

Research Success with Senior

High School Students

Lois Barranoik, Department of Elementary Education, University of Alberta, Canada

The objective of this research project was to identify what factors motivated different types of students in different content areas to complete assigned research projects successfully. Information was collected through student journals, interviews with students and teachers, and observation. Preliminary findings identified access to information, task perception and understanding, the research purpose, and time as factors that appeared to encourage students to complete their research and develop confidence in their ability to create meaning. This work adds the important component of student experience and voice to earlier research concerning motivation and student information literacy.

Introduction

Research assignment. These two simple words are able to evoke powerful feelings: dread, anxiety, fear, uncertainty, anticipation and hope. Even the most confident high school students seldom feel thrilled when given a research assignment. Why? What is it about the research process that seems to place undue stress on those involved? Why is the initial feeling more often one of panic than of expectation and the "thrill of the hunt" seen as more trouble than it is worth? Perhaps it is because the research has been imposed rather than chosen, and so the students are more concerned with creating a viable final product than with understanding new ideas and/or adding to their knowledge base. Kuhlthau (1998) states that an emphasis on understanding will make both the research process and the information gleaned through this process more meaningful to the student.

In my practice as a teacher-librarian, I have observed that many young people do not see information as valuable to themselves. Because their topics are assigned rather than chosen, their use of information is simply seen as "important to the task at hand" rather than as a fundamental way to enhance and increase their own knowledge base. Burdick (1998) states, "Although information literacy is abilities, skills, knowledge and use, those essential components by themselves don't ensure information literacy. To use information well, there must be motivation: a reason to do so, some interest or desire that is lacking in the 'aliterate'" (p. 13). The idea of motivation affecting aliteracy prompts an important question: How do we motivate our students not only to consume and transmit information, but also to construct meaning and to create new understandings? Further research in this area

could "determine which motivational strategies are most effective with different types of students and content areas" (Small, 1998, p. 228).

In fall 2000, I designed a small study to try to determine which factors appeared to encourage students to complete their research and develop confidence in their ability to create meaning from their findings. The question that needed to be answered was: What factors motivate different types of students in different content areas to complete assigned research projects successfully? Successful completion was defined as finishing the assigned project and creating meaning from their findings. Because this was a pilot study, I also wished to compare the effectiveness of several methods of collecting information.

A necessary component of this study was listening to the voice of students. Adults' engagement with literacy is influenced strongly by their formal school experiences, and adults' alienation from literacy activities has economic, social, and political costs. Educators and library information specialists working with students in the area of research need to understand and use appropriate intervention and motivational strategies to ensure that students gain understanding and construct meaning and do not merely regurgitate data. Making the research process relevant and manageable should ensure greater student success and improve student achievement, as well as encourage their literacy engagement into adulthood.

Review of the Literature

Kuhlthau (1993) has stressed the importance of intervention in the process of seeking information. Her research began in the 1980s with high school students and focused on the difficulty of getting them involved in the research process. Kuhlthau realized from her studies of the student perspective of information-seeking that there were two different and somewhat conflicting perspectives at work: "the library perspective emphasizing order and organization and the student perspective emphasizing confusion and uncertainty" (1998, p. 16). This "uncertainty principle" is presented in her book *Seeking Meaning*. One aspect of Kuhlthau's uncertainty theory is the "interest corollary," which holds that the learner's interest increases as uncertainty decreases. "Motivation and intellectual engagement intensify along with construction" (p. 122). The research process is a process of construction, of meaning-making; motivation is a key element of that process.

Kuhlthau used the concept of the "zone of intervention" to help librarians and teachers determine when to intervene with students and when to leave them alone. According to Small (1999), Kuhlthau is one of the few researchers in the field of library and information research to recognize the importance of motivation. However, Kuhlthau's focus was more on the feelings and attitudes of students as they work through the research process and the general elements of successful programs. Small states that "research on motivation in classroom settings indicates that students perceive their

own motivations inextricably linked to the motivational quality of the instruction they receive" (p. 223).

In a research paper, Small (1999) described a study designed to identify motivational strategies used by library media specialists in eight New York schools and the resulting on- and off-task behaviors of students. The strategies were categorized using John M. Keller's ARCS Model of Motivational Design, the model also used in her book about research and motivation (Small & Amone, 2000). This model identifies four essential strategy components for motivating instruction:

[A]ttention strategies for arousing and sustaining curiosity
[R]elevance strategies to provide the importance and value of the learning
[C]onfidence strategies to help learners believe they will be successful
[S]atisfaction strategies which provide intrinsic and extrinsic reinforcement.

