How Do Low Achieving Students in an Urban High School Learn with Information?: An Exploratory Study[*]

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ABSTRACT

This study investigates how high school students with low academic achievement seek and use information. Participants were seven US students in an American Literature and Composition course of the 11th grade Remedial Education Program who completed a class project that required comprehensive information seeking and use. Data were collected through comprehensive observation and individual interviews with each student, the teacher, and two library media specialists. Additionally, we gathered and analyzed the instructions the teacher and the two library media specialists provided and all documents each student produced to complete the class project. The process of data analysis was supported by QSR NVivo. The findings of the study implied that students experienced cognitive and affective challenges for their information seeking and use required for the tasks and suggested that technological and individual conferencing would motivate the students to continue their information seeking and use. We then conclude the study with some important implications that can be used as a basis for designing information literacy instructions for students with low academic achievement.

Keywords: Information Seeking and Use, Learning, Low Achievement Student, Information Literacy, Cognitive Demand, Affective Demand, Library Media Specialist, Instructional Strategy

1. Introduction

The advance in information technology has created a learning environment that students can have access to a variety of information resources and learning tools. Leaning in this information rich environment is often challenging because it requires acquiring complex skills to apply. Students need to develop skills to access, evaluate, and use information, effectively and intellectually, with proper tools and/or technology. Thus, it becomes increasingly important for effective library media program to intervene teaching these skills for students to enhance their learning and for teachers and library media specialists to work together when designing the instructions and class projects that can enable students to practice such skills.

One of the major concerns for teachers and library media specialists is the different learning needs of individual students. Particularly in an urban general high school setting, the diversity in academic competency and the levels of information skills make it hard for educators to accommodate the different learning needs of individual students. Teachers often try to accommodate it by adjusting their lectures and instruction strategies for students with different learning needs. However, it is not an easy job for teachers to develop a class project that involves information seeking and use and that, at the same time, can accommodate all students with different levels of information skills. The challenges and burdens to address the different needs of individual students all remain for teachers and library media specialists.

Meanwhile, students have difficulties as well. Students without appropriate skills for finding and using information may suffer while learning and likely fail to carry out their class requirements. Whether a student is successful or not may largely depend upon the student's own ability to access, evaluate, and use the information that meets his/her own learning needs. Thus, developing a careful guidance for information seeking and use is important especially for those low-achieving students to enhance their learning.

Unfortunately, we do not yet have a complete picture of the complexity of information seeking and use by students at all levels. Researchers to date have been focusing either on studying the information skills of average- to high-achieving students (Kuhlthau 1993; 2004; 2008; Bowler 2010) or on examining students without identifying their levels of academic achievement (Heinstrom 2006). Only a handful of studies addressed information seeking and use by low achieving students (Chung and Kim 2007; Markey 2015), and there are few studies conducted in Korean school settings with low achieving students. More studies need to be done to understand the needs of low achieving students while seeking and using information.

Although most Korean schools assign "performance assessment projects" that require information literacy skills to their students, teachers and library media specialists do not adequately prepare students to conduct the projects. Often, students are left alone to carry out the process of producing their projects without the help of teachers and library media specialists. Teachers and library media specialists need to develop information literacy instructions using the successful theoretical framework that address the learning needs of students at different academic levels.

The goal of this exploratory study is to better understand the different needs of those students, during information seeking and use, with low academic achievement. It is our belief that the study will provide a starting point for future researchers when employing low achieving students. For practitioners, the study results will provide insight into the design of information literacy instructions particularly for low achieving students. Particularly, the results of this research will suggest some useful ways to address the learning needs of low achieving Korean high school students.

In order to achieve the goal of the study, the following research questions were investigated:
a. What are the challenges that low achieving students have during information seeking and use for learning?
b. How do the teacher's instructional strategies affect the student's information seeking and use?

2. Literature Review

2.1 High school students' information seeking and use

Our knowledge on students' information seeking and use is still limited (Chung and Neuman 2007; Julien and Barker 2009; Shenton 2004), but describing it is not a simple task. Because the nature of adolescent information seeking is complex (Shenton 2007) and multi-dimensional (Todd 2003), the review of the studies needs careful examination of relevant research literature. The review in this section focuses on some of the important studies with high school students in school settings.

