Research as a Cognitive Process (instead of information retrieval) SCIL Works 2008

April Cunningham, Saddleback College, acunningham@saddleback.edu
Allison Carr, CSU San Marcos, acarr@csusm.edu

Have you ever encountered a student at the reference desk who has finished writing his paper and only needs 3 more sources to "fit in" so he can fulfill the assignment requirements? Or, have you ever seen the student who has spent too much time on research, has a ton of articles, but still can't focus her topic? These students don't understand that what you don't know CAN hurt you. They don't realize that research is a problem solving process, and that there are consequences to their actions or inactions. They don't realize that chaotically searching for information will make it harder for them to write their papers. ACRL recognizes the need students have for information literacy competencies that "will help to sensitize them to the need to develop a meta-cognitive approach to learning, making them conscious of the explicit actions required for gathering, analyzing, and using information" (ACRL, 2000, p. 6). What we are describing today is a model created by Kuhlthau and applied by April Cunningham at workshops at Saddleback College. It reaches students who are novice researchers and aren't aware that the way they pursue their research will influence the process of their thinking and writing in predictable ways.

Problem

April Cunningham, Saddleback College

Saddleback is a comprehensive community college in Mission Viejo, an affluent community in Southern California. The backbone of our Library's instruction program is a series of information competency workshops. They are standalone, 50-minute sessions that students attend on their own time in order to receive homework or extra-credit points from their professors. This curriculum is written completely by the librarians and is not course-integrated. Most of the students who attend the workshops are enrolled in Speech or English classes, but we also see History and Environmental Science students. The workshops are general enough to help students in any class or discipline, and are based on the most important things that librarians think students should know.

In 2006, I decided to revise the workshop titled "Ready, Set, Research" in order to expand its coverage of the research process. I envisioned that it would give students a foundation for all of the decisions that they make about selecting search tools and evaluating sources. I had been inspired by Kuhlthau's Information Search Process (ISP) model in graduate school but once I entered the field, I didn't know how to apply what seemed like an idealized version of students' experience. When I considered incorporating the ISP into my workshop lesson, I read "Understanding the Millennials: Updating Our Knowledge about Students," Holliday and Li's update of Kuhlthau's ISP, and I found that the stages their students skip are the same stages I see my students skip. Students don't take notes, but instead rely on printing out the full text. They don't formulate a focused topic, but instead push ahead with a mess of sources and try to

make some coherent argument out of nothing. And since they don't have a focus, they never do focused research where they look for supportive evidence and consider the most appropriate types of sources for their research. Knowing that most students were skipping steps that ultimately led to poorly written or plagiarized papers, I wanted to teach new content that could start to solve their problem.

I also knew from reading articles on competency theory that these students probably didn't know that they were having suboptimal outcomes and that they were using unacceptable research strategies. I looked to cognitive theories of how we can teach problem solving and decision making because students need to perceive research as more than information retrieval. They are not familiar with the concept of research as a cognitive process that requires the researcher to engage in ongoing evaluation, correction, and development. I found research about metacognitive scaffolding, modeling, and problem solving that lead me to my current practice.

This same review of the literature has also given me ideas for ongoing improvements in instructional design, applications in other instructional settings and for potential research that I can contribute to the field. Today we'll be talking about the development and implementation of this design, founded in theories and guided by research. Knowing the reasons why this has worked has made it easier to adapt it for different audiences and under different instructional constraints. In addition to teaching the ISP in workshops, I use the model to structure the 3-unit online course I teach on advanced information competency.

Here's a summary of highlights from "Understanding Millennials," the article that inspired me to create a lesson on Kuhlthau's ISP:

- Students who do not go through all the stages have more difficulty conducting research, p. 361;
- Discomfort with uncertainty leads students to make hasty decisions, p. 362;
- After initial search, students didn't bother to find more specific, pertinent (relevant) information, p. 363;
- Students don't take notes, and instead relied on the access of full-text, p. 363, which can lead to students to skim the articles; without reading and finding similarities and differences in their sources, students do not notice themes or understand main ideas, and they don't develop a focused research topic, p. 364;
- Few students asked for help at any stage in the research process, p. 364;
- Regardless of using a research process or not, students still operate under the assumption of "good enough," p. 364;
- "They expect the research process to be easy, like Google. As such they expect to be independent in the process and they do not seek help from librarians… It is quite easy for a novice searcher to 'bump into,' or encounter, information on the web or in a general library database that is somewhat relevant to their topic… They often stop at the first information they encounter in their initial search, if, as Whitmire suggests, many students in their early college careers are not yet independent thinkers," p. 364-5.

Allison Carr, California State University, San Marcos

Cal State San Marcos is one of 23 campuses in the California State University system. A relatively new campus, it focuses on undergraduate programs with two graduate schools, and a few graduate programs. CSUSM is a commuter campus, and the majority of our students come from the surrounding area. General Education Lifelong Learning (GEL) 101 is a first-year experience course that 75% of freshmen take during their freshman year. Students are taught study skills, time management, health information, career and major planning, and basic library research skills. The library research skills are taught throughout a three-week Library Module, in either 6 75-minute sessions, or 9 50-minute sessions. During the Library Module, students are oriented to the library, taught basic research skills including topic selection and focus, evaluating information, including identifying scholarly sources, selecting appropriate resources, plagiarism, and citing sources. Students are assigned a research assignment by the main instructor, which is generally due a few weeks after the Library Module is completed. The above skills are taught within the context of this assignment. Each librarian teaches anywhere from two to four sections of GEL, depending on the semester. While the learning objectives are the same for each librarian's section, each librarian uses their own lesson plans in their sections.