The results of Small's study indicated that library media specialists (LMSs) used mostly attention-focusing strategies, that middle school (grades 6-8) LMSs used more strategies than did elementary (grades 3-5) LMSs, and that LMSs used extrinsic motivators more commonly than intrinsic motivators. Small concluded that there needs to be further research in this area, one aspect possibly being a replication of the study with grades 9-12. Although the research reported in this article does not replicate the study by Small, it was designed to determine which factors appeared to encourage high school students to complete assigned research projects and to create meaning from their findings.

In a qualitative study conducted in Canada by McGregor (1995), a relationship between the complexity of students' thinking and their orientation to either research process or product was identified. "The students who evidenced some process orientation showed more involvement in a process of making sense for themselves, of transferring information into long-term memory" (p. 32). Another study concerned with identifying elements associated with meaningful research tasks found process instruction to be important to the students and one of five elements related to satisfaction with the research process (Garland, 1995).

Research Design and Methodology

Through a qualitative research approach, I sought to understand the process of research as seen through the eyes of high school students. The key concern for me was "understanding the phenomenon of interest from the participants' perspectives, not the researcher's" (Merriam, 1998, p. 6).

The data were collected for this study using multiple methods: journals, interviews, and observation. The researcher, as the primary instrument for data collection, was able to "respond to the situation by maximizing opportunities for collecting and producing meaningful information" (Merriam, 1998, p. 20). However, this approach to research also demanded a tolerance for ambiguity, a sensitivity to context and data, and good communication

skills in collecting and analyzing the research data. Approval for conducting the research was obtained from the Research Ethics Board at the University of Alberta and from the school district in which I conducted the study.

Students involved in senior English and senior science research projects were involved in this project. Thirteen self-selected grade 12 students of varying academic ability, six in English and nine in science, were followed over a period of five weeks. Two students were in both an English and a science course, which made the total student number of 13 appear to be 15 (see Table 1).

During the study, I visited the school nine times, with each visit lasting approximately three hours. Because these students were 19 and 20 years of age, they were over the legal age of consent age of 18 years; they were able to make the decision to be part of this study and signed the consent forms themselves. The precise purpose and nature of the research was explained to them in a letter of consent as well as in an oral presentation. The right to withdraw and the right of confidentiality were also part of the letter of consent. Initially, 17 students wanted to be part of this pilot study; however, as the study progressed, four decided to withdraw.

Data about their experiences while completing an English, biology, or chemistry research project were gathered through student journals and through structured audiotaped interviews with the 13 students and their six teachers. The structured interviews with students and teachers and the student process journal used ideas from the prior work and research of Kuhlthau (1993). The students were involved in two interviews: one before beginning the research assignment and one after the assignment was completed. Each student also was observed in the Learning Resource Centre (the school library) for approximately 20 minutes. After the final interview, the students were shown the transcriptions of their initial interview and the notes recorded during observation to ensure researcher accuracy.

Because of the small number of participants in this project, findings are considered tentative. However, the implications for practice may help both teachers and teacher-librarians with the design and implementation of research projects for high school students.

Data Analysis

The data collected were analyzed to determine which factors appeared (a) to encourage students to complete their research, and (b) to develop confidence

Table 1

<i>Students</i>	<i>English</i>	<i>Biology</i>	<i>Chemistry</i>	<i>Total</i>
Male	2	1	2	5
Female	4	5	1	10
Total	6	6	3	15

in their ability to create meaning from their findings. Data analysis involved data reduction, data display, and drawing conclusions or verification (Miles & Huberman, 1994). For purposes of this project, data reduction involved coding, sorting information into categories, and making themes.

Once all the data were collected, the interview transcripts, the student process journals, and the observation field notes were read to gain a holistic view of the information collected. I then worked through the data trying to ascertain appropriate codes and categories. The analysis and comparison of the findings from the before and after interviews with students also suggested some possible themes. Of the tactics useful for generating meaning and drawing conclusions recommended by Miles and Huberman (1994), those most useful for this study were noting patterns and themes, making contrasts and comparisons, and counting.

