

Going Mental: Tackling Mental Models for the Online Library Tutorial

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ABSTRACT

Online instructional design is a relatively new field for librarians. Many librarians have taken on the challenge of creating online library tutorials without the benefit of formal education and training in the field. Librarians can learn much from research in system design, human-computer interaction, and applied psychology as it relates to the creation of online learning systems.

Researchers in these areas believe that people approach online learning systems by making use of a conceptual model – or mental model - of the system. Designers' mental models influence the way they create learning systems; students' mental models affect the way they interact with and learn from the system.

This article compares and contrasts the mental models of librarians and students as they relate to online library tutorials. These mental models are examined through a review of existing library tutorials, usability studies on various library tutorials, and student interviews about the research and writing process. Analysis of these models demonstrates how undergraduate's mental models vary, often significantly, from the mental models of the librarians who design the online library tutorials. Interpretations of this analysis identify ways in which to design a tutorial for more effective instruction aimed at the undergraduate.

1. Introduction

At the 2001 meeting of the American College and Research Libraries nearly half of the presentations grappled with information literacy. Library science journal articles increasingly

focus on this topic. These presentations and articles discuss various approaches to teaching information literacy: one-shot workshops tailored to specific classes, workshops with open registration, credit-courses, faculty training, curriculum integration, and tutorials. This article will focus on the development of just one of these approaches - online information literacy tutorials. They are being created at almost every level of college and university library systems. But it is in large universities such as at the University of Minnesota, where tutorials are essential to reaching large-scale student populations. They are also invaluable tools to support faculty in integrating information literacy competencies into their curricula. However, as the creators of tutorials know, tutorials are extremely time-consuming ventures.

If libraries are going to spend the time and money in developing and maintaining these tools, librarians need to have a better understanding of what makes them most effective. The Online Learning Instruction Project (OLIP) Team at the University of Minnesota's Libraries sought to explore a sub-set of this issue: how to better understand how students interact with the tutorial in order to modify or redevelop it to improve student effectiveness. This inquiry was set in a larger context of a "customer-centric" approach that urges us to "...locate the library in the life of the user rather than the user in the life of the library..."¹ Although it sounds perfectly reasonable to "locate the library in the life of the user" it is not always easy. Breaking out of the library box, can be difficult, if not radical. So the design team set out to explore what barriers the tutorial might be placing *in the way* of students gaining information literacy competencies and how the team might not only remove those barriers, but create a tutorial that relates to student life. Although this goal was not fully reached, one of the most critical outcomes of this research has been insight into how the mental models – or conceptual models - of students clash with those of the librarians' building the tutorial. This article examines these mental models and offers suggestions to librarians on ways to build more effective tutorials that bridge the gap between mental models and brings librarians closer to this vision of a tutorial "in the life of the user."

2. Background on project

Without any experience or training in instructional design or online teaching tools, library staff embarked on the challenge of explaining a complex research system in a way that enhanced and improved students' capabilities to be effective researchers. The tutorial project began in 1997 when the University's Central Administration gave funds to the University Libraries for the purpose of developing research tools targeted to undergraduate students. Librarians provided tutorial content, the University's computing center's Java and Web Services programmers constructed the tutorial database, and information architects with the computing center's Digital Media Services provided direction with the web design. The tutorial, named "QuickStudy: Library Research Guide," was mounted on the web at <http://tutorial.lib.umn.edu/> and underwent a necessary redesign two years later, in 1999. As of this writing, the design team is currently working on the third phase of QuickStudy. In each phase of work on QuickStudy, the team has attempted to make it more learner-centered. User feedback has, therefore, been critical to all phases of the design process.

The primary method used to elicit this feedback is a process called usability testing.² During a usability test a student would attempt to use the tutorial to answer scenario based questions. The test administrator would encourage the student to think aloud as he or she used the tutorial to answer these questions by asking open ended questions such as, "What did you expect to find when you clicked there" and "What were you thinking when you did that?" This kind of interaction with the student helped the design team understand the experience students were having in each part of their interaction with the tutorial. Observers from the team watched, listened, and recorded the student's actions and discussion. Unlike qualitative research, accepted guidelines for usability testing caution that above a certain number of test subjects, there are diminishing returns on the testing results. Jakob Nielsen, a usability "guru" in the field, in fact,

advises that test administrators test with no more than five users, but conduct these small tests on a frequent basis.³

For the most part however, the design team did test on more than five students. During the first round of testing in the fall of 1998 in fact, twelve undergraduates were randomly recruited to participate, enticed by \$15 in return for 45 minutes of their time. These students were asked to complete twelve tasks each:

