Enablers and Inhibitors to English Language Learners' Research Process in a High School Setting

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Abstract

This researcher sought to examine enablers and inhibitors to English language learner (ELL) students' research process within the framework of Carol C. Kuhlthau's Information Search Process (ISP). At a high school forty-eight ELL students in three classes, an English as a Second Language (ESL) teacher, and a biology teacher participated in the study while the students conducted a research project in English. Data were collected through a demographic questionnaire, process surveys, interviews, and observations. The findings indicated that at the end of the research process more students reported difficulties looking for specific information, understanding hard vocabulary, evaluating (or selecting) information, summarizing, and writing than they did in the middle stage of the research process. To develop a solid grasp of vocabulary and concepts about their topics, some students searched resources in their native languages first, but did not use the content of these resources in the final product. To overcome the addressed challenges, the students wished for someone who knew the project and the subject, prompt help in finding precise information and looking up vocabulary and pronunciation, more background knowledge on their topics, sufficient time to complete the project, and a sample research paper. This study provided instructional strategies the teachers used to teach ELL students, and included discussions about information behaviors of ELL students, instructional strategies to support ELLs, and research instruments.

Introduction

Information-literacy skills have been emphasized as an essential competency needed to succeed in school and become a lifelong learner. Appropriate instruction for information literacy is particularly stressed at the high school level to help students be prepared for their postsecondary education and career (e.g., Burhanna and Jensen 2006; Kovalik, Yutzey, and Piazza 2013). Related to the recognized importance of information-literacy skills, research has actively been conducted on:

- how information-literacy instruction or skills help students transition from high school to college or career (e.g., Burhanna and Jensen 2006; Smith et al. 2013; Varlejs, Stec, and Kwon 2014),

- how high school students seek and use information (e.g., Bos 2000; Chung and Neuman 2007; Shenton 2008), and

- what instructional assistance can facilitate their research process (e.g., Herring 2006; Kovalik, Yutzey, and Piazza 2013; Pickard 2008).

However, little attention has been paid to understanding the information-seeking and information-use process of English language learner (ELL) students in high school and designing instructional programs to support their research process. This group of students needs special attention in the United States as their number has dramatically increased (NCELA 2011), and significant gaps in academic performance have been observed between ELLs and native English speakers (Herrera and Murry 2005).

To understand enablers and inhibitors to ELL students' research process, I examined their information-seeking and information-use behavior, with the framework of Carol C. Kuhlthau's Information Search Process (ISP). As part of a larger study that examined all three dimensions of the ISP model—affective, cognitive, and behavioral—during the research process of ELLs, this paper reports on the behavioral aspect of the findings. The cognitive aspect of the study was reported in another paper (Kim 2015), which focused on the knowledge-development process in terms of amount and substance of knowledge, labeling of knowledge, estimate of interest and knowledge, and amount and substance of learning outcomes. The affective aspect of the study examined ELL students' emotional changes during the research process with particular focus on positive feelings, such as confidence, relief, optimism, and satisfaction, and negative feelings, such as disappointment, frustration, confusion, uncertainty, anxiety, and concern about English proficiency. The report on the affective dimension is under preparation.

Specific research questions addressed in this paper are as follows:

RQ1: What are easy or challenging tasks for ELL students during their research process?

RQ2: What types of assistance do ELL students need during their research process?

RQ3: What instructional strategies do teachers and school librarians use to support ELL students' research process?

The remainder of this paper includes the following: The Literature Review section reviews previous studies on high school students' information behaviors and describes Kuhlthau's ISP and its applications in the learning context; the Methods section describes participants, research tasks, data collection, and data analysis; the Results section provides the findings of this study; and the Discussion and Conclusion sections interpret the findings and discuss implications.

Literature Review

Information Behaviors of High School Students

In spite of the importance of information-literacy skills, research has revealed that information-literacy instruction is not adequately embedded in the school curriculum and high school students do not possess sufficient abilities to find and manage information (Haras 2011; Julien and Barker 2009; Smith et al. 2013; Varlejs, Stec, and Kwon 2014). Heidi Julien and Susan

Barker pointed out that as information-literacy skills are not directly tested in exams, in their instruction teachers are more likely to focus on subject content than on information-literacy skills. Consequently, students focus mainly on the end product of their work with little emphasis on the search process (2009).

Research has revealed that high school students tend to prefer searching the Web to researching print materials because of the wide range and quantity of online information and the ease and speed of access to up-to-date information (Herring 2006; Julien and Barker 2009; Williamson et al. 2007). Moreover, high school students tend to consider Google and the Internet identical (Julien and Barker 2009). Educators, including school librarians, should heed learners' preference for use of the Internet for research because students who substantially plagiarize tend to copy more from online resources than from print resources (Williamson et al. 2007). Joy H. McGregor and Kristy Williamson found that students who plagiarized the least considered the process of learning more important, were more engaged with their topics, learned more about their topics, and were more able to recognize plagiarism than did those who plagiarized the most. In addition, students who plagiarized the least tended to synthesize information better with effective use of direct quotations than did those who plagiarized the most (2005). As for evaluation of sources, high school students consider accuracy of spelling and grammar, verifiable information, topicality, and recentness as important evaluation criteria when assessing information on the Web; they consider authorship less important (Pickard, Shenton, and Johnson 2014).

Research has been conducted to understand challenges that high school students encounter during their information seeking and use. Andrew K. Shenton classified the problems that students experienced when looking for information into the following six categories: "difficulties in initial decision-making, restrictions of the user's 'information world,' process frustration, shortcomings in the retrieved information, limitations on information use, and barriers to the construction of meaning" (2008, 279). In Jin Soo Chung and Delia Neuman's 2007 study, students showed difficulties composing appropriate search terms because their search vocabulary was limited and no assistance was provided. However, students who participated in Chung and Neuman's study perceived the process of retrieving information to be an easy task. In contrast, they considered organizing information as the most challenging task during their information-seeking and information-use process. Lois Barranoik (2001) found that, although students often mentioned using the Internet and electronic resources, they were not always proficient at selecting search terms, analyzing found information, and creating reference citations and a bibliography. Nathan Bos (2000) found that students had difficulties summarizing scientific resources and identifying evidence for scientific claims and potential biases. Raya Fidel et al.'s 1999 study revealed that students felt challenged during Web searching for information for their homework assignments, especially when both subject content and Web searching were new to them. Fidel and her colleagues' findings demonstrated that those who have adequate Web-searching skills can learn about new topics more easily than those who do not. In Cindy Kovalik, Susan Yutzey, and Laura Piazza's 2013 study, students needed help with strategies to evaluate information and use that information effectively; however, a majority of them visited the school library only once during their research project and were unlikely to ask school librarians for help. It is notable that students were interested in learning more about books and using them in their research. Randell K. Schmidt, Virginia Kowalski, and Lorraine Nevins (2010) observed that even after librarians guided students (through instructional workshops) to search and use information for their scientific literature review paper, half of the students needed additional individual assistance in understanding scientific articles, taking notes, and summarizing articles.

There have been research and instructional efforts to assist students in overcoming the challenges they experience during information seeking and use. For instance, students considered teachers' guidelines, concept maps, and outline templates useful, and found print sources easier to review than electronic sources. Using concept maps and outline templates helped students organize and effectively present information (Chung and Neuman 2007). James E. Herring (2006) examined students' views on various information-literacy skills, such as concept mapping, individual/group brainstorming, preliminary reading, and note taking. Students reported that concept mapping and individual brainstorming helped them develop more ideas, organize the ideas, think more about their topics, use their prior knowledge, and refresh their memories. Group brainstorming enabled students to learn ideas from others, and preliminary reading helped students select keywords, find appropriate resources, take notes, and write their papers. Students took notes in various ways to meet their learning style (Herring 2006). Note taking was considered an effective way to synthesize information and avoid plagiarism (Williamson and McGregor 2011). Also, students relied on assignment requirements and rubrics to decide when to stop searching and what types of resources they should use (Kovalik, Yutzey, and Piazza 2013). Alison J. Pickard (2008) suggested that because peer interaction (both collaboration and tutoring) enhances learning, students should be encouraged to collaborate with peers throughout the information-seeking process. According to Barranoik's 2001 study, students were motivated to complete the research project when they had clear guidelines on the assignment, found and accessed information sources and help, selected an interesting and proper research topic, were given enough time, and were graded on the assignment.

