



This paper appears in *Managing Modern Organizations Through Information Technology*, Proceedings of the 2005 Information Resources Management Association International Conference, edited by Mehdi Khosrow-Pour. Copyright 2005, Idea Group Inc.

# Teaching Information Fluency: A New Pedagogical Framework

Anne Matheus, Rita Longo and Roger Norton

Marist College, School of Computer Science & Mathematics, North Rd., Poughkeepsie, NY 12601, USA,  
{anne.matheus, rita.longo, roger.norton@marist.edu}

## ABSTRACT

In facing the challenges of the information age, many colleges have revisited and reinvigorated their courses in computer literacy and information literacy. The first is usually taught in the school of computer science, the second in the school of library science. Recent changes have renamed the computer literacy effort as information fluency; however, most colleges and universities have not integrated the two concepts into one course. In order to effectively teach information fluency, it must be done from the pedagogical framework of problem solving, i.e. asking significant questions, researching those questions, analyzing the questions, and successfully communicating the results. Successfully integrated information skills programs are designed around collaborative projects and include computer skills. The computer skills are more than “laundry lists” of isolated skills; these skills become the vehicle for evaluation, research, presentation and analysis of the information.

In this paper we will examine the process for the development of a new pedagogical framework for teaching information fluency. We will start out by defining what we mean by information fluency and then we will describe the evolution that brought us to that definition. Finally, we will describe a course that has been developed to meet the needs of students that need to become information fluent.

## WHAT IS INFORMATION FLUENCY?

Information Fluency is not just information literacy nor is it only computer literacy. Information literacy is a set of abilities requiring individuals to “recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information.[6]” Information literacy also is increasingly important in the contemporary environment of rapid technological change and proliferating information resources. The uncertain quality and expanding quantity of information pose enormous challenges for society. The sheer abundance of information will not in itself create a more informed citizenry without a complementary set of skills and knowledge necessary to use information effectively. Information literate people are those who have learned how to learn. They know how to learn because they know how knowledge is organized, how to find information and how to use information in such a way that others can learn from them. They are people prepared for lifelong learning because they can always find the information needed for any task or decision at hand. Problems are more difficult to solve when people lack access to meaningful information vital to good decision making. Information literacy is a means of personal empowerment; it allows people to verify or refute expert opinion and to become independent seekers of truth; it provides them with the ability to build their own arguments and to experience the excitement of the search for knowledge. By experiencing the excitement of their own successful quests for knowledge, it also creates in people the motivation for pursuing learning throughout their lives.

Information (organized data, the raw material for specialized knowledge, and generalist wisdom) is now our most important resource. Information literacy is a survival skill in the Information Age. Instead

of drowning in the information that floods their lives, information literate people know how to find, evaluate, and use information effectively to solve a particular problem or make a decision - whether the information they select comes from a computer, a book, a government agency, a film, or any number of other possible resources.

Computer literacy [2] is more than “laundry lists” of isolated skills, such as:

- knowing the parts of the computer
- writing drafts and final products with a word processor
- searching for information using an online database

The “laundry list” approach does not provide an adequate model for students to transfer and apply skills from situation to situation. This approach addresses 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. Information fluent individuals 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.

“Today’s college students - the first truly wired generation - are far more Net-adept than the general population, and will graduate with expectations of a high-speed Internet world that could push the technology development of the workplace and the home, according to a new report. The researchers also found that students use the Internet differently from the rest of the population, a fact that probably has as much to do with fast college Internet connections and free time as with an adventurous technological gestalt. They are roughly twice as likely to have downloaded music as the general population, 60 percent versus 28 percent. Instant messages, used daily by 12 percent of the general population, are used by 26 percent of college students.”[11] Can they critically evaluate the flood of information they so easily access?

Most current educational and communication endeavors - with their long-standing history of pre-packaging information - militate against the development of even an awareness of the need to master information management skills. Students receive predigested information from lectures and textbooks, and little in their environment fosters active thinking or problem solving. The problem solving that does occur is within artificially constructed and limited information environments that allow for single “correct” answers. Such exercises bear little resemblance to problem solving in the real world where multiple solutions of varying degrees of usefulness must be pieced together - often from many disciplines and from multiple information sources such as online databases, videotapes, government documents, and journals.