1. Let's pretend that you've just been assigned to write a term paper for your class. You don't really know how to begin or what to do, but your professor has given you the web address to this site [<http://tutorial.lib.umn.edu>]. What do you think this is? What do you think you would use it for?
2. [Using the tutorial at the University of Iowa (www.lib.uiowa.edu/libexp/)] Your instructor said that you have to cite at least one book in your term paper on the evolution of rock music. Using this tutorial, how would you learn to find a book in the Libraries on your topic?
3. [Using the tutorial at the University of Iowa (www.lib.uiowa.edu/libexp/)] You're doing a speech on AIDS and need to find several articles. Using this tutorial, how would you learn to find them?
4. [Using the tutorial at the University of Arizona (www.library.arizona.edu/rio)] You're still working on that speech on AIDS and need to find more articles. Using this tutorial, how would you learn to find them?
5. [Using the tutorial at the University of Arizona (www.library.arizona.edu/rio)] Your instructor said that you need more scholarly articles for this paper you're working on. How would you learn to tell if the articles you have are scholarly or not?
6. [Using the tutorial at the University of Minnesota (<http://tutorial.lib.umn.edu/>)] Using this site, can you find if your articles are scholarly enough?

7. [Same site] You need to do a paper on the greenhouse effect in Minnesota and you've searched through a related database on the computer that should have articles on this topic. But the database keeps saying, "no entries found." Where would you find advice on what you should type in so that you can get the articles you need?
8. You need to cite these articles you've found in your bibliography. Your instructor said to use something called MLA Style. How would you learn to do this?
9. Do you think this tutorial would be useful to you? How?
10. Where do you think a link to this tutorial should be?
11. What would you recommend we call this tutorial? (refer to worksheet)
12. Are there any other comments or advice you'd like to offer about this?

During this round of testing it became apparent that we were making an erroneous assumption about the use of the tutorial. During the summer of 1999 a shorter series of testing was conducted with undergraduates that reflected the way that, according to them, they would actually be using the tutorial – as a part of an assignment from their faculty that would direct them to X Module or Y Lesson. Our usability questions were changed to reflect this usage:

1. You're taking a Biology course on environmental management and your final project is to write a ten page paper. Your professor has asked each of you to come up with a great topic. Practically the whole class is made up of freshmen and you're all unsure about how to create a good paper topic. Your professor tells you to use something called QuickStudy and includes these directions in your syllabus [student is shown the following]:
 - a) Go to QuickStudy: Library Research Guide at: <http://tutorial.lib.umn.edu>
 - b) Choose and complete "Starting your Research"

Now, let's say you're sitting in a computer lab ready to start this assignment. What do you do?

2. Let's say that now you're taking an economics course. You're assigned a research paper where you have to compare Internet access in two different countries. Your professor wants you to use up-to-date articles and so assigns the class to complete part of a tutorial designed to help you learn how to find articles in the University Library system. This is what it says in your syllabus [student is shown the following]:

Economics Research Paper

- a) Go to QuickStudy: Library Research Guide at <http://tutorial.lib.umn.edu> and complete the section in the tutorial called "Finding Articles" by October 1.
- b) Find 5 good articles and hand in this bibliography to me by October 7.
- c) Your first draft is due November 1.
- d) The final paper is due December 3.

Now you're back at the computer lab, ready to start the first part of this assignment.

DEBRIEFING QUESTIONS

3. What are your general thoughts about this tool?
4. What did you think about how the site is arranged?
5. What are your thoughts on navigating the site?
6. Specifics [anything the test administrator wants to follow-up on from the test]
7. What were the best things about this site?
8. What were the things you would like us to change on this site?
9. Would you ever use this again? Why or why not?
10. Questions from observers.

Yet a third round of testing was conducted in the fall of 1999 by students from Rhetoric 4501 who were taking a class that focused exclusively on usability testing. Although these students were testing a variety of our online tools, fourteen “testing” students outside the class participated as subjects for the usability test and the follow-up debriefing survey. Interviews were also conducted with a 1000 level Rhetoric class in December 1998 in which eleven students provided in-depth answers to five questions, three of which related specifically to the tutorial:

- 1) What is your usual way to get help using library resources? Ask at the desk? Ask your class instructor or another student? Use online help? Experiment on your own? Or other ways? In a "perfect library", how would you get help?
- 2) What do you find most difficult about using the library? If Research Quickstudy (the tutorial) were developed to a point that would allow you to learn to use the library efficiently, would you be inclined to use all or part of the self-paced online lessons? If not, could you explain why?
- 3) Research QuickStudy (the tutorial) is currently in phase 2 of development, in order to reorganize the information and add key graphic illustrations, exercises, an index, and additional topics. What sorts of additions/revisions do you think would be useful to you and why?