Description of the Research Projects

The senior English research project followed a study of *Night*, the book by Elie Wiesel, a Holocaust survivor. The outline given to the English students for their research assignment comprised a timeline, possible research categories, and the suggested format for the final product. The possible research categories were quite open-ended and allowed students to make choices based on their personal interests. However, the expectations for the final product were clearly delineated and required that students identify a research focus, list the steps taken in the research process, write a report in first-person narrative, and include bibliographic citations.

The biology students were required to choose a disease related to either the nervous system or the reproductive system. They had to access and summarize three articles related to their topic, as well as identify related technologies and careers. The final product included an introduction to the topic, three article summaries, related technologies and career(s), and a bibliography. The students were also required to hand in copies of the three articles they had chosen to summarize.

The students in the chemistry class were asked to choose and research an alternate energy source from a list of possibilities found on the website of environmentalist David Suzuki. Their final essays on this "future fuel of choice" needed to address the technological perspective of the fuel source, as well as two other perspectives from a list provided. For example, students might choose to consider the fuel source from an ecological, an economic, a political, an ethical, or a social perspective. Bibliographic citations were also required.

Findings of the Study

For the purposes of this research report, most of the biology and chemistry findings were combined and discussed as one unit under science. These preliminary findings are the result of analyzing the student interviews, the student process journals, and the library observations. Findings from the

teacher interviews are discussed separately and follow the student findings. The findings are grouped under the following categories developed from the data: clarity and expectations; sources of information and help; skills for accessing information; understanding the research process; choosing a research topic; project completion; and perceived learning.

Clarity and Expectations

At first, the English students felt that their research project, especially the topic selection, was too open-ended. However, by the end of the project, they had all focused and completed a piece of writing, handing in a product that included a title page, reference citations, and bibliography. Five students had written essays, and one had written a journal. Their feelings about the project seemed to be tied into their expectations. On beginning the research, their feelings were anticipatory (excited, confident, certain) combined with concern (frustrated). However, once the project was completed, three students still felt excited and confident, and one student still felt certain, but confusion had now been added to the original list of identified feelings. The two students whose feelings about the project had changed realized that research was hard work and felt that they had not received enough guidance.

In contrast, the science students understood the requirements of their research project and could clearly explain what was expected. Because they were given a choice of topics within the structure of a curricular unit, choosing a topic did not seem to be a major issue. Even though the students knew what their assignment was, their uncertainty about teacher expectations created some initial feelings of confusion and frustration mixed with feelings of anticipation and confidence. Once the project was completed, five students indicated that their feelings had changed. Some negative feelings were due to the realization that research was hard work, but positive feelings were also evident because the students felt that they had gained personal knowledge through their research.

Sources of Information and Help

Initially, the English students identified electronic and print resources as sources of relevant information four times more often than either people or places (libraries, museums, etc.). In the final analysis, although electronic and print resources were still mentioned more often than people and places, students had also accessed the media for information. All the English students mentioned using the Internet. The science students initially mentioned accessing print and nonprint resources equally. However, on completing their research, the use of both the Internet and electronic databases was mentioned 13 times, and the use of books was mentioned only once. This may be due to the need for current scientific material and the fact that it can be more easily accessed on databases.

At the beginning of the project, English students discussed their research mainly with school contacts: their classmates, teachers, and librarians. Two

also spoke to family members, and one spoke to no one. In their final interview, students indicated that they had discussed this topic with classmates, their teachers, and school, public, and academic librarians. Family members were not mentioned again, and one student still had not discussed this project with anyone. Librarians and teachers were approached equally. Science students discussed their project most often with teachers, then with family members, and finally with librarians, friends, and classmates. They did not approach librarians as often as the teachers or the family members.

When seeking help with their project, all six English students initially mentioned their teacher, and four also mentioned the librarian. On completion of the project, those who had actually been consulted were the teachers, librarians, classmates, and family. In the final analysis, teachers and librarians were consulted equally. However, science students mentioned seeking help from their teachers almost four times more often than they mentioned seeking help from the librarians. Perhaps this was due to a perception that science is a subject that requires specialized knowledge; therefore, teachers can best help with content. Librarians assisted students with computer use. One science student indicated that she did not have time to ask for help, so she completed the project on her own.

It is interesting to note that English students approached teachers and librarians equally when either discussing the research project or requesting help with the project, whereas science students were more selective when either discussing the project or accessing help.

