Inquiry Takes Time: Breaking Down Barriers to an Understanding of the Inquiry Process of Grade 9 Students

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This study examined the inquiry process of a group of Grade 9 students (ages 14-15) as they completed an inquiry project on a topic of their own choice and shared their project using a PowerPoint presentation. Data for the study was gathered using informal observations and two verbal protocol methods: Think Afters and Think Togethers. The study found that students needed a lot of time to explore information before they were able to web their ideas and develop an essential question to examine more fully. Choosing a topic focus and developing an inquiry question was a challenge for many students. Most required assistance from peers, teachers, and teacher-librarians as well as the time to explore background information.

Introduction

Understanding the information-seeking processes of adolescents involves looking at different kinds of situations in which there is an information need. Adolescents often need to find specific bits of information for school homework, reports, and personal interests. At other times, they are involved in more sustained inquiry where they use a variety of information sources to develop an understanding of a topic or issue in order to answer a question or propose a solution. The study followed a group of grade nine students in Beaumont, Alberta as they completed a large inquiry project using a variety of resources including online databases, online library catalogues, electronic encyclopedias, the Internet and the print collection of the school, public and university library. This study asked the following questions:

- What are the needs of grade nine inquirers?
- How does instruction influence the inquiry process?
- What affective behaviours need to be addressed during an inquiry project?
- How do grade nine students cope with too much information?
- How do we support small group and whole group discussions about the inquiry process?
- Do students seek help from other classmates who have special skills?
- How does the creation of a PowerPoint presentation shape the inquiry process?

A Research Process Model

For this study, Kuhlthau's work, a process approach to information seeking, was very important (Kuhlthau, 1983, 1988, 1991, 1993). Kuhlthau's Information Search Process (ISP) model includes affective, cognitive and physical aspects of the whole information-seeking process. It was the inclusion of all three aspects that, for Kuhlthau (1991), was "necessary for a model to address a wider, holistic view of information use" (p. 362). Her findings indicated that searchers experience six stages as they complete a search for information. These stages are called Initiation, Selection, Exploration, Formulation, Collection and Presentation. According to Kuhlthau, all information seekers pass through these same six stages when completing an inquiry project.

Information Technology, Information-Seeking and the Inquiry Process

Research on the information-seeking behaviour of children and adolescents is limited. According to Chelton and Thomas (1999),

> One of the challenges of teaching graduate students to work with children and youth in school and public libraries is to inform their approaches to instructional design and their understandings of how people use information technology through an examination of current research. The problems in so doing have been exacerbated by the scarce, fragmented, and sometimes flawed nature of past research in information and library studies dealing with youth issues in information seeking. (p. 7)

Research using adolescent participants can help to inform not only those who work in school libraries and young adult departments of public libraries but also those who serve adults. For Chelton and Thomas, "considering the problems of youth in navigating increasingly sophisticated searching environments may be helpful to system designers, at the same time that they serve as cautionary guideposts to those who may have forgotten the problems that exist for novice users of all ages" (pp. 7-8). Of course, grade nine students are an interesting population all on their own. Their need for information for school projects and personal enjoyment becomes very important at this stage of their school life.

Researchers have tried to determine what it is that novice users do when accessing information in electronic environments. Oliver and Oliver (1996) have suggested that new skills are needed to find information in these new environments and that the skills necessary are quite different from the ones needed when using traditional sources. The researchers also reported that these specific skills did not develop from personal exploration of the system. They suggested the three main problem areas in the use of multimedia and hypermedia applications in schools and school libraries are disorientation, navigation inefficiency and cognitive overload. Without intervention by a teacher or teacher-librarian, Fidel (1991a, 1991b, 1991c) found that novice users lacked the ability to form effective search plans. Trumball, Gay and Mazur (1992) stated that novice users "have only impoverished strategies for synthesizing data into patterns" (p. 315). Pappas and Geitgey (1994) observed that novice user's information-seeking strategies might be at any point on the simple to complex continuum. Most students left to their own devices failed to progress to a more analytical search strategy.

Marchionini (1989) contended that users of information technology are required to deal with finding too much information and so need different skills to deal with refining and selecting appropriate articles. Gross (1999), in her study of imposed queries in three school libraries, found that "in using resources, students had trouble finding answers when they had to search through a lot of text [and] when the resources did not use the same terminology they were given in class" (p. 513). Hirsh (1999) explored the relevance criteria and information seeking of ten Grade 5 children using the OPAC, the Internet, World Book Encyclopedia, and SIRS magazine index. Participants reported that they relied on teachers, librarians, and peers for help in finding information. Librarians were asked for help with search terms, search strategies and locating materials. Fidel et al. (1999) studied searching behaviour of eleventh- and twelfth-grade high school students on the Internet. The first finding was that "searching was both a social and academic event" for the students (p. 28). Fidel et al. stated that the "interchanges covered many aspects relating to searching, ranging from technical pointers to tips about searching to interpretations of the questions in the assignment, and all intertwined with social intercommunications, mostly verbal, typical of students their age" (p. 28).

Fidel et al. also reported the students' opinions about the web. For students, the Internet was appealing because of the speed of locating information. Therefore, when the Internet failed to produce results quickly, students became frustrated. They were also frustrated when they felt like they had spent a reasonable time and could not locate information.

Bilal (2000, 2001, 2002) reported the results of a research project that looked at 22 grade-seven students' use of the Yahooligans! Web Search for fact-based and self-generated search tasks. Bilal (2000) found that those children who used only single or multiple concepts alone were more successful than those who used single or multiple concepts as well as natural language phrases. Scrolling, use of the back button, and navigating links were three important physical behaviours that all students used. Students browsed more on the self-generated tasks and were much more satisfied with results than when the topics were assigned (Bilal, 2002).

Bilal (2002) also found that the students' self-generated topics were "research-oriented and broad in nature" (p. 1181). A full one third of the students were unable to formulate a focus for their search and those who "searched under their initial broad topics remained undecided about the information to select from the results they retrieved" (Bilal, 2002, p. 1181). In fact, Bilal found that most students needed mediation to find their true information need. Students continue to need instruction and practice to be able select an inquiry topic and to find a focus for their inquiry.

There is a body of literature that can provide support for the use of children and adolescents as participants in the study of information seeking. Children and adolescents are an interesting population to study and the research described has contributed greatly to our overall understanding of how children engage in information seeking and learning.

Research Method

This study followed four participants in a Grade 9 (ages 14-15) Language Arts class. The students went to a suburban/rural high school in a small town about 30 minutes drive from Edmonton, Alberta, Canada. The French/English bilingual school served students from Grades 9-12 (ages 14-18). The students were followed for two months (a total of about 30 instructional hours) as they completed an inquiry project on a topic of their own choice. During the two months, participants shared their information-seeking strategies and their reflections on the inquiry process as a small group as well as individually. The researcher was involved in assisting with all students in the class so informal observation of other students also occurred.

Different types of verbal protocols were used to collect data from the participants. In a previous study, Think Alouds and Think Afters were used to collect data from participants (see Branch, 2001, 2000). Think Alouds are verbal reports that are gathered while a participant is completing a task, e.g., searching for information on the Internet. Think Afters are verbal reports gathered after a participant has completed a task, e.g., talking about the inquiry process after completing the inquiry project for this study. In this study another method, Think Togethers, was used to describe a group of participants doing Think Alouds together, i.e., discussing their information-seeking processes as they complete a group or individual inquiry project.

The four participants, two boys and two girls, were selected by the teacher-librarian to be a part of the study. The researcher did not know the participants prior to the study. The participants and the rest of the class received instruction from the teacher-librarian during the first nine classes. This instruction included strategies to help students with inquiry process, critical thinking, searching different databases, the Internet, and the online catalogue, planning, and webbing topic ideas. Informal observation of the participants took place during every class and instruction was video-taped. On four occasions during the inquiry project, the participants were asked to do Think Togethers by sharing their ideas, processes, resources, and plans. Participants also completed Think Afters throughout the inquiry project and their feelings about the inquiry project. These responses were given using a personal tape recorder.

Summary of Findings

What are the needs of grade nine inquirers?

In order to formulate a focus for their inquiry project, the four Grade 9 inquirers in this study needed time and the mediation of both the teacher-librarian and the researcher. This time included instruction in how to plan for an inquiry and how to retrieve a variety of print, non-print and electronic resources to support their inquiry. The instruction focused on strategies to develop an essential question, to map ideas and questions that arise from the essential question, to create an outline, to develop a rubric for evaluation, to think about higher level questions and critical thinking techniques, to search online databases, library catalogues, and the Internet, and to evaluate Internet sites. In other words, students needed time, instruction, and mediation to get to the essential question and develop a plan for their inquiry. One student noted, "Once I had the topic and knew what information I needed, it wasn't hard to find information."

Finding an essential question is the hardest part of any inquiry and one that requires students to commit to a topic, find a focus, and then be engaged enough to sustain a long inquiry. One student in his Think Afters stated,

Next time I would just pick a topic right away, even if I didn't think it would be good. The first topic I thought of was mountain biking, but I didn't like it at first so I wasted a bunch of time trying to find something better, just to come back to the same thing.

Once they determined their focus, students needed very little assistance with note-making, creating the PowerPoint and sharing aspects of the project. It seemed that once the essential question was determined, the inquiry moved forward quite well. In the Think Afters, one student stated,

Well, my subjects weren't all over the place. They were all basic information on how golf works and so I think that was nice that I didn't have topics that didn't have any relation towards each other. They all fit together nicely."

How does instruction influence the inquiry process?

In this study, instruction in the early weeks of the inquiry allowed students to gains skills and strategies that would help them better be able to plan for inquiry and retrieve a variety of materials to support their needs and interests. The instruction was designed to support students as they planned for their inquiry and allowed them time to explore questions and issues. In the final Think After one participant stated, "While doing this research project I learned that I should plan my time a little bit more. If I am not finding information in one source, not to look at all the websites, just try to find a book or something like that that may help me on my research. Then I won't be so pressed for time towards the end…"

The retrieval strategies that were taught also gave students time to explore their topic focus in the databases, catalogues, and on the Internet. This allowed students time to develop the background knowledge necessary to develop an essential question. One participant commented, "Next time I would start out with a book instead or would just do a few websites and stuff like that because for the topic I chose the Internet wasn't really the best tool to use." Another participant felt that next time he would "probably find more sources of information. I had one good book but I probably should have found more."

What affective behaviours need to be addressed during an inquiry project?

Students were excited to begin an inquiry project of their own choice. However, this meant that some topics needed refining. An interest in World War II, for example, developed into an essential question of the conditions that must exist for World War III to happen. An interest in the television show, *Friends*, developed over time into a question of whether the actors and actresses that play the characters on Friends are worth one million dollars an episode. An interest in witches developed into a question of the role that recent pop culture has played in changing our perceptions of a witch. One student noted, "My least favorite part was just trying to find a good topic."

Once committed to a topic focus, students were able to sustain their inquiry over the next 5-6 weeks. Even in the final Think After (completed a week after the inquiry was complete), students still felt committed to their topic focus. All participants felt very positive about their inquiry topic. One student remarked,

If I started this project all over again I would not choose a different topic because this topic I find now is very, very interesting. At first I had doubts because I wasn't really finding anything [on the Internet] but then I found the books and now I am really happy with it.

Another stated, "If I were starting the project all over again I'd go with the same topic right from the beginning." A third commented, "If I were to do this project over again, I don't know. It was a pretty good topic to use I guess. I don't know what other kind of topic I would use."

There was some frustration and confusion as students tried to move from an interest to an essential question. There was also some frustration when trying to find information on the Internet to answer their question. Two of the students preferred to use books to complete the assignment as a result of finding inappropriate information on the Internet. One student commented in the Think Afters that, "What worked really, really well for me on this project though was the two books because they had a lot of good information."

There was some anxiety with creating bibliographic entries from information gathered on the Internet. A few students failed to copy down all the information they needed from Internet sites. This was a teachable moment and the teacher-librarian was able to show students how to use NoodleTools (www.noodletools.com) to record their bibliographic information. Even though students knew that bibliographies were part of the evaluation of the inquiry, this was a very unpleasant part of the inquiry for them.

During the processing and creating phase (Kuhlthau's presentation phase), students were, for the most part, excited and busy. One student commented that this was his favorite part of the assignment was "actually designing the slides and putting the info on the slides." This was a time when the teacher-librarian and teacher could move about the room answering small questions and monitoring progress. Students enjoyed using PowerPoint to present their new knowledge. The software package allows for a lot of creativity and students were keen to add music and images to their presentations. For many students this was the best part of the inquiry. One student stated, "My favorite part of the project was probably working with the animations. I don't mind working with the software. I think it is kind of fun sometimes." However another student (who worked with a partner) stated that the hardest part of the inquiry was "deciding what information we would use and not use because it was all good."

There was some anxiety when it came time to present their inquiry projects to others in the class. This is not surprising given the fact that the presenters are teenage boys and girls. However, most students were very excited to share their inquiries.

How do grade nine students cope with too much information?

Many students found the amount of information on the Internet to be very challenging. As a result, the teacher-librarian and I guided them to online databases including SIRS Researcher and Electric Library/Big Chalk. Many students found information that was useful for their inquiry here. However, other students with essential questions such as influence of the characters on Friends, gender issues in professional snowboarding, and strength training for golfing, found many useful Internet sites. Instruction on how to narrow and broaden searches and how to find the best resources on the Internet helped to alleviate some of the students' confusion and anxiety. One participant shared the following comment:

> My favorite part of this assignment I would have to say was getting the information because I found out a lot of interesting things. I couldn't put everything on my slide show that I wanted to, because there was way too much information, but I found out a lot of stuff.

Some students chose to find information in other ways. Several students selected print resources from the University of Alberta library or the public library to support the materials in their school library. Students also acknowledged when they felt more comfortable using print materials and found a quiet corner in the library and did their work away from the computer lab. The teacher-librarian and the researcher encouraged students to choose the best possible resources to answer their inquiry questions.

How do we support small group and whole group discussions about the inquiry process?

Using the Think Togethers Method allowed the four participants to spend time talking about the inquiry process during different stages of the inquiry. Most of the discussion focused on feelings that were being experienced during the current stage of inquiry, i.e., excitement, frustration, relief, anxiety, information overload, and so on. During each Think Together the researcher encouraged students to look at Kuhlthau's Information Search Process model to locate their current feelings, as well as progress on their inquiry in relation to the six stages. This was a very useful activity as students could discuss being "through" one stage and onto the next.

Doing a large inquiry project such as this can be intimidating and frustrating. One student stated,

> My least favorite part of the assignment is having to do these because I'm not really that good at handing things in on time sometimes. Especially when it is a project like this because I get too interested in the information and I research too much for my project and then I just don't have it done on time. I am a very slow worker when it comes to doing PowerPoint because I want everything to work just the way I want.

Allowing participants to have the time to talk about the process and to relate their feelings to a model was a very effective way of encouraging an open and safe dialogue. Large group discussion was also encouraged during the instructional times. The teacher-librarian had a strong sense of the need to reflect on the process throughout an inquiry and created a safe atmosphere in which to question and wonder.

Do students seek help from other classmates who have special skills?

Students sought help from classmates who had special skills in creating "flashy" PowerPoint presentation. Many students had experience with using PowerPoint to create basic presentations but wanted to be able to incorporate sound and images into the presentation. Those students with expertise in locating copyright free images and sounds were highly sought after during the creating stage of the inquiry. There was also a lot of discussion on design of the PowerPoint presentation and how to "capture the interest of the audience."

How does the creation of a PowerPoint presentation shape the inquiry process?

Using PowerPoint necessitated that students deliver succinct, organized information in a creative way. This meant that students could make point-form notes from print and electronic sources and use them as the basis for their presentation. Because PowerPoint presentations eliminate the need for lengthy written ideas and focus on "hitting the highlights" students spent more time organizing information into coherent chunks and adding visuals to engage their audience of 14-15 year old students. In other words, "flashy" presentations were important and so locating appropriate visuals and sounds became another part of the inquiry process.

Summary of Findings

Participants were open to sharing information and ideas in the Think Together situations and found the discussions helpful to their planning and organization of their inquiry. Students felt comfortable with their fellow participants and used ideas and conversations as a springboard for their own ideas and concerns. Students were at different stages of the Kuhlthau model every time we met for Think Togethers. Focus Formulation happened during 8th class of 22 classes and this was a very exciting time to be working with the students. While working towards an inquiry question students needed emotional support as well as instruction/mediation. Two of the students found that books proved to be the best information source. There was some frustration when the Internet didn't provide the best possible information or when there was too much information.

Implications and Conclusions

This study found that developing an essential inquiry question takes time, instruction, mediation and support. Choosing a personal choice inquiry topic requires assistance from peers and teacher-librarians and the time to explore background information. For many of the students this was the first time they had been allowed to choose their own topic focus, and this was a challenging learning experience for many of them.

Teachers and teacher-librarians need to recognize that students need more opportunities to choose their own essential questions. The long time that this group of students needed to find a topic and choose an essential question is indicative of the lack of skills and strategies necessary to choose good topics. By providing students with opportunities to choose their own inquiry topics for both large and small inquiry projects, students will be better able to move more quickly into inquiries.

Teachers can also make the task less daunting if students can choose a topic from within a curriculum topic for which they have already developed considerable background. This can be especially useful if students are told at the beginning of the unit that they will be able to do an inquiry at the end. Students can then begin to generate ideas and talk to others about possible inquiry topics. This also allows students to begin to look for other information outside of school and to develop an essential question.

There were still students who liked to use books and who gravitated to books as their first information source. However, most students started with the Internet. Some of these students were discouraged when their topic wasn't covered well on the Internet or if their search terms did not help them locate the appropriate information. Helping students to manage their time was an important part of helping students to do an inquiry project. Given time, students

could create thoughtful, critical, and important inquiry projects. Allowing students to create PowerPoint presentations created more interest in the inquiry project.

Using Think Togethers as a way of talking about both the affective and cognitive experiences of completing an inquiry project was very useful. Open dialogue using Kuhlthau's stages allowed students to recognize their feelings and cognitive struggles and successes were a natural part of completing an inquiry process. Using the model consistently to guide discussion allowed students to chart their own progress and to realize when they have moved on to a new stage.

Large inquiry projects such as this require both emotional and cognitive support from peers and teachers/teacher-librarians. Instruction in the planning and retrieving stages of the inquiry supported students in the most challenging and most important part of the inquiry. A testament to the time and effort spent in the early stages of the inquiry was the level of commitment students displayed throughout the inquiry and their overwhelming agreement that they would not choose another topic focus if doing the inquiry again.

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