In June 1998, the tutorial design team also conducted two focus groups with a total of nine teaching assistants and instructors for the 1000 level English Composition program. Although the purpose of the focus groups was broader than just the tutorial, these interviews were useful and instructive for QuickStudy development. Questions included:

1. What assignments do you currently give in your courses (or that you might give in the future) that include a library research component?
2. What obstacles to library resources and services limit you in giving certain assignments or projects in your courses?

3. What might the Library do about these obstacles?
4. After demo of QuickStudy: Are we on track? Would you use this in your course?

These studies led the OLIP Team to explore mental models theory and how it might help librarians understand the challenges we faced in designing online tutorials.

3. Mental models

Researchers in system design, human computer interaction, and applied psychology believe that people approach online learning systems by making use of a conceptual model – or mental model - of the system. Mental models are “...the conceptual and operational representations that humans develop while interacting with complex systems.”⁴ These representations can be so powerful that they govern thinking and behavior including the way the learner interacts with and learns from the system.

Mental models are usually not accurate representations of a system or phenonma, but rather provide a more simplified explanation of something more complex. Mental models contain errors and contradictions, and are constantly evolving.⁵ A common example of how computer designers were able to build their system around a commonly held user mental model is that of the Macintosh computer system. Mac users (and now users of the Windows operating systems) pull documents from a briefcase, toss documents in the recycling bin, and rearrange their "desktop" for easy access to our most used computer applications. Apple has decided that these metaphors create a compelling mental model that will help users make the transition from the physical desktop to the virtual desktop. Technically speaking, however, this mental model is much simplified, incomplete and somewhat erroneous. Nonetheless, it does help computer users more fully utilize the computer to do their work effectively. An important point gleaned from this

example is that Apple's representation of the computer system (using the desktop metaphor) directly affects the user's performance on the system.⁶

In the case of our library tutorial, there are two different representations occurring simultaneously: first, a representation of an online tutorial, and second, a representation of the library research process. Both representations provide librarians with various challenges. During user testing on both the University of Minnesota tutorial and on several other tutorials from other academic libraries, the team discovered that if either of these representations is handled poorly, users are not able to effectively use the tutorial. If, for example, students do not understand that they are in a tutorial and not in a portal to library resources, their confusion and frustration will prevent them from meeting the instructional objectives. If, on the other hand, they understand that they are in a tutorial environment and that they will not be conducting research from this environment, but they do not understand the tutorial's research metaphor or its representation of the information literacy process, then they will also not be able to meet the instructional objectives. Consequently, designers must examine both how the online tutorial is represented as a learning environment (not a searching environment) as well as how the research process is represented.

4. Mental models of the research process

Student Mental Models

Comments gathered from students through usability testing and conducting interviews provide insight into the ways students view the research process. The following are a few of the comments the team logged:

- ◆ "I really just want to do a search."

- ◆ "I'm looking for something that will get me to a real search screen."
- ◆ "Well, how do you get to the information?"
- ◆ "I think the library is pretty self-explanatory, and QuickStudy probably teaches every detail about the system, which is helpful but probably not necessary just to find resources. I don't think I would take a QuickStudy class. I feel that I know enough of the basics to get the sources I need efficiently."
- ◆ "I think that [sic] online lessons to try to teach me how to use the library... I would not want to use it. I think that these day's students do not have the time to take lessons on how to use the library. They are in a hurry and want things to be there with little effort to find them."
- ◆ "This might be good for beginners, but I think it is annoying."

These comments overwhelmingly suggest that students view the research process as something to hurry through in order to get to an end -- the articles and books required for their project. A search of the literature indicates that the students the team talked to were pretty typical. For example, in a review of studies done on the information gathering/research process, Joy McGregor concludes students are "focused on a final product rather than a process," and that students see research as a "task" or "product-oriented activity" rather than an opportunity for learning.⁷

The comments also suggest that students don't see information gathering as a topic that is even worthy of a tutorial. If research is fast and easy, then why should they spend the time learning about it? An outline of a typical undergraduate student mental model emerged in the following way:

- Undergraduate students think of the library as a place to DO something. They do not think of it as a place to come to LEARN about doing.
- Library web pages achieve a particular end - that end being a decent grade on a paper or speech. Web pages are the vehicle for getting information on their topic. They get three articles, three books, three web sites and then they're out the door.

D. Scott Bandt has succinctly summed up the mental model we saw in our students as the racing model of research. In the race to get their articles students exhibit fairly limited research methods.⁸ They browse on the shelves, flip through journals, or pick the first few citations in a database they have used before. All of these strategies may have gotten them the material they've needed in the past. Usually they will only ask for help when the old standbys fail them - and even then it is often amazing how long they will keep trying the old system without getting results. Students often begin a reference encounter by revealing that they have been trying to find articles in the library OPAC for hours and that they have only now gotten so frustrated that they are coming to a librarian for help. Brandt, who has written extensively on mental models and the research process, contends that librarians need to be more conscious of the fact that their own mental models are not the only ones. For many students the racing mental model is a sufficient mental model to get what they want done – two or three articles, a book, and a Web site for a short paper or speech.