When I heard about April's class, I had only taught two sections of GEL the previous semester. During those two sections, I noticed that the students didn't seem to quite understand the relevance of the library module. This could have been due to a number of issues, such as lack of communication from their instructor, or lack of relevance of their research assignment. However, it occurred to me that students' research habits in high school had been mainly driven by what they could find on the internet. According to informal discussions I had with students, many of their high school teachers did not emphasize the importance of reliable sources, did not address the issue of plagiarism and generally tended to deemphasize the research part of the assignment, and only emphasize the product of the assignment. I have generalized that because freshman come into college having only used Google and other internet sites to do research, they don't understand that research is a multi-step process, and see it only as information retrieval, or searching. As a result, they couldn't see the relevance in coming to the library for three weeks. As discussed in detail below, the Information Search Process is used as a framework for the three-week library module to help students understand the process of research, and the myriad sources, free or otherwise, available to them.

Information Search Process, Kuhlthau

Carol Kuhlthau developed the Information Search Process (ISP) after working with high school students over an extended period of time. Students were asked to keep both a research journal and a search process journal. The research journal was more reflective and students recorded their feelings during the research process, while the search process journal was intended only to keep record of the explicit steps students took during the process (e.g. what keywords to use, narrowing a topic, choosing a tool). After her research with high school students, Kuhlthau developed a model of information seeking with 6 steps (Kuhlthau, 2004, p. 45):

1. Task Initiation
2. Topic Selection
3. Prefocus Exploration
4. Focus Formulation
5. Information Collection
6. Search Closure/Starting Writing

Based on students' journals, Kuhlthau's stages also include the feelings, thoughts and actions that accompany each step (Kuhlthau, 1991, p. 367):

Stages in ISP	**Feelings** Common to Each Stage	**Thoughts** Common to Each Stage	**Actions** Common to Each Stage	Appropriate Task According to Kuhlthau Model
1. Initiation	Uncertainty	General/Vague	Seeking background information	Recognizes
2. Selection	Optimism			Identify
3. Exploration	Confusion/ Frustration/ Doubt		Seeking relevant information	Investigate
4. Formulation	Clarity	Narrowed/Clearer		Formulate
5. Collection	Sense of Direction/ Confidence	Increased interest	Seeking relevant or focused information	Gather
6. Presentation	Relief/Satisfaction or Disappointment	Clearer or focused		Complete

This model is an excellent resource to guide librarians and professors can as they help students navigate the research process. Students can also use the model to evaluate their own performance and make good decisions when conducing research, as we will discuss below.

Theories

The theories below influenced us most in the development of our research process curriculum: 1) Competency Theory, 2) Cognitive Theory (including metacognition, modeling, scaffolding, and reflective thinking), and 3) Kelly's Personal Construct Theory.

1. Competency theory explains students who overestimate their proficiency and are unable to accurately evaluate their own performance of a skill. In addition, these students cannot accurately gauge the skills of others, and frequently see others as less competent than they. This is especially prevalent with students and their information seeking and research skills. Having used Google and other search tools their entire lives,

some students can't distinguish between their internet searching and research skills. "Competency theory indicates that it is unlikely that individuals with low level information literacy skills have the cognitive ability to self identify as needing training or assistance and are therefore unlikely to take advantage of opportunities to attain skills they lack" (Gross, 2005, p. 158). Students who are required to participate in library instruction receive intervention and are given the opportunity to learn skills they would otherwise think they have and don't need to learn. Teaching Kuhlthau's ISP can help build students' knowledge base of research skills and information seeking, which may increase their metacognitive ability to recognize when they don't know the answer/don't have the skills, and need to ask for help.

2. Metacognition is "thinking about thinking," and it's believed to be the way that learners monitor their task performance and select and understand appropriate strategies for completing a thinking process. The research process in which students are asked to engage is an example of an ill-structured problem, requiring different skills than well-structured problem solving, as in math or physics. Metacognition is essential to solving ill-structured problems because the information needed to solve the problem has no boundary and students need to have awareness of gaps in their knowledge and possible ways of filling those gaps in order to proceed from their initial understanding of the problem. Students can be taught to become aware of and strengthen their metacognition through several related instructional methods that are based on the fundamental theories of cognitive science that explain how we learn. Three complimentary theories within metacognition are modeling, scaffolding and reflective thinking. Each contributes to the building of metacognition in students.

    1. Modeling— Research has shown that giving students models of the appropriate quality and quantity of responses to an ill-structured problem will lead them to create better and more numerous answers to similar problems. In her research with library systems, Borgman (1996) suggests that users need both a conceptual understanding of the system, not just procedural knowledge, which can also be applied to the process, or system, of research. In another study, college freshmen were asked to analyze tables and graphs representing research findings and to make hypotheses that can account for these findings (Frederiksen & Evans, 1974). The experimental groups that received models of acceptable performance were able to perform better than the students in the control group. The conclusion of the researchers is that "variations in creative performance may be influenced by altering subjects' standards as to what constitutes satisfactory performance" (Frederiksen & Evans, 1974, p. 82).

    2. Scaffolding— Since the learning process takes place when a student tries to achieve something just beyond her ability, scaffolding is an important technique for all teachers. A metacognitive scaffold is defined as a "support structure for learners engaged in activities just beyond their independent abilities" (Wolf, Brush & Saye, 2003, p. 322). While some students might develop the right techniques through trial and error, most students need to have good examples,

or models, of the work they are being asked to do. Metacognitive scaffolding is a way for teachers to support students so they can practice ways of thinking that they have not yet mastered. The type of scaffold used to support metacognition is often a model of the thought process that a critical thinker would apply to a new situation, guiding students to ask good questions about what they're learning and how they're learning. For example, students in one study were asked to read about the events surrounding the civil rights Selma March and then write a newspaper article reporting on the details of the March (Wolf, Brush, & Saye, 2003). The students in the experimental group received guiding critical thinking questions—a metacognitive scaffold—as they read about the Selma March. Their performance on the writing task showed that they were better able to manage their own performance, they required less direction from the teacher, and their work was more complete and on-topic than the work of the control group.