Therefore Information Fluency is not just information literacy and computer literacy combined; it requires a blending of the two along with the integrating component of critical thinking. Teaching information

literacy without the computer tools needed to analyze and present the information is inadequate. Teaching both without the essential pedagogical component of critical thinking does not meet the mandate to challenge students to think and to use their intellectual abilities to the fullest.

### HOW THIS COURSE EVOLVED

It is the general consensus that computer skill courses no longer meet the needs of students.

- Students are arriving with significantly more computer skills and no longer need introductory skill courses.
- More and varied computer skills are needed depending upon the curriculum in which the student is majoring.
- Skill courses do not fulfill the pedagogical requirements of a college course; they specifically do not encourage independent thinking or problem solving.
- Skills that are learned in isolation are not retained or transferred to future courses.

Learning that is based on the information resources of the real world and learning that is active and integrated, not passive and fragmented, is needed. Studies in higher education have shown students fail to retain most information they are “given”. Students forget 50% of the content within a few months. It is clear that teaching facts is a poor substitute for teaching people how to learn, i.e., giving them the skills to be able to locate, evaluate, and effectively use information. What is called for is not a new information studies curriculum but, rather, a restructuring of the learning process. Textbooks, workbooks, and lectures must yield to a learning process based on the information resources available for learning and problem solving throughout people’s lifetimes. Such a learning process would actively involve students in:

- knowing when they have a need for information
- identifying information needed to address a given problem or issue
- finding needed information and evaluating the information
- organizing the information
- using the information effectively to address the problem or issue at hand

Such a restructuring of the learning process will not only enhance the critical thinking skills of students but will also empower them for lifelong learning and the effective performance of professional and civic responsibilities.

### RATIONALE

Despite the above findings, educators concur in their belief that students need to be “computer literate”. In his report to the Committee on Information Technology Literacy, [2] Tucker states: “Fluency with information technology goes beyond traditional notions of computer literacy.... [it] requires that persons understand information technology broadly enough to be able to apply it productively at work...to recognize when information technology would assist or impede the achievement of a goal, and to continually adapt to the changes in and advancement of information technology.” [p. 15]

Information Literacy, while showing significant overlap with information technology skills, is a distinct and broader area of competence. Increasingly, information technology skills are interwoven with, and support, information literacy. “Fluency with technology” focuses on understanding the underlying concepts of technology and applying problem-solving and critical thinking in using technology. Information technology “fluency” focuses on a deep understanding of technology and the increasingly skilled use of it. “Fluency” with information technology may require more intellectual ability than the rote learning of software and hardware associated with “computer literacy”, but the focus is still on the technology itself. Information literacy, on the other hand, is an intellectual framework for understanding, finding, evaluat-

ing, and using information - activities which may be accomplished in part by fluency with information technology, in part by sound investigative methods, but most importantly, through critical discernment and reasoning. Information literacy initiates, sustains, and extends lifelong learning through abilities that may use technologies but are ultimately independent of them.[1]

Using the standards found in Information Literacy Competency Standards for Higher Education Standards, Performance Indicators, and Outcomes [7] and the Information Literacy as a Liberal Art [10], a new framework was developed.

### COURSE APPROACH

In order to teach information fluency effectively, it must be done from the pedagogical framework of problem solving, i.e. the asking of significant questions, researching of those questions, analysis of the questions, and the successful communication of the results. Successfully integrated information fluency programs are designed around collaborative projects and include computer skills instruction. “...it is becoming increasingly popular for educational technologists to advocate integrating computers into the content areas. Teachers and administrators are recognizing 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. This is an important shift in approach and emphasis... [3].

Students will learn when and why to use computer skills as well as how. Students will develop an understanding of how the various computer skills fit together to solve problems and complete tasks. Students will learn to use computers flexibly, creatively and purposefully. They will be able to use the computer as part of the process to solve problems. Individual computer skills will be integrated with information problem solving. Students will develop information and computer literacy by applying various computer skills as part of the learning process.