Kuhlthau (1991; 1993; 2008) provided important insight into the field of students' information seeking and use. She developed the *Information Search Process* model that delineated six stages

of information search process from cognitive, affective, and physical perspectives. The process moved along as students initiate a task, select a topic, explore information, formulate focus, collect information, and present their final product. The model is important in describing human information behavior as it holds its validity with diverse groups of users including high school students and adults (1991; 1993; 2004) and within online environments (Kulthau et al. 2008).

One of the major contributions of Kuhlthau (1991) is that she began to discuss students' affect in relation with the success of students' information seeking and use. She found that uncertainty and anxiety are the common feelings students have as they find meanings from the information in the beginning of the process, and confidence is the feeling students achieve in the later process. Nahl (1995; 2001) defined and emphasized the role of affect in information behavior and pointed out the development of cognitive as well as affective skills such as sufficient motivation, positive attitude, and coping skills. Bowler (2010) examined how high achieving adolescents use metacognitive strategies to deal with their affect in information seeking and reported self-regulation of curiosity and interest was a metacognitive strategy for high achieving adolescents. Although curiosity and interest were a positive aspect during information seeking, controlling curiosity was an important skill.

Students' cognitive activities in information seeking and use are also important considerations because those activities directly relate to learning. Kuhlthau (1991; 2004) pointed out the importance of *focus formulation* as a critical stage that determines the success of students' information seeking and use. Todd (1999; 2003) reported that adolescent girls had five perceived effects of exposures to information. They clarified, modified, confirmed, or changed their knowledge, belief, and values as well as decided personal positions. Chung and Neuman (2007) indicated that junior honor students in a high school understood and learned as they searched information and that interactivity and serendipity are two characteristics in their understanding, activities, and strategies. These honor students in a high school used all levels of thinking skills indicated in the revised Bloom's taxonomy (Anderson, Krathwohl and Bloom 2001) in information seeking and use (Chung 2003). More research indicated that students demonstrated higher-order thinking skills in information seeking and using (e.g., McGregor 1993; McGregor and Streitenberger 1998).

Research also reported that students had challenges in accessing information due to cognitive as well as affective barriers (Neuman 1993; Nahl 2007). Students' information skills are under-developed even when schools' curricular mandates information literacy instruction (Julien and Barker 2009). Interestingly, however, high school students seem to have some confidence in accessing and using information. Kovalik et al. (2012) found that high school students believed they had

basic information skills such as locating and using information but expressed the need for guidance in selecting the information sources for searching. Interestingly, her participants had clear focus as they began to use library sources. Williamson et al. (2006) reported that students in different grade levels enrolled in different subject classes from four secondary schools had confidence of their having required information skills. More recently, high school students in low socio-economic background were found to be better taught by "informed learning" approach in which students use information to learn (Smeaton et al. 2016).

Focusing on the use of the Web sources by high school students, Fidel et al. (1999) found that students showed interests on searching information on the Web while completing their school assignment but made quick decisions on accessing and evaluating information found. Madden et al. (2007) echoed the findings from previous studies that the Web was the students' highest choice among all information resources. They also reported that young students relied on people as an information resource when finding information whereas older ones used "artifact-based information" as their assignments get more specialized.

2.2 Low achieving students' information seeking and use

We know very little about information seeking and use by low achieving students. The reported barrier in studying this group of students is the difficulties in collecting valid and sufficient research data. Kuhlthau (1989) reported that she attempted to validate her *Information Search Process* model with high, middle, and low achieving high school students. However, she had to exclude low achieving students as study participants due to the fact that they "proved to be a difficult group to track because of frequent absenteeism" (p.225). In fact, the low achieving students did not complete all of her "process survey" conducted at three points of time while seeking and using information. We need to remember that incomplete data collection from low achieving students does not mean that they did not carry out their information seeking and use. By excluding low achieving students, her *Information Search Process* model has limitations in its application to low achieving students.

In school settings, one of the important educational goals is to teach students' thinking skills, and learning tasks requiring information seeking and use closely relate to exercise students' higher order thinking skills. Our common belief is that low achieving students often have difficulties because of inabilities to perform the learning tasks requiring higher order thinking skills. However, Zohar & Dori (2001) found that low achieving students can gain higher order thinking skills

when taught and argued that educators should encourage teaching higher order thinking skills.