Research has revealed some interesting findings about information behaviors of ELL students. For instance, Catherine Haras's 2011 study involving Latino high school students revealed that a majority (90.7 percent) figured out what type of resources they needed to complete the assignment, and 83.1 percent reported they mostly use Google. About 88 percent reported they brought facts from different resources together by putting them in their own words, whereas 57.3 percent said they cut and pasted what they needed from online sources, not using their own words. Although the school library was significantly associated with Latino students' perceptions of research, they did not have sufficient opportunities to develop their information-literacy skills during their assignment, and demonstrated low information literacy. Julien and Barker had a non-native English-speaking student among the participants of their study, and observed that he searched only in English, not in his native language. They suggested that ELLs should be encouraged to search in their native language, a strategy that may help them more easily understand subject areas and lessen their cognitive load for translation. Searching in students' first language may also help their parents and guardians understand and participate in their homework (2009).

Kuhlthau's ISP and Its Applications in the Learning Context

Carol C. Kuhlthau's ISP model (2004) views the information-seeking process as a process of construction, and demonstrates users' six information stages—initiation, selection, exploration, formulation, collection, and presentation—in terms of affective, cognitive, and behavioral dimensions (see figure 1).

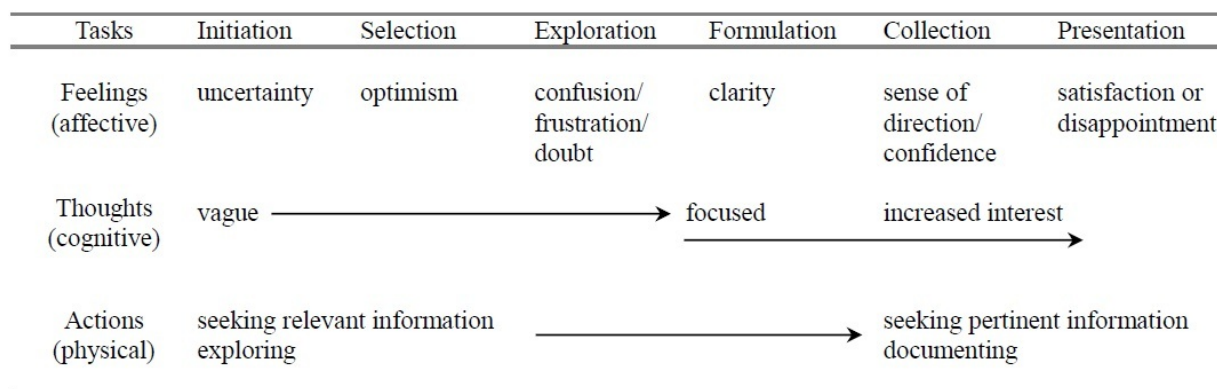| Tasks	Initiation	Selection	Exploration	Formulation	Collection	Presentation
Feelings (affective)	uncertainty	optimism	confusion/ frustration/ doubt	clarity	sense of direction/ confidence	satisfaction or disappointment
Thoughts (cognitive)	vague		→ focused		increased interest →	
Actions (physical)	seeking relevant information exploring		→		seeking pertinent information documenting	

Figure 1. Model of Information Search Process (ISP). (Kuhlthau 2004)

The ISP has been used as a conceptual framework for many information-behavior studies in learning and research contexts (e.g., Chu et al. 2011; Cole et al. 2013; Hyldegård 2006), as well as in occupational contexts (e.g., Byström and Hansen 2005; Kuhlthau and Tama 2001) and in everyday life (e.g., Warner and Procaccino 2004). The ISP has also served as a diagnostic tool for instructional interventions or reference services in various information settings.

Based on Lev S. Vygotsky's Zone of Proximal Development (1978), Kuhlthau defined the zone of intervention in information seeking as "that area in which an information user can do with advice and assistance what he or she cannot do alone or can do only with great difficulty" (2004, 129). When students face problems they cannot solve alone, intervention enables them to minimize difficulties and successfully accomplish their tasks. The situation can be divided into a source problem and a process problem (Kuhlthau 2004).

In addition, the ISP has been employed to develop Guided Inquiry, which offers "an integrated unit of inquiry, planned and guided by an instructional team of a school librarian and teachers, allowing students to gain deeper understandings of subject area curriculum content and information literacy concepts" (Kuhlthau, Maniotes, and Caspari 2007, 1). Guided Inquiry emphasizes the process of learning rather than the product, and must be carefully planned to include close supervision, continuous assessment, and timely intervention by an instructional team (Kuhlthau, Maniotes, and Caspari 2007).

Previous ISP-based studies have contributed to a general understanding of secondary school students' information seeking and use (Bilal 2001; Branch, 2003; Cole et al. 2013; Gordon 1999; Kuhlthau 1991; Limberg 1999; McGregor and Streitenberger 2004; Todd 2006), and have also provided a research foundation for practical applications such as instructional interventions for inquiry-based learning (Bilal 2000, 2001, 2002; Branch 2003; Chu 2009; Chu et al. 2011; Gordon 2000; Gross 1999). (The related studies were reviewed in the "Literature Review" section of another paper reporting on the larger study (Kim 2015).) However, only a few studies (Ellis 2009; Kim 2015; Kim and Todd 2008) have applied the ISP specifically to the information-seeking behavior of ELL students.

In a study of Chinese ELL students, Mary Ellis (2009) found that the performance of the advanced group moved forward more quickly in terms of the cognitive and behavioral aspects of the ISP than did participants in the beginning and the intermediate groups, while members of all three groups experienced similar emotional changes during the research process.

In an in-depth case study of Korean high school students in a biology class, Ross J. Todd and I found that in searching, ELL students preferred high recall to high precision through the research process, and rarely used variations of search terms or Boolean operators. When selecting sources ELL students had to consider the length and vocabulary level of the articles as well as topic relatedness. Furthermore, the lack of English-language proficiency hindered ELL students in summarizing sources; they tended to summarize the sources in chronological order without topical synthesis (Kim and Todd 2008).

In the comparison of the knowledge development process among the different ELL groups, as reported in another paper, I found that only the intermediate English-language proficiency group, different from the advanced and the beginning groups, showed significant increases in topical knowledge and estimate of knowledge throughout the research process. As for the nature of the research task, ELL students who had received structured interventions and researched personalized topics exhibited significantly more topical knowledge at the completion of the project than those who did not (Kim 2015).

Methods

Participants

The participants in the study were forty-eight ELL students and two teachers—an English as a Second Language (ESL) teacher and a biology teacher—at a public high school in New Jersey. Among the participating students, ten students were from a theme class that focused on contemporary themes in various content areas and was taught by an ESL teacher. The remaining thirty-eight students were from two biology classes that were taught by a biology teacher in collaboration with a supervisor of the ESL program. Twenty-three boys (47.9 percent) and twenty-five girls (52.1 percent) participated. They were born in fourteen different countries, and most of them (95.8 percent, n=46) came to the United States within the four years immediately preceding participation in the study. They had little or no previous research experience in either the United States or their native countries. The ELL levels of the participants ranged from level 2 to level 5 on the six-level scale of English language proficiency defined by the World-Class Instructional Design and Assessment Consortium. The levels are: 1–Entering, 2–Emerging, 3–Developing, 4–Expanding, 5–Bridging, and 6–Reaching (WIDA Consortium 2015). According to the terms used in the school where the research was conducted, this study used *beginning group* for level 2 (29.2 percent, n=14), *intermediate group* for levels 3 and 4 (33.3 percent, n=16), and *advanced group* for level 5 (37.5 percent, n=18). The theme class contained only advanced students, and the biology classes contained students at three different ELL levels. The student profiles are in Appendix A.