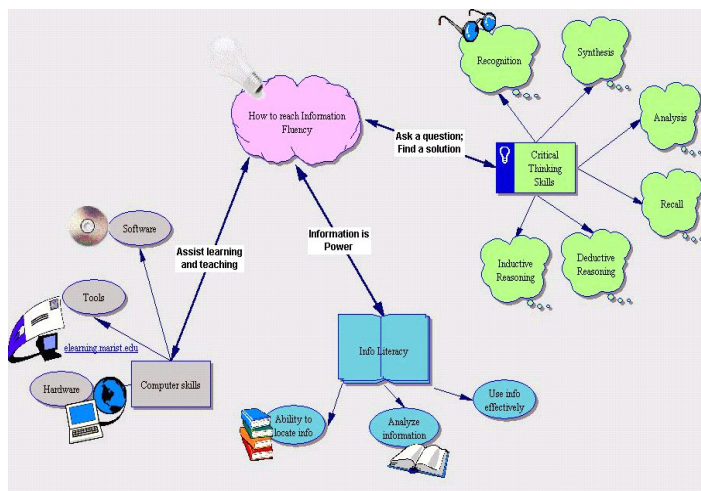
### METHODS

An instructor seminar was held in August 2003 with presentations on each of the modules that would define the course, CSIS103: Computer and Information Literacy. There was agreement among the instructors present that the course offered great potential for the students and would have a significant impact. During the first semester in which the course was offered it became apparent that there was a need to reorganize the material into a better “flow”. The amount of information this course was trying to convey in 15 weeks was immense – but there was some amount of redundancy; and there were other key items missing. A visual of the course goals needed to be created that mapped the goals to the individual modules. The structure needs to be flexible and fluid in order to create a dynamic course that was easily adaptable to the ever-changing environment.

In the article “Information as a Liberal Art” [10], Shapiro and Hughes outline seven dimensions of literacy: Tool literacy, Resource literacy, Social-structural literacy, Research literacy, Publishing literacy, Emerging technology literacy, and Critical literacy. These dimensions were useful in providing a structure that is used as a basis for an Information Fluency course. The next question was how to fit a reasonable amount of instruction into a fifteen week semester, have enough instruction in each area to make it flow into the next lesson, and have it be balanced in information literacy, computer literacy and critical thinking.

The ultimate outcome of the course is guided by the pedagogical framework described in the previous section, “*Course Approach*”. It is difficult to not get “too technical”, as in “algorithmic thinking, formalization in mathematics” that *Information as a Liberal Art* recommends as Critical Literacy (the seventh of the dimensions of literacy). Moreover, to think of teaching “Tool Literacy” which Shapiro and Hughes describe in their article as, “fundamentals of algorithms, data structures, and network topologies and protocols” is far too technical to fit our concept of “Computer and Information Literacy”. For students interested in being proficient in using the tools

Figure 1. Integrating Computer Skills, Information Literacy and Critical Thinking (figure designed by the authors)



(hardware, software and applications) there is no need to be so technical. One of the modules in the course, called “Computer Basics”, could be compared to a lesson on purchasing an automobile for the first time. The approach is to talk about computer specifications in a “consumer approach”, giving the students enough information that they could go and purchase a state of the art, multimedia computer and be knowledgeable about the components. There is no need to get “too far under the hood” and too deeply involved in the internal workings of a computer. It is a Tool, as is the automobile. We do not teach people about automotive engineering in order to drive the car, it is simply a tool.

The pedagogical framework of the course is to develop the skills, shown in the above diagram and create scenarios in which situations, questions, problems, and articles are presented to the students who are then asked to work in small collaborative groups in search of information to resolve the situation, answer the question, solve the problem, and/or support the article. Students are encouraged to analyze, synthesize, deduce and come to their own conclusions, solutions or findings that would then be discussed in small groups or presented to the class as a whole.

This course is less about teaching all the details of a particular tool and more about planting the seed of independent thinking, along with the introduction to the tools and resources that the students can use in support of their endeavors. The advantage of this type of pedagogical framework is that the students learn to question and even challenge what they have “been told” previously in their learning experiences. The students have to ask, to verify, and to break out of the old mold of rote learning.