3. Reflective thinking – According to John Dewey, reflective thinking involves various levels of thinking. The most applicable to our situation is Dewey's "second phase [which is] intellectualization, [which] involves conceptualizing the problem, interpreting the given elements, and anticipating possible solutions and suggestions" (Kuhlthau, 2004, p. 16). These are the exact actions we are asking students to take in the research process. Reflection, or reflective thinking, is a way for students to connect prior knowledge or experience to the current learning situation. Through reflection, we are asking students to apply past knowledge to new situations, act upon and process information, synthesize and evaluate data, and apply new learning to contexts outside the original situation (Costa & Kallick, 2000). In one study, librarians found that journal keeping "challenges students to deal with problems that are 'ill-structured,' and to recognize and harness the different emotive and affective stages that distinguish their personal experiences of learning" (McGuinness & Brein, 2007, p. 28). Reflections can give educators insight as to the problems students experience during their research.

3. Lastly is George Kelly's Personal Construct Theory, under which we use our personal models of reality to understand the world around us. Like scientists, people create hypotheses that are tested by experiment, or personal experience, which make up personal constructs. People use these constructs to predict the outcomes of their behaviors, and they are revised and retested as needed (Kuhlthau, 2004). These constructs provide guidelines or frames of reference, which determine the choices one makes. Kelly emphasized the importance of the influence that feelings have on the process of constructing new knowledge. We make decisions based on how we are feeling. During the research process, if students are frustrated with the prospect of narrowing a topic, they may choose to skip it, not fully understanding the consequences of these choices. By teaching the ISP, students can start to predict the outcomes of their decisions, or their refusal to make decisions.

Curriculum

April Cunningham's Lesson

The theory behind building the "Ready, Set, Research" workshop around the model of the research process is that there are some ineffective techniques for research that students have learned through osmosis or by following unexplained assignment parameters. The indirect methods of instruction that are often used to teach students about research have been found to work for students who already have some facility with the skill or material being taught, but they don't work well with novice students like college freshmen and sophomores (Frederiksen, 1984). Competency theory suggests that incompetent students may not be able to assess their own short-comings and can't see the ways in which other students or experts are using different techniques that work better (Gross, 1995). These students need to be encouraged to use a model against which they can compare their practice. That is how they are going to be able to reflect on how their process has worked, what decisions they've made in the past, and how making different decisions will have different outcomes. Providing students with the model offered by Kuhlthau will serve as a metacognitive scaffold. Metacognitive scaffolding has been found to help students to be more self-starting and their work more on-topic than when students are only given directions for completing the research assignment (Wolf, Bush & Saye, 2003).

Explicitly teaching the ISP model as a metacognitive scaffold is intended to help them with one of the primary tasks of problem solving: problem representation. The type of problem being solved in the research process is called an ill-structured problem because there is no clear boundary to the information needed to solve the problem and the techniques that can be used to solve it (Frederiksen, 1984). This is in contrast to the problem solving required for problems in rule-governed fields like math or physics. The first step in the problem-solving process is to accurately represent the problem so that possible strategies can be dismissed or pursued. In ill-structured problem solving the problem representation is the most important step because it defines what amount, quality, and sources of information will be necessary for finding a solution. Our goal for students is that they will understand how to *represent* the problem of research, and then they can apply their practiced techniques to each new situation. By seeing an example of the steps that other researchers follow in order to successfully prepare to write, students will have a more complete sense of the problem before them.

Research in cognitive science has suggested the "possibility of using models to change a student's subjective standards in judging the quality of his or her own performance" (Frederiksen, 1984, p. 384). This judgment and the corrections made when a student judges her performance, decisions, or outcomes to be unacceptable is a type of metacognition known as executive control. Even students who are reflective thinkers may not have the skills of executive control they need to edit their research practice when they encounter obstacles (Moore, 1995). Often this is because they have not learned the modes of thought (like openness to ambiguity) that are necessary for managing the research process. If they can learn to identify which stage of the ISP they are in, they have a better chance of exercising the correct kind of metacognitive control that will keep them on track.

I try to get students on this track during the workshop. I ask students to pair up and generate terms that describe how it feels to start a research assignment. They list negative emotions like stress, anxiety, anger, and boredom. Occasionally one or two students will list positive emotions like excitement. After recording their responses on the board, I propose that these are all based on feeling uncertain in the face of having to make decisions that may or may not turn out to be the right ones. We list some of the decisions that students have to make when they're doing research: when to start, how much to read, where to search, when to ask for help. Each of these decisions will have consequences for their work and their experience doing the work. In this way, I frame the content of the workshop as a possible solution to the things that have gone wrong in their research before.

After this brief discussion, I display a slide of the common model of a research assignment (Appendix A): "Step 1: Get the Assignment," "Step 2: Do Research," "Step 3: Write the Paper." I ask for feedback from students about what's missing from the model. Invariably I get answers like "Making an outline" or "Citing your sources." These answers show that students have been trained on the writing process but don't see that there is something to research besides "doing." The next slide shows how "Step 2: Do Research" can actually be understood as several separate steps. This table is based on Kuhlthau's Information Search Process with slight modifications to the terms used so that it's easier for students to understand.

I explain that this model of the Research Process is based on years of interviews that Kuhlthau did with high school and college students. The students in my class can see that the feelings of anxiety and being overwhelmed at the start of the research process is something that they share with the students who were interviewed. Based on research about teaching problem solving, I ask students to compare the model to what they've experienced. I describe the common practice of skipping certain steps. The research by Holliday and Li is useful here for understanding which stages are most often skipped. I propose to the students that the outcome of skipping these stages manifests in the accumulation of a pile of materials, usually print-outs from websites and full-text article databases, and then a struggle to organize and present the evidence when the students finally sit down to write. Students often respond during this directed learning, reinforcing my belief that this is a common experience for them.

In order to encourage students to think about how adapting this model for their research could change their experience, I give them examples of the signs of a poor research process. Some of these examples include: inserting quotes that don't really support your claim just because you know you need citations, struggling to organize a coherent argument because none of your sources are really related to each other, still feeling confused about your topic when you sit down to write the paper, and finding that there is a wide gap between what you want to show in your paper and the evidence you can find in your sources. Personal construct theory suggests that we can use our past emotional and cognitive experiences to predict or determine outcomes of future decisions. The research process is often very emotional for students. These concrete examples of negative experiences that are common to student-writers should, therefore, help them to reflect on alternatives to their past practices that will remedy their difficulties.