Librarians' mental models

In the course of library and information studies training and work experience, librarians have developed a fairly rich mental model of research. Librarians have an understanding of the complete research cycle, the complexity of finding books, articles and Web sites that are appropriate and useful for a topic, and the social, economic and political contexts of information. As Michell and Dewdney assert, “the librarian’s mental model is closer to the ‘conceptual

model,' whereas the user's model tends to be more simplified and sometimes grossly inaccurate."⁹ One could choose to think of the librarian's model as more complete in relation to unformed and incomplete working model of research. However, as the team did more testing with students, the team began to see the limits of their own research model.

While students tend to view library research as a means to end, librarians tend to teach research as if it is an end in itself. Librarians show students how to search catalogs, databases, and the Web but spend very little time talking about the steps before and after research: coming up with a topic and weaving resources into a speech or paper. This library centric conceptual model of research overlooks the reality in which students are doing their research. Though it's tempting to see the librarian's mental model of the research process as more complete than the student's, it actually lacks context. When students learn library research methods in an academic class, the methods are usually presented in the context of the writing process. Student's writing manuals include chapters on finding material in the library and taking notes on and assessing the information found. Library tutorials generally emphasize finding material over the assessment and use of the material.

The logical extension of the belief that the librarian's model is the ideal to which students must aspire, drives librarians to fight, cajole, motivate, and hope that students will eventually "get it" and be liberated by their faulty working models. An alternative option is to acknowledge the librarian's model as library-centric and recognize that in order to make a difference, librarians need to examine how this model impedes the success of the ultimate goal – to build an information literate student body.

5. Mental models of online learning and tutorials

In addition to the issue of contrasting mental models regarding the research process, it became apparent during our testing, that there is yet another mental model in conflict: how we conceptualize online learning and tutorials.

Students

The primary audience for the tutorial is part of the “Generation Y” or the “Echo Boom Generation.” The “Generation Y student has “grown up with technology in school and at home, they are infinitely comfortable with it.”¹⁰ According to an article in Training and Development, “Generation Y (the segment of the U.S. population age 10 to 17) will spend nearly one third of their lives (23 years, two months) on the Internet.” In contrast, “The average baby boomer Internet user will spend 5 years, 6 months on the Net.” And “The average Gen Xer Internet user will log 9 years, 12 months online.”¹¹

In addition to spending a higher percentage of their lives online than librarians (who are primarily Baby Boomers and Generation Xers), the Generation Y student also has had a multitude of experiences with fun, interactive, exciting online learning environments. Many of the games that students routinely play for fun at home incorporate learning. Students play with flight simulators, space travel simulators, and historical simulations, to describe just a few of the categories of simulation games currently on the market. One of the most popular games is a building simulator, SimCity, in which students “design and manage their own cities by dividing a large plot of land into residential, commercial and industrial areas, using detailed menus to add items like coal-fired electrical plants, seaports and road systems.”¹²

K-12 teachers are also using many of the games that students play at home to teach humanities, social science and science concepts. SimCity, for example, has been used by teachers to teach a variety of topics including, urban planning, public policy, and civics. Social Studies teachers teach the history of immigration through an simulated migration game.¹³ Physics teachers use flight simulators to teach students the difference between “potential and kinetic energy.”¹⁴ Our students’ concepts of learning, especially online learning, are shaped by their experiences with tools like these. Incorporating learning objectives in interactive and enjoyable ways are hallmarks of these learning tools.

Librarians

As primarily Baby Boomers and Generation Xers, most librarians do not have as much experience with online learning as their users. Librarian’s early experiences with learning were for the most part book based – and, not surprisingly, this is reflected in many of the online tools librarians have created for students. In the midst of testing the second iteration of the University of Minnesota tutorial, the team realized, for example, that the tutorial tried to resemble a book. It taught primarily through words and included few images and almost no interaction. It also had an “index,”¹⁵ where terms were hot-linked to appropriate sections in the tutorial and a “table of contents” page. The team thought the index and table of contents were helpful navigational tools for users until one of the students tested said incredulously, as if we were the most clueless people in the world: “But this is the Web, why is that called a table of contents?”¹⁶

The tutorial not only reflected the design team’s exhaustive mental model of the research process, it also demonstrated the team’s lack of experience with online learning. The team had an antiquated view of what a tutorial could be or do. Not only was the team holding fast to our mental models, it was forcing them on students, despite unsuccessful results. After students have

experienced fun, interactive learning environments, why do librarians think the best way to reach them is through a linear, text-based, information overloaded tutorial out of context of their specific research needs?