The course management system “Ucompass” was used to help organize this course into a more fluid and understandable mode. This particular electronic teaching and learning tool can be modified to fit the needs of each course. In this case, Tasksheets were created that represent the 15 modules or weeks of instruction. In these tasksheets are included readings, web links, video clips, PowerPoint presentations, links to assignments, quizzes, exams, discussion groups and more. Each tasksheet contains various supporting and reinforcing tasks that are integrated to help support the development of the various skills. Each module is designed to work toward the ultimate goal of the course, which is reaching a level of “Information Fluency” with which the student will be able to research a topic and present it to the class at the end of the semester. The tasks along the way provide support for the various elements a student needs to accomplish this goal.

One of the things completed in conjunction with the reorganization of the course was the provision of objectives and rubrics for each tasksheet. These guidelines were created to assist the instructors with the flow of

the tasks, tasksheets, and the course in reaching the goals of the course. The tasksheets that are part of the Ucompass Educator eLearning educational system are designed with links to all the resources required for each module. A negative aspect is that there is so much material to cover; there is some frustration with not being able to cover things in greater detail. However, that again is part of the ultimate goal of Information Fluency - in which we allow the students to explore and research, and come up with their own answers.

### CONCLUSION

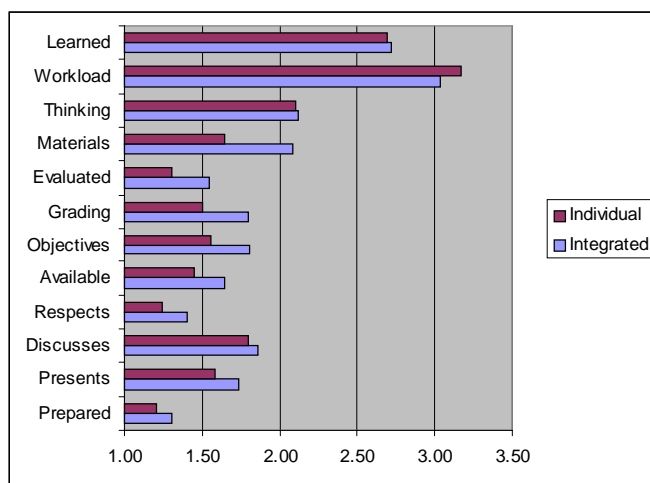
Based on the initial course evaluations completed by students at the end of the Summer course, there is improvement in two significant areas; Independent thinking and Amount learned. More data will be available after the Fall semester and the results will be presented at the conference in May. Figure 2 includes data from the twenty-two sessions of the new Integrated Course over 3 semesters as compared to eighty-nine sessions of individual modules over 6 semesters. The Fall semester of 2004 data was not available and is not included. Our goals are to improve the Amount Learned and Independent Thinking, the first and third categories in Figure 2. The results are inconclusive at this time. Our expectations are that as the faculty becomes more confident in their approach to this new pedagogical framework, the course evaluations will show improvement in the areas noted. We will continue to monitor progress and offer continued support and training to faculty to help them make the transition from teaching keystrokes and applications to challenging students to think independently.

In addition, the organization of this course made it possible to move it into a distance learning format using Ucompass Educator. The modules are already in place, and the course format with the emphasis on “tools-oriented, research-driven, problem-solving” focus made the lateral transfer to an online course an easy process. Two sections out of twenty two this semester are being offered fully online. Comparison will be made between the students’ ratings of the online sections versus the traditional course delivery sections.

### REFERENCES

- [1] An Entry-level Course on the Research Aspects of Information Literacy. (2003). *Middle States Commission on Higher Education*. Philadelphia, PA
- [2] Being Fluent with Information Technology. (1999). Committee on Information Technology Literacy and National Research Council. *National Academy of Sciences*. Washington DC.