Research Tasks

Overview

Students in the theme class and the biology classes were involved in different types of research projects. These projects are summarized in table 1.

Table 1. Research tasks.

Class	Week	Research Task
Theme Class	1st Week	Building vocabulary and background knowledge
	2nd Week	Research process overview
	3rd Week	Researching and making note cards
	4th Week	Making an outline and writing the draft paper
	5th Week	Submitting the final paper
Biology Classes	1st Week	Building vocabulary and background knowledge; Searching for information in the school library
	2nd Week	Searching for information as homework (spring break)
	3rd–4th Week	Creating a foldable

Theme Class

In twenty sessions over five weeks, the ten students in the theme class were required to write a research paper on their career and college preparation (see table 1). The assigned paper had to describe each student's career goal, identify higher-education institutions offering preparation for the career, explain plans and options for financing education needed for the career, and describe the process of applying for college. During their research, systematic interventions were provided around vocabulary, background knowledge, database search, outlining, and citations. The lesson plan included instructional sessions for the first week covering vocabulary and background knowledge, and for the second week covering research skills needed for the research project. Students were required to use Naviance's Family Connection, a web-based tool focused on college information. Students were also required to produce three midpoint research products: note cards, an outline, and a rough draft.

Biology Classes

In twelve sessions over four weeks, thirty-eight students in two biology classes were required to create a six-page multilayered foldable on a self-chosen genetic disorder (see table 1). In the research foldable, each student was required to write a general description of the chosen genetic disorder and include information about its inheritance process, major symptoms, and treatment options. Students also needed to make a glossary of five new words with definitions, display a picture of the effects of the disease with explanations, and decorate the cover page. They were expected to put the information in their own words, and use bulleted statements instead of full sentences. In the biology classes only a few interventions were provided. Two sessions were

devoted to building background knowledge about different kinds of genetic disorders. In another session during the first week, students visited the school library for information. During the class visit to the school library, the biology teacher distributed guidelines for searching, which included five recommended websites the teacher considered reliable sources. Students were expected to complete searching as homework during spring break, and create a foldable during the last two weeks of the project period.

Data Collection

Overview

Data were collected through a demographic questionnaire, process surveys, interviews, and observations. To satisfy my university's institutional review board requirements, prior to data collection an authorization letter from the superintendent of the school district, consent forms from the students' parents, and assent forms from the students were obtained.

Demographic Questionnaire

Before they began their research project, students were asked to fill out the paper-based questionnaire about demographic information (see Appendix B). The questionnaire included questions about students' age, gender, ELL level, race, country of birth, length of time living in the United States or other countries, and language(s) spoken at home, as well as proficiency with receptive and expressive language in their native languages and in English.

Process Surveys

The process survey (see Appendix C) was administered at three points during the research project: initiation (PS1), midpoint (PS2), and completion (PS3). The first six questions in the survey were the same in PS1, PS2, and PS3. The focuses of questions 7 and 8 were the same in PS1, PS2, and PS3. However, for each of the three survey administrations, the wording of questions 7 and 8 was modified to match the stage of the students' projects. The survey instrument was based on the Student Learning through Inquiry Measure (SLIM) toolkit (Todd, Kuhlthau, and Heinström 2005), which was developed by the Center for International Scholarship in School Libraries (CISSL) to track the process by which students learn during inquiry-based research. The survey consisted of questions about cognitive, affective, and behavioral aspects of the information search process. Although the research tasks in this study were not inquiry-based, the SLIM toolkit was selected as a research instrument because it provides a suitable device to measure the cognitive, affective, and behavioral changes that students experience during any type of learning process. This paper includes the findings on behavioral aspects, particularly about easy tasks (question 7) and challenging tasks (question 8) that the students identified during the research process: "When you do research, what do you generally find easy/hard to do? Please list as many things as you like" (PS1); "Thinking of your research so far, what did you find easy/hard to do? Please list as many things as you like" (PS2); and "In the completion phase of the research, what did you find easy/hard to do? Please list as many things as you like" (PS3).

Interviews

The students, ESL teacher, and biology teacher were interviewed after the completion of the research project. Students were asked about the hardest/easiest part of the research project,

assistance they wished to have had, problems caused by limited English proficiency, and prior experience with computer and research projects (see Appendix D). In the theme class, interviews were conducted individually in the school library or the conference room during the lunch period. Each interview took twenty to twenty-five minutes. In the biology classes, because of the large number of students and their tight class schedules, focus group interviews were conducted instead of individual interviews. Three groups of three to eight students in each biology class were interviewed in the laboratory's annex room while the others were doing class activities in the laboratory. Each focus group interview took fifteen to twenty-five minutes.

The teachers were asked about their experiences with ELL students during the research project and about considerations in designing a research project for ELL students (see Appendix E). Individual interviews with teachers were conducted in the teacher's office or classroom for twenty-five to thirty minutes. Besides formal interviews, during the students' research projects the teachers and I often interacted via e-mail or brief conversations on site.

Participants were given a list of interview questions, and ELL students were given a few minutes to read through the questions before the interviews began. Interviews were digitally recorded. The interviews were conducted in clear and plain English so that students of all levels of English proficiency could understand.

Observations

From the start to the completion of the project, I closely observed the students' research process and took field notes. These field notes were recorded on site at the time and supplemented with more detailed comments and questions afterward. In addition to keeping track of the curricular lessons and the research tasks of students, observations during the students' research projects mainly focused on students' individual research activities, their interactions with classmates, and interventions of teachers.

Data Analysis

The participants' answers on the demographic questionnaire and three process surveys were entered in Excel spreadsheets. Categorical answers on the demographic questionnaire were coded into numbers. Open-ended answers on the process surveys (questions 7 and 8) were categorized into the coding scheme I developed, and the frequency and percentage of responses that fell into each category were calculated. Field notes from observations were documented in Microsoft Word files and organized in sequence by dates. Interview audio recordings were transcribed with the assistance of Express Scribe transcription software. I analyzed the interview transcripts by means of content analysis. Both field notes and transcripts were analyzed to corroborate the findings from the analysis of the questionnaires and process surveys.

Results

Introduction

This section presents the findings about the ELL students' easy and hard tasks, the types of assistance they needed and wished for, and teachers' instructional strategies while ELL students worked through a research project.

Easy Tasks

Overview

Through an open-ended question on each of the process surveys and during interviews, students were asked which tasks they did during their research project were easy. Table 2 shows the results from the process surveys.

Table 2. Frequency and percentage for easy tasks.

		PS1 (n=35) Frequency (%)	PS2 (n=42) Frequency (%)	PS3 (n=45) Frequency (%)
Information Search (ISP Stages 3–5)*	Looking for information in general	5 (14.3)	6 (14.3)	16 (35.6)
	Looking for specific information	8 (22.9)	19 (45.2)	15 (33.3)
	Finding pictures	5 (14.3)	3 (7.1)	3 (6.7)
	Searching online	9 (25.7)	7 (16.7)	3 (6.7)
	Searching physical materials	4 (11.4)	1 (2.4)	0 (0.0)
	Asking people	1 (2.9)	0 (0.0)	0 (0.0)
	Total$^{\pm}$	22 (62.9)	32 (76.2)	34 (75.6)
Information Comprehension (ISP Stages 3–5)	English vocabulary	0 (0.0)	0 (0.0)	0 (0.0)
	Math/Statistics/Science	0 (0.0)	0 (0.0)	0 (0.0)
	Total$^{\pm}$	0 (0.0)	0 (0.0)	0 (0.0)
Information Evaluation (ISP Stages 3–5)	Selecting	0 (0.0)	0 (0.0)	0 (0.0)
	Total$^{\pm}$	0 (0.0)	0 (0.0)	0 (0.0)
Information Use (ISP Stage 6)	Summarizing	0 (0.0)	4 (9.5)	4 (8.9)
	Organizing	0 (0.0)	4 (9.5)	4 (8.9)
	Writing	2 (5.7)	1 (2.4)	5 (11.1)
	Total$^{\pm}$	2 (5.7)	9 (21.4)	11 (24.4)
Others		6 (17.1)	8 (19.0)	5 (11.1)
No Response		4 (11.4)	1 (2.4)	3 (6.7)

* ISP Stage 1–Initiation; Stage 2–Selection; Stage 3–Exploration; Stage 4–Formulation; Stage 5–Collection; Stage 6–Presentation.