Allison Carr's Lesson

At CSUSM, this lesson is used as the framework for the three-week Library Module. In this way, it models the process for them, as they learn how to best tackle each step of the process. This is a sample outline of how each of the sessions fit into the ISP:

- Day 1: Research Process and Reflection
- Day 2: Getting the Assignment, Topic Selection, and Pre-Focus: As a group, we review the tasks and actions Kuhlthau suggests for these three steps of the research process. During this session, the students work in groups to analyze their assignment and put together a list of tasks to complete this assignment. Most times, students have a broad topic as a starting point, and need to conduct background research in order to focus their topic further.
- Days 3, 4 and 5: Collecting Information: Collecting Information is spread over three days to cover selecting appropriate tools, basic searching techniques and evaluating information. Again, to begin, we review the tasks and actions associated with this step in the research process, and use that to direct the collecting information stage.
- Day 6: Search Closure/Wrapping Up: During this class, we review citations and plagiarism and how this process has helped them prepare for this step. I do allude to the importance of writing citations throughout the module, so this class mainly focused on the mechanics of writing the citations.

As I have used this basic outline for a few of my sections, I have recognized the challenges of using the ISP as a framework. For example, ideally students need a week or more to choose a topic and conduct background research, while we complete it over the course of a day or two. Further collaboration with the main instructor could alleviate some of the challenges by having students start the research process prior to the beginning of the library module. Another solution would be to spread the library module over the course of many weeks, rather than limiting it to three.

The lesson plan for day one consists of the one April described above, in addition to time for reflection. At the end of the lesson, students are asked to spend 10-15 minute writing a reflection on their experience with research and using libraries. To guide their reflection, I ask them the following questions:

- How have you done research in the past? Was your research process similar?
- How do you feel when you are looking for information?
- How do you think research in college will be different from what you did in high school?
- What changes could you make for research to be a less frustrating, and more rewarding process?
- Do you agree with Kuhlthau's Model of Information Seeking?

In their reflections, students offer honest and frank responses of their past experiences and what they expect their future experiences to be. Generally, students explain that their research in high school consisted of using unreliable internet sources that were typically the first things

they found, and plagiarism. The surprising thing that I heard numerous times is that they fully understand what they are doing incorrectly during research, and that they should be doing it better. They also reiterate their discomfort and frustration during the research process. A few of them agree that Kuhlthau's ISP could help them to do a better job on their papers and keep them from procrastinating. At the end of the Library Module, students are asked to reflect on the same questions. Over the course of three weeks, students feel that they have learned enough about the research process and the library to feel more comfortable with research and with using the library for their research needs.

In addition to the change in their affective domain, a few students comment on how much they didn't realize they didn't know, which relates back to competency theory. While a few are self-aware enough to recognize this, I am afraid that other students may think they are learning all they need to know about research, which could contribute to a higher level of incompetency. In future library modules, I will attempt to address this by including questions in their reflections to attempt to get at their true level of competency of research skills. New questions will be modified to include reflections on their shortcomings, growth and feelings about the research process. Perhaps, by asking about their shortcomings, they will come to realize how much more there is to learn about the research process. For sample reflections, please see Appendix B.

Next steps

1. As with any curriculum or lesson plan, using student feedback and assessment and the current literature, we will work towards continuous evaluation and improvement.
2. More and more classes at both CSUSM and Saddleback are moving to an online-only format. An online tutorial or video, with accompanying assessment, will be created to reach distance learners. Ideally, collaboration with subject faculty will help to make this lesson a mandatory part of their research assignment.
3. While we hope that all students are exposed to this curriculum in either the GEL 101 (CSUSM) or Advanced Information Competency (Saddleback), there are many students who are not being exposed to the idea of a research process. We would like to modify the curriculum to be used in a one-shot session to act as a jumping off point for the rest of the session.
4. We can only see the change in the affective domain, but we can't see the difference in their work. Studies have shown that a high confidence level does not equate to a high level of work. Is their improvement in the comfort in the research process evident in their work/grade?
5. Contribute to the larger body of research literature on the information seeking behavior of young adults.
6. Provide faculty development training at Saddleback College in fall 2008 on the details of the ISP model and how professors can apply it in their instruction.
7. Collaborate with the chair of the Saddleback College English department to develop an ISP library session and additional instructional materials tied to the content of the transfer-level Composition course.

References

Association of College & Research Libraries. (2000). *Information literacy competency standards for higher education.* Retrieved January 4, 2008, from http://ala.org/ala/acrl/acrlstandards/standards.pdf

Borgman, C. (1996). Why are online catalog still hard to use? *Journal of the American Society for Information Science 47*(7). 493-503. Retrieved January 15, 2008 from ABI/Inform Global.

Costa, A. L. & Kallick, B. (2000). Learning through reflection. In A. L. Costa & B. Kallick (Eds.), *Assessing and Reporting on Habits of Mind* (pp. 15-28). Alexandria, VA: Association for Supervison and Curriculum Development.

Frederiksen, N. (1984). Implications of Cognitive Theory for Instruction in Problem Solving. *Review of Educational Research, 54*(3). 363-407.

Frederiksen, N. & Evans, F. (1974). Effects of models of creative performance on ability to formulate hypotheses. *Journal of Educational Psychology*, *66*(1). 67-82. Retrieved December 17, 2007 from PsycArticles database.

Gross, M. (2005). The impact of low-level skills on information-seeking behavior. *Reference and User Services Quarterly 45*(2). 155-162. Retrieved January 7, 2008 from Library Literature and Information Full-Text database.

Holliday, W. & Li, Q. (2004). Understanding the millennials: Updating our knowledge about students. *Reference Services Review 32*(4). 356-366. Retrieved January 7, 2008 from Emerald Insight database.

Kuhlthau, C. C. (1991). Inside the search process: Information seeking from the user's perspective. *Journal of the American Society for Information Science, 42*(5). 361-371.

Kuhlthau, C. C. (2004). *Seeking meaning: A process approach to library and information services*. Westport, CT: Libraries Unlimited.