In library and information science discipline, we found a few studies on low achieving students. Although the study did not define students with low-level of information skills are also low achieving students, Gross (2005) analyzed how students with low-level of information skills behave and why they fail. By using competency theory, Gross explained that they often overestimate their abilities, develop strategies that do not work, and make poor decisions as they move along with their information seeking and use. She suggested that schools should carefully consider this when designing information literacy instruction for students with a low level of information skills. Gordon and Lu (2008) studied reading behavior of low achieving students and reported that these students considered the relevance of reading materials to their personal experience as important factors for their reading preference. The researchers also found that the students preferred alternative reading materials from media other than books.

We know so little about how low-achieving students seek and use information so that our knowledge consists of bits and pieces of the research findings. Although Kuhlthau (1989) indicated that low achieving students were not good study participants for a study required prolonged participation, we have to understand them in order to accommodate their learning needs. The lack of research on this important issue limits the professional practice by teachers and library media specialists in teaching how low-achieving students access, evaluate, and use information. Far more studies need to be done in order to understand information seeking and use by low achieving students.

3. Study Design

3.1 Participants

Seven students were selected from an urban high school in a metropolitan area of the southeastern region of the United States. All participating students were in the 11th grade and enrolled in an American Literature and Composition class of the Remedial Education Program (REP). Using *purposeful sampling* (Patton 1990), the researchers asked the classroom teacher to choose students who did not have the behavioral issues in classroom and who were willing to participate in our study. The classroom teacher initially excluded half of the students in his class who had behavioral issues such as frequent absences. Seven students out of the remaining eight students volunteered

(with the approval of their parents) to participate in the study. These students consisted of three females and four males. Five of them spoke Spanish as their first language and completed their ESL program in the school. The consent forms were prepared in English as well as Spanish for better understanding, and all seven students and their parents signed and returned their forms.

3.2 Students' tasks

During seven weeks, each student conducted a class project that required independent research on a selected author in American literature using at least five information resources including three print sources and two online sources available through the library media center. The final products of the class project were to write a two-page paper about the selected author and to do a *PowerPoint* presentation on their research. Other sub-components of the project included completing at least fifteen note cards, five source citation cards, a research journal, and two questionnaires prepared by the teacher. The purpose of the first questionnaire was for individual students to do preliminary research to select one between two authors. The second questionnaire served as a research guide for students to generate their papers. The teacher scheduled seven weeks for the instruction and library research needed for completing the class project and asked students to conduct their research during class sessions only.

The teacher's goals for students were to find information on the questions and then to synthesize the information to write a paper. Students were required to use five information sources for their projects: three print sources and two online sources.

3.3 Methodology

This study used qualitative research methods in the constructivist paradigm (Guba and Lincoln 1998) because of the exploratory nature of the research questions and of the characteristics of low achieving students as study participants. The study needed to employ the methods allowing some flexibility in addressing emerging concerns and issues. The major problem reported involving low achieving students was students' unexpected absences when data collection was scheduled (Kuhlthau 1989). Since qualitative research methods allow the researchers to respond as the un-expected issues arise, the researchers had additional reason to employ qualitative research methods to address students' behavioral issues, such as frequent absences and neglecting class schedules for assignments.

3.4 Data collection and analysis

Data were collected for seven weeks during students' class projects. The researchers adopted "interactive" (Neuman 1993) and "comprehensive" (Chung and Neuman 2007) observation and individual interviews with the seven students, the teacher, and two library media specialists. Interactive observation allowed the researchers to collect data on students' emerging questions and opinions as students work on their tasks. Observation was also comprehensive in that the researchers jot down all of the student activities involved from the beginning to the end of the project in class. A set of two interviews was conducted per student: One was conducted in the beginning for twenty minutes and the other was done at the end of their projects for thirty minutes. Three packs of notepads were used to take handwritten notes for observations, and all the individual interviews were transcribed. All documents each student produced in completing the class project were gathered to establish greater confidence in the inferences that were supported by observation and interviews.