$^{\pm}$ Totals may not be identical to the sum of the values because some students identified more than one task as being easy.

Information Search (ISP Stages 3–5)

When students were asked what they generally find easy to do in their research (PS1), twenty-two students (62.9 percent) said something that fell within the "Information Search" category. Among them, nine students (25.7 percent) perceived searching online as an easy task. Students said, "For mostly projects, I search in Google and get information" (s7), and "I like looking for information in the Internet more than looking in books" (s38). Eight students (22.9 percent) found it generally easy to find specific information. Students said, "It's easy to look out the details sometimes" (s28), and "[I found it easy to] answer the shortest questions" (s4). Five students (14.3 percent) considered it easy to find general information.

When they reflected on their research experience at the midpoint and completion of the research project, in PS2 thirty-two students (76.2 percent) and in PS3 thirty-four students (75.6 percent) reported that they found it easy to access and locate information. Among them, in PS2 nineteen students (45.2 percent) and in PS3 fifteen students (33.3 percent) said they could locate specific information without difficulty. Students said, "Something that I found easy it was to find the definition or the meaning of red-green color blind" (s42), and "I could find easy an introduction of sickle cell disease and causes" (s22). In PS2 six students (14.3 percent) and in PS3 sixteen students (35.6 percent) found it easy to look for general information. At no point in the research process did any student mention a task related to "Information Comprehension" or "Information Evaluation" as being an easy task.

Information Use (ISP Stage 6)

Before they started the research project (in PS1) only two students (5.7 percent) perceived tasks within "Information Use" as being easy. In contrast, when they reflected on their research experience in PS2 nine students (21.4 percent) and in PS3 eleven students (24.4 percent) found it easy to use information. Students who answered that "Information Use" was easy were mostly from the advanced or the intermediate group. Some students in the theme class felt it easy to make note cards and an outline and to write a paper based on the outline. In the interviews, students said, "Making note cards was easy, because on every topic, we had to make a note card, and I found a lot of topics in Family Connection, and that was easy for me to do" (s7), and "The outline was easy because when you have the note cards, it's easier just to organize the information" (s5), and "The essay, because with the outline, I just have to copy the draft and put some more details" (s3).

Other Responses

Students' answers that did not match any of the four categories—Information Access, Information Comprehension, Information Evaluation, or Information Use—were classified into "Others." A few students misunderstood the question and listed their easy topics such as sports, history, and computer use. Most answers in this category were about decorating the final products, which was required in the biology classes: "I find easy to make the foldable, I find easy to organize it, decorate it, and make it look good" (s32). A beginning-level ELL student said in PS2, "Nothing [was easy], because I have to think about my project I know a little" (s39).

Difficult Tasks

Overview

Through an open-ended question on each of the process surveys and during interviews students were asked which tasks they did during their research project were difficult. Table 3 shows the results from the process surveys.

Table 3. Frequency and percentage for difficult tasks.

		PS1 (n=35)	PS2 (n=42)	PS3 (n=45)
		Frequency (%)	Frequency (%)	Frequency (%)
Information Search (ISP Stages 3–5)*	Looking for information in general	3 (8.6)	4 (9.5)	0 (0.0)
	Looking for specific information	9 (25.7)	12 (28.6)	18 (40.0)
	Finding pictures	1 (2.9)	3 (7.1)	2 (4.4)
	Searching online	0 (0.00)	1 (2.4)	0 (0.0)
	Searching physical materials	0 (0.00)	1 (2.4)	1 (2.2)
	Asking people	0 (0.00)	0 (0.00)	0 (0.0)
	Total±	13 (37.1)	18 (42.9)	20 (44.4)
Information Comprehension (ISP Stages 3–5)	English vocabulary	5 (14.3)	0 (0.0)	3 (6.7)
	Math/Statistics/Science	2 (5.7)	2 (4.8)	0 (0.0)
	Total±	6 (17.1)	2 (4.8)	3 (6.7)
Information Evaluation (ISP Stages 3–5)	Selecting	7 (20.0)	1 (2.4)	3 (6.7)
	Total±	7 (20.0)	1 (2.4)	3 (6.7)
Information Use (ISP Stage 6)	Summarizing	5 (14.3)	9 (21.4)	11 (24.4)
	Organizing	1 (2.9)	3 (7.1)	2 (4.4)
	Writing	0 (0.0)	1 (2.4)	3 (6.7)
	Total±	6 (17.1)	11 (26.2)	14 (31.1)
Others		7 (20.0)	11 (26.2)	9 (20.0)
No Response		5 (14.3)	2 (4.8)	3 (6.7)

* ISP Stage 1–Initiation; Stage 2–Selection; Stage 3–Exploration; Stage 4–Formulation; Stage 5–Collection; Stage 6–Presentation.

±Totals may not be identical to the sum of the values because some students identified more than one task as being difficult.

Information Search (ISP Stages 3–5)

In PS1 thirteen students (37.1 percent) considered it generally difficult to access and locate information. Among them, three students (8.6 percent) considered it difficult to look for information in general. They said, "[It was] wasting time researching when I don't really know where to find the information" (s4), and "It's hard to find more information about the topic which I am supposed to do" (s28). Nine students (25.7 percent) considered it generally difficult to look for specific information. A student in the biology classes said, "When I have to look for something really specific, and it takes me some time to do it" (s25).

In PS2 four students (9.5 percent) reflected that it had been difficult to look for information in general. Twelve students (28.6 percent) reported experiencing difficulties in finding specific information. A student in the biology classes said, "Getting information in my language first, finding pictures to understand, then, getting information in English will be much easier" (s18).

In PS3 no one mentioned looking for information in general as being a difficult task. However, eighteen students (40.0 percent) had difficulties in finding specific information. Students said, "It was hard to find information about the financial aid and how to apply for scholarships" (s7), and "The hard thing to do was to find some specific information, like what kind of bacteria causes what kind of disease" (s19).

During the interviews, students said that they had difficulties searching when they encountered words they could not understand. In general, most of the participating students needed help with hard vocabulary, and they typically turned to their teacher or online dictionaries for assistance. This challenge occurred for two reasons: lack of English vocabulary in general and lack of background knowledge on their topic.

Some students in the theme class answered that making note cards was the hardest part of the research process. While looking for information, students were required to make note cards for key information by filling out the plain side of a note card with bibliographic information and filling out the lined side of the note card with a title question, all applicable W questions (who, what, where, when, why, how), and answers in their own words. Finding specific information from the resources as answers for W questions was reported to be challenging.

A student in the theme class said that extensive searching about one topic was the most challenging because he had never conducted a research project before. He said, "Finding the information on the same topic, on one topic, in the same website was a little bit hard…because I've never searched a lot about one topic. …I didn't have a lot of experience" (s7).

Using their native languages, students sometimes entered queries on search engines, such as Google and those from their native countries, and on familiar websites such as YouTube. Then, once students understood the information in their first languages, they used that knowledge to search for and understand information in English. However, they tended not to cite the materials in their native languages in their final products. The ESL teacher in the theme class noticed that students used their own languages and looked for schools in their countries but did not include these findings in their final paper.

Information Comprehension (ISP Stages 3–5)

In PS1 six students (17.1 percent) answered that it was generally difficult for them to understand English vocabulary or math/statistics/science during a research project. In PS2 two students (4.8 percent) found understanding math/statistics/science difficult. In PS3 three students (6.7 percent) had difficulties with English vocabulary, a decrease from PS1 but an increase from PS2.

Information Evaluation (ISP Stages 3–5)

In PS1 seven students (20.0 percent) mentioned that it was generally difficult to select "the most important," "correct," or "appropriate" information when they found a lot of information. Among them, six students (17.1 percent) were from the advanced or the intermediate group, and only one was from the beginning group. In PS2 one student (2.4 percent) and in PS3 three students (6.7 percent) mentioned that they had difficulties selecting information during the research project. A student said, "I find hard to choose the appropriate material. I have it but not sure about it" (s20).