McGuinness, C. & Brien, M. (2007). Using reflective journals to assess the research process. *Reference Services Review 35*. 21-40. Retrieved January 14, 2007 from Emerald database.

Moore, P. (1995). Information problem solving: a wider view of library skills. *Contemporary Educational Psychology*, *20*. 1-31.

Wolf, S., Brush, T. & Saye, J. (2003). Using an information problem-solving model as a metacognitive scaffold for multimedia-supported information-based problems. *Journal of Research on Technology in Education, 35*(3). 321-341.

Further Reading

Colorado College. (2007). *A guide to assignments for library research.* Retrieved December 17, 2007, from http://www.coloradocollege.edu/LIBRARY/ACMassign/guide.html

Costa, A. L. (Ed.). (2001). *Developing minds: A resource book for teaching thinking* (3rd ed.). Alexandria, VA: Association of Supervision and Curriculum Development.

Gradowski, G., Snavely, L., & Dempsey, P. (Eds.). (1998). *Designs for active learning: A source book of classroom strategies for information education*. Chicago: Association of College and Research Libraries.

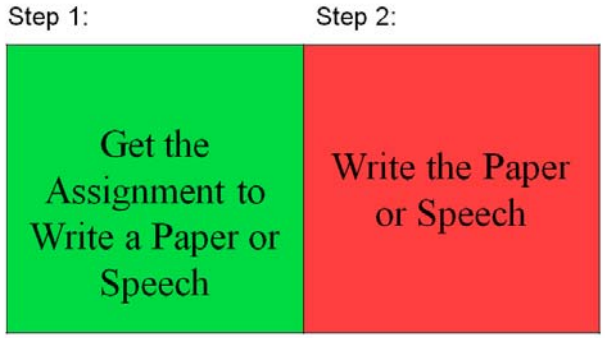
Kracker, J. (2002). Research anxiety and students' perceptions of research: An experiment. Part 1. Effect of teaching Kuhlthau's ISP model. *Journal of the American Society for Information Science and Technology*, *53*(4). 282-294. Retrieved January 15, 2008 from ABI/Inform Global.

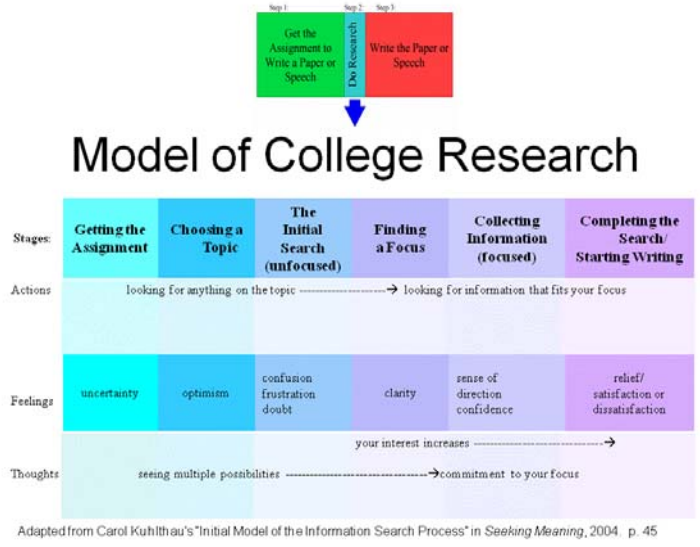
Kuhlthau, C. C. (2005). Towards collaboration between information seeking and information retrieval. *Information Research, 10*(2), December 17, 2007 from http://informationr.net/ir/10-2/paper225.html

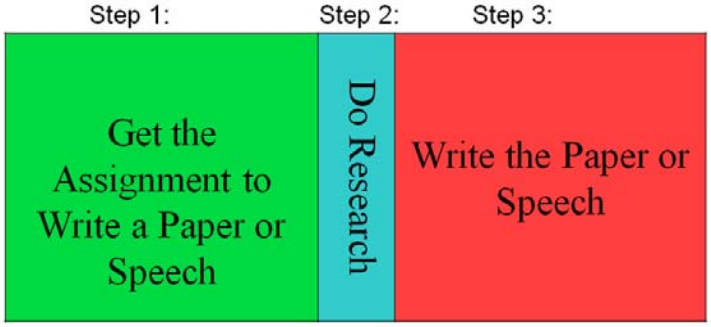
Szeliga, T. (2005). *Review of the literature: Research on the information seeking behavior of young adults.* Retrieved December 17, 2007, from http://www.pages.drexel.edu/~tjs522/ROL.html

Appendix 1: Research Process slides

The PowerPoint file and lesson plan can be found at: http://public.csusm.edu/acarr/scilworks/







Stage: Getting the Assignment

Task	Thoughts	Feelings	Actions	Strategies
To prepare for the decision of selecting a topic	Contemplating assignment Comprehending task Relating prior experience and learning Considering possible topics	Apprehension at work ahead Uncertainty	Talking with others Browsing library collection to spark ideas	Brainstorming Discussing Contemplating possible topics Tolerating uncertainty

Adapted from Carol Kuhlthau's "Initial Model of the Information Search Process" in *Seeking Meaning*, 2004. p. 44

Stage: Choosing a Topic

Task	Thoughts	Feelings	Actions	Strategies
To decide on a topic for research	Weighing topics: Is it interesting to me? Does it match the project requirements? Is there enough appropriate information available? Can I get it done in the time allotted? Predicting the outcome of possible choices Choosing a topic with the potential for success	Confusion Anxiety Brief elation after selecting the topic Anticipation of the next task	Consulting with professors and librarians Making a preliminary search for library materials to see if there will be enough information Using reference sources, like encyclopedias	Discussing possible topics Predicting the outcomes of your decisions Using general sources to get an overview of the topics you're considering

Adapted from Carol Kuhlthau's "Initial Model of the Information Search Process" in *Seeking Meaning*, 2004. p. 46