Data were analyzed using inductive reasoning to infer the emerging issues and themes from the data gathered. Interviews with individual students, the teacher, and two library media specialists were transcribed and imported to QSR NVivo, and several hundreds of hand-written observation notes were typed and also imported to QSR NVivo. Students' documents as well as the teacher's instructional materials were all obtained and copied for manual analysis. Because students' final papers were not completed, they were not included for analysis. Other written comp onents of the projects － students' answers to the teacher's questionnaires, source cards, note cards, and *powerpoint* slides － were analyzed. Initial coding categories were developed from studying relevant literature, and the coding categories were revised and updated as data analysis progressed. Coding was done by two researchers. Each researcher coded, reviewed, and updated the coding categories. Then, the researchers compared and discussed to develop the analysis that are agreed by both researchers.

3.5 Limitations

This study has limitations due to its exploratory in nature. First, since the study employed qualitative research methods (Guba and Lincoln 1998), the findings cannot be generalized but can be transferred to another similar context. Second, only seven students in American Literature and Composition class participated in the study. Third, six of seven participating students did

not finish the final papers as required. These factors might lead to the specific findings reported in this paper.

4. Findings

Findings indicated that (1) qualitative research methods were effective to collect data from low achieving students, that (2) they had great difficulties in coping with the cognitive as well as affective demands that were involved with information seeking and use, and that (3) students' information seeking and use were enhanced by providing technology tools and instructional mediation.

4.1 Low achieving students and study participants

Having low achieving students as study participants presents some challenges for researchers during data collection. The students participated in this study, except for only one student, did not complete the required final paper for the project, so the researchers were not able to collect all the data as originally planned. Students began and worked on all the components of the project, such as answering pre-designed questionnaires, making note cards and source cards, creating *powerpoint* slides, and writing a paper. However, six out of seven students did not complete their papers. All seven students had begun a draft version for their papers, but six students left them in draft forms until the end of the projects. Also, one student did not finish making the *powerpoint* slides due to his own time constraints.

The classroom teacher also expressed his concerns about students' irresponsibility about keeping school related materials. Because the teacher had students work on their projects only during class sessions, and because the teacher collected all of the students' folders keeping all of the relevant documents at the end of each of the class sessions, students did not lose any documents or written works related to their projects. Therefore, students were able to keep all of their documents produced during the period of their projects.

Qualitative research methods were effective in addressing emerging concerns in data collection activities from low achieving students. Purposeful sampling was effective because the researchers were able to exclude the students with some behavior problems such as frequent absences. For this study, the researchers asked the teacher to select students who could contribute the purpose of the study. Students were helpful providing verbal data to the researchers. For data collection,

the researchers made it clear that the purpose of collecting data is not to evaluate but to learn about students. Then, students seemed to consider the researchers as helpers for their class. When students had to do their work individually in class or in the school library media center, they frequently asked questions about how to do the required tasks during data collection.

During observation sessions, students became familiar with the researchers. Therefore, students shared their concerns or opinions regarding their projects during observations and individual interviews. Open-ended questions for individual interviews were, however, not effective to get verbal information from students. For example, when the researcher asked how they found new information indicated in their documents, one student said, "I just did it. I don't know how I did it. But, I did it," and another student said, "my problem is I can't explain how to do. I only know I could do it, but I cannot explain how I do." These statements indicated how low achieving students reacted to open-ended questions and had difficulties in articulating their thoughts. The researchers often rephrased the questions that students did not answer or did not understand.

The researchers also found that interactive and comprehensive observation was the effective data collection method to draw verbal data from students. Interactive and comprehensive observations enabled the researchers to observe and ask questions when they arose. Students seemed more comfortable to express their thoughts during informal observations than during individual interviews. When a student was absent, however, the researcher could not observe him/her but was able to schedule the interview later.

4.2 Cognitive challenges

Despite their initial interest about the project, low achieving students could not smoothly follow their information seeking and use because of their lack of information skills, reading ability, and cognitive flexibility. Their difficulties in the areas above put much cognitive burden for students to complete the tasks required.

4.2.1 Lack of information skills

Students lacked the needed information skills for accessing, evaluating, and using information. When the teacher planned and assigned the project, he expected that students had the level of information skills taught in lower grade levels. However, students did not have the basic level of information skills. When accessing information from print encyclopedias for preliminary research to select their topics, four of seven students used an author's first name to locate an entry about

the author in an encyclopedia. Therefore, on the first day of the projects in the library media center, the teacher and the library media specialist had to make sure that all students knew that an author's last name should be used for locating information about a person.