In the interviews students said that they chose information for their project with the instant help of their teachers; however, they did not know what they needed to consider in evaluating information. Some of them had their own criteria to select information. They said, "I am looking [at] different websites and they have the same things. So the repeated information is important" (s40), and "There is like some pages, they give you information but it's not enough. But other ones like they have a lot of information" (s49).

Information Use (ISP Stage 6)

Students had difficulties putting the information into their own words: five students (14.5 percent) in response to PS1, nine students (21.4 percent) in response to PS2, and eleven students (24.4 percent) in response to PS3. Students in the biology classes expressed more difficulty summarizing information than those in the theme class because paraphrasing the biological information they found was challenging for them. Students often asked the biology teacher for help summarizing the information and putting it into their own words. Some students felt organizing information was hard: one student (2.9 percent) in response to PS1, three students (7.1 percent) in response to PS2, and two students (4.4 percent) in response to PS3. A student in the biology classes said, "I think the hardest part is classify the ideas. I don't know what to put first, what could be the order" (s25).

In PS2 one student (2.4 percent) and in PS3 three students (6.7 percent) felt that writing was difficult. More specifically, explaining the pictures and starting to write the paper were challenging for them. A student in the theme class said that developing an outline into full sentences and paragraphs was the most challenging part because of spelling and grammar. To avoid plagiarism and use of the automatic spell-checking function, the ESL teacher asked students to make a handwritten draft and then type it on the computer.

A student in the theme class answered, "Writing an essay is easy, because with the outline I just have to copy the draft and put some more details" (s3), and another commented that the outline was easy "because when you have the note cards, it's easier just to organize the information" (s5). These responses suggest that students needed two prerequisites to smoothly proceed to the next step of the writing process: writing skills, and complete and well-done work from the previous research steps (i.e., making note cards, creating an outline, and drafting the paper).

Other Responses

Some students in the theme class answered that they had difficulties making a decision about their career plan beyond completion of the research project. A student said, "It was hard to decide which college is better for me" (s7), and another said, "[It's hard to] think how I am going to pay my college" (s3). Some students answered that nothing was difficult to do. A few students in the biology classes said that decorating was the hardest task.

Assistance ELL Students Need

Introduction

In the interviews the students were asked what types of assistance they wished to have had during their research process.

Someone Who Knows about the Topic

For most of the students, their teacher was the only person from whom they could get help with their research project. To reduce the challenges they encountered throughout the research project, they wished they had had someone who knew about their topic. Students sometimes talked to classmates who spoke the same native language as they did and helped each other in their native language. However, students had very limited time to talk with one another about their research because each of them had a different class schedule and had to move to another classroom after the class in which the research project was assigned. In another period or after school, some students sought help from teachers who spoke their native languages. One student in the theme class (s9) said he could ask his parents questions related to the project in Spanish. Even though his parents did not know exactly what the college system in the United States is like, because they had studied in college in their own country they could explain the college system in that country. Also, he could ask his uncle, a current college student in the United States, vocabulary questions. However, s9 was the only student of ten in the theme class who could get help with the research project at home.

For the rest of the students in the theme class, although they talked to their parents and siblings about their research, no help was available outside of the classroom. Most students in the biology classes also could not get help at home. A few students said that their parents explained the genetic disorder disease to them in Spanish. It seemed that it was harder for parents to help their children with their research projects when the research topic is not related to universal subjects (such as health issues), but, instead, is related to the system in the United States (such as career and college education).

Finding and Evaluating Information

Students needed help finding and evaluating information. Many students had difficulties finding specific information. A student in the theme class said, "I think I got most things I need to know, but sometimes, it's very hard to find like very detail, like for example, like how the college, what does the college require from high school, for example like GPA. Sometimes that's hard to find" (s6). Also, students needed help with deciding what information was more appropriate to use for their project. Students in the biology classes said, "I want somebody to teach me what information is important" (s40), and "I wish I knew the websites a little bit better so that I can know which one gives me the best information" (s33). Students in the theme class valued the orientation session on the Family Connection database offered by a school counselor in the guidance department.

One student in the biology classes mentioned her previous research experience with the assistance of a school librarian: "I wish I had the school librarian help because last time when I did the project, they really helped us how to do it online and which website to choose because sometimes people posted some weird stuff so you cannot put it on a school project. So I wish I had the librarian, the school librarian, help me" (s15).

Most students in this study predominantly used Web resources for their project. Although the ESL teacher in the theme class provided some print materials for her students, students did not look for print materials by themselves. A student in the biology classes said, "I would like more help with the books to have more information because most information I had found was from the Internet. I didn't use books" (s26).

Vocabulary and Pronunciation

Students needed help with vocabulary and pronunciation. Besides asking teachers for help, they looked up the words in online dictionaries, such as onlinedictionary.com, and used translation websites, such as freetranslation.com. A student said, "In school I asked Ms. A., and at home I went to dictionary.com. It's the only way I can pronounce, I can know how to pronounce it" (s7). Although students used the computer to get help with vocabulary and pronunciation, they wished to get the information more quickly from someone who could help them.

Background Knowledge

Students in the biology classes spent only two class periods on an overview of twenty-eight different genetic disorders; in contrast, those in the theme class spent a week building vocabulary and background knowledge. In the interviews, students in the biology classes mentioned that they wished the teacher had explained their diseases in greater detail so that they started the research project with more background knowledge.

Sufficient Time

Students wished they had had more time for the research project. A student (s19) in the biology classes said that having a partner would have helped him to finish the project on time.

Sample Papers

A student (s4) in the theme class answered that seeing a sample research paper by a person who had successfully completed the same research project would have been helpful.

Instructional Strategies

Overview

The ESL teacher and the biology teacher were interviewed about their experiences while working with ELL students during the research projects and about the instructional strategies they used to help the students. They concurred that most students were greatly challenged by the scope of the research project and had difficulties proceeding from one stage to the next within a complicated research process. In addition, the fact that students were doing the project in English provided another challenge for the students. The biology teacher said that "reading large amounts of material in English" and "putting it into their own words" would be most challenging for ELL students. In table 4 the instructional strategies that the teachers used for ELL students are summarized in alignment with Kuhlthau's ISP stages.

Table 4. Instructional strategies for ELL students.

	Instructional Strategies
Prior to Research	Building language skills (reading and writing)
	Building background knowledge (vocabulary and concepts) on the research assignment topic
	Overviewing research steps
	Additional time and effort needed by lower-level ELL students for more vocabulary and knowledge background
Task Initiation (ISP Stage 1)*	Assigning a research project that will be interesting or important to students and relevant to their lives
	Flexibility of ESL curriculum
	Using a simple rubric that is given to students
	Showing examples of the final product done by previous students
Topic Selection (ISP Stage 2)	Showing visuals to help students choose and be motivated by a topic
	Providing a list of possible topics, especially to lower-level ELL students
Information Search (ISP Stages 3–5)	Supporting lack of previous technological experience (often unavailable in their own countries)
	Assisting in searching and using print materials
	Assisting in finding or choosing research materials at their reading levels
	Suggesting sites and key words for searches
	Allowing students to research in their own language
Information Use (ISP Stage 6)	Assisting in summarizing the information and putting it into their own words
	Guiding students as they create note cards, an outline, and a draft paper as mid-products
	Providing instructions for citing sources and avoiding plagiarism
General (ISP Stages 1–6)	Seating students with classmates who speak the same native language as they do
	Encouraging students with higher-level English proficiency to assist lower-level students
	Collaborating with ESL teachers to obtain a clearer sense of the lower-level students' English proficiency
	Being flexible in grading for lower-level ELL students
	Repeatedly restating the written directions and rephrasing as needed
	Practicing research steps

* ISP Stage 1–Initiation; Stage 2–Selection; Stage 3–Exploration; Stage 4–Formulation; Stage 5–Collection; Stage 6–Presentation.

