archives.
- C. Cut and paste information from an electronic source into a personal document complete with proper citation.
- D. Take notes and outline with a word processor, database, or similar productivity program.
- E. Record electronic sources of information and locations of those sources to properly cite and credit in footnotes, endnotes, and bibliographies.
- F. Use electronic spreadsheets, databases, and statistical software to process and analyze statistical data.
- G. Analyze and filter electronic information in relation to the task, rejecting non-relevant information.
- H. Save and backup data gathered to secure locations (floppy disk, personal hard drive space, RW-CD, online storage, flash memory, etc.)

5. Synthesis:

Students must organize and communicate the results of the information problem-solving effort. Students will be able to:

- A. Classify and group information using a word processor, database or spreadsheet.
- B. Use word processing and desktop publishing software to create printed documents, applying keyboard skills equivalent to at least twice the rate of handwriting speed.
- C. Create and use computer-generated graphics and art in various print and electronic presentations.
- D. Use electronic spreadsheet software to create original spreadsheets.
- E. Generate charts, tables and graphs using electronic spreadsheets and other graphing programs.
- F. Use database software to create original databases.
- G. Use presentation software to create electronic slide shows and to generate overhead transparencies and slides.
- H. Create and use projection devices to show hypermedia and multimedia productions with digital video, audio and links to HTML documents or other programs. Convert presentations for display as web pages.
- I. Create web pages and sites using hypertext markup language (HTML) in a text document or webpage creation tools and know the procedure for having these pages loaded to a web server.
- J. Use e-mail, ftp, groupware, and other telecommunications capabilities to publish the results of the information problem-solving activity.
- K. Use specialized computer applications as appropriate for specific tasks, e.g., music composition software, computer assisted drawing and drafting programs, mathematics modeling software, scientific measurement instruments, etc.
- L. Properly cite and credit electronic sources, including text, graphics, sound and video, of information within the product as well as in footnotes, endnotes, and bibliographies.

6. Evaluation:

Evaluation focuses on how well the final product meets the original task (effectiveness) and the process of how well students carried out the information problem-solving process (efficiency). Students may evaluate their own work and process or be evaluated by others (i.e. classmates, teachers, library media staff, parents). Students will be able to:

- A. Evaluate electronic presentations in terms of both the content and format and design self-assessment tools to help them evaluate their own work for both content and format.
- B. Use spell and grammar checking capabilities of word processing and other software to edit and revise their work.
- C. Apply legal principles and ethical conduct related to information technology related to copyright and plagiarism.
- D. Understand and abide by telecomputing etiquette when using e-mail, newsgroups, listservs and other Internet functions.
- E. Understand and abide by acceptable use policies and other school rules in relation to use of the Internet and other electronic technologies.
- F. Use e-mail, real-time communications (e.g., listservs, newsgroups, instant messaging services, chat rooms, IP telephony) desktop teleconferencing, and groupware on the Internet and local area networks to communicate with teachers and others regarding their performance on assignments, tasks, and information-problems.
- G. Thoughtfully reflect on the use of electronic resources and tools throughout the process.

Mankato Grade Five Benchmarks

Research and Inquiry Skills

Research question

- I can create a research question that identifies topics, subtopics, and key words.

Location

- I can find information using
 - an almanac - an atlas - the Internet

Communication

- I can take usable notes that help me answer my research questions that are in my own words and include the source of the information.
- I can communicate and record data on a single topic.
- I can report and organize findings.

Evaluation

- I can compare individual findings to large group findings.
- I can identify areas for further investigation.

Life-long Reading

- I can identify award-winning Newbery and Maud Hart Lovelace books.
- I select books from a large variety of sources including
 - school media center - classroom collections
 - public library - personal book collection
- I recommend books to others.

Technology Skills

- I can format word processing documents with
 - columns - headers - footers - tabs
- I can produce a spreadsheet with assistance.
- I can chart a graph with assistance with a computer that .
 - has axis labeled - has legend/key included
 - uses appropriate scale - uses appropriate intervals
- I can create a signature and nickname in an email program.

Appropriate Use of Resources

- I can use and care for media materials and equipment.
- I understand the difference between an appropriate and an inappropriate e-mail message.
- I understand the difference between an appropriate and an inappropriate WWW site.
- I understand the district's appropriate use policy.

Mankato Survey of Grades 7 and 8 Information Literacy Skills

Class name _____ **Grade level** _____

In this class, students learn and practice these information literacy and technology skills:

Research and Inquiry Skills

- _____ narrowing the scope of a research topic.
- _____ generating questions and information in order of importance and relevance.
- _____ copying and pasting between resources to take notes.
- _____ using and, or, and not (Boolean logic) to determine the scope of a search.
- _____ using a variety of search engines to locate information.
- _____ using a variety of sources, print and non-print, and synthesize the information to answer a question or support a position.

Representing and supporting a position on a topic using the following:

- _____ direct observation
- _____ interviews
- _____ surveys.
- _____ communicating information through multimedia.

Technology Skills

- _____ using email to gather information on a topic.
- _____ inserting audio and/or video into a multimedia presentation.
- _____ producing an .html document (webpage) to communicate information.
- _____ locating and using information from the World Wide Web.
- _____ producing a multimedia presentation to communicate information.