The following chart illustrates what the authors call the “clash of the mental models:”

LIBRARIANS	STUDENTS
Research is an ends.	Research is a means to an end.
Good research is valued.	Good grade is valued.
Research is complicated.	Research is fast and easy.
Research is something to learn how to do	Research is simply something you do
Learning through books and pathfinders.	Learning through games and interactive simulations.

Despite this, the team is still committed to shaping students mental model of research into a more complex notion of information gathering and assessment strategies; the team hopes to change their mental model of research. But, the authors have learned that we must begin our teaching where students are; we must build upon the mental models which already exist in their minds.¹⁷

6. Applications to Undergraduate Online Tutorial Design

The authors learned four major lessons from their research:

1. Clarify that the student is in a tutorial and not conducting research
2. Control the environment so that users are guided linearly, but are personally enabled to leave the linear sequence
3. Take our online instruction seriously

4. Integrate content into other contexts

Items one through three have been incorporated into the latest design phase of QuickStudy: Library Research Guide. Fully incorporating the last learning, however, is an ongoing effort with full development planned for 2002.

1- Clarify that the student is in a tutorial and not conducting research

One of the most important ways to communicate to the student the nature of a library research tutorial is to properly set up their expectations before they even go online. Students need to be adequately prepared to enter a “learning” environment, rather than a “searching” environment. For the most part, the instructor assigning the tutorial must lay this groundwork.

As a way to assist the instructor in doing so, the design team included a piece in the Instructor’s site of the tutorial that helps them set the tutorial in context before a student ever gets online. Included, for example, is actual text that they can lift and put in their syllabus and introduce in their class that uses terminology to describe the tutorial such as:

- “.... a course on library research..”
- “Free online, self-paced lessons cover how to get the most out of your library research...”
- “This will prepare you to complete your research assignment.”
- “At the end of the module you must complete the quiz and have it sent electronically to me.”

Another way to differentiate the tutorial from the search experience is to purposely differentiate the look and feel of the tutorial from the Libraries' homepage and the indexes. The colors and fonts, graphics, and layout of the tutorial should be very distinct. Anything in your design that implies a search engine is an invitation for disaster. Do not, for example put a “search” button on your tutorial. Students are bound (and did in testing) to misunderstand the intent of this box and enter things like “mad cow disease” or whatever their research topic may be.

Based on user testing, the University of Minnesota tutorial design team also made a few other subtle, but important changes:

- Within a module, the team used the term "lesson" to relate the tutorial to a regular educational context and indicate that students were in a learning environment, not a “doing” environment.
- The team used gerunds for the module names. Instead of saying "Find Books," for example, which lead students to think they would actually be able to find the books they need – the tutorial says "Finding Books" to indicate that they will learn more about the process of finding books in the library.
- The team is in the process of linking information literacy competencies and learning objectives to lessons or modules. Students will be kept apprised of which competencies they are being asked to master - and then after they take the quiz, will be told which ones they did indeed master and which ones they still need more work on.
- The team made sure that the tutorial included mention that the University of Minnesota Libraries built this site. Students in testing had commented that they thought that the tutorial,

called “QuickStudy” was just another one of those databases that the library links too and didn't know it had anything to do with this particular library.

- One note here about the name of the tutorial: There was enough sentiment on the team against using the word tutorial in the title because of negative connotations this has for many librarians and students. On the other hand, using this word could be another useful way to communicate to students that they were indeed dealing in a learning environment. There is absolutely no connection of the word "tutorials" to databases or to pathfinders or to library guides. It clearly differentiates itself.

2 - Control the environment so that users are guided linearly, but are personally enabled to leave the linear sequence

A tutorial is not the same as a help page. The University of Minnesota tutorial reflects much of our curriculum in information literacy. By designing a tutorial to guide students through an information literacy “curriculum,” rather than letting them pick and choose brief topics like they would in “help” pages, the tutorial sends the message that this is a curriculum or unit that they need to master like they would any other academic curriculum or unit. And it conveys that this curriculum goes beyond finding three or four quick articles somewhere on the web.

It is important to allow students to see the full range of the curriculum in the tutorial and not control the environment so carefully that they can't see what's coming and so are powerless to move around. Students in any learning environment need not only clear structure and direction, but also opportunities to explore on their own. The team has therefore designed for both a sequencing of movement as well as freedom of movement within the tutorial.