Most students did not have experiences in searching online sources accessible through their school library media program. When students need to perform a search, they did not like to search the school's online catalog because they did not have skills to search effectively. One student mentioned that he usually went to the shelves directly to browse and select the books needed because it was always hard for him to sort through all the books retrieved on the school's online catalog. Three students mentioned that they had "never used their school's online catalog until this project," and four students indicated that it was their first time they would be using the databases that the library media specialists demonstrated.

In addition to the fact that students were novice searchers of school's library catalog as well as online sources, students were tardy to get any books from the library shelves. When the teacher asked the individual students to get one book written by the selected authors from the library shelves, two students got books by themselves. the teacher searched and found books for students who did not have any to use for their projects. For two students who had library fines that prohibited them from checking out more books under their names, the teacher and the library media specialist discussed and made a special arrangement for them so they could check out books for the teacher's class only. Despite the special arrangement made by the teacher and the library media specialist, students did not seem so interested in reading the books. One student said that he could work on the project only with online sources.

Students were, however, excited when the library media specialist introduced school's subscription databases to them. Contrary to the fact that students were uncomfortable searching the school's library catalog, searching these databases were perceived not difficult because, for their projects, they could search for the authors only and could browse the full text during their search. All of them used *Discovering Collection* (Gale 2007) database for their project. They often reviewed and printed out the first and/or the second articles from their search results. There were two things students particularly liked about using *Discovering Collection* (Gale 2007): (1) Plot summary for major works was available, and (2) MLA style of citation was given at the end of an article.

The teacher and the library media specialists told students not to read the information for word to word and to skim through or use index to find any relevant information. However, it seemed difficult for students to skim the information presented because of their reading ability and information skills.

4.2.2 Lack of reading ability

Students' reading ability to read the information in a source material was another hurdle. Lack of reading ability prevented students not only from understanding but also from drawing meaning from the information in a source material. During students' preliminary research to select their author between two authors, students had to answer eight questions per author in the questionnaire the teacher distributed. They all answered seven questions that asked for factual information at face value in the sources, but none answered the remaining "why" question that asked students to draw meanings from the information in the sources and to formulate their own statements. Two students did not answer the question, "Why is this person a famous literary figure? Why do we still read his or her writing?" After selecting an author for individual projects, the teacher developed and distributed the second set of questions as the research guides for the projects. Students, however, had difficulties to complete. The questions designed to an author consisted of three parts: Information about the author's biographical details, the author's major works, and literary criticism. Students, however, overwhelmingly focused on the questions asking the biographical details when reading and extracting information about their authors. On their *powerpoint* slides, all seven students had their authors' biographical information such as birth and death dates, three students added the titles of the major works by their authors, and none provided any literary criticism information on their authors' works. Although the sources that students accessed contained information on literary criticism of their authors as a section, they ignored and skipped it due to their cognitive burden to read and extract the information in the sources.

4.2.3 Lack of cognitive flexibility

The student participants in this study were not cognitively flexible enough to progress and to complete their information seeking and use. Cognitive flexibility is defined as "the ability to spontaneously restructure one's knowledge in many ways in adaptive response to radically changing situational demands" (Spiro and Jehng 1990, 165) and can be applied to a person's cognitive ability to carry out a task when ill structured problems are given. The students in this study lacked cognitive flexibility in applying the sub-components of the class project to final papers. Students had difficulties in focusing on the sub-components of tasks as a whole to write their final papers.

The teacher clearly mentioned that the list of questions were designed to give students ideas to look for the kinds of information about their authors and to compile the collected information into a final paper. However, students did not synthesize the information they collected for the questions in the research guides and the source citation form. Six out of seven students did not

finish the final papers despite the fact that they had the information required by the research guides, and none of seven students did not include bibliographic information on their own source citation forms into their final papers.