Skills for Accessing Information

Because the English students all mentioned using the Internet and other electronic resources, it was assumed that all the students were fairly competent computer users. However, through observation of the students conducting research, it became apparent that only three students had good computer skills: they knew how to use the Internet and various databases, how to manipulate data on the screen, and how to take notes online. Three of the students were not as computer literate, and this hampered their progress online. It was also evident that the students did not always know how to use appropriate search terms, how to analyze websites, how to complete reference citations, or how to develop a bibliography.

Six of the science students had good computer skills, but three did not. This hampered their use of online databases. The science students also did not always know how to use appropriate search terms, how to analyze websites, how to complete reference citations, or how to develop a bibliography. In fact, the necessity of providing reference citations for another person's ideas was new to a number of these students.

Understanding the Research Process

English students saw their first task in the research process as either finding a topic or choosing a focus. They felt that topics could be chosen through browsing the Internet or browsing the library. Although these students realized that browsing was valid, they put more emphasis on choosing a topic. Perhaps this was related to the time constraints of the project. Because four science students had already chosen their topic, they identified their first task as locating information. Another four students thought that their first task was choosing a topic. Only one science student identified browsing as a relevant first task.

When asked to identify the tasks used to complete the project, accessing appropriate information seemed to be of prime concern for both English and science students. Searching the Internet and visiting libraries were mentioned by five English students, writing the paper or synthesizing the information once it was found was mentioned by two English students and five science students, and managing research time was mentioned by one English student. One science student mentioned the importance of looking at previous work for ideas.

Choosing a Research Topic

Initially, topics in English were chosen by finding what was considered the "right" amount of information for the project, or by finding something that was of interest. The rationale for topic choice was divided equally between the six students: three chose on the basis of the "right" amount of information and three chose on the basis of "interest." When the students were asked how their final focus or topic was chosen, the "right" amount of information was mentioned by three students, and selecting items of interest was mentioned by five. It was interesting that two English students noted in their journals that their choices were serendipitous. One student wrote about how she came upon her topic quite by chance while listening to the radio, and another indicated that the eyes of Anne Frank on the cover of the book drew her to the diary. Because of this experience, she felt that she had to read the diary and to research Anne Frank.

The science students also indicated that interest was the predominant reason they chose a topic. However, it was interesting to note that these students also focused on what they considered would be beneficial information for their classmates as well as themselves. They chose what seemed best for the assignment; this did not include "the right amount of information."

Project Completion

The English students were realistic about the length of time they believed it would take for them to complete the project. Because they had been given two weeks, five believed that it would take them that long. One said that it would only take a week and a half. All six students completed the research

project. The time for completion varied from two days to two weeks. One student spoke about organizing his time, one spoke about learning the importance of time management, and one spoke about not having enough time to complete the project as well as she would have liked because it took her half of the allotted time to find a topic. She also admitted to continually being sidetracked and not having the willpower to stay on task.

All nine science students also completed their project. They were realistic about the time needed, but the biology students identified procrastination as a major problem because they were given a month to complete their project. One student felt that a month was too long and required time management skills that many students did not have. The chemistry students finished their project in five days. Perhaps this was due to a promised extra 5% on their mark if the project was completed early.

When asked why they intended to complete the research project, English students mentioned the importance of passing the course, needing marks, and preparation for university. In a similar vein, science students mentioned that it was important to complete the project because they needed the marks and they needed to pass the course. Only two English students and three science students mentioned that they would complete the project because they wanted to or because it sounded interesting. One science student also indicated that he would complete the assignment because "I'm not the kind of guy that doesn't complete projects."

Perceived Learning

Initially, all six English students believed that research projects helped them learn. One student was uncertain, qualifying the statement by stating that the focus was only on one specific topic so it was not general enough. In the final interview, five students indicated that they had learned from the project, and only one student indicated that he had not learned much. Students identified the following reasons for believing research projects helped them learn: developed research skills and application; prepared them for university; encouraged time management; developed synthesizing/writing/citation skills; interest inspires learning; in charge of own learning; and learn more about topic.

Initially, all nine science students also believed that research projects helped them learn. They all believed that the assigned research project just completed had helped them learn in the following ways: increased understanding; provided more in-depth knowledge; gave a new perspective on an issue; material was relevant to self and to the curriculum; learned how to use a variety of resources; and interest inspires learning.