Prior to Research

During the interview the ESL teacher explained that ELL students need a lot of background knowledge about their topics before beginning their research projects. ELL students need to build vocabulary, develop concepts on the topic, learn the reading and writing skills, and become familiar with all the research steps. The ESL teacher emphasized that vocabulary development is one of the most important things because without that foundation students cannot understand what teachers try to teach them about the project. Therefore, teachers must first help students acquire the relevant vocabulary so that students will understand lessons on the research process and will be able to find and assess information for their projects. The background knowledge and language of each research step, for example what "works cited" means, should be built before students attempt the step. This practice helps to reduce ELL students' load while dealing with a complicated research process in a language they are learning.

The ESL teacher said that lower-level classes in particular need to learn more vocabulary for the research project than do higher-level classes. Therefore, for the whole research process a lower-level class might take six weeks, but a higher-level class might take only three to four weeks. The ESL teacher also reported that when she tries to use the students' background knowledge for class activities and the research project, discerning the students' prior knowledge is difficult in lower-level classes because of the language barrier. Especially when the student speaks a language the teacher does not speak, the ESL teacher needs more time to figure out the student's background knowledge on a topic.

Task Initiation (ISP Stage 1)

Due to the challenges of a complex research process and the students' lack of English proficiency, the teachers considered it very critical to help students maintain their interest and focus on the research project. The ESL teacher mentioned that a specific, well-defined topic was a key component of the ESL research project. For students to stay focused on a research project, both teachers chose a research project topic that was interesting or important to students and related to their lives. The ESL teacher explained that while subject teachers focus on the curriculum and have to cover certain topics in regular classes, ESL teachers focus on teaching language skills and, thus, have more freedom to select topics.

The biology teacher said that when she explained the research project to students during the initiation stage, she distributed and reviewed a simple rubric so students could understand her expectations and could use the rubric as a final checklist before turning in the project; she also showed examples of the final product created by previous students.

Topic Selection (ISP Stage 2)

The biology teacher mentioned that the stage of topic selection should be carefully designed in a research project for ELL students. During the first two days of the research project, she used PowerPoint slides as she presented an overview of different kinds of genetic disorders. This overview was intended not only to build background knowledge on the topic but also to help students be motivated by the visuals to choose their own topics. The students in the biology classes were supposed to pick as their research topic one disease from a list of genetic disorders

provided by the biology teacher. The ESL teacher did not provide a list of possible topics for the theme class; however, she gives students a list of specific topics in lower-level classes because she knows which topics are easier for their language level. Because each student is allowed to select a research topic of interest from the prepared list, students work with topics that they can handle. Therefore, students do not become discouraged and remain focused and interested in the research project.

Information Search (ISP Stages 3–5)

Both teachers stated that most ELL students did not have trouble finding information on the Web. The ESL teacher said that most of her students were used to using the computer to keep in touch with what was going on in their cultures. She said, "They want to know what's going on in their country, so they know how to find things. They know how to find the Chinese website, and they know how to find the Pakistani newspaper on the computer. I don't know how they do it, but they know." She was especially surprised to see how quickly the students learned how to use Family Connection, which was the main resource for the theme class project. She explained that it seemed that students were able to use Family Connection easily because 1) it was very similar to Facebook or Myspace, both of which the students were familiar with, 2) it provided options to be clicked for searching, eliminating the need to enter key words, and 3) it had a lot of visuals and videos in non-English languages. She had only one student who had problems with searching for information on the computer because he had never used a computer or had Internet access in his country. Although he quickly learned how to manipulate the computer, he initially needed special help with searching. Also, she pointed out that the students might experience more difficulty with print materials than online sources; she came to this conclusion because even though she provided students with magazines or books, and most of the students read them, students did not cite the printed materials as frequently as they did online resources.

The biology teacher also mentioned, "One thing that seems to keep them on the same playing field as the English-speaking students is many of the ELL students are adept at computer use." However, she recognized that ELL students with low English language proficiency tended to use the first site they found without searching more or used only one site for their research. She also mentioned that ELL students had more requests than native English-speaking students for one-on-one help during research time in the school library. The biology teacher said that many of the same problems students encounter as they acclimate to a new culture, new country, new school, and new lifestyle would also apply to their information-seeking abilities. She mentioned that teachers should assist ELL students in finding or choosing research materials at a reading level appropriate for their English reading abilities, suggest sites and key words for searching, and allow students to research in their own language and then translate.

Information Use (ISP Stage 6)

Both teachers provided concrete instruction on the required elements of the research project. The biology teacher offered students assistance in summarizing information and putting it into their own words as bulleted statements. The ESL teacher guided students through the process of creating note cards, an outline, and a draft, intermediate products that helped students summarize and organize the information they found. She also taught students how to cite sources and avoid plagiarism.

General (ISP Stages 1–6)

Both teachers encouraged students to interact with classmates who spoke the same native language. The biology teacher taught students with various ELL levels in the same classroom. To support lower-level ELL students, the biology teacher allowed and encouraged higher-level students to assist lower-level students. She sometimes asked ESL teachers about the lower-level students to get a clearer sense of their English language proficiency level and considered the students' lower ELL level when she graded their work. The biology teacher also restated written directions repeatedly and rephrased them as needed. She seated together students who spoke the same native language so that they could help each other in their native language during class. The students in the theme class tended to voluntarily sit next to classmates who spoke the same native language, even though the ESL teacher did not require them to do so.

Discussion

Information Behaviors of ELLs

When they reflected on their research experience at the project's midpoint and upon completion, about three-quarters of the ELL students reported that they could easily find information. Teachers also thought that their students had sufficient skills to search online. Searching could be easy for some of the students in the theme class because Family Connection provided options for students to click for searching without typing key words, and also showed visuals and videos in non-English languages. In the biology classes giving students guidelines for searching and a list of recommended websites seemed to be helpful. It was observed that, to find answers to the questions in their research assignment, the biology students typed natural-language questions into search boxes in Google or on the recommended websites. Nevertheless, at the midpoint of the research project 42.9 percent and at the conclusion 44.4 percent of the participating students reflected that searching and finding information was difficult. Among these two groups, a majority reported that looking for specific information was particularly hard. This challenge was triggered mainly by a lack of English vocabulary in general and a lack of background knowledge on their topic.

No one mentioned tasks in the "Information Comprehension" or "Information Evaluation" categories as being easy for research in general, nor for the specific research project in which they were involved. However, some students started the research project with the fear that information would be generally hard to understand (17.1 percent) and evaluate (20.0 percent) for research, although fewer students expressed difficulties with those tasks at the midpoint and completion. Perhaps students did not consider information evaluation to be a difficult task because they had instant help from their teacher during the research project; students were not required to learn how to evaluate and select information.

Summarizing the information and putting it in their own words was considered challenging by many students. Students in the intermediate and advanced levels tended to consider using information easier than did those in the beginning level. Students' writing skills and their work products from previous research steps, such as note cards, an outline, and a draft, enabled them to efficiently organize information.

Among the ISP's six stages, neither task initiation nor topic selection was mentioned as easy or challenging. Perhaps students perceive the research process mainly as searching and writing. Another reason task initiation and topic selection were not mentioned could be the fact that

students participating in this study started their project with a predetermined topic or a list of possible topics provided by the teacher, a circumstance that lessened students' load in the initial stages.

Instructional Strategies for ELLs

The school librarian was observed to be only minimally involved in the research tasks. For the theme class, the school librarian provided print resources for the ESL teacher but without direct interactions with the students. For the biology class, the school librarian helped students search online when they visited the school library once during the project. The findings confirmed the need for the involvement of the school librarian in research projects to provide ELL students with systematic interventions for information-literacy skills, involvement that was suggested in an earlier report of the larger study (Kim 2015).

The participating teachers seemed to focus more on teaching the content and writing skills than on the search process, and they perceived the students' search skills to be good. The participating ELL students went through the information search and evaluation process by using preselected resources with instant assistance by the teachers. Although that assistance reduced challenges that students might experience and helped students complete the research task, students did not acquire information-literacy and research skills that they could use in the current project and transfer to future research projects or other situations. Unlike native English-speaking students, during a research project ELLs are learning a new language in addition to a new subject and information-literacy and research skills. Better preparing students to seek and use information effectively would enable them to better learn the language and the subject, as well as to apply those information-literacy skills to future research and decision-making.