The students in this study did not seem to distinguish relevant background information that helped them understand their topics and pertinent information that could be used directly for their papers. When the researchers asked students if there was information that helped them learn more about their authors but did not use in their papers, they answered that all the documents should be usable for their papers because all of them were about their authors and because they came from the recommended sources. Four students commented that they did not need even five sources required for this project, and just one or two encyclopedia articles were sufficient for completing their projects. In fact, these four students used only four sources. All indicated that these students did not try to learn about their authors by reading information from different sources and that they wanted to extract the information that could be directly used for their projects. Thus, students were not cognitive flexible to process the relevant information found in the information sources for their learning and to restructure the relevant information and select only pertinent information for developing their final papers.

Students had difficulties in citing sources particularly using the source citation form the teacher distributed. For example, students thought that a publication should contain all of the elements on the form － such as author, editor, title of the article, title of the source, edition, publication year, and publisher. All students often were not able to distinguish an author from an editor, and five of seven students had hard time in distinguishing a source title from an entry title. Therefore, students thought that they needed to extract "all" elements on a publication when, in fact, there was only a few relevant information indicated. This also indicate the lack of cognitive flexibility in extracting the appropriate bibliographic information from the sources.

4.3 Affective challenges

Findings showed that students had difficulties in coping with the affective demand assumed for their information seeking and use and that students' affective state changes as they progress. Although they showed interest and confidence in the beginning of the project, frustration, intolerance, and boredom were the major affective states students had as they progress their projects. Particularly, students' frustration occurred throughout their information seeking and seeking but was eased from time to time when the teacher and the library media specialist provided help. Use of technology

enhanced students' interest to overcome students' boredom. Students' intolerance affected the quality and the process of their information seeking and use.

4.3.1 Changes in affect states: From interest and confidence to frustration, intolerance, boredom

When the teacher introduced the class project, students expressed interest and confidence that they could complete it. Students believed that they "just had to follow the steps in guidelines" provided by the teacher and the library media specialists. On the next day when they used the library media center to do preliminary search to select their own authors, students were frustrated because they were overwhelmed by amount of the information presented in the sources both in print and online. The teacher required students to use at least five sources and students located the relevant information by using their authors' names. Locating or typing using their authors' names in print sources or online databases enabled students to find the relevant books and articles. A couple of students misunderstood that they could select sources written *by* their authors, not *about* their authors. So, one student said that he "got mad" because he had to select only five of his author's works as his authors left so many literary works. As high achieving students in Chung and Neuman (2007) did, low achieving students also felt a sense of accomplishment simply by having the physical copies of the documents about their authors. The teacher had to constantly remind students that "having paper copies is not the end of research."

However, their interest and confidence could not last long. Clearly, lack of information skills to complete all parts of the projects frustrated students and caused loss of their interest and confidence in completing the projects. One student mentioned that she was "confused" and did "not understand why" she had to do "other papers" such as source citations and note cards to write her final paper. All students were particularly frustrated for citing their sources in MLA style that was required for projects. Students were not shy to ask for help to the teacher, the media specialist, and even the researchers when they felt frustrated. They skipped the part they did not know and waited until any adult came to instruct them. Although the teacher's instruction was given to them in advance, finding and synthesizing elements required to find for the sub-components of the project and writing them down on paper were big hurdles for all of them.

Students were also frustrated when accessing and reading information presented in information sources due to the amount of reading required for the project. One student thought that the project would be very difficult for her because she had to "read a lot and write a lot." Unlike the cases on students' work for citing sources, no one asked any questions or help about comprehending

information from the source materials to the teacher and/or the library media specialists. As a result, students lost their tolerance while reading and extracting information from a source material and often were frustrated to cope with the task. So, the teacher tried to instruct reading strategies for students. For example, he distributed highlighters to individual students to use when reading and asked students to go over the highlighted text later for writing. During observation, however, five students focused on reading a first few paragraphs only and then did not read any further. One student said that, "I don't need to read any more because I can find what I need here." This student clearly did not want to read more about the authors.

Students demonstrated low level of tolerance to the uncertain nature of information seeking and use involved with the class project. The level of tolerance decreased noticeably as the difficulties in dealing with the affective demand (e.g., frustration) increased over the course of seven weeks. Although students showed their interest and confidence on researching their authors in the beginning, they seemed to lost their interest. One student even mentioned that, "I have short attention span, so it is hard for me to keep focused." Students' interest for the project in physical activities for locating information in print and online could not continue to make students finish their projects. When the teacher asked students to write their papers by hand in the classroom before they use wordprocessing devices for typing, they were not focused on writing and the teacher constantly asked students to use the class time wisely and not to be distracted.