Appropriate Use of Resources

- _____ practicing appropriate email usage by following the district guidelines
- _____ understanding and practicing appropriate World Wide Web use by following the district guidelines.

Life-long Reading Behaviors

- _____ reading silently ten minutes or more each day.
- _____ identifying a favorite author and/or literary type.
- _____ checking out leisure reading materials from the media center on a regular basis.

Mankato Survey of Grades 9-12 Information Literacy Skills

Class name _____

Grade level _____

In this class, students learn and practice these information literacy and technology skills:

Research and Inquiry Skills

- _____ asking an original question and formulating a topic of limited scope for a research project that requires an original supported conclusion.
- _____ identifying the information sources available, including print, electronic, and primary sources and determining which sources best suit the needs of the research.
- _____ using the electronic catalog to find a book and the print and electronic reference sources in the media center.
- _____ using multiple Internet search engines efficiently and effectively to locate information relevant to a topic.
- _____ efficiently using a variety of on-line databases, including periodical databases, to locate information.
- _____ using criteria to judge the accuracy, currency and bias of information.
- _____ citing the sources of information in proper format from print, electronic and primary sources.
- _____ efficiently gathering and organizing information by copying and pasting information into an original word processing document or database
- _____ using technology to collaborate with others for the completion of academic work.

Identifying the important information from my research and being able to communicate it to various audiences through:

- _____ word processed report
- _____ face-to-face talk supplemented by a computer presentation program that includes original digital images
- _____ a webpage that meets the school's guidelines
- _____ a spreadsheet and pictorial representation of data from charting and graphing program
- _____ using the assessment tools provided by the instructor to judge the quality of one's research.
- _____ establishing criteria for a self-assessment of one's research.
- _____ evaluating the ethical decisions made during the research process.

Technology skills

- _____ identifying and determine hardware configuration for a personal computer system and can use a computer operating system to launch and close a program.
- _____ creating and using a system for storing, organizing and backing up files of my original work.
purposely using the following pieces of hardware:
 - _____ personal computer
 - _____ fixed and removable storage devices
 - _____ remote storage devices such as YODA or an Internet accessed server
 - _____ digital cameras, still and video
 - _____ scanner
- _____ purposely using all the following types of software:
 - _____ word processor
 - _____ email program
 - _____ Internet browser
 - _____ graphic tools and graphics editing program
 - _____ spreadsheet and graphing software
 - _____ database
 - _____ hypermedia or presentation program
 - _____ digital still photo and video editing software

Appropriate Use of Resources

- _____ understanding and following the school's policies regarding the use of technology and understanding the difference in use between a home computer and school or work computer.
- _____ protecting oneself from the harmful acts of others by recognizing threats to personal privacy and property.
- _____ knowing and following copyright laws and understanding the concept of plagiarism.
- _____ identifying the uses of technology as they relate to one's academic work, personal life, and future career.

Life-long reading behaviors and critical reading, viewing and listening

- _____ identifying favorite authors and literary types for personal reading.
- _____ identifying sources of information for topics of personal interest in both print and electronic formats.
- _____ identifying sources of information about current events in both print and electronic formats.
- _____ articulating the criteria used when evaluating the quality either a fictional or factual work.

Unit planning

Unit Name:	
Content Area and Grade Level:	
Standards Met:	
Other necessary information...	
Big6 Step	Suggested Activities and Technologies
1. Task Definition <ul style="list-style-type: none"> Define the information problem Identify information needed in order to complete the task (to solve the information problem) 	
2. Information Seeking Strategies <ul style="list-style-type: none"> Determine the range of possible sources (brainstorm) Evaluate the different possible sources to determine priorities (select the best sources) 	
3. Location and Access <ul style="list-style-type: none"> Locate sources (intellectually and physically) Find information within sources 	
4. Use of Information <ul style="list-style-type: none"> Engage (e.g., read, hear, view, touch) the information in a source Extract relevant information from a source 	
5. Synthesis <ul style="list-style-type: none"> Organize information from multiple sources Present the information 	
6. Evaluation <ul style="list-style-type: none"> Judge the product (effectiveness) 6.2 Judge the information problem-solving process (efficiency) 	

Are 21st Century Skills Right Brain Skills?

Many of us were terrified by Thomas Friedman's book *The World is Flat* and its report on the rise of outsourcing of white collar jobs to Asia. But there's hope.

Daniel Pink's book, *A Whole New Mind: Moving from the Information Age to the Conceptual Age* brings some relief – if not a little optimism for our kids in tomorrow's workplace – if we as educators take some lessons from it.

Like Friedman, Pink acknowledges the outsourcing trend (Asia), as well as two others he labels Automation and Abundance, as having an impact on employment in the future. He suggests that his readers ask themselves three questions about their jobs:

1. Can someone overseas do it cheaper?
2. Can a computer do it faster?
3. Am I offering something that satisfies the nonmaterial, transcendent desires of an abundant age?