Figure 2. Comparison of the Individual Modules and the Integrated Course



- [3] Eisenberg, M. and Johnson, D. (1996, March). Computer Skills for Information Problem-Solving: Learning and Teaching in Context. <http://ericit.org/doigests/computerskills.shtml>
- [4] Information Fluency Instruction. Fuhrman University. Retrieved September 13, 2004 from <http://library.furman.edu/services/research/instruction.htm>
- [5] Information Fluency Program. (2002). Washington and Lee University. Retrieved September 13, 2004 from [http://info.wlu.edu/literature\\_review/literature\\_review.html](http://info.wlu.edu/literature_review/literature_review.html)
- [6] Information Fluency Working Definition. (2003). Retrieved September 13, 2004 from [http://www.colleges.org/~if/if\\_definition.htm](http://www.colleges.org/~if/if_definition.htm)
- [7] Information Literacy Competency Standards for Higher Education Standards, Performance Indicators, and Outcomes. (2000, January 18). *Association of College and Libraries Research Approved by: ACRL Board, January 18, 2000.*
- [8] McEuen, S. (2001). How Fluent with Information Technology Are Our Students? *Educause Quarterly* Number 4.
- [9] Pask, J. M and Saunders, E S. (2004). Differentiating Information Skills and Computer Skills: A Factor Analytic Approach. *Portal: Libraries and the Academy*: Jan 2004; 4, 1: Research Library.
- [10] Shapiro, J. and Hughes, S. (1996). Information Literacy as a Liberal Art: Enlightenment proposals for a new curriculum. Retrieved September 13, 2004, from <http://www.educause.edu/pub/er/review/reviewarticles/31231.html>
- [11] Schwartz, J. Student Skill Is Expected to Bolster Technology. *The New York Times*. 9/16/02.
- [12] What is 21<sup>st</sup> Century Information Fluency? (2002). Retrieved September 13, 2004 from <http://21cif.imsa.edu/inform/program/whatisinfofluency.html>

0 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

[www.igi-global.com/proceeding-paper/teaching-information-fluency/32606](http://www.igi-global.com/proceeding-paper/teaching-information-fluency/32606)

## Related Content

---

### Electronic Data Interchange (EDI) Adoption: A Study of SMEs in Singapore

Ping Liand Joseph M. Mula (2009). *Information Systems Research Methods, Epistemology, and Applications* (pp. 272-292).

[www.irma-international.org/chapter/electronic-data-interchange-edi-adoption/23480](http://www.irma-international.org/chapter/electronic-data-interchange-edi-adoption/23480)

### Research on Removing Image Noise and Distortion in Machine Dial Recognition

Xiaoyuan Wang, Hongfei Wang, Jianping Wang, Maoyu Zhaoand Hui Chen (2024). *International Journal of Information Technologies and Systems Approach* (pp. 1-20).

[www.irma-international.org/article/research-on-removing-image-noise-and-distortion-in-machine-dial-recognition/343047](http://www.irma-international.org/article/research-on-removing-image-noise-and-distortion-in-machine-dial-recognition/343047)

### Improvement of K-Means Algorithm for Accelerated Big Data Clustering

Chunqiong Wu, Bingwen Yan, Rongrui Yu, Zhangshu Huang, Baoqin Yu, Yanliang Yu, Na Chenand Xiukao Zhou (2021). *International Journal of Information Technologies and Systems Approach* (pp. 99-119).

[www.irma-international.org/article/improvement-of-k-means-algorithm-for-accelerated-big-data-clustering/278713](http://www.irma-international.org/article/improvement-of-k-means-algorithm-for-accelerated-big-data-clustering/278713)

### Integrating User Stories in the Design of Augmented Reality Application

Carlos Ankoraand Aju D. (2022). *International Journal of Information Technologies and Systems Approach* (pp. 1-19).

[www.irma-international.org/article/integrating-user-stories-in-the-design-of-augmented-reality-application/304809](http://www.irma-international.org/article/integrating-user-stories-in-the-design-of-augmented-reality-application/304809)

### Database Replication and Clustering for High Availability

Wenbing Zhao (2015). *Encyclopedia of Information Science and Technology, Third Edition* (pp. 1748-1755).

[www.irma-international.org/chapter/database-replication-and-clustering-for-high-availability/112580](http://www.irma-international.org/chapter/database-replication-and-clustering-for-high-availability/112580)