School librarians' collaboration with ESL teachers supports the emphasis on research in the Common Core State Standards (CCSS). The purpose of these standards is to have all students, including ELLs, fully prepared for college and careers when they leave high school (CCSS Initiative 2015). These new standards highlight the importance of close reading of nonfiction text, writing to explain or persuade, and research skills—skills that school librarians can help students develop. Now that ESL teachers need new instructional strategies to adapt to the CCSS and school librarians need guidance from ESL teachers to reach out to and effectively teach ELLs (TESOL International Association 2013), their collaboration would be timely to support ELLs' academic achievement in key areas emphasized in the CCSS. The students' research tasks in this study were conducted to "inform or explain" among various types of text. Therefore, ELL students may show different patterns of information behaviors in research that requires them to "argue or persuade."

It is notable that prior to searching in English, some students searched resources in their native languages in an effort to develop a solid grasp of vocabulary and concepts about their topic. However, interestingly, although the resources in their native language enhanced their understanding of the topic, they did not cite these non-English resources in their end products. This study suggests that bilingualism should be emphasized as a strength of ELLs because they can access a wide variety of resources and understand different cultural perspectives on a topic. As suggested by Julien and Barker (2009), taking advantage of students' bilingualism should be further encouraged as an instructional strategy so that students can search in their native language to facilitate sense-making (during the ISP's exploration and collection stages). Furthermore, students should be encouraged to use the information from native-language resources in their research project (during the ISP's presentation stage), and teachers and school

librarians should include in their citation instruction a guideline on how to cite non-English resources. This approach will allow ELLs to make better connections between their prior knowledge or their own culture and what they are learning now. Also, encouraging students to take advantage of their bilingualism will benefit the multicultural environment of ESL classes by allowing students to learn from their classmates who have different cultures and languages.

The participants of this study sat with classmates who spoke the same native language during the research project, and it was often observed that they asked questions and discussed with each other in their native language. Pickard (2008) suggested that for efficient learning all students should be encouraged to collaborate with peers while they seek information. This study suggests that peer interaction in a native language should be encouraged to enable ELLs to solve problems and learn by collaborating with and mentoring their classmates throughout their research process.

Reflections on Research Instruments

Process surveys in this study were conducted in English, which was the respondents' learning language. Although the questions were written in plain English, and students were asked simply to list their easy/difficult tasks, it should be acknowledged that they had limited capacity to express themselves in English and their answers might have been more in-depth if they had responded in their native languages. Also, as the survey responses were self-reported, data from the surveys may provide a limited view on students' research experience. Therefore, it was critical to supplement the process survey with additional research methods, such as interviews and observations, especially because students were dealing with a cognitively demanding task in a non-native language.

In addition, process surveys were scheduled to be conducted during the class periods at the initiation, midpoint, and completion of the research project. Unexpectedly, due to limited time in class, the process survey in the beginning stage of this research project was assigned as homework in the biology classes. As a result, only twenty-six (68.4 percent) of the total thirty-eight students in participating biology classes returned their completed surveys. Those who did not answer the process survey on time were not allowed to submit it later because by then they had progressed further in their research project. To obtain a complete sequence of the surveys from more students, it would seem necessary to have students answer the surveys on site.

Individual interviews were conducted with students in the theme class. However, group interviews were conducted in the biology classes due to the large number of students in them and the students' tight class schedules. In general, individual interviews offered more personalized interview questions as well as increased opportunities for students to follow up on their answers from the process surveys. Each interview group in the biology classes consisted of three to eight students with mixed ELL levels. For efficient management of the interview sessions, it seemed that three to five students was an appropriate number for the group interviews. To gain insights on unique research experiences shared within an ELL-level group, interviewing students in groups based on their ELL levels would be worth considering.

I closely observed the students' research process while taking field notes from the initiation to the completion of the project. Field notes were recorded on site at the time without any particular framework and supplemented with more detailed comments and questions afterwards. In addition to keeping track of the curricular lessons and the research tasks of students, observations mainly focused on students' individual research activities, their interactions with classmates, and interventions of teachers during the project. However, structured field notes would be useful to more effectively transform observations, surveys, and interviews into findings. For instance,

Observation Form for Guided Inquiry (Kuhlthau, Maniotes, and Caspari 2007, 118), which is an assessment tool for inquiry learning, seems to be a useful research instrument for structured observations.

Conclusion

This study examined enablers and inhibitors to ELL students' research process in a high school setting. The results showed that at the end of the research process more students reported difficulties looking for specific information, understanding hard vocabulary, evaluating (or selecting) information, summarizing, and writing than they did in the middle stage of the research process. Though students reported difficulties, observations indicated that guiding and instructing students through the steps of the research process helped students find the information they needed to complete the project and gradually develop their knowledge on the topic.

Some students searched in their native language first to more easily build knowledge about their topic and later focused on the materials in English. The ELL students experienced common difficulties performing complicated research tasks in the learning language, although each student might have had additional challenges, possibly lack of prior experience with technology or research projects, and topic-related concerns arising from the students' personal situations.

To overcome the challenges, the students wished to have had someone who knew the project and topic and could help them when their teacher was not available. They needed prompt help in finding precise information and looking up vocabulary and pronunciation. Other assistance they wanted included more background knowledge on the topic, sufficient time to complete the project, and a sample research paper by someone who had conducted the same research project.

Teachers and school librarians must understand the challenges ELL students face when doing complicated research tasks in a new language. As instructional strategies, this study suggests that school librarians should be involved to help ELLs acquire information-literacy and research skills that can be transferred to students' future research or decision-making. Teacher-school librarian collaboration for ELLs is also a strategic way educators can embrace the CCSS in their lessons, as the new standards highlight the importance of close reading of nonfiction text, writing to explain or persuade, and research skills. Furthermore, this study suggests that taking advantage of bilingualism should be encouraged as an instructional strategy so that ELLs can search in their native language and use the information from those resources in their research projects. Encouraging peer interaction in a native language is also suggested as it will facilitate student learning.

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Appendix A: Student Profiles

ID	Class	Gender	Age	ELL Level	Ethnicity*	Country	Home Language(s)
s1	Theme	Girl	17	5	H	El Salvador	Spanish
s2	Theme	Girl	17	5	H	Uruguay	Spanish and English
s3	Theme	Girl	17	5	H	Ecuador	Spanish
s4	Theme	Boy	18	5	B	Haiti	Creole, French, and English
s5	Theme	Girl	17	5	H	Peru	Spanish and English
s6	Theme	Boy	18	5	A	China	Chinese
s7	Theme	Boy	18	5	A	Pakistan	Urdu
s8	Theme	Girl	17	5	H	Peru	Spanish and English
s9	Theme	Boy	16	5	H	Peru	Spanish
s10	Theme	Boy	18	5	H	El Salvador	Spanish and English
s11	Biology	Boy	15	3	B	Nigeria	Igbo and English
s12	Biology	Girl	15	2	H	Ecuador	Spanish and English
s13	Biology	Girl	16	2	H	Peru	Spanish
s14	No student assigned						
s15	Biology	Girl	18	4	B	Haiti	Creole, French, and English
s16	Biology	Boy	14	2	B	Haiti	Creole and English
s17	Biology	Girl	16	2	B	Haiti	Creole, French, and English
s18	Biology	Girl	17	4	A	Taiwan	Chinese
s19	Biology	Boy	18	5	A	China	Chinese
s20	Biology	Girl	16	4	A	India	Gujarati and English
s21	Biology	Girl	15	3	H	Ecuador	Spanish and English
s22	Biology	Girl	19	5	H	Mexico	Spanish
s23	Biology	Girl	15	2	H	Peru	Spanish and English
s24	Biology	Boy	16	3	H	Peru	Spanish and English
s25	Biology	Boy	16	3	H	Peru	Spanish
s26	Biology	Boy	17	5	H	Peru	Spanish
s27	Biology	Girl	17	3	B	Haiti	Creole, French, and English
s28	Biology	Girl	14	2	B	Haiti	Creole, French, and English
s29	Biology	Boy	19	5	H	Peru	Spanish