As a result of these trends, he believes we are shifting from the Information Age to the Conceptual Age. Successful players in this new economy will increasingly be required to develop and use the right-brain abilities of high concept (seeing the larger picture, synthesizing information) and high touch (being empathetic, creating meaning). Happy news, perhaps, for those of us who never were all that good the left-brain stuff in the first place.

More specifically, he suggests we work toward developing in ourselves (and by implication, our students), six right brain “senses,” to complement our left-brain, analytic skills. We need to realize the value of:

1. Not just function, but also DESIGN
 2. Not just argument, but also STORY.
 3. Not just focus, but also SYMPHONY.
 4. Not just logic, but also EMPATHY.
 5. Not just seriousness, but also PLAY.
 6. Not just accumulation, but also MEANING.
- And I would add a final conceptual age skill to Pink's list: 7. Not just knowledge, but also LEARNING.

In the age of educational accountability, we seem to be gearing all our instructional efforts to helping students master left-brain skills, since that is what the tests measure, of course. But to what extent should we also be helping kids develop design sense, storytelling abilities, synthesis, feelings for others, humor and the ability to detect the importance of the information they learn?

Using Pink's model, might technology use help cultivate the skills of a “conceptual age” worker?

1. DESIGN
 - ☐ Teach drawing and painting programs
 - ☐ Assess not just content, but appearance of student work
 - ☐ Teach visual literacy
2. STORY
 - ☐ Ask for student writing in the narrative voice when word processing
 - ☐ Teach speaking skills along with multimedia presentation creation
 - ☐ Teach storyboarding as a digital photography skill
3. SYMPHONY
 - ☐ Design classroom projects that cross disciplines
 - ☐ Ask for the application of skills and concepts to genuine problems
 - ☐ Use inductive learning strategies (learning by doing)
4. EMPATHY
 - ☐ Use the web to find literature about people from other cultures and socio-economic groups
 - ☐ Give students service learning and volunteer opportunities or requirements (maintaining the computers at a senior citizen center)
 - ☐ Design group projects
5. PLAY
 - ☐ Teach with games, including computer games such as simulations
 - ☐ Offer a variety of athletics and physical education classes (not just computers!)
 - ☐ Offer participatory music classes that include electronic music composition
 - ☐ Allow access to humor sites on the web
6. MEANING
 - ☐ Use the web to find information on comparative religion, myth and legend
 - ☐ Teach ethical behaviors as a part of every technology project
 - ☐ Asking for communication products that include statements of personal values
7. LEARNING
 - ☐ Teach processes, not facts
 - ☐ Allow students to research areas of personal interest (and tolerate a diversity of interests)
 - ☐ Give students the ability to learn in non-traditional ways (online, early enrollment in college, apprenticeships)

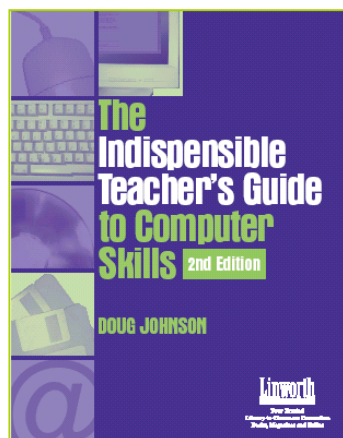
Our society and educational system sadly sees many of the opportunities listed above that develop “conceptual age” skills as “extras” – frills that are often the first to be cut in times of tight budgets. It's tragic that by doing so, we are doing a disservice to our students as future workers and citizens.

Building Conceptual Age Skills – What Should Schools Be Doing?

Daniel Pink's book, *A Whole New Mind*, suggests some 'Conceptual Age skills' needed for workers in a world of Asia, Abundance and Automation. What experiences/activities should schools be offering students to help build these skills?

1. Not just function, but also DESIGN. "It's no longer sufficient to create a product, a service, an experience, or a lifestyle that's merely functional. Today it's economically crucial and personally rewarding to create something that is also beautiful, whimsical, or emotionally engaging."	
2. Not just argument, but also STORY. "When our lives are brimming with information and data, it's not enough to marshal an effective argument... The essence of persuasion, communication, and self-understanding has become the ability also to fashion a compelling story."	
3. Not just focus, but also SYMPHONY. "What's in greatest demand today isn't analysis but synthesis – seeing the big picture and, crossing boundaries, being able to combine disparate pieces into an arresting new whole."	
4. Not just logic, but also EMPATHY. "What will distinguish those who thrive will be their ability to understand what makes their fellow woman or man tick, to forge relationships, and to care for others."	
5. Not just seriousness, but also PLAY "Ample evidence points to the enormous health and professional benefits of laughter, lightheartedness, games and humor."	
6. Not just accumulation, but also MEANING. "[Material plenty] has freed hundreds of millions of people from day-to-day struggles and liberated us to pursue more significant desires: purpose, transcendence, and spiritual fulfillment."	
7. Not just knowledge, but also LEARNING. (Johnson) Unless a person develops both the ability and the desire to continue to learn new skills, to be open to new ideas, and to be ready to change practices in the face of new technologies, economic forces, and societal demands, he or she will not be able to successfully compete in a global economy.	

Three Indispensable Titles for the Information Age! By Doug Johnson



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