It is interesting to note that the primary focus for the learning identified by the English students included research, writing, and management skills, whereas the primary focus for the learning by the science students seemed to be gaining knowledge and understanding. The science students emphasized

content more than process, and they were interested in learning more in their particular subject area. They were also interested in gaining an in-depth, well-rounded point of view about their subject matter.

When asked whether they would like to change the research assignment, three English students said Yes and three said No. One student believed that limiting the length of the writing limited her ability to express her viewpoint, one believed that the Holocaust was too sensitive an issue for research, and one felt that she should have focused more quickly. However, all the science students except one would have liked to change their project in some way. The biology students felt a need for time management and felt that summarizing the articles was too hard and took too long, whereas the chemistry students wanted a less structured project. One question remains unanswered: Were the students who wanted to change the project dissatisfied with the project design itself, or simply dissatisfied with their final product?

The following comparison chart (see Table 2) provides a summary of the data. For purposes of this report, biology and chemistry findings have been grouped together under one heading, Science.

Six teachers were involved in this study (see Table 3). The preliminary findings discussed here are a result of analyzing the interview I had with each teacher. The English and science teachers had five similar goals and objectives:

1. to give students the opportunity to experience the research process;
2. to help students develop research skills;
3. to help students develop independence (tied closely to increased confidence in their skills);
4. to prepare students for postsecondary schools;
5. to help students learn to communicate knowledge appropriately.

The two areas of curricular fit identified by both English and science teachers were:

1. the research project follows or is part of a particular unit of study;
2. the research project allows students to investigate a chosen area of interest.

The curricular fit for English seemed to be more process-oriented, whereas science appeared to be more product-oriented with an emphasis on technology and society. This may be because the science curriculum is based on the *Science Technology Society Model*.

All the teachers believed that the time spent on the research project was time well spent. The common reasons for this belief were:

1. develops time management skills;
2. develops student independence and responsibility;
3. promotes "real" research and relevance of course material;
4. develops necessary writing, process, and computer skills.

Table 2

<i>Categories</i>	<i>English</i>	<i>Science</i>
<i>Clarity and Expectations</i>	<ul style="list-style-type: none"> • Topic selection allowed choice (open-ended) • Students felt uncertain about requirements (their description not always clear) • Two students (2) changed initial positive feelings about project due to discovery that research was hard work, whereas the rest remained positive 	<ul style="list-style-type: none"> • Topic selection allowed choice within structure • Students felt certain about requirements (description clear) • Five students (5) changed positive and negative feelings about project due to discovery that research was hard work, but also that personal knowledge was gained through research
<i>Sources of Information and Help</i>	<p><i>Sources of information</i></p> <ul style="list-style-type: none"> • People, places, media, • Internet, print mentioned both initially and finally <p><i>Discussed project</i></p> <ul style="list-style-type: none"> • Teachers, librarians, classmates, family, no-one • Teachers and librarians talked to equally <p><i>Help with project</i></p> <ul style="list-style-type: none"> • Teachers and librarians, classmates, family • Teachers and librarians accessed equally 	<p><i>Sources of information</i></p> <ul style="list-style-type: none"> • People, media, Internet, print mentioned initially, but in the final analysis identified Internet and databases 13 times and books once <p><i>Discussed project</i></p> <ul style="list-style-type: none"> • Teachers, family, librarians, friends, classmates <p><i>Help with project</i></p> <ul style="list-style-type: none"> • Teachers, librarians, classmates, family, no • Teachers were access for help with the content (science seen as more specialized?) • Librarians access for computer help
<i>Skills for Accessing Information</i>	<p><i>Computer skills</i></p> <ul style="list-style-type: none"> • Good (3 students), needed help (3 students) <p><i>Research skills</i></p> <ul style="list-style-type: none"> • Needed help with analysis of web sites, appropriate search terms, reference citations, bibliography 	<p><i>Computer skills</i></p> <ul style="list-style-type: none"> • Good (6 students), needed help (3 students) <p><i>Research skills</i></p> <ul style="list-style-type: none"> • Needed help with locating best web sites, appropriate search terms, reference citations, bibliography

Table 2 (continued)