In addition, do not let students “get carried out” of the tutorial. During usability testing, the students who were presented with links that either lead them out of the tutorial, or promised to (such as glossary terms) immediately clicked on those links so they could get on with their information search. This is the “hurry up and go” part of their mental model of research. The tendency to link right out of the tutorial was attributed in some part to their misunderstanding of the purpose of the tutorial as a learning tool and their interpretation of it as a pathfinder, quick help, or simply an alternative interface to get to the information resources they needed. Simply put, outside links, presented within the tutorial can be confusing.¹⁸ But the team also found during testing that the lack of outside links can also be infuriating. When students do want to go and see what the tutorial might be referring to, or to try something out themselves, they do not understand why there wouldn't be a link. It doesn't make sense to them - why have something on the Web if you aren't going to make links to the Web pages to which you just referred?

The compromise the team settled upon is to make a separate list of links that appear at the bottom of each page and correspond to the instruction in that page. For example, in the lesson that deals with choosing appropriate periodical indexes, there is a link to the Libraries’ web site where the indexes are listed. If a student chooses to, they can check out this web site, but the lesson does not encourage students to explore out of the tutorial. The warning in red cautions them, “Warning: If you click on the links below, you will leave your current QuickStudy environment. Use your browser's back button to return to this page.”

3 - Take our online instruction seriously

Novice students tend to think that research is either fast and easy or something dreadful they plan on completing as quickly as possible with the least amount of work. By building tutorials as a fairly flat online reading experience, libraries are perpetuating this notion that library research

isn't something that needs to be taken seriously. The unintended message becomes, "Fly through this tutorial, and get on with the research itself."

"Serious," however, does not have to mean "boring." However humorous or creative your tutorial is, that library online instruction should be approached as would any other professor building part of their course. "Just making content available is not education. Learning requires action, interaction, and application."¹⁹ This might be done through the quizzes and interactive exercises that are electronically sent to the instructor for grading. Through workshops and the Instructor's pages the team also provide supporting materials so they can introduce research in a more scaffolded way - by giving them lesson plans and assignment ideas that will be supported through modules in the tutorial. Without incorporating the tutorial into a course curriculum, grading, and instructor expectations, the majority student testers made it clear that they likely not use it.

4- Integrate content into other contexts

Although the other lessons learned were useful in helping to adjust the tutorial to better fit the mental models of students, this last lesson is the most critical. It is the one what most clearly situates the tutorial in the life (and mental models) of the student.

The majority of library tutorials that cover information literacy skills exist primarily as stand-alone tutorials found somewhere off the library's homepage. The primary reason why a student would use them is to learn how to use the library – a purpose, as was said earlier, that students do not normally have. A sub-objective of these tutorials might be to improve students' skill and ease with technology and would be represented like this (Figure A):

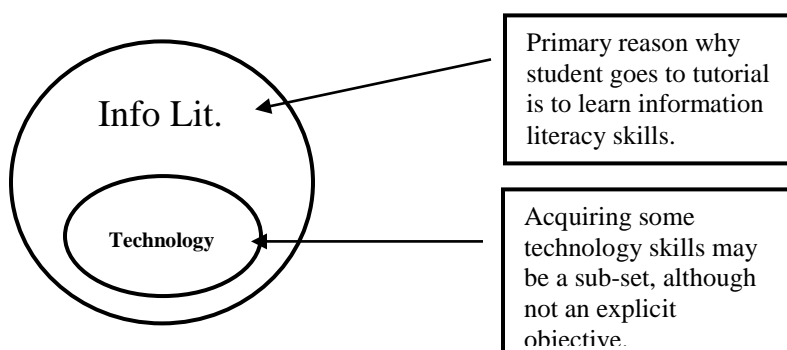


Figure A

However, as with any library research or information literacy content, the more integrated the learning is within a context that the student already understands, the better. This illustration, represented above, is often incomprehensible to the student. What's the point? Research to them is not an end in itself, but rather a means to an end.

In order to create tutorials that are compatible with the way students think, and not at odds with it, librarians need to contextualize the information literacy content into the student's "world" just as they do with regular information literacy initiatives. For example, some libraries are integrating library research modules within their campus online writing centers. Students are therefore already within a tutorial designed to help them learn how to improve their writing skills when they encounter the unit that helps them learn to improve their research skills. At the University of Minnesota, librarians developed a tool with staff at one of the writing centers and with the Center for Interdisciplinary Studies of Writing that does just this. The "Assignment Calculator" (<http://www.lib.umn.edu/help/calculator/>) is designed to step students through the process of writing their research paper. After they enter the final deadline for their paper, the tool provides suggested sub-deadlines for each step in the research and writing process. The power of the tool,

however, is its connection with appropriate modules and/or lessons within the information literacy tutorial. The library-centric tutorial is therefore contextualized to some degree within the primary goal of the student – to complete their research paper (Figure B). A parallel tool for faculty teaching writing intensive courses will also be developed in order to facilitate their teaching process. This tool will give them direct access to the resources the library and other units have to support them and their students.