Stage: Finding a Focus

Task	Thoughts	Feelings	Actions	Strategies
To formulate a focus from the information you've encountered	Predicting the outcome of writing about this focus, considering your interest in the focus, the requirements of the assignment, the availability of materials, and how much time you have Identifying ideas in the information you're reading that you'll use to formulate your focus Sometimes sudden insight or inspiration	Optimism Confidence in your ability to complete the assignment	Reading the notes you've taken during your early research to see if you can identify any themes that you find interesting	Reviewing your notes Listing possibilities for your focus Choosing one focus and discarding the others Combining the themes you've found during your early research to make one focus for your assignment

Adapted from Carol Kuhlthau's "Initial Model of the Information Search Process" in *Seeking Meaning*, 2004. p. 48

Stage: Collecting Information

Task	Thoughts	Feelings	Actions	Strategies
To gather information that defines, extends, or supports your focus	Seeking information to support your focus Defining and extending your focus through the information you find Gathering pertinent information Organizing the information in your notes	Realization of the extensive work to be done Confidence in your ability to complete the task Increased interest in the focus you selected for your assignment as you see its depth	Using library resources, like books and articles, to collect evidence Taking detailed notes with bibliographic citations so you don't have to track them down later	Using the keywords you've identified in your research to find evidence Making a comprehensive search of various types of materials, like reference, magazines, journals, books, and authoritative websites Requesting assistance from the librarians

Adapted from Carol Kuhlthau's "Initial Model of the Information Search Process" in *Seeking Meaning*, 2004. p. 49

Stage: Completing the Search / Starting Writing

Task	Thoughts	Feelings	Actions	Strategies
To conclude your search for information and begin your writing	Identifying whether you need any additional evidence to make your point Considering how soon your work is due Finding less brand new information and more redundant information when you search because you've already exhausted the available resources and have a view of all sides	Sense of relief Satisfaction or Disappointment	Rechecking the sources of information you initially overlooked or chose not to check Confirming that you quoted or paraphrased the information correctly Confirming that you have all the information you need to complete your bibliographic citations	Returning to the library's resources to make a last search for anything you missed before Keeping books and print-outs until you finish writing so you can recheck any information that's not clear in your notes

Adapted from Carol Kuhlthau's "Initial Model of the Information Search Process" in *Seeking Meaning*, 2004. p. 50

Appendix 2: Student Reflections

These reflections take place at the beginning of the three-week module, and with the final quiz at the end of the module. To guide their reflections, I ask these questions.

- How have you done research in the past? Was your research process similar?
- How do you feel when you are looking for information?
- How do you think research in college will be different from what you did in high school?
- What changes could you make for research to be a less frustrating, and more rewarding process?
- Do you agree with Kuhlthau's Model of Information Seeking?

Overwhelmingly, students felt angry and frustrated prior to the library module, and much more comfortable and confident after the library module, and about using the ISP as a research process in college. I've included the terms along with their before and after reflections, because there can be a stark difference between students who take GEL in the fall, versus the spring of their freshman year. By spring, they have been exposed to research at a very superficial level during the fall semester. These students often have more difficulty with research as a process because they think they know all there is to know about research and using the library.

Term	Before	After
Spring 2007	Research is skeptic topic for me. I love to always learn about new information, but it depend on the topic. Many topics interest me, but there are a few that totally slip my mind.In highschool, the teachers would usually give the students most of the time broad topics. It was alot easier in highschool because a student doesnt not have one main focus, rather has multiple focuses under the topic. When i came to CSUSM it was a little hard for me to adapt to the research writing structure, due to the fact that i was used to focusing on a topic broad rather than focusing on one topic.Research itself is not frustrating, it is the teachers that make it frustrating. Each and every teacher has their different styles of research that they like their students to do. Research is indeed rewarding, but when a student has so many different teachers telling them to do the process in different ways and that they only accept the assignment a certain way, it makes it very frustrating on the student.I agree that research takes a process,but over all i feel that students are confusing their emotions such as frustration with research , when it is really frustration with their teacher.	After completing the library module i feel that i am well prepared for scholarly research. **I Knew research was a long process full of many steps, but never really realized how to fully put the process in order**. I practiced to refine my topic from broad to a focus. I never really payed attention to the different kind of sources there were on the internet. I basically just catagorized whatever i found on the internet :internet research and whatever i found in a book, book research. I library module helped me notice the different types of sources and ways to find and refine my research. An idea that challenged me what the fact of finding what exactly is the type of source i am using, but with all the practice i am sure that i would not make a mistake in that area again.Overall, the library catalouge was quite an experience and taught me alot that i needed to know for further research.
Spring	When I think about research the first thing that comes to mind is time.	I really enjoyed the Library Module. I know feel better about researching. **At first**