Due to their decreased interest and tolerance and increased frustration and intolerance, students were bored with their projects as they progressed. It was unexpected to observe that two students were not willing to make any corrections even though the students knew that they were wrong on some of the questions. When the researchers asked two students why they did not correct their wrong answers, both of them simply said, "it's okay." Having wrong answers did not seem to bother them at that moment. In the library media center, when individual students worked around a table to extract information from sources to answer the questions in the research guides, they often had personal conversations and did not concentrate on their work. However, when the teacher and researchers go around a table to table in the library media center to offer help, then they raised their hands and asked questions.

4.4 Useful help and strategy

Students' interest and concentration on their project were enhanced when the teacher provided individual conferencing and technological tools for students to use.

4.4.1 Individual conferencing

Individual conferening could relieve students' frustration and facilitate students' information seeking and use. The teacher prepared many instructional sessions, such as lectures about doing research and formatting MLA style citation as well as handouts for students to support their information seeking and use. However, students did not seem to review their class notes or handouts. Students preferred verbal communications with the teacher. When they had difficulties, they asked questions to the teacher, rather than reviewing their notes. For example, students were constantly confused about finding bibliographic elements for citation, such as author's name, editor, or publisher, etc. The most effective mediation strategy used was frequent individual conferencing between a student and the teacher. The teacher provided two formal individual conferencing sessions with students to check where they were and what they needed to focus on from then. For example, the teacher checked what articles the student had pointed and even highlighted the parts in some of the articles for these students to address. Therefore, it was particularly essential for ensuring that each student was following the process. It also helped students make progress and thus mitigated their frustration and confusion.

4.4.2 Use of technological tools

Students particularly liked two technological tools: *Powerpoint* software and *AlphaSmart* keyboard system. One of the project' components was to give an oral presentation to class by using five *Powerpoint* slides. Except for one student who had not have any experience in using *Powerpoint* software, students were experienced users and had fun while making slides. Although they had not been concentrating on writing their papers, all students showed much excitement for making slides about their authors. One student who expressed much boredom in writing his paper suddenly showed his excitement when making his slides and said that "I am really a *powerpoint* guy." Another student also had not paid much attention on writing his paper changed his attitude completely and worked hard to find his author's image and to extract text quotations from sources to make his slides. Students had fun changing background color of the slides and designing their own slides using images an d text. The teacher asked students to copy and paste key sentences from their own papers in draft version to the slides they were working on.

Providing an *AlphaSmart* keyboard to individual students also facilitated the progress of student writing. Students could type and save their papers in using it. It was surprising to observe a sudden change of students' attitude toward writing their papers. When students used a paper and a pencil to write their draft papers before the teacher allowed students to use the keyboards,

students did not pay much attention on writing. Much of the time given for paper writing was spent for personal conversations between and among students. However, the level of motivation and concentration of each student was instantly increased when the teacher distributed the *AlphaSmart* keyboards to students and thus facilitated the speed of students' paper writing. It was amazing to observe that students who had been ignoring writing their paper focused on typing. However, students' motivation and excitement did not last to the completion of their papers. These students typed but did not polish and submit their papers to their teacher.

5. Discussion and Conclusion

This study explored how low achieving students go through information seeking and use for class projects. Findings suggest some methodological consideration to the research community when including low achieving students as study participants. The use of purposeful sampling technique (Patton 1990) allowed the researchers to screen out students with behavioral problems. Despite the absence issues of low achieving students in participating in this study, focusing on interactive and comprehensive observation (Chung and Neuman 2007) in a naturalistic setting enabled the collection of contextual as well as specific data from these students. However, many students did not complete the final product of the projects, and the researchers could only collect the draft versions of the students' final products.