<i>Categories</i>	<i>English</i>	<i>Science</i>
<i>Understanding Research Process</i>	<p><i>First task</i></p> <ul style="list-style-type: none"> • Choosing a topic, sentencing focus <p><i>Tasks to complete project</i></p> <ul style="list-style-type: none"> • Accessing information (prime concern) • Writing paper • Managing time • Interest identified as most important • Other reasons: Serendipitous interest, right amount of information for the assignment 	<p><i>First task</i></p> <ul style="list-style-type: none"> • Choosing a topic, locating information (half had already chosen their topic for research) <p><i>Tasks to complete project</i></p> <ul style="list-style-type: none"> • Accessing information (prime concern) • Writing paper • Looking at previous work for ideas • Interest identified as most important • Other reasons: teacher suggestions, benefit to others, best for the assignment, easy • Note: Idea that the knowledge gained will benefit others is interesting and new.
<i>Choosing a Research Topic</i>	<ul style="list-style-type: none"> • All completed project • Time for completion – 2 days to 2 weeks • Realistic about length of time needed, but identified a time management issue (too little time given) • <p><i>Rationale for completion</i></p> <ul style="list-style-type: none"> • Pass course, receive marks, preparation for University, wanted to, and sounds interesting • Extrinsic factors mentioned three times more then intrinsic 	<ul style="list-style-type: none"> • All completed project • Time for completion – one week to one month (biology); 3 to 5 days (chemistry) • Realistic about length of time needed, but identified a time management issue (too much time given – biology) <p><i>Rational for completion</i></p> <ul style="list-style-type: none"> • Receive marks, interested, need to learn, and “that’s who I am” • Extrinsic factors mentioned twice as often as intrinsic
<i>Project Completion</i>	<ul style="list-style-type: none"> • Initially all students positive that research projects helped them learn 	<ul style="list-style-type: none"> • Initially all students positive the research projects helped them learn
<i>Perceived Learning</i>		

Table 2 (continued)

<i>Categories</i>	<i>English</i>	<i>Science</i>
<i>Perceived Learning (continued)</i>	<ul style="list-style-type: none"> • Final analysis of this research project: 5 students had learned from the project, 1 had not learned much <p><i>What learned</i></p> <ul style="list-style-type: none"> • Research skills/application • Preparation for University • Time management • Synthesizing/writing/citation skills • More about topic • Inspired through interest • In charge of own learning • <i>Focus:</i> research and writing skills <p><i>Changes:</i> length, topic, time</p>	<ul style="list-style-type: none"> • Final analysis of this research project: all students had learned from project <p><i>What learned</i></p> <ul style="list-style-type: none"> • Greater understanding • More in-depth knowledge • New perspective • Material relevant to self and curriculum • How to use variety of resources • Inspired through interest <ul style="list-style-type: none"> • <i>Focus:</i> gaining knowledge and understanding <p><i>Changes:</i> requirements, product, time</p>

The science teachers also believed that the research project helped to stimulate thinking and provided a different teaching strategy for curriculum delivery.

One issue that came up in five of the six interviews was time. One teacher was concerned with the lack of time management as evidenced by some students, but this may be indicative of a bigger issue: how to integrate the research project in the unit. Four of the six teachers interviewed identified the time spent on the project as being crucial to the success of the research project. These four teachers said they would like to spend more time on the project. Three of the science teachers, however, felt that due to curricular restraints, this was not possible. One English teacher decided to try a new approach next semester. In order to allow the appropriate amount of time for student to focus and process, the research project will begin with the unit and be integrated over a six-week period.

Table 3

<i>Teachers</i>	<i>English</i>	<i>Science (Biology/Chemistry)</i>	<i>Total</i>
Female	1	3	4
Male	1	1	2
Total	2	4	6

40

Discussion of the Findings

Did these findings answer the question asked initially: What factors motivate different types of students in different content areas to complete assigned research projects successfully? The question involved two aspects: completion of research and meaning-making. Factors that appeared to encourage the completion of research included clarity and expectations about the research assignment, identifying and accessing sources of information and help, choosing a research topic that was both appropriate and interesting, being given a sufficient amount of time, and being graded on the assignment. Factors that appeared to encourage students to develop confidence in their ability to create meaning from their findings were the students' perception and understanding of the purpose for the research project. However, this aspect of the study needs further exploration. These factors seemed to be relevant to both English and science students, although further exploration in the different content areas is also necessary. The six identified factors that encouraged project completion and the creation of meaning were combined into the following four major themes: access to information; task perception and understanding; research purpose; and time.