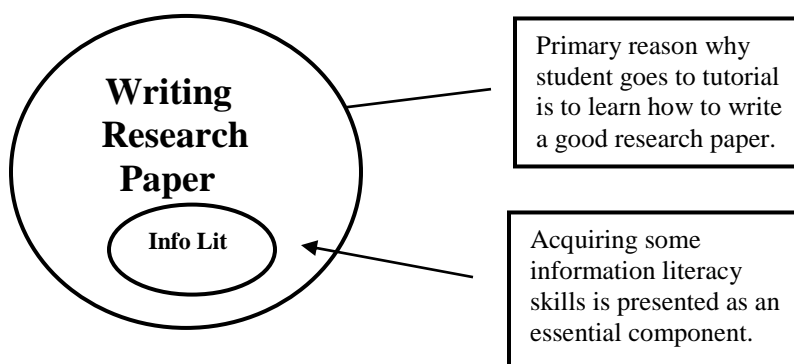


Figure B

Other libraries are incorporating parts of their information literacy content into online instruction with the overall purpose of increasing technology literacy. Students learn some information literacy within the context of computer literacy (Figure C).

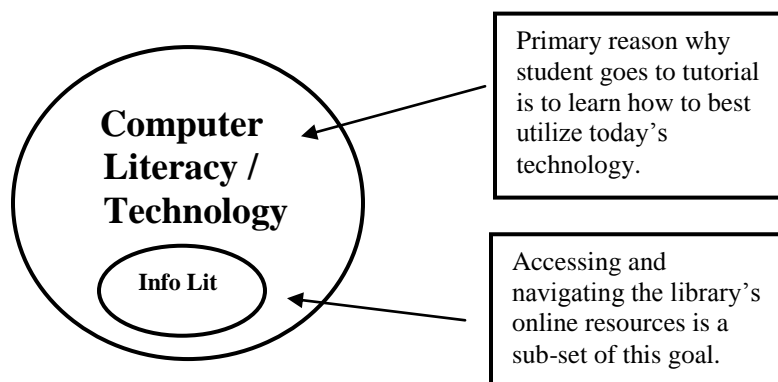


Figure C

Beyond the benefits of these kinds of integrated approaches for supporting student mental models, is the potential libraries have for customizing online library instruction to fit smoothly into the campus curriculum (Figure D). Examples include integrating a library component in an online case study for students in water management or a simulation experiment in global business which would embed the library learning into a larger, more meaningful context. The University of Minnesota's tutorial is built within a SQL database to allow for this kind of flexibility and customizability.

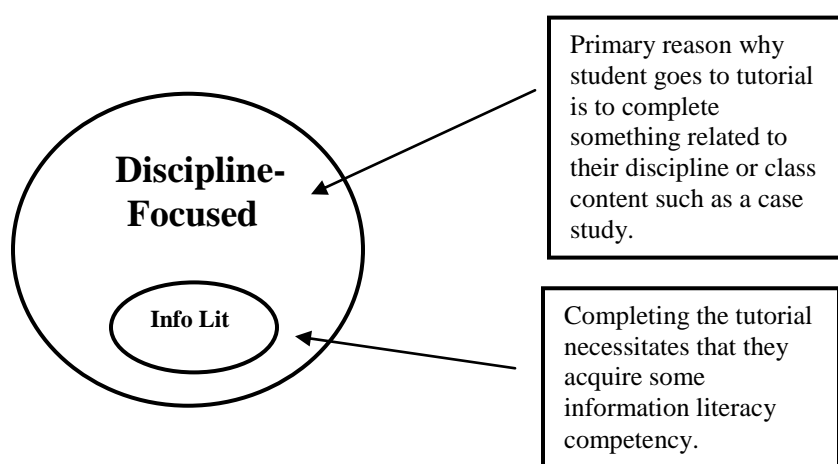


Figure D

CONCLUSION

Continuing to ignore these lessons and produce library-centric tutorials will not remove barriers to students using the tutorial nor make a positive contribution to their education. User testing has revealed the tremendous gap that still remains between the tutorial we currently have and the learning tool that is needed. If the design team had not tested students, team members may only have intuited that the tutorial was problematic from a student-use perspective, but would never have known for sure.