s30	Biology	Girl	14	n/a	H	USA[±]	Spanish and English
s31	No student assigned						
s32	Biology	Girl	14	4	A	Pakistan	Urdu, Punjabi, and English
s33	Biology	Girl	16	3	B	Liberia	English
s34	Biology	Boy	16	2	H	El Salvador	Spanish
s35	Biology	Girl	14	3	H	Peru	Spanish and English
s36	Biology	Girl	16	2	B	Liberia	English
s37	Biology	Boy	16	4	H	Ecuador	Spanish and English
s38	Biology	Boy	17	2	B	Haiti	Creole and English
s39	Biology	Boy	17	2	H	El Salvador	Spanish
s40	Biology	Boy	15	2	H	Peru	Spanish
s41	Biology	Girl	14	3	H	Peru	Spanish and English
s42	Biology	Girl	17	5	H	Peru	Spanish and English
s43	Biology	Boy	18	2	H	El Salvador	Spanish
s44	Biology	Girl	15	3	H	El Salvador	Spanish
s45	Biology	Boy	16	3	H	Peru	Spanish
s46	Biology	Boy	18	5	B	Haiti	Creole, French, and English
s47	Biology	Boy	15	2	B	Canada	French and English
s48	Biology	Boy	15	3	B	Haiti	Creole, French, and English
s49	Biology	Girl	17	2	B	Haiti	Creole, French, and English
s50	Biology	Boy	19	5	H	Ecuador	Spanish

* A = Asian; B = Black or African American; H = Hispanic or Latino.

[±] s30 moved to Honduras after she was born and returned to the USA two years ago.

Appendix B: Questionnaire

Each question in the questionnaire will be read to you. When you need help, you can ask any questions to Ms. Kim. Please try to answer all of the following questions.

1. How old are you? _____

2. Are you boy or girl? Boy [   ] Girl [   ]

3. What ELL level are you in? _____

4. Are you _____ ? Check (✓) one.
   ___ Caucasian
   ___ American Indian or Alaska Native
   ___ Asian
   ___ Black or African American
   ___ Hispanic or Latino
   ___ Native Hawaiian or Other Pacific Islander

5. Were you born in the U.S.? Yes [   ] No [   ]
   If Yes,
      5.1 Have you lived in other countries? Yes [   ] where? _____ No [   ]
   If No,
      5.2 Where were you born? _____
      5.3 When did you come to the U.S.? _____ years ago
      5.4 Where else have you lived? _____

6. What language(s) do you speak at home? _____, _____, _____

7. Tell me how good you are at …

	poor	okay	good	very good
reading in your native language	1	2	3	4
writing in your native language	1	2	3	4
listening in your native language	1	2	3	4
speaking in your native language	1	2	3	4

8. Tell me how good you are at …

	poor	okay	good	very good
reading in English	1	2	3	4
writing in English	1	2	3	4
listening in English	1	2	3	4
speaking in English	1	2	3	4

9. Tell me who you are living with and how good they are at …

the person you are living with		poor	okay	good	very good
	reading in English	1	2	3	4
	writing in English	1	2	3	4
	listening in English	1	2	3	4
	speaking in English	1	2	3	4
	reading in English	1	2	3	4
	writing in English	1	2	3	4
	listening in English	1	2	3	4
	speaking in English	1	2	3	4
	reading in English	1	2	3	4
	writing in English	1	2	3	4
	listening in English	1	2	3	4
	speaking in English	1	2	3	4
	reading in English	1	2	3	4
	writing in English	1	2	3	4

listening in English	1	2	3	4
speaking in English	1	2	3	4
reading in English	1	2	3	4
writing in English	1	2	3	4
listening in English	1	2	3	4
speaking in English	1	2	3	4
reading in English	1	2	3	4
writing in English	1	2	3	4
listening in English	1	2	3	4
speaking in English	1	2	3	4

Appendix C: Process Surveys

Each question in the survey will be read to you. When you need help, you can ask any questions to Ms. Kim. Please try to answer all of the following questions.

1. Take some time to think about your topic. Now write down what you know about it.

2. What is the name you have given to your paper at this time?

3. How interested are you in your topic? Check (✔) one that best matches your interest.

0	1	2	3
Not at all	A little	Some	A lot

4. How much do you know about _____? Check (✔) one that best matches how much you know.

0	1	2	3
Not at all	A little	Some	A lot

5. How do you feel about your research assignment now?

	not at all	a little	some	a lot
confident	1	2	3	4
disappointed	1	2	3	4
relieved	1	2	3	4
frustrated	1	2	3	4
confused	1	2	3	4
optimistic	1	2	3	4
uncertain	1	2	3	4
satisfied	1	2	3	4
anxious	1	2	3	4
other _____	1	2	3	4

5.1 Why do you feel like that?

6. Are you worried about your English for doing this project?

   0   1   2   3

   Not at all   A little   Some   A lot

   6.1 What concerns, if any, do you have with reading in English for the project?

   6.2 What concerns, if any, do you have with writing in English for the project?

   6.3 What concerns, if any, do you have with listening in English for the project?

   6.4 What concerns, if any, do you have with speaking in English for the project?

7. When you do research, what do you generally find easy to do? Please list as many things as you like. (PS1)

   Thinking of your research so far, what did you find easy to do? Please list as many things as you like. (PS2)

   In the completion phase of the research, what did you find easy to do? Please list as many things as you like. (PS3)

8. When you do research, what do you generally find hard to do? Please list as many things as you like. (PS1)

   Thinking of your research so far, what did you find hard to do? Please list as many things as you like. (PS2)

   In the completion phase of the research, what did you find hard to do? Please list as many things as you like. (PS3)

9. What did you learn in doing this research project? Please list as many as you like. (PS3)

Appendix D: Interview Guideline for Students

1. What did you find hardest/easiest to do?

   - Why was it hardest/easiest?

2. Your research project was done in English. Did you have any problems doing this in English?

   - What problems, if any, did you have with reading in English for the project?

   - What problems, if any, did you have with writing in English for the project?

   - What problems, if any, did you have with listening in English for the project?

   - What problems, if any, did you have with speaking in English for the project?

   - How did these problems affect your project?

   - What help did you need to solve these problems?

   - Did you get the help you needed?

   - Who helped you? *For example, the school librarian, teachers, classmates who are also doing the project, people who live with you (or family members), friends, and public librarians.*

   - How did _____ (each of the people mentioned) help you?

   - What help do you wish you had while doing the project in English?

3. When you were doing this project, were you thinking in English or in your native language?

   - When did you think in your native language?

   - If you could read and write in your native language for this project, how would your project be different?

4. How could you have been better prepared for the research?

Appendix E: Interview Guideline for Teachers

1. What do you think is the hardest part of a research paper project to ELL students?

2. What do you think is the easiest part of a research paper project to ELL students?

3. What cognitive patterns (i.e., topic selection, focus formulation, knowledge building) do ELL students show during the project compared with native English-speaking students?

4. What behavioral patterns (i.e., search terms and tactics, operators, article selection criteria) do ELL students show during the project compared with native English-speaking students?

5. What affective patterns (i.e., emotional changes, concerns caused by English language proficiency) do ELL students show during the project compared with native English-speaking students?

6. What help do ELL students need in each phase of the research project?

7. What do you consider important when you design the research paper project for ELL students?

8. How differently do you help ELL student between lower levels and higher levels?

General thoughts

Please give me your general thoughts on how students' linguistic and cultural background impact their information-seeking and knowledge-building process and what kind of help should be provided for ELL students during the project from people and information systems.

Cite This Article

Kim, Sung Un. "Enablers and Inhibitors to English Language Learners' Research Process in a
   High School Setting." American Association of School Librarians.
   <http://www.ala.org/aasl/slr/volume18/kim>

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