Access to Information

Students' access to information was dependent on the computer and research skills they had for accessing information. It was also dependent on the sources of information they identified as appropriate for their project and on the people students accessed for help. One student indicated that initially she wanted only facts, but in the end she used another person's experiences because she realized the importance of giving the facts a "face." In other words, both primary and secondary sources of information were important to the students and were seen as important to research. In the analysis of her longitudinal case study, Kuhlthau (1993) indicated that librarians played a minimal role in the participants' search process. It was interesting to note that the English students involved in this study consulted librarians as often as they did teachers, but the science students consulted their teachers more often. Librarians played a minimal role in the science project. One participant in Kuhlthau's study was determined to be independent and did not access help. Two students in this study remained independent as well; one did not wish to discuss her project or access help, and one indicated that she had no time to seek help.

Task Perception and Understanding

Task perception and understanding depended on the clarity of instruction, the feelings and expectations of the students, and the research process itself. Students needed to be aware that the process of research involved both cognition and affect. Allowing students to select their own topic created more interest, focus, and intrinsic motivation; however, there needed to be

clarification that choosing a topic was not the first task. This misunderstanding may have happened because students had not been given enough opportunity during their junior and senior high school years to do research projects. One science student indicated that the last time she remembered doing research was in elementary school. In a study of high school students, Kuhlthau (1993) indicated that students did not have a clear understanding of a sequence of tasks in the research process. The students involved in this study were unclear as well.

The Research Purpose

The research purpose and the students' understanding of this purpose were based on past experience, current relevance, and future application. Students who had experienced success in previous research projects felt more confident and could more easily identify what, where, and how to access information. They could also apply the learning and understanding gained from research projects. Two students, one in English and one in science, indicated that their past experience with research projects in both the English and science areas made them feel more confident about research in general. The majority of the students in this pilot study completed the project because they understood part of the purpose for their research project was to get a mark and pass the course. One student identified by McGregor (1995) in her study also understood the purpose of a research project as simply a way to get report card marks. Garland (1995) indicated that students felt more satisfaction with the research process if they understood how they were being evaluated. She went on to state that a direct connection to course content was also valued and provided relevance.

Time

The time given to complete the research project and the management of time by the students involved were identified as crucial to the completion of a research project. Both the students and the teachers in this study recognized that unless time was well managed, the project was not completed to the students' potential. Kuhlthau (1993) found that the time allotted was important and that students often miscalculated the amount of time necessary for completion.

Implications for Practice

Although numerous implications for practice arise from this small study, only four are discussed here. These are project design, project introduction, marking, and teacher expectations.

Project Design

When designing a project in any curricular area, teachers and teacher-librarians should carefully consider topic selection, process, time allotted,

final product, and relevance of the project to both the student and the curriculum.

Giving students a choice within the structure of specific curriculum may help to alleviate the feeling that a topic must be chosen quickly and that there is little time to browse and decide about what is of value and interest.

We cannot assume that students have computer and research skills. Therefore, a basic orientation about search strategies, databases, and the Internet should be provided before and during a research project. Before the orientation, a needs assessment of the students involved in the research project should take place to ensure that students are being taught the skills they currently lack.

Because time and time management appear to be crucial to successful project completion, it may be helpful for the teacher and teacher-librarian to assist with this throughout the project. This could be in the form of research journals, calendars, and weekly summary reports by the students. It may also be beneficial to plan a research project that would begin and end with a specific unit of study over a number of weeks. This would allow the teacher and the teacher-librarian to assist with time management skills, as well as give the students time to integrate new information into their current knowledge.

Allowing students to design their final product may create more interest in the research project. Obviously, this product would need to meet the requirements of the research project, but the thoughtful analysis about how best to present the information gained through research would add a component of critical thought to the project.

It is also important that the research project be viewed as relevant to the students as well as to the curriculum being studied. The most excited, focused students in this study were those who chose topics of interest and relevance to their current life situation.

Project Introduction

Students' expectations about the research project are often based on how clearly they understand the instructions. Therefore, it may be valuable for teachers and teacher-librarians to check for understanding through either oral or written feedback from the students after the research project has been introduced. Misconceptions and misunderstandings could then be clarified before beginning the research process.