2007	Researching is very time consuming and can be very boring. I dred the research part of a project because I know it's not one of my strong points. I feel very overwhelmed and frustrated when it comes to researching. I never know where to begin and I never know what i want to focus on. Researching is a very long process. I especially hate researching topics that I am not interest me. It's already hard enough to to the research, but on a topic I don't like. That just sums up in one word, boring. When I am looking for information i feel very confused because I never know where to start or what to focus on. Also when I am on the computer I get very sidetracked easily. I think that college research will be better than high school research because we are actually going to get a chance to see how research will be done easier and more acuratly. If I want to be less stressed out about research then I should probably not procrastinate as much. I do agree with Kuhlthau's Model. You need to specify what your topic is and research that one topic. Find your main focus.	**I wasn't too sure how this class was going to turn out because I thought I felt comfortable to researching, but after taking this class I feel better prepared and equipped to research.** Now I feel better about chosen a specific topic to research and I know now how to find scholarly research. I feel more comfortable now to research. I really enjoyed learning about the techniques to research. I feel this module has helped me and better equipped me to do my research for future research papers. I think this is a great oppertunity and liked this class very much. It is great help for future papers.
Spring 2007	In the past I have found that because of the level I write at, it was not necessary to do an excess amount of research to substantiate my argument or my topic. With that said, often I would wait until the last minute to complete assignments and would usually receive average grades for doing mediocre work. Unfortunately I have found that in the college environment knowing more than enough is the only way to approach writing papers because of the specificity of the topics. This is the way in which college writing differs from high school: quality certainly outweighs quantity in this environment and it is essential to know what you are writing about before you begin the process of writing. In that regard, it is important to remember to begin research early in order to be thorough and meticulous. The quality of the information must specifically relate to your topic. Information in bulk will not impress a professor. I agree with Ms. Kuhlthau's model of research because it very much illustrates the roller coaster ride of research, which includes the highs where you think your paper is amazing, and the lows where it is difficult to find a way to proceed.	The research process becomes increasingly more difficult as you navigate the higher academic courses. With that said, I feel pretty confident that I have the ability to find prevalent information to support my topic, and if I have learned nothing else, I know who to seek out if I do not. **As a result of the library module I will make more proactive decisions about researching and seek out that information that will enhance my report instead of working twice as hard trying to substantiate an essay with only my opinion.** I was really discouraged when I was seeking information for my group's topic, but I was able to learn that there are more effective search methods than the one I was using. For example, simple search on databases are not going to give you the quality of results you will get in an advanced search. I feel that the library module was very beneficial in enhancing my knowledge of research and how to go about it, as well as making me more comfortable in a search database and the library database.
Spring 2007	When I reflect on my past research experiences I find that they were long processes taking at least two weeks in time to complete with a presentation at the end or a research paper due. I remember I did a very important research paper in high school that was vital to graduating and that added extra pressure on me to do the research and do it right. I have done some research in the past here in college and realized that the time for the research was shorter. This was one way in which the research process was different from other research I have	**After completing the library module, I know many more things that I thought I knew.** Although my research process has been aliviated some what due to the knowledge I gained here, it still can be frustrating at times. Yet, my research process has changed dramatically. As a result of the library module I learned the APA citation style, which I didn't know before. I learned how to properly cite my sources in APA if ever needed and where to find sources, making my research a lot easier and pain free. The library module instructor was a great one. This

	done in the past. Another way in which it is different from past research experiences was that the sources were not so evident because the topic was vague and I had to make my own decisions about what to research and how to research it. When I have to do research I always get anxious and worry about it for along time. When I am actually looking for information I feel confused sometimes. Not being clear on what to research can sometimes throw you off track, so that's when confusion kicks in. I would get angry and frustrated sometimes because the sources were hard to find. Sometimes the sources lacked the information I needed for my research paper; there was simply not enough information there. When the research is done, like any normal person, I feel relieved. I already got a taste of college research my previous semester, but I still think it might be a lot harder than high school research. There is not a lot of time to do the actual research let alone to mess around. I know there will be huge research papers due in later college years that will be very important towards graduating. However, there is also a more ways to retrieve sources available, so I think that will make the research a bit easier. The school has tons of databases and 3 floors of printed material to be used to find sources. The research may be more complicated here in college, but the tools to do the research are here as well. One way to deal with frustrating research is to use all the resources available. For example, finding sources on the computer for two hours won't be fun, but talking to a librarian about finding sources might be more relaxing than doing it on your own. Also looking for different types of sources might be helpful. If you find a video that helps your research you can talk about it and cite it, which would be better than looking at printed material for a long time.	module caould have been a lot worse if some other people were running it base on experiances wih librarians. My view of librarians changed now that I have completed the module, which was helpful in so many ways.
Spring 2007		Upon starting the Library Module, I felt as though this might have been a waste of my time. **I took Kine202 last semester and so I had already been accustomed to the library and how to perform research. However, I learned more from this library module than I did in the one from last semester. I was never taught to research in steps but was rather taught all the steps in one single class period.** I felt that by allowing 3 weeks for this module I was able to take a lot more information in and I feel that this will help me a lot in future research papers and projects. I even used this module to help me in writing an english paper these last couple of weeks. I'm especially thankful for the part on citations, I was always unclear about citations and the handouts were able to help me a lot. I was also glad to hear that there is a lot of help available to me if I ever need it

		within the library and that the research process is not always as hard as people make it out to be. It just takes time and a little bit of effort.
Summer 2007	I have done research before but not in a step by step process. Usually I would just find what topic I was going to talk about and them find research and write my research paper. When I look for information I feel frustrated because I am not very good at researching in the internet. I feel that I need improvement with researching in the internet. I need help trying to find the right words to enter into Google, Yahoo, or Ask.com. I think that writing a research paper in college will be different than writing a research paper in high school. From what I know, for college you must enter your research project into a program in order for the professor to see if you have plagiarized or not. Research projects are not from one to two pages in college, my sister would tell me that it could be up to twenty pages per research paper. In order for me to successfully write a research paper I think it would help me to follow the steps to writing better than finding references and just writing a research paper. I think if I took everything step by step I will not be very frustrated and stressed out. I am a procrastinator so I would need to manage my time and keep according to what I am to do every day instead of cramming everything into the last two days before everything is due. I do agree with the research process because it seems like neither process is being ignored and every little detail for writing a research paper is not either. It seems that nothing is left behind.	After attending the library module I still feel overwhelmed of writing a paper but a feel I am more prepared than before. I learned that to write a research paper you have to take it step by step and not rushing it. Taking the research method has helped find more reliable sources and a less stressed environment than in past experiences. One of my biggest challenge is to overcome plagiarism but through the step by step process I commit to every step and I do not procrastinate as much as I use to. I that the library module was a great experience for me and it will definitely help me when writing papers.
Summer 2007	I have been assigned research projects before, but I didn't receive as much help. I was pretty much on my own and I just researched and wrote the paper. I get frustrated when I can't find as much information as I know I need in order to write a research paper. It is sometimes time consuming to find what I am looking for. Not everything is in the sites that come up when you search for the topic. I do think that a college research projects will be different than a high school research paper. It will need to be longer than a high school research paper. They will also require more time. Procrastinate will not be a good thing to do. I need to plan ahead and leaving it off to the end. Taking my time will let me finish without stress and end with a better job. I agree with the research process it will be helpful. It will help me organize myself and do well on a research project something I didn't do a good job of in high school.	The library module was great help. I was always so fustrated and without a clue of how to start a research paper. **My research paper were mostly just enough research and start writing the paper. I would do so poorly.** Now after I have completed the library module I feel that now I can write a research paper. It dosent seem as tough to do a research project when you can break it down into parts. Now I will start early and let it of until the night before like I used to do in high school. I will know how to research and have the information to write the paper, but always cite to make sure I dont plagarize. The library module was great experience that will help me from now on to complete my research projects that I will need to write throughout my college years.
Fall 2007	My past research has been very straight forward with not much looking around; searching on sites that I found on google.com or ask.com. My research methods were somewhat similar but I would wait until the last minute in many cases to complete the project. I feel confused and frustrated when researching	Through the library module, I now feel more comfortable with researching a subject for an assignment. Taking away all of the stress that I begin to feel the moment the professor hands me the rubric/instructions for the assignment. To change my research process I will now know how to look for articles and