Findings showed that low achieving students had difficulties in coping with cognitive and affective demands when seeking and using information. In fact, it was somewhat expected, from the researchers' point of view, that students had cognitive challenges to access and use information intellectually because they were low achieving students who did not have appropriate levels of reading ability for their grade. This study found that low achieving students lacked their cognitive flexibility in accessing and using information. They particularly had difficulties in comprehending information in sources and using it for their purposes. Therefore, they were able to answer "what" questions requiring finding information at face value without much difficulties but not able to answer "why" question requiring extracting information based on their understanding. Lack of cognitive flexibility affected their information seeking and use as a whole. Rather than gathering and understanding the relevant information first and applying pertinent information later directly for a research purpose as Kuhlthau (1991) suggested, low achieving students in this study did not distinguish the relevant information from the pertinent information. As a result, students did not exercise cognitive flexibility

that could have enabled them to understand and to apply the information to develop their own foci from the information they accessed. Studying how students' cognitive flexibility affect their use of information needs further research.

Applying Gross' theoretical analysis on students with low-level skills (2005) to the findings of this study seems relevant and can promote more research and discussion on the issue of information seeking and use by low achieving students. Gross focused on developing metacognitive skills of the students with a low level of information skills − not explicitly with a low level of academic competency − and indicated that low level students often overestimate their competency about what they can do and need to develop metacognitive skills to assess themselves. This study did not focus on examining the use of the meta-cognitive skills by low achieving students who lacked both information skills and academic competency. However, the findings suggest that, in a school context, students' estimation of their competency and metacognitive skills might depend on the teachers' expectation and guidelines given to students. Students believed in the beginning that they could complete the projects by following the steps exactly given to them from their teacher. When they faced with cognitive difficulties to follow certain steps, they became frustrated and simply gave up the parts that needed their extra cognitive efforts and skills. The findings suggest that low achieving students who lack information skills relied too much on their teacher's guidelines and instructions rather than assessing their knowledge and skills to see if they are able to complete the steps outlined by the teacher.

Low achieving students had frustration, intolerance, and boredom to uncertain nature of their projects during their information seeking and use, and the affective loads (Nahl 2005) were not overcome by the students. Unlike successful students whose affect is changed from frustration to optimism as they formulate their focus (Kuhlthau 1991) and high achieving students who had metacognitive skills to control one's curiosity and interest (Bowler 2010), low achieving students in this study did seem to remain their frustration throughout the process and even avoid the given tasks. This can be an indicator that affect changes to optimism and interest occur when students develop their final products and learn from the process. Further research is needed to know more about the relationship between affect changes and producing final products.

The findings have some hopeful implications to practitioners, particularly teachers and library media specialists, in teaching information skills to low achieving students. Using technology tools, such as *Powerpoint* and *AlphaSmart* keyboards, were proven to be an effective strategy to help students more focused on their projects. Although the teacher provided his research guides in forms of questions to students, students had hard time concentrating on writing and

finishing their papers. Making *powerpoint* slides made students to develop the main ideas for their papers. Students' preference of typing over hand writing was evidently shown when students showed much more attention on typing than writing their papers. One interesting finding was that students did not finish their typing their papers even if they had the pieces of information to synthesize. The incompletion of students' papers might have to do with their boredom due to their cognitive burden needed for writing and lengthy period of days required for this project. It certainly indicates that a lengthy period to work on class projects was not successful with low achieving students.

Another instructional strategy shown effective with low achieving students was frequent individual conferencing. The teacher paid careful attention to individual students by giving each of them very detail instructions on what and how to do, and it relieved students' cognitive and affective burdens. The findings suggest that cognitive and affective aspects are very much related, and we need to emphasize the view of Nahl (2007) that addressing both cognitive and affective aspects in information seeking and use is important for designing and/or delivering information environments and services responsive to users.

The findings of the study contribute to the research community by shedding light on the issues associated with information seeking and use by low achieving students in a learning context. This study is an exploratory study employing qualitative research methods, the findings should not be generalized but can be transferred to a similar context. Studying low achieving students in different age groups, different subject classes, and different school contexts can yield different findings. Further research should be conducted to give us more complete understanding of how low achieving students go through information seeking and use in school.

The study also gives implications to library media specialists as well as teachers in assigning projects for the purpose of performance assessment in Korean schools. The findings indicate that the students, particularly low achieving students, need cognitive and affective challenges to deal with the information seeking and use required for the projects. This means more rigorous instructional designs to address the needs of the students in their information seeking and use. More research can detail the ways to accommodate the needs of students.

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