It is also important for students to have a comprehensive knowledge of resources available, as well as knowing how and where to access relevant information. This includes a knowledge of electronic resources, print, media, institutions, and people. Student-developed pathfinders designed for each research project would assist in this area. Before beginning the research project, students could brainstorm resource possibilities, and one pathfinder could be developed by the teacher or teacher-librarian by combining their

ideas. This pathfinder could be expanded as students discover other sources of information while completing their research.

Marking

Marks seem to be an important reason for completing a research project. Because students who are more involved in process seem also to be more involved in making meaning for themselves (McGregor, 1995), marking both the process and the product may encourage students to focus on making the information gained in the project meaningful for themselves.

Teacher Expectations

Students always seem concerned about what the teacher wants and expects in their final product. Perhaps students need to hear their teacher and teacher-librarian articulate both the long-term and short-term goals for each research project. This may increase student understanding regarding the importance of the research process and the relevance of research to lifelong learning. It is also important that teachers and teacher-librarians take the time to explain the how and why of research and that they do not assume that students already know this. Perhaps easing other homework assignments during the research project would also help to reinforce the importance of research.

Further Directions for Research

As expected, more questions arose from this study, and these may provide a starting point for further research. Because not all the goals and objectives for research assignments are immediately measurable, students need to understand that research assignments can meet both process and product goals. It would be interesting to assess whether allowing students to focus more on process would make the project more meaningful to the students and, in turn, eventually yield a better product. It would also be interesting to explore whether the process orientation of the English curriculum and the product orientation (i.e., technology, facts, etc.) of the science curriculum makes a difference in the types of research assignments that teachers create. Would the process or product orientation of the curriculum make a difference in the interest students have in completing the research assignments? Because the research in science focused on a particular curricular area and/or questions that they might expect on their final examination questions, the students may have found the science assignments more immediately relevant than the English assignment. The whole issue of relevance and meaning needs to be explored in more depth; this issue will be the focus of my dissertation research.

References

Burdick, T. (1998). Pleasure in information seeking: Reducing information aliteracy. *Emergency Librarian* 25, 13-17.

- Garland, K. (1995). The information search process: A study of elements associated with meaningful research tasks. *School Libraries Worldwide*, 1(1), 41-53.
- Kuhlthau, C.C. (1993). *Seeking meaning: A process approach to library and information services*. Norwood, NJ: Ablex.
- Kuhlthau, C.C. (1998). Constructivist theory for school library media programs. In D. Callison, J.H. McGregor, & R.V. Small (Eds.), *Instructional Intervention for Information Use: Research papers of the sixth Treasure Mountain Research Retreat/or school library media programs held in Oregon March 31- April 1, 1997* (pp. 14-22.). San Jose, CA: Hi Willow Research and Publishing.
- McGregor, J.H. (1995). Process or product: Constructing or reproducing knowledge. *School Libraries Worldwide*, 1(1), 28-40.
- Merriam, S.B. (1998). *Qualitative research and case study applications in education*. San Francisco, CA.-Jossey-Bass.
- Miles, M.B., & Huberman, A.M. (1994). *Qualitative data analysis*. Thousand Oaks, CA: Sage.
- Small, R.V. (1998). Motivational aspects of library and information skills instruction: The role of the library media specialist. In D. Callison, J.H. McGregor, & R.V. Small (Eds.), *Instructional Intervention for Information Use: research papers of the sixth Treasure Mountain Research Retreat for school library media programs held in Oregon March 31-April 1, 1997* (pp. 220-231). San Jose, CA: Hi Willow Research and Publishing.
- Small, R.V. (1999, January). An exploration of motivational strategies used by library media specialists during library and information skills instruction (55 paragraphs). *School Library Media Research* [On-line]. Retrieved from <http://www.ala.org/aasl/SLMR/motive.html>
- Small, R.V., & Amone, M.P. (2000). *Turning kids on to research: The power of motivation*. Englewood, CO: Libraries Unlimited.

Author Note

Lois Barranoik is a doctoral candidate in the Department of Elementary Education at the University of Alberta, Edmonton, Alberta, Canada. She has a BA, a Professional Diploma (After Degree) in elementary education, and an MLS. Before returning to university, she was a classroom teacher and teacher-librarian in elementary and secondary schools, as well as a learning resources consultant for Edmonton Public Schools. Lois is president-elect of the Alberta Teachers' Association Learning Resources Council.