	for information for a paper or project. I also feel nervous as there is a chance for me to be mistaken as plagiarizing if I don't site my sources correctly. he research that I do in college I believe will differ because I will have to ensure that all of the sources I which I use in college are creditable and make sense while in high school teachers didn't really check for those types of things. To make my research experience less frustrating I would try to make sure that I start researching for the project ahead of time to ensure that I would not feel rushed and feel as if I can't complete the assignment on time. I somewhat agree with his form of Information Seeking but he leaves no room for accidents or for anything to go wrong. He doesn't give the time to procrastinate like most students often do.	information that is scholarly and **worth using in my assignment**. I have also learned how to make the broad subjects more specific instead of just keeping the subject broad and confusing myself by trying to take on a big task. Citing my sources will be difficult for me in the long run. Due to the fact that you have to search for each one of those components to put into the citation. Although that may be difficult I learned about KnightCite.com which will be a life saver. Thank you Allison for everything you have taught me in the past couple of weeks.
Fall 2007	In the past I would get the research assignment and just look up information while writing the paper. I realize now that I cut out many steps into making a better research paper. You need to decide a topic, start your initial search, find a focus, start collecting information, complete your search and start on your paper. When I start any research paper I try to be positive but after a couple hours of staring at a bright screen while finding no information, I get very frustrated. I feel I am better at writing the essay instead of finding information. I eventually find good sources but I don't feel very strong most of the time when I search for information. I get very ansy, frustrated, and I always have that feeling of being rushed. I think college will be very different than high school because I have so much more to work with. The library offers so much information as well as the people working there. I can get help if I need it, whereas high school the librarian wasn't always available to help. For research to be less frustrating I need to start the assignment on time. I can't procrastinate because it just ends up making me feel worse. This way if I keep on top of things, I will have plenty of time for the whole research process and I can get help from people working in the library. I do agree with Kuhlthau's model of information seeking! There are many steps but in doing them it makes for a better paper.	After having the library module classes, I feel better about the research process. **I realize now all the things I did wrong in the past when I had to research for a paper.** I feel more comfortable in researching now because I used to dread looking things up. I was always better at writing the paper instead of looking things up. Now I can be good at both! I will make many changes to my research process as a result of the library module. I know now the importance of narrowing down a topic and all the things to look for to make sure an article is scholarly. I learned about many tools and databases that will make it easier for me to research. I also learned how to correctly cite a website, and the reason we cite things. I learned the difference between a scholarly article and non scholarly, the stages of college research and so much more! I am really glad we had the class. It wasn't the most interesting subject but I know it greatly prepared me for all my classes in the future. It was confusing and hard at times but I know if I keep working at it, it will get easier.
Fall 2007	I have done research in the past very half-heartedly. It is pretty much whatever I can find on the first page in google. I do feel like I want to do well on whatever I am researching, so I do make sure my facts are extremely relevant. I think my research in college will be a more in-depth than what I did in high school, because I know more is expected of me. If I just make sure that I have enough time and I'm not rushed, researching will be a lot less frustrating. The library	After completing the library module, I feel more confident about doing research. **I always thought doing research was easy, but I realize that is because I wasn't doing enough of it.** I now look for more credible resources and have started using databases as a means of doing research. I overall found the library module effective and helpful.

	module I think will help me a lot in terms of finding better ways to research and make everything easier and less stressful.	
Fall 2007	I have experimented with many different forms of research while I was in high school. On more than one occasion I started my paper the night before it was due. When doing this it takes away from time to do research on the topic, so any sources I would use were less than wonderful. If you don't plan enough time to perform complete research your paper will suffer. The one occasion that I used a well planned out process of research and writing lead to one of my best papers. I had to write a research paper on hemophilia for my final in Biology. I understood the importance, so I started the process weeks before it was due. I researched the background of this disease, and was able to find many sources. My paper was well planned with many good sources.	**After completing the libary module I feel that I have gained a great deal of information that I didn't know was available before.** I didn't know how to proparly cite in APA format, but with this learning module and www.knightcite.edu I have learned how to do this correctly. I have also learned the differnce between good and bad sources for papers, and how to discover if the sources is crediable. Finally, I have learned how to find a scholarly article, how to identify one, and how to pull information from it.
Fall 2007	The research that I have done in the past is similar to this process. However, I never thought about breaking it up into different column like the presentation. Seperating each step really clarified aspects of the research process that I couldn't always remember. Depending on the information I can feel mad or interested. If its something that's for school then generally I am angry and would much rather be doing something else. If there is something that interests me than I am glad to read through pages of websites to satisfy my hunger to know more. Research in college is going to have do be more narrowed down to a specific topic. In high school I could right on one broad topic and get full credit on the assignment. To make it less frustrating and more rewarding I should try and pick topics to research that interest me personally. I agree completely with the model. Now I just have to apply the method to actual researches that I am going to be doing.	**The research process really works. This past research project went much smoother because I followed each step of the process.** I usually don't go to more than one website (Google) to search for my information. I did learn that about Google Scholar which is something I am sure I'll find quite useful these coming 4 years. Lexus Nexus is something that I never knew existed. Now having been shown how to use it I am confident that Ill be more effective in my research for upcoming classes.