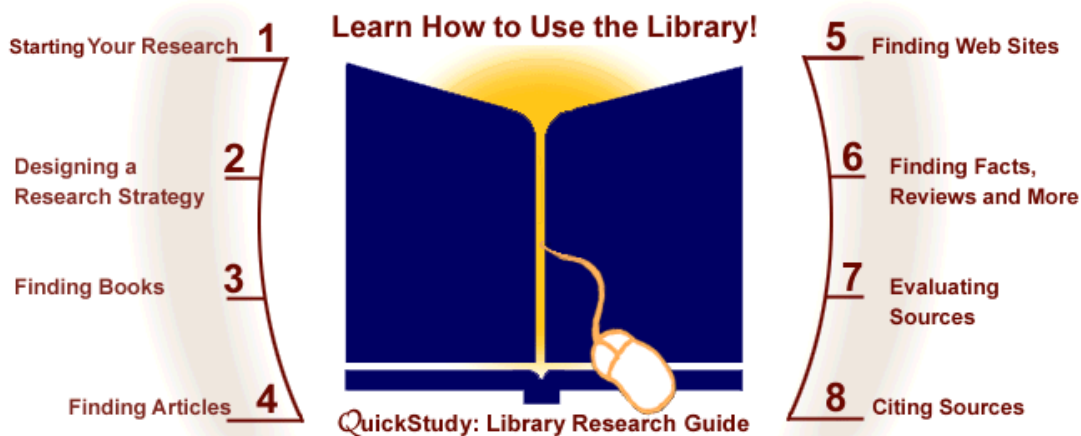
Libraries need to situate information literacy education within a mental model that works for students, and not one that simply suits librarians. Librarians have a better chance of expanding students' mental models about the research process within contexts with which they are already familiar and that they will repeatedly encounter. By redesigning library-centric tutorials to be more conducive to student mental models, and by integrating information literacy education into other learning environments and online curriculum, libraries will still stand a much better chance of making an impact on campus-wide information literacy competency.

APPENDIX A

The University of Minnesota Libraries Welcome You!

QuickStudy: Library Research Guide


[[Site Map](#) | [Search QuickStudy](#) | [Definitions](#) | [U of M Libraries](#) | [Research QuickStart](#)]



[[Ask Us!](#) | [Contact Us](#) | [For Instructors](#) | [About QuickStudy](#)]

University of Minnesota Libraries Tutorial: <http://tutorial.lib.umn.edu/>

APPENDIX B



The University of Minnesota Libraries Welcome You!

QuickStudy: Library Research Guide

[[Main Menu](#) | [Site Map](#) | [Search QuickStudy](#) | [Definitions](#) | [U of M Libraries](#) | [Research QuickStart](#)]

[Lesson 1](#)
[Why use the Web?](#)

[Lesson 2](#)
[Mapping Out a Research Plan](#)

[Lesson 3](#)
[Using Search Engines & Subject Directories](#)

[Lesson 4](#)
[Evaluating the Web Sites You Find](#)

Guided Exercises:
Warning: Use of Guided Exercises Requires a Frames Capable Browser.

- [Searching Yahoo!](#)
- [Searching AltaVista](#)

Finding Web Sites: Introduction

Information on the World Wide Web is organized into Web sites. Each site contains at least one page and many sites contain dozens to hundreds of pages. In fact, there are more than 800 million pages on the Web [Nature 400(6740): 107-109, July 8, 1999], and this number is increasing rapidly.

With so many pages available, you need search strategies for finding sites that are valuable to you. Since anyone with a computer can publish on the Web, from government agencies to scholars and experts to the person next door, you will need techniques to evaluate the sites you find.

In this module, we will help you learn to find and evaluate Web sites, and to use search tools, such as search engines and subject directories, to find useful sites quickly and easily. You can practice by trying out the guided exercises, "Searching Yahoo" and "Searching Alta Vista."

You can jump right in with [Lesson 1](#) or choose a specific lesson from the list at left.

Example of a module within QuickStudy:

<http://tutorial.lib.umn.edu/infomachine.asp?moduleID=7>

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13. Janet Coburn, "The Social (Studies) Side of Technology," *Technology and Learning* 18 (September 1997): 36. Available from Expanded Academic Index, <http://infotrac.galegroup.com>; accessed April 21, 2001.

14. Scott A. May, "Games That are Good For You," *Compute* 16 (August 1994): 90. Available from Expanded Academic Index, <http://infotrac.galegroup.com>; accessed April 21, 2001.

15. Calling this part of the tutorial an "index" added yet another level of complexity to attempts at defining a periodical "index." A good example of this was found in the section of the tutorial where periodical indexes were explained. Right above this lesson was a link to "index," yet that link did not go to a type of index that had just been explained.

16. University of Minnesota Libraries, *QuickStudy Usability Tests* (September 1998). Unpublished.

17. For concrete strategies on how to build upon students' already existing mental models see D. Scott Brandt's "Techman's Techpage" column in the May 1999 issue of *Computers in Libraries*.

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