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A Critical Investigation of Students' and Teachers' Views of the Use of Information Literacy Skills in School Assignments

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This study examines the views of students and teachers in a United Kingdom high school on the students' use of information literacy skills. The students were provided with a scaffold in the form of the PLUS information literacy model. The study demonstrates that there exists a range of understanding amongst students about the value of information literacy skills such as brainstorming, concept mapping, reading for information and understanding, note taking and writing an assignment. It also demonstrates that students have a range of views on what they perceive to be the value of learning and applying information literacy skills, and that these views range from the superficial to a deeper level. The study provides some insight into students' feelings about confidence in their ability to produce good work and also their feelings about the efficacy of some of the suggested strategies given to them by the teachers and the school librarian. The results show that most students viewed the existence of a scaffold--the PLUS model booklet in this case--as being beneficial to them. The evidence from students demonstrates that students have a preference for electronic sources of information over printed sources. Teachers' views supported the use of a scaffold and teachers saw the PLUS model as being of benefit to most students. Potential implications for library media specialists and teachers and suggestions for future research are included.

This study took place in Ripon Grammar School, Yorkshire, United Kingdom. The school is a secondary (i.e., high school) county coeducational grammar school with 750 students. The school library has one member of staff, the school librarian. (As this is a U.K.-based study, the term *school librarian* is used when referring to the school library media specialist [SLMS] or teacher-librarian in the school.) Two previous studies relating to students' use of the PLUS model in this school have been published (Herring, Tarter, and Naylor 2000; Herring, Tarter, and Naylor 2002). Students taking part in the study were in year 8 (second year of secondary or high school) and were undertaking a physics project in sound technology (Tarter 2005). The school librarian collaborated with the science teachers in developing information skills amongst the students who were studying sound technology.

Students had previously been taught a range of information skills by teachers and the school librarian and had been introduced to the PLUS model (see appendix A). Students were each given a PLUS booklet (an information skills scaffold) at the start of the assignment. Students were required to select a topic within sound technology, such as musical instruments, radio, ultrasound, or how animals used sound. Each student was expected to do some individual brainstorming after selecting the topic and to produce a keyword-based concept map of the topic.

Students were then encouraged to do preliminary reading about their topic to refine their thoughts about the scope of the topic and the concept map. For the assignment, the students had to write a six-hundred-word essay about their topic and students had to select the key elements themselves to include in their essay. Students also had to complete a practical exercise related to their topic. Two separate classes of students completed the assignment and fifty-two students in total took part in this study. The study complied with the Ethical Committee standards of both Charles Sturt University and Ripon Grammar School.

The PLUS model was developed by the author and was first published in 1996 (Herring 1996). The model has been used in or adapted by a range of schools in the U.K., South Africa, Australia, and New Zealand. The elements of the PLUS model--Purpose, Location, Use and Self-evaluation--are intended to provide students with a scaffold that they can use when completing school research assignments but also with a potentially transferable framework that can help them to develop as information literate citizens.

Research Questions

The aim of this study is to examine students' and teachers' views of information literacy skills in school assignments. The study's approach was to take an in-depth examination of the extent to which students identify benefits or limitations in applying a range of information literacy skills introduced to them by their teachers and school librarians. Many assumptions are made by teachers and SLMSs about students' use of information literacy skills but these assumptions are seldom backed by empirical evidence. This study seeks to obtain the views of the students in particular to gain a better understanding of how students use information literacy skills and also the extent to which they understand and reflect on the processes that they are engaged in when completing a school assignment. The key research questions identified are:

- To what extent did students value the use of the PLUS model booklet issued to them at the start the assignment?
- How confident were the students about doing a good assignment and did the PLUS booklet affect their confidence?
- What benefits and limitations did students identify from individual brainstorming and concept mapping in relation to learning more about their topic and producing a good assignment?
- To what extent did students see value in doing preliminary reading to revise their initial keywords and concept map?
- What reading and note-taking strategies did students adopt when using print and electronic learning resources to find information and ideas for their assignment?
- To what extent (and why) did students prefer to use electronic rather than printed learning resources?
- What are the implications of the findings of this research for teachers and SLMSs?

Literature Review

The literature on information literacy is already vast and continues to grow. The upsurge in interest in information literacy in recent years has widened from the school context to higher education and the workplace. There is considerable revision of the definitions, importance, and

scope of information literacy in schools and outside the school context. For example, views of information literacy skills learned in schools as lifelong learning skills have been challenged by such authors as Lloyd (2003 and 2004). There is also considerable debate about information literacy in schools relating to such aspects as definitions of information literacy, whether information literacy can be view as a *process*, the value of information literacy models, and the place of information literacy in the new *digital literacies.* What is clear is that, while there is agreement that information literacy is important and integral to student learning, there are a range of viewpoints on the meaning, definition, teaching, and evaluation of information literacy. This critical literature review seeks to explore elements of information literacy in schools, including the meaning of information literacy, evidence of information literacy teaching and learning, models of information literacy, and whether information literacy can be included in digital literacies.

What Is Information Literacy?

Given the extent of the literature on information literacy, this question may seem redundant, but any review of the literature will indicate that there is no one all-encompassing answer to this question. Other questions arise including: Is information literacy a set of skills or attitudes or attributes? Is information literacy a process? Can models of information literacy be effective in enhancing student learning? How does information literacy fit into the digital school environment?

Evidence of a lack of agreement on the meaning of information literacy can be seen in the plethora of definitions of information literacy. Langford (2001, 18) expresses anxiety about information literacy stating, “It was frustrating because one’s understanding of the concept [information literacy], depended on what end of the elephant you had in your grasp.” Langford (2001) states that Doyle’s (1994) definition of information literacy should be seen as an excellent starting point for debating information literacy. Doyle (1994, 40) defines information literacy as “the ability to access, evaluate, and use information from a variety of sources, to recognize when information is needed, and to know how to learn” but also identifies some attributes of an information literate person. The National Forum on Information Literacy (2004, np) define information literacy as “The ability to know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand.” Moore (2002, 1) states that information literacy is a “dynamic concept [which] extends basic reading, writing and calculating skills for application in information and technologically rich environments (Kuhlthau, 2001) for the purpose of learning or solving problems.”

Herring (2004, 74) defines information skills as “the skills which pupils [students] use to identify the purpose of, locate, process and communicate information concepts and ideas and then reflect upon the effective application of these skills.” Abilock (2004, 1) takes a wider view of information literacy arguing that “Information literacy is a transformational process in which the learner needs to find, understand, evaluate, and use information in various forms to create for personal, social or global purposes.” Other definitions of information literacy or lists of attributes of an information-literate student have been examined in *Information Power* (AASL/AECT 1998) and by such authors as Kuhlthau (2004), Loertscher and Woolls (2002), and La Marca and Manning (2004).

Williams (2001, 1) is critical of definitions of information literacy and argues that "Definitions of information literacy, drawn from many perspectives, seem to situate themselves *outside the actual learning process*." (Williams' italics). Williams (2001, 4) also poses the question "What sort of *information literacy*?-- an often-used but dangerously ambiguous concept--should we be promoting, and what should it accomplish?" Boyce (2004, 21) also challenges the concept of information literacy, arguing that "the logic of information literacy is inappropriate for the new era of electronic communications technologies--that it [information literacy] is a persistent expression of the will for print-based pedagogy to transcend the changing culture of our communications environment."

Boyce (2004, 26) cites Kapitzke (2003) as stating that "The information literacy framework, as it is currently articulated, is inadequate on three counts: (i) its modernist presuppositions (ii) its lack of a politicised criticality and (iii) its neglect of the implications of new technologies on knowledge and literate work."

Limberg (2005, 49) urges educators in schools to change their attitude towards information literacy teaching and argues that "the essence of the change needed concerns a shift from focus on procedure and order toward a focus on more abstract and the more exciting contents of information literacy as regards what is at stake and what is crucial for becoming an information literate person."

In the higher education sector, Bruce's (1997) oft-quoted work echoes some of Limberg's concerns and argues that information literacy should be viewed broadly and not merely as a process that is followed within the narrow field of education. Bruce (1997) focuses on the information literate person and presents a model (7 Faces of Information Literacy) that views information literacy as encompassing the use of information technology, information retrieval and use of sources but also such aspects as how individuals control information, construct and personalize knowledge and view information wisely and ethically.

A further challenge to prevailing notions of information literacy comes from Lloyd (2003 and 2004, 219) who argues that information literacy is biased towards "the educational sector which focuses on textual and digital works as access points to sites of knowledge" and that to assume that information skills taught in schools or universities will facilitate lifelong learning is false as to be information literate in the workplace often means being able to interpret "non-textual information practices (e.g. the use of the body or others as information sources)."

It is important that teachers and SLMSs reflect on these criticisms of information literacy in schools and seek to explore whether the present teaching of information literacy can enable students to cope with the complex range of digital information which is presented to them; whether information literacy teaching can provide students with not just a prescribed set of skills but a metacognitive approach to their own learning; whether information literacy in education, and in schools in particular, can provide students with the perhaps different information literacy attitudes and skills needed in the workplace; and whether information literacy teaching is *in fact* related to student learning as opposed to students' ability to find and evaluate information. As educators, academics, teachers, and SLMSs encourage students to be critical of what they read, so it is incumbent on us to be critical of our approaches to information literacy.

Research Evidence of Information Literacy Teaching and Learning

It was noted above that there is a vast and growing literature on information literacy in schools but much of the writing on information literacy, while informative and of use in a contextual manner, is not based on empirical research. The work of Kuhlthau (2004) is highly respected and the most cited in the literature. Kuhlthau's (2004) research in schools focused not only on students' knowledge of and views on assignment related information literacy skills but also on the affective features of students' learning and Kuhlthau presents evidence of how students went through a range of emotions when planning and completing curricular assignments. The review of information literacy research and the information literacy literature by Loertscher and Wools (2002) is a valuable contribution to the area and covers such aspects of information literacy as the research process, key issues, information literacy strategies, and information literacy models. The current work of Henri and Asselin (2005) includes significant reviews of the information literate school community and information literacy research by Limberg (2005, 47), who stresses the need for students to have a "repertoire of understandings of information seeking and use." There have been a range of research studies in information literacy in schools, including such subject-related research as Lewis (1999) on science teaching and information literacy and Maxwell (2000) on aspects of information literacy in a year 7 science program. Moore and Poulopoulos (1999) studied teachers' knowledge and practice of information literacy. Ryan and Hudson (2003) examined aspects of secondary school students' understanding of information literacy, while Barranoik (2001, 45) investigated high school students' views on "meaningful assignments." Particular elements of information literacy have been researched by Wolf, Brush, and Saye (2003) who evaluated the Big Six as a scaffold for students and concluded that "when students are provided metacognitive support during information problem-solving activities, they may be able to manage complex tasks and subject matter content." Harada (2002) examined students' journal writing and information literacy and noted that students "had taken the first steps in articulating new conceptions and new feelings about the information search process." Gordon (2000) and Gordon (2002) focused on students' use and understanding of concept mapping and one of the conclusions of the studies was "that mappers were more sensitive to the electronic environment" than students who did not use concept mapping. In the educational field, Kinchin and Hay (2000, 43) argued that "concept mapping can be a helpful metacognitive tool" although they did not examine concept mapping as part of information literacy teaching in the school. Fisher, Frey, and Williams (2002, 72) examined note taking and concluded that note taking often "leads to deeper student engagement and reflection." Other research studies include Fitzgerald (2004) on information literacy of students going from high school to higher education and McGregor (1998) on plagiarism. The present author conducted research into the use of the PLUS model in schools (Herring, Tarter, and Naylor 2000; 2002).

Information Literacy Models

There now exist a large number of information literacy models that have been designed in different countries. The application of many of the models in schools is unclear, but research has been undertaken in relation to Kuhlthau's ISP model (Kuhlthau 2004 and Kracker 2002); Eisenberg and Berkowitz's Big Six model (Wolf, Brush, and Saye 2003) and Herring's PLUS model (Herring, Tarter and Naylor 2000 and 2002). There is anecdotal evidence of the use of Ryan and Capra's ILPO (Ryan and Capra 2001). Stripling (2004) presents a model for inquiry learning and Oberg (2004) reports on a model developed for Canadian teachers and teacher librarians. There are a number of reviews of information literacy models, such as those by Loertscher and Woolls (2002), Shannon (2002), Branch and Oberg (2003), and Callison (2002).

The two previous studies of the PLUS model (Herring, Tarter, and Naylor 2000; 2002) focused on students' views of the use of the elements of the model--purpose, location, use, and self-evaluation. The model is intended to be an iterative and not a linear model that students can use as scaffold to their assignment work but also as a reflective tool to enhance their learning. A diagrammatic view of the model is provided in appendix A and at http://athene.riv.csu.edu.au/~jherring/PLUS%20model.htm. In the completed studies, students were generally positive about the use of the model, indicating that they benefited from the use of tools, such as brainstorming and concept mapping in the purpose stage, but that they also used the results of brainstorming and concept mapping when searching, evaluating information and ideas, and when writing the assignment. Some students indicated they had no need for such a scaffold and were reluctant to use a model as they preferred their own methods. Interviews with the class teachers and the teacher librarian revealed that these students were the more able students in the class and that most students had clearly benefited from using the model. Improvements in students' structure of assignments, in their use of a range of information resources, had contributed to a general improvement in student grades although this was not fully tested in the studies.

Green (2004, 70) takes a critical view of information literacy models, stating that "many of the existing information skills models don't meet the needs of the learner as well as they should." A general criticism which can be made of all information literacy models is that they do not take into account individual students' learning styles and that they may appear as a one-size-fits-all approach to learning. The use of a model in a school can be adapted by the SLMS and teachers for individual students or those individual students can be offered the model not necessarily as a *sine qua non* for completing an assignment but more as an option which can be modified to suit their own use. In a recent, as yet unpublished, study by Herring and Hurst, it was observed that students could be viewed either as *recipients* of a model or scaffold, where they were required to integrate elements of a model or scaffold into their completed assignment, or as *consumers* of a model or scaffold, where they could choose to use or ignore elements of the model or scaffold.

Information Literacy and Digital Literacy

If information literacy is seen as emerging from a print-based culture as Boyce (2004) argues, then it may be argued that the term *information literacy* has been overtaken by *digital literacy* in relation to students' use of, and sometimes stated preference for, Web-based information sources. The literature on digital literacy is perhaps as confusing (and confused) as that of information literacy, with little agreement on definitions and parameters. Dolan (2004) states that "There is no clear definition Digital Literacy. The current definitions range from low-level competence in the use of computers to high levels of competence and cognitive ability in the use of information extracted by use of computers." Bawden (2001) reviewed a range of definitions of digital literacy in the 1990s and concluded that

> It is cognition of what you see on the computer screen when you use a networked medium. It places demands upon you that were always present, though less visible, in the analog media of newspaper and TV. At the same time, it conjures up a new set of challenges that require you to approach networked computers without preconceptions. Not only must you acquire the skill of finding things, you must also acquire the ability to use these things in your life.

McCarthy (2002) states that "One definition of digital literacy is 'the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers.'" Finn (2004) takes a rather narrower, utilitarian view, stating that "Digital literacy is a means for ascertaining the computer skills competency of an individual to function in the workplace." Kapitzke (2003, 55) seeks to widen the concept of digital literacy to *hyperliteracy* and states that "this term [hyperliteracy] encapsulates the notion of being literate about literacy, and refers to critique of the information process itself, as students are provided opportunity to consider their positioning as information users and producers."

The present author would argue that while digital literacy can be recognized as a prerequisite for learning in digital age schools, it would be false to assume that digital literacy was somehow separate from or in addition to information literacy. While some aspects of digital literacy, such as the evaluation of the authority of a Web-based source may be more crucial in general than with some print-based sources, such as books, students can be encouraged to view all sources with a critical eye. The present author views information literacy as enabling students to take a critical approach not only to information resources of any format but also to their own learning and understanding. Students' use of digital information resources is important and thus digital literacy is increasingly important. However, students can learn from non-print and non-digital sources such as analog video and interviews with people. It is argued here that information literacy encapsulates *all* sources of information and ideas and supports critical learning.

Research Method

This study is essentially a qualitative research project although there are some elements of quantitative analysis presented in the findings section. According to Bouma and Ling (2004, 165), "Qualitative research sets out to provide an impression: to tell what kinds of 'something' there are; to tell what it is like to be, do or think something," and that qualitative researchers are interested in examining a particular situation from the point of view of those in the study. Thus, this study seeks to draw tentative conclusions by examining the views of students and teachers on the place of information literacy in the assignment process in a high school. A key qualitative researcher, Patton (2002, 145) sums up qualitative research methods as "ways of finding out what people do, know, think and feel by observing, interviewing, and analyzing documents."

This study can also be viewed as *action research* in that the study was carried out with a view to improving learning and teaching in a school by developing students' information literacy. The North Central Regional Educational Laboratory's (nd, 1) definition of action research is widely cited and refers to "Action research is inquiry or research in the context of focused efforts to improve the quality of an organization and its performance. It typically is designed and conducted by practitioners who analyze the data to improve their own practice. Action research can be done by individuals or by teams of colleagues. The team approach is called collaborative inquiry."

Burns (2000, 443) supports this view, arguing that action research can be viewed as "the application of fact-finding to practical problem-solving in a social situation with a view to improving the quality of action within it." The impetus for this study was to improve students' learning of a curricular topic but also to improve their understanding of how they might apply information literacy skills.

The study used three methods to collect data. Students who were undertaking a project in sound technology, led by physics teachers, completed a post assignment questionnaire. Burns (2000), Bouma and Ling (2004), and Patton (2002) agree that there are a range of advantages in using questionnaires in a situation such as a school, including the availability of respondents, ease of administration of questionnaires, and the potential quality of data gained from semi-structured questionnaires as used in this study. They also warn that questionnaires may be less valuable if poorly constructed or if participants respond minimally to questions.

The second research method to be employed was group interviews with students and teachers. Three groups of four students from the classes undertaking the sound technology project were interviewed as a group and one group of four teachers was interviewed as a group. The students were selected by teachers and the teacher librarian to represent different levels of ability from the classes. The teachers were selected from those involved with the students in the sound technology project (two teachers) and those who had ongoing collaborations with the teacher librarian in curricular assignments which were helping to develop information literacy in students (two teachers). The sampling was not fully structured but purposive (Patton 2002) particularly in relation to teachers as teacher availability was restricted. Williamson (2002, 242) argues that "interviewing in interpretivist or naturalistic research aims at understanding people from their own point of view." Both interviews were semi-structured in nature and Burns (2000, 424) states that some of the advantages of semi-structured interviews are that ".. the content focuses on the crucial issues of the study. This permits greater flexibility than the close-ended type [of interview] and permits a more valid response from the informants' perception of reality." Burns (2000, 426) argues that group interviews are valuable sources of rich data but adds a caution that "There is the danger that members will not fully reveal their beliefs and feelings when other persons are present." Lankshear and Knobel (2004, 208) argue that "Small group interviews are particularly useful data collection methods for accessing alternative points of view, for obtaining insights into group consensus or divergence on an issue or across accounts of an event and for clarifying the researcher's in-process interpretations garnered or developed from already collected data."

The present researcher also noted Lankshear and Knobel's (2004, 208) advice that "With children and adolescents, three or four interviewees may produce the most useful data." The third method was a semi-structured individual interview with the school librarian.

Data analysis for the study was done using the NVivo software package (www.qsrinternational.com/products/productoverview/NVivo.htm) and was particularly useful for identifying themes in the data, cross collating data from interviews and questionnaires and coding the data. Gibbs (2002) argues that NVivo is a useful tool for researchers in coding, theory building, and testing. Bazeley and Richards (2000) argue that NVivo is designed for researchers who wish to manipulate rich data in dynamic documents and that NVivo supports code-based structures, searching, and theorizing combined with ability to annotate documents created from research data. While the above are proponents of the software, it should be noted that NVivo, while an extremely useful research tool, is also a complex one and there is a steep learning curve for the novice researcher. Some of the facets of NVivo can be carried out within available spreadsheet and word-processing packages but the value of NVivo is that it brings a variety of data analysis features within one package. The present researcher used the basic tools of NVivo for this analysis and found it sufficient for the amount of data to be analyzed. A standard spreadsheet package was also used for the tables in this article.

Findings and Discussion

The Students' Views

The findings of the study are outlined and discussed in relation to the topics which students commented on in the questionnaires and group interviews. The views of teachers in the group interview are then presented and discussed. The following topics relating to student views are:

- Student views on using the PLUS booklet and the advice given about the assignment
- Student views on confidence at the start of the assignment
- Student views on using the PLUS booklet and its effect on their confidence
- Student views on individual brainstorming and concept mapping
- Student views on group brainstorming
- Student views on preliminary reading
- Student views on initial use of books and Web sites
- Student views on note taking
- Student views on preferences for print or online information resources

Student Views on Using the PLUS Booklet and the Advice Given about the Assignment

Students were issued with a booklet which provided them with guidance for completing their assignment and which included elements of the PLUS model. Students had been introduced to the PLUS model in the library. In the questionnaires, of the 52 students, 24 answered positively, stating that they had used the booklet and that it was beneficial to them; 18 students made no response and therefore it is not clear whether they used the booklet or not; 5 students answered positively but also included a negative aspect to their response; and 5 students stated that they did not use the booklet. Those students who answered positively referred to elements, such as:

- Organization of work--"I wrote in the booklet to help me organise my work."
- Following the advice--"I took the advice and followed it carefully" and "I tried to follow all the advice and filled in all the evaluation sections."
- Searching and finding information--"The tips for searching and finding information were useful"; "I used the questions to find out what I didn't know"; "I used the notes from the PLUS book and wrote down useful Web sites"; "I used it by using the Internet and it helped me to know what to search for and finding information."
- Note taking--"I found my project a lot easier because of the advice I was given. It helped me make more notes"; "I think the PLUS booklet made my project easier to do. It made me write down more notes than I would have done"; and "I used it to write down notes and useful things to know."
- Planning--"I wrote my planning ideas in it and followed the advice"; "I planned out what I needed to find out"; "It helped me plan and get my information sorted."

Responses from those students who answered positively but with reservation included comments such as "I used it some of the time but sometimes I preferred not to use it"; "I didn't really need much advice but the advice helped me with how to lay it out"; and "I used it a bit but I'd rather not. It was useful when I did use it."

Students were then asked in the questionnaire if they were given enough advice about their assignment in general and 30 students circled "Yes" and 22 circled "No". Those who answered negatively were asked what they would have liked more help with and 9 students indicated that they would have liked more help with the practical element of the assignment, 7 with searching and finding information, 3 with general guidance, and 1 each with computer skills, understanding PLUS booklet and how to write more in the assignment.

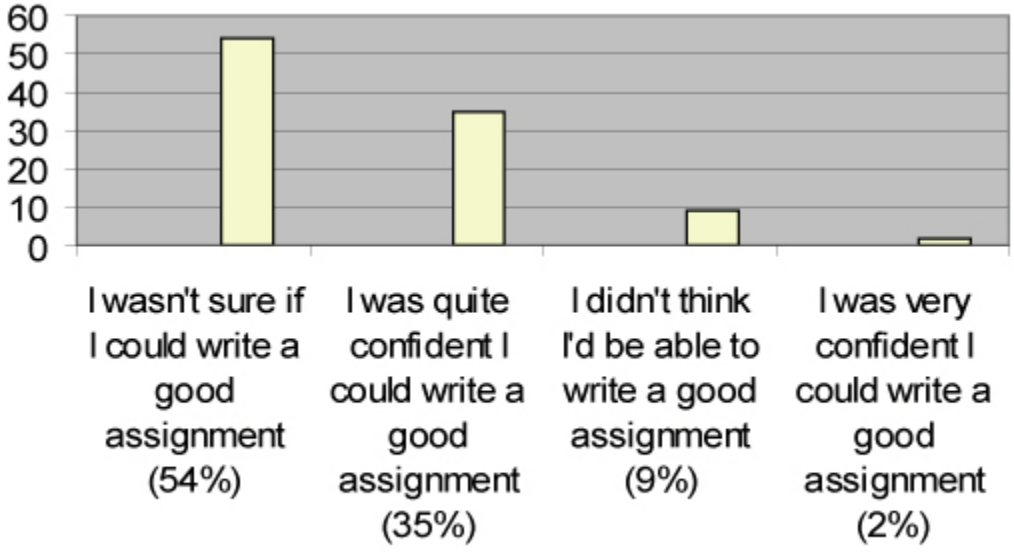
Students were almost all positive in the group interviews and it must be recognized that this could be the result of the presence of the non-school-based researcher or of the effect noted by Burns (2000) in relation to other students. The key areas identified were that the booklet helped students to keep organized and on track with the assignment with such comments as "It would be harder without PLUS because you might go off the track a bit--at least I would anyway" and "It helps you to remember and how to sort out all the information you have. It helps you to do the project better"; and that the booklet helped with stages of the assignment with such comments as "It helps you to plan out what you need to do for your end product", It divides research into stages and this makes it easier when you write it up" and "It's useful--it helps you with skimming and scanning and this saves you time."

It is clear from the above responses that students were mostly satisfied with using the PLUS booklet (if the 18 non-replies are interpreted as a neutral response) and with the advice given by the teacher librarian and the teacher. It is also clear that students reflected on the booklet in terms of information literacy skills such as planning, searching, and note taking. Some students stated a preference for *not* using the booklet as they did not need to use it and it is possible that some of the 18 students who did not respond took a similar view. These findings reflect those of previous studies in this school (Herring, Tarter, and Naylor 2000; 2002) and to a certain extent those of Wolf, Brush, and Saye (2003) in that there is some evidence of students reflecting in a metacognitive manner on their own approach to learning, for example their ability to take an overview of the assignment process and how stages in that process are interlinked.

Student Views on Confidence at the Start of the Assignment

Students were asked in the questionnaire to state how confident they felt at the start of the assignment and figure 1 shows the responses in percentage terms.

Figure 1. Students' Confidence at the Start of the Assignment



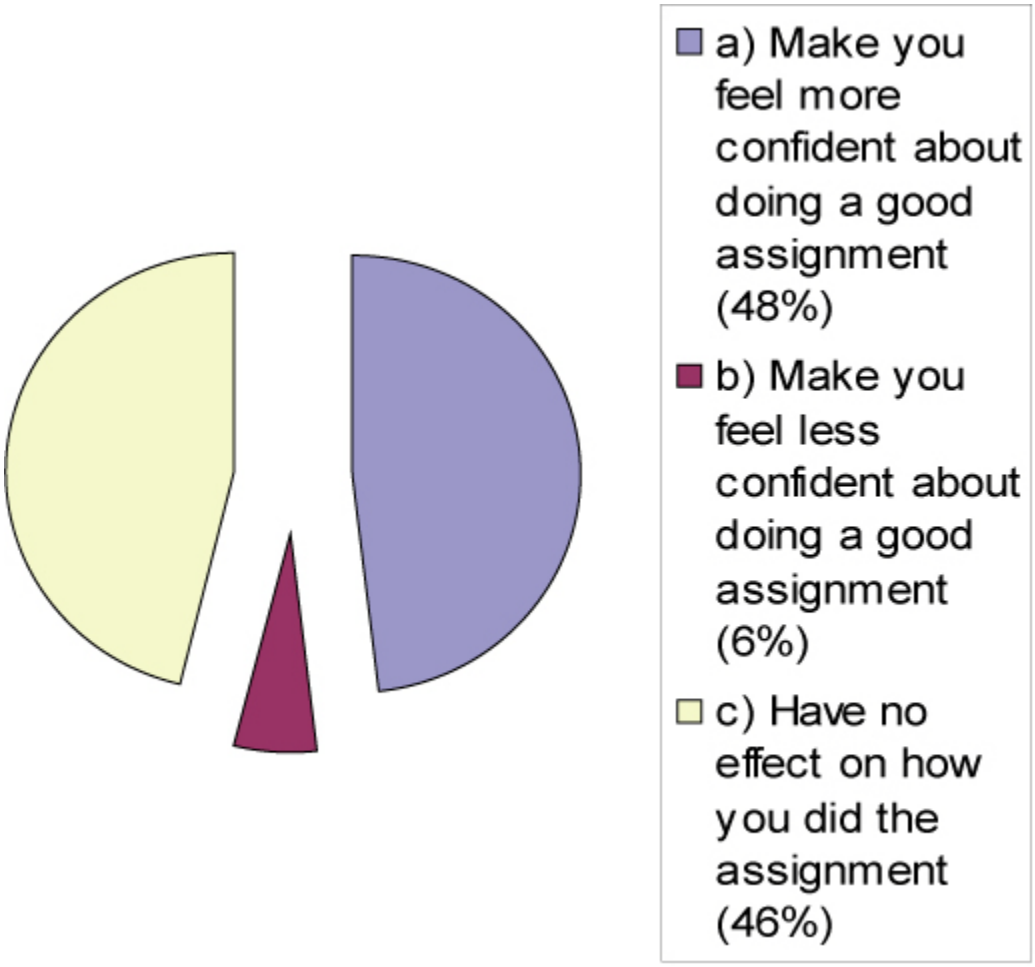
It is clear that most students did not feel confident about writing the assignment, with the majority of students stating that they were not sure if they could write a good assignment. Only one student was very confident and stated that this was "Because I play the instrument I used." Students who were quite confident based this confidence on aspects, such as the amount of information they had or had access to, with such comments as "Because I had enough notes to write with and a whole load of information at home" and "In our research I felt I had gathered enough information to write quite a good assignment"; and their familiarity with the subject with comments such as "I felt confident because I was familiar with dolphins and their habitat and background info" and "I felt like this because I play an instrument that is in the same family and so I knew some information." Students who were not sure if they could write a good assignment identified aspects such as unfamiliarity with the subject with comments such as "Because I didn't know anything about dolphins so that I wasn't quite confident" and "Because I didn't know anything about the trumpet whatsoever"; the size of the assignment with comments such as "I didn't think I could write 800 words about a guitar" and "I thought 800 words was a bit much but in the end I wrote over 800 words"; and concern about the subject with such comments as "I can write essays and things. I'm just not good at the subject of physics" and "I'm not very good at physics and thought I wouldn't understand." Students who indicated that they did not think that they could write a good assignment displayed a lack of confidence in themselves with such comments as "Because I am not a very confident person" and "I wasn't confident and didn't want to do it."

These findings reflect those of Kuhlthau (2004) whose research identified that students often exhibited feelings of anxiety or lack of confidence at the beginning of the assignment process. There are alternative ways of examining the implications of these findings. It may be natural that students, faced with an assignment on a subject which is unfamiliar to them, will inevitably show lack of confidence and that the information literacy guidance provided will dilute this lack of confidence as students become familiar with their subject. It may also be lack of confidence is beneficial to students, given that overconfidence at this stage may lead to students underestimating the difficulty of the task.

Student Views on Using the PLUS Booklet and Its Effect on Their Confidence

One of the motivations of the teachers and teacher librarians in providing students with the PLUS booklet was to provide them with a scaffold which might make the students more confident about completing the assignment. When students were asked in the questionnaires about whether use of the PLUS booklet had any effect on their level of confidence, there was a mixed response, as shown in figure 2. Almost half of the students stated that the booklet made them more confident, but a similar number of students stated that the booklet had no effect on how they completed the assignment. Only a small minority stated that it made them less confident.

Figure 2. Student Views on the PLUS Booklet and Its Effect on Their Confidence



Students who felt more confident when using the booklet identified such factors as general advice on completing the assignment, responding with such comments as “It had a grid of what to do. It told you to use different resources. It was all stuck together and organised” and “It told me what to include and how to do it”; finding relevant information, with such comments as “It helped me think of where and how to find more information” and “It had tips on what to do and broke up the stages to look for information”; organizing ideas and information, with such comments as “Because it was there to order my info and ideas” and “It would (and did) help my

organization of information"; and note taking, with such comments as "Because I needed to make more notes (this was my target). There was lots of space for notes" and "In the PLUS booklet, I could sort my notes into sections, this helped me to write a better assignment." The small number of students who had a negative attitude toward the PLUS booklet did not see the potential benefit of the booklet, providing such comments as "Because I didn't understand why certain pages were necessary."

Students who stated that the booklet had no effect on how they did the assignment identified such factors as their lack of need for such a booklet, responding with such comments as "I would have done most of what was in the booklet without it" and "I was already pretty confident about my assignment. I had already planned out in my head what it would be like"; their awareness of the booklet but their preference for not using it, with comments such as "Because I knew that if I needed it then it would help but I like to try to find my own resources first" and "I think it helped me record the info but it was a lot of trouble"; the time it took to use the booklet, with such comments as "All it did was waste time that could have been used writing the assignment" and "Sometimes it wastes time"; an ambivalent attitude toward the booklet, with such comments as "I didn't feel more confident but it helped me with my research" and "I think it helped me record the info but it was a lot of trouble"; and a dismissive attitude to the booklet, with comments such as "Because the booklet wouldn't write my essay for me" and "I didn't really think it would help".

The few students who stated that the booklet made them feel less confident appeared to be puzzled as to the reason for the booklet, and one student commented, "Because I didn't understand why certain pages were necessary."

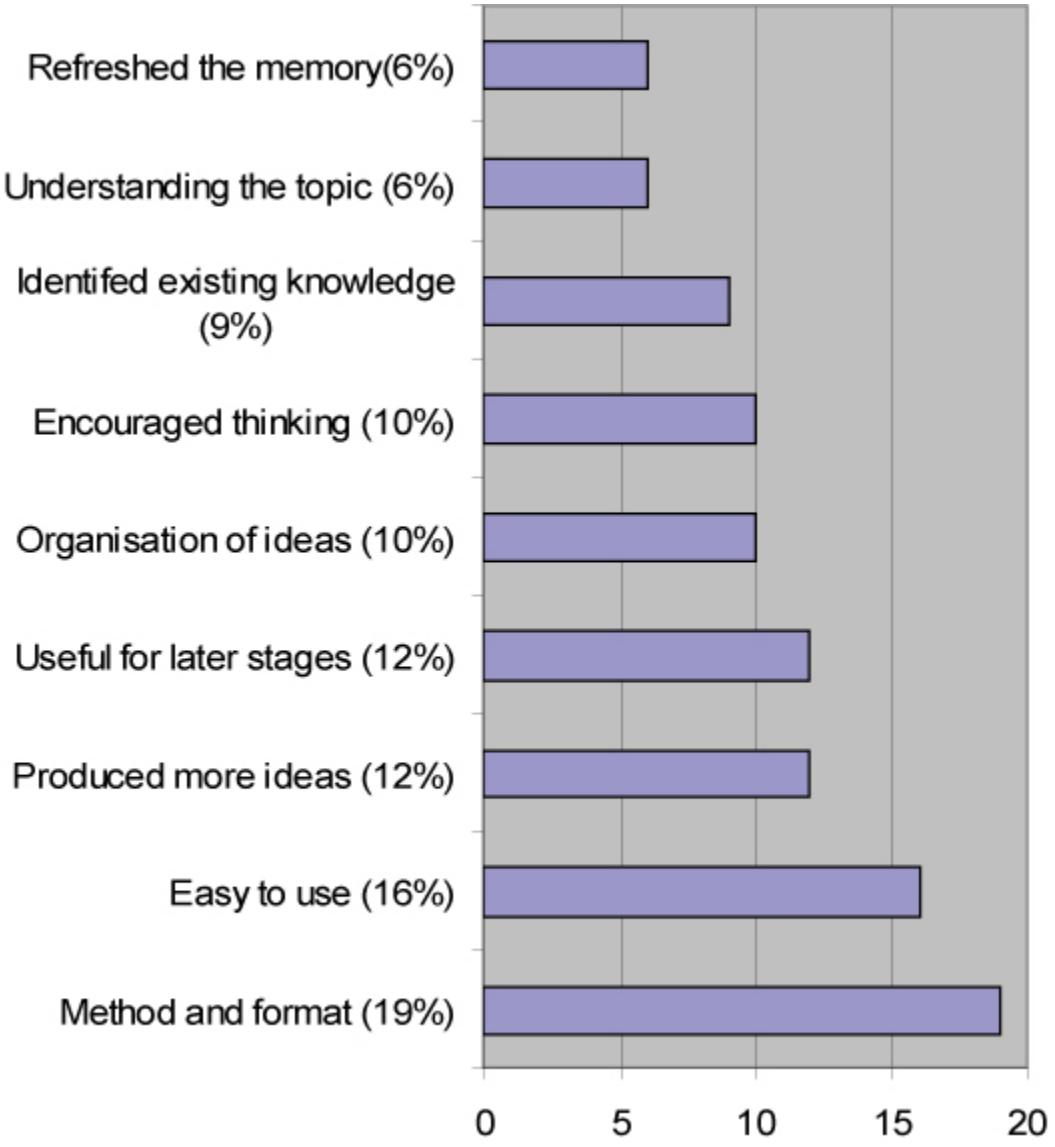
The provision of the research booklet does appear to have helped most students in some way although only 48 percent identified the booklet as increasing their confidence in the questionnaires. While the aim of the booklet is not merely to increase confidence but to provide students with a scaffold or support, it may be seen as encouraging that almost half of the students identified an increase in confidence. What the results do not show and what might be interesting to find out in future research is whether the students who identified an increase in confidence were the students in most need of a scaffold or support. Anecdotally, teachers and the teacher librarian speculated that the students at the top ability range would be unlikely to identify an increase in confidence while those at the middle and lower levels might identify such an increase.

Student Views on Individual Brainstorming and Concept Mapping

In the questionnaire, students were asked to "list up to three things you liked" about brainstorming. In this context, brainstorming took the form of each individual student reflecting on their own topic and drawing up a concept map of their topic. In the previous studies done in this school (Herring, Tarter, and Naylor 2000; 2002), brainstorming took the form of group discussion. There was a wide range of responses, as shown in figure 3, from students, but students particularly focused on the method and format of individual brainstorming and concept mapping, and their comments included "It was an easy way to plan out what to do," "I could write anything I thought of," and "Writing down what came out of my head." Students also found the method easy to use, and they commented that "It was an easy way to help plan out what to do" and "It's an easy way to note important info[rmation]." Brainstorming and concept

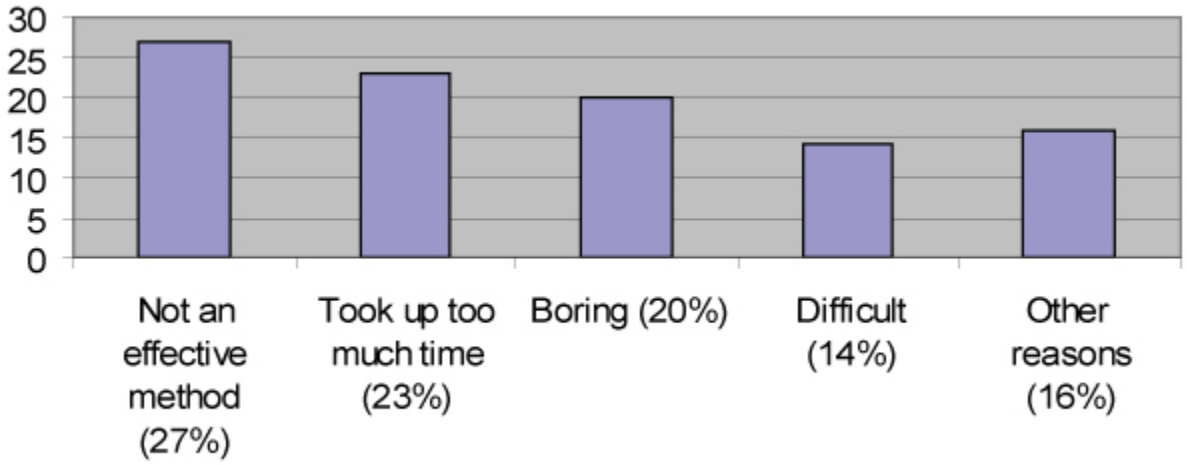
mapping also helped some students to develop more ideas, and their comments included "It helped me get more ideas" and "You come up with a lot of ideas." Students were also able to identify how brainstorming and concept mapping could be used at a later stage in the assignment process and this was shown in such comments as "It was useful later for writing the essay" and "Helps to write up finished product." Students were also positive about how this method helped them to organize their ideas, and their comments included "It sorted out the ideas in my head" and "It organized information and ideas." Students also stated that this method encouraged them to think more about their topic and their assignment, and their comments included "It helped me think about ideas" and "It made me think more and use my brain." Students also focused on their existing knowledge when brainstorming and concept mapping, and their responses included "It made me realize how much I knew" and "I found that I knew more about bats than I thought." Students also identified positive factors relating to understanding the topic ("Making sense of what came out of my head") and refreshing their memories ("It helped to refresh my memory"). These positive comments by students demonstrate some fairly sophisticated reflection in that students can relate to later stages of the assignment, can reflect on previous knowledge, and can appreciate the value of new ideas and information. Some of the students' reflections are superficial (e.g., in relation to the ease of use), but the students' appreciation of the format (e.g., the freedom to write in their own style), shows more depth.

Figure 3. Students' Positive Views on Brainstorming



Students were asked to comment on what they did not like about brainstorming and concept mapping in the questionnaires and figure 4 shows the spread of responses. Some students stated that this was not their preferred method with such comments as "It wasn't the most useful way about it" and "It didn't give me more information." Students also found the process too time-consuming, and their comments included "It took too much time" and "It took too long," while others found the process to be boring and five students stated "It was boring." Some students found the process difficult with such comments as "Sometimes it was hard to understand" and "Thinking of things was hard." Other negative viewpoints included "I didn't have enough ideas" and "It didn't make me feel more confident."

Figure 4. Students' Negative Views on Brainstorming and Concept Mapping



While the students identified negative aspects of brainstorming and concept mapping, it does not necessarily mean that these students viewed the negative aspects as outweighing the positive aspects. Also, in this study, there was no correlation between the comments of individual students on positive and negative factors. For example, students may have found the process boring but also helpful. They may also have viewed the process as time consuming but at the same time found it useful to them in a number of ways. Clearly, a number of students did not see the value in individual brainstorming and concept mapping, and this may reflect the individual student's learning style or it may be due to a lack of understanding of the value of the process. The questionnaire responses do not make this clear but student comments in the group interviews do cast more light on how some students view individual brainstorming and concept mapping. Driscoll (2002) argues, in relation to such software as Inspiration, that brainstorming and concept mapping "can extend memory and make thinking visible" and this is reflected in the result above. The responses in this study echoed the findings of previous studies by Herring, Tarter, and Naylor (2000 and 2002) on brainstorming and concept mapping.

In the group interviews, students were asked to comment about the value of concept mapping in the assignment process. In the group interviews, students were split between those who found the concept map, *in a written form*, to be very useful (groups) and those who found a similar concept map to be less useful. The first group of students made clear distinction between a written and a mental concept map, but all found the *idea* of a concept map to be useful. In this group, students commented, "It's good to have this in your head, but I don't think you need to write it down--well, I don't need to write it down. It might help others" and "I just have it in my head and I can remember it-- mostly--when I look for the information I need." Students in the other groups agreed that a written concept map was useful, particularly in the later stages of the assignment process, and student comments included "The map really helps--you can split your project up in to bits and work from there" and "You go back to it and it's like a support--so if you find what you think is new information, you can check if you have it already." One student concisely identified the potential value of a concept map, stating "It helps because you know what you know and you know what you need to know."

These students were mainly positive and reflected well on their use of the concept map and how it benefited them. There is a clear appreciation of the *process of concept mapping* whether it is mental or physical. In these groups, there is a preference for *physical manifestation* of their ideas and some students can clearly link the use of the map to later stages of the process and see it as a useful check on their progress or as a guide to keeping on track. Students expressing a negative point of view do seem to indicate that a written concept map does not suit their individual learning style. Gordon's (2000 and 2002) research on concept mapping, while not seeking the views of students on the benefits or otherwise of concept mapping, does support the findings of this study. Gordon (2000 and 2002, np) discovered that students using concept maps "were more thorough and efficient in their searching, more inclined to concept-driven searching as evidenced by their ability to focus and make connections, and more inclined to make metacognitive judgments that led to successful searching" and the evidence presented here of students linking concept mapping to later stages of the information seeking and use process. Kinchin and Hay (2000, 43) state that concept mapping is a tool in "promoting understanding in which new material interacts with students' existing cognitive structure" and this supports the evidence in this study where students identified concept maps as a link to their existing knowledge of a topic. Harada and Yoshina (2005, 50) concur with the evidence of this study that "concept mapping provides a structure for organising existing knowledge and connecting new ideas to it" and they cite Callison's (2003) views that concept maps are useful for encouraging students to explore their topic deeply.

Student Views on Group Brainstorming

In the group interviews, students were asked about their experience of group brainstorming, in which they had participated while doing other assignments. Ten out of the twelve students saw group brainstorming as a positive experience and identified the key features of group brainstorming as the acquisition of ideas from the group with such comments as "It helps you to get more ideas about what you might do for your project" and "you get more ideas with a group than you might by yourself"; encouragement to reflect on previous knowledge with such comments as "It helped me look at what I already knew about the subject and this helped me choose my topic"; and motivation for wider thinking with such comments as "It made me think about some things I wouldn't have." The two students who did not see group brainstorming as a positive experience appeared to suggest that it did not suit their individual learning style, and one student commented, "I don't know--it was very noisy and people mucked about--I could have done it better on my own." The evidence here supports the findings of the previous research by Herring, Tarter, and Naylor (2000; 2002), which found that, while most students found group brainstorming to be of benefit, a minority of students indicated that they would have preferred to work on their own. These previous studies also indicated that students identified behavioral factors mainly in their negative comments on group brainstorming, with comments similar to the student above who criticized the behavior of fellow students.

Student Views on Preliminary Reading

When doing this assignment, students were asked, as part of the information skills scaffold provided by the teachers and school librarian, to do some preliminary reading around their topic and make a list of keywords to use while using learning resources identified at this stage and later. The intention behind this was to encourage students to build on their existing concept map and to adapt it in the light of preliminary reading. In the questionnaire, students were asked to

indicate the extent to which this helped with their assignment. 33 percent of responses indicated that it had helped students to identify the right keywords for subsequent searching; 31 percent of responses indicated that it helped students to find the right resources; 27 percent of responses indicated that it helped students to take notes; and 9 percent of responses indicated that it helped students to write their project.

Students were given the opportunity to identify other ways in which they thought the preliminary reading might have helped them with their assignment, and while some students reiterated the categories above (e.g., "It helped me realize what words I had to type in on the net"), other students were more reflective and their comments included "It helped me understand more about what I should find out," "It helped me get a better picture of my project," and "it helped me expand on that idea and find out more about it." Only one third of students made comments in this section of the questionnaire.

It should be noted that students were not asked if this process was not helpful to them. These findings tend to indicate that most students identified immediate rewards--keywords and finding resources--as opposed to subsequent rewards--note taking and writing--and it is possible to interpret the findings as indicating that most students did not take an extended view of the assignment process but a rather narrow one. On the other hand, the fact that most students were able to reflect on at least one further stage of the process can be seen as encouraging.

Student Views on Initial Use of Books and Web Sites

In the questionnaire, students were asked to comment on how they initially used the learning resources, such as books and Web sites, that they had accessed for their assignment. Students were asked to nominate a strategy from a list of five options (see appendix B). Fifty percent of students indicated that they scanned the material to identify relevant keywords; 36 percent indicated that they skimmed through the material to judge whether it was relevant; 9 percent looked for photographs and graphics; and 5 percent indicated other methods which included examining the contents or index. No students indicated that they read the material all the way through. This indicates that these students were following strategies recommended to them by the teachers and the school librarian. Students were not asked in the questionnaire to comment on how successful their approach was or what reading strategies they followed once they identified relevant information or ideas.

In the group interviews, students were asked to comment about their initial reading strategies and nine out of the twelve students preferred to skim and scan a resource to judge its relevance before taking notes. Three students indicated that they preferred to read and take notes from the start, and their comments included "I prefer to take notes right from the start and keep taking notes--otherwise, I forget and have to read it again, so what's the point?" and "I prefer to take notes as I go along and not read it through first as this doesn't really help me." These students were not asked how they judged the relevance of the sources before they started reading but gave the impression that they had gone through the process of evaluating relevance before they started reading, although they did not indicate how they had done so. The other students favored skimming and scanning, and their comments included "I'm the same [as the previous speaker]--scan it through then come back to take notes if you think it's the right information for you," "I always read it through first--quite quickly usually--and then I go back to the start and take notes," and "I read it through first and then you can read back to think about what you've got."

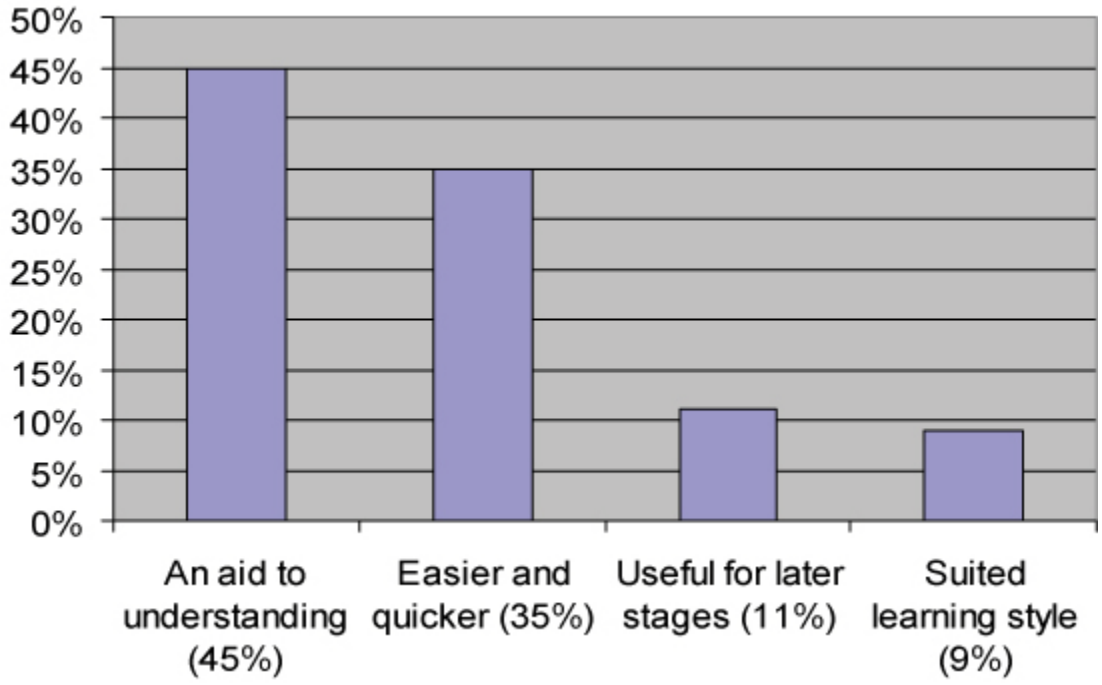
Students are reflective here in that they clearly identify a purpose in skimming and scanning in that they recognize that they can use their skimming and scanning to evaluate the usefulness of the content, so they see the link between skimming and scanning and evaluation. The other students appear to recognize the value of skimming and scanning, but these students prefer to take notes without reading over the material first as this is more effective and practical and perhaps suits their own learning style.

One aspect related to reading strategies which was followed up was the students' approach to parts of learning resources which they found difficult to understand and in the questionnaire students were asked to identify how they would cope if they found information which they did not understand. Students were given five options (appendix B) and asked to nominate their preferred strategy. Thirty-six percent of students indicated that they would continue to read to see if the subsequent text provided an explanation, 23 percent indicated that they would try another source, 13 percent of students indicated that they would use a dictionary or encyclopedia in the library, 13 percent indicated that they would ignore it and read on, and 14 percent stated that they would adopt another strategy. For those 14 percent, the favored strategy was to ask for help from the teacher or the school librarian, and their comments included "I'd read it again and then ask [name of school librarian] and "I'd ask someone e.g. teacher." While it may be of concern that 13 percent of students stated that they would ignore information or ideas which they did not understand, most students adopted sensible strategies, although the questionnaire did not ask the 36 percent of students what strategy they would adopt if their first strategy was unsuccessful. Herring, Tarter, and Naylor (2002) found that 20 percent of students would ignore something which they did not understand.

Student Views on Note Taking

In the questionnaire, students were asked to comment on the format of their note taking and to explain why they preferred to take notes in this way. The rationale behind this question was to identify note taking preferences among students but also to investigate whether students could reflect on note taking in relation to their use of information skills in other stages in the assignment process. The responses (graphically shown in figure 5) indicated that 65 percent of students preferred to take notes by writing in their own jotter (exercise book), 15 percent preferred to write their notes in Notepad or Word and 12 percent preferred to cut and paste text sections into Notepad or Word, and 8 percent preferred other methods. When asked why they preferred to take notes in this way, students identified a range of preferences which included viewing note taking as an aid to understanding (45 percent of those indicating a preference), and their comments included "It helps you to understand more about what you're doing. It will make it sink in," "I prefer it this way as I get to understand it if I write it down," and "Because you are putting it in your own words so you understand it." Students (35 percent) also viewed the method as easier and faster than other methods, although these students made short and perhaps superficial statements, such as "It is easy and quick," "It is easier," and "It's quicker and leaves time for other work." On a more reflective level, some students (11 percent) viewed the method as being helpful for use later in the assignment process and one student commented, "Because later you don't have to think of other ways to put it. You can just expand on your notes and copy them because they are worded differently from [the wording on] the Web site."

Figure 5. Students' Views on Note Taking



The remaining 9 percent of students expressed the view that their chosen method suited their own learning style, and their comments included "I can write in any way I want and other people can't read them and copy."

While it may be of concern that 35 percent of students commented fairly superficially on their chosen method, most students did show an ability to reflect on their preferred style in relation to their own understanding and this evidence reflects Wolf, Brush, and Saye's (2003) findings about student metacognition. Students also showed an ability to link note taking to later stages of the assignment process and this also shows an ability to think more broadly about the process.

In the group interviews, students were asked a general question about how they preferred to take notes. Students adopted a range of note-taking styles including the use of lists, and their comments included "My notes look like a list as I write down information in a list when I find something that I can use for my project." Students also used headings to categorize their notes, and their comments included "I have headings and write my notes in different paragraphs under the headings," but not all students used headings in the same way, with one student commenting "I have headings too but I use bullet points because I don't want to waste time writing whole paragraphs at this stage--I can do that when I write the project." Other students used spider diagrams (i.e., concept maps) to categorize notes, and their comments included "I have a spider diagram and I have bullet points next to the keywords that I chose," but there was also variety in the use of concept maps as another student commented, "I do a spider diagram and I just write down short notes beside the keywords." In both these comments, students refer to keywords and four out of the twelve students interviewed referred to keywords. One student took a flexible approach to note taking, commenting that "I have a list with headings but sometimes I change the headings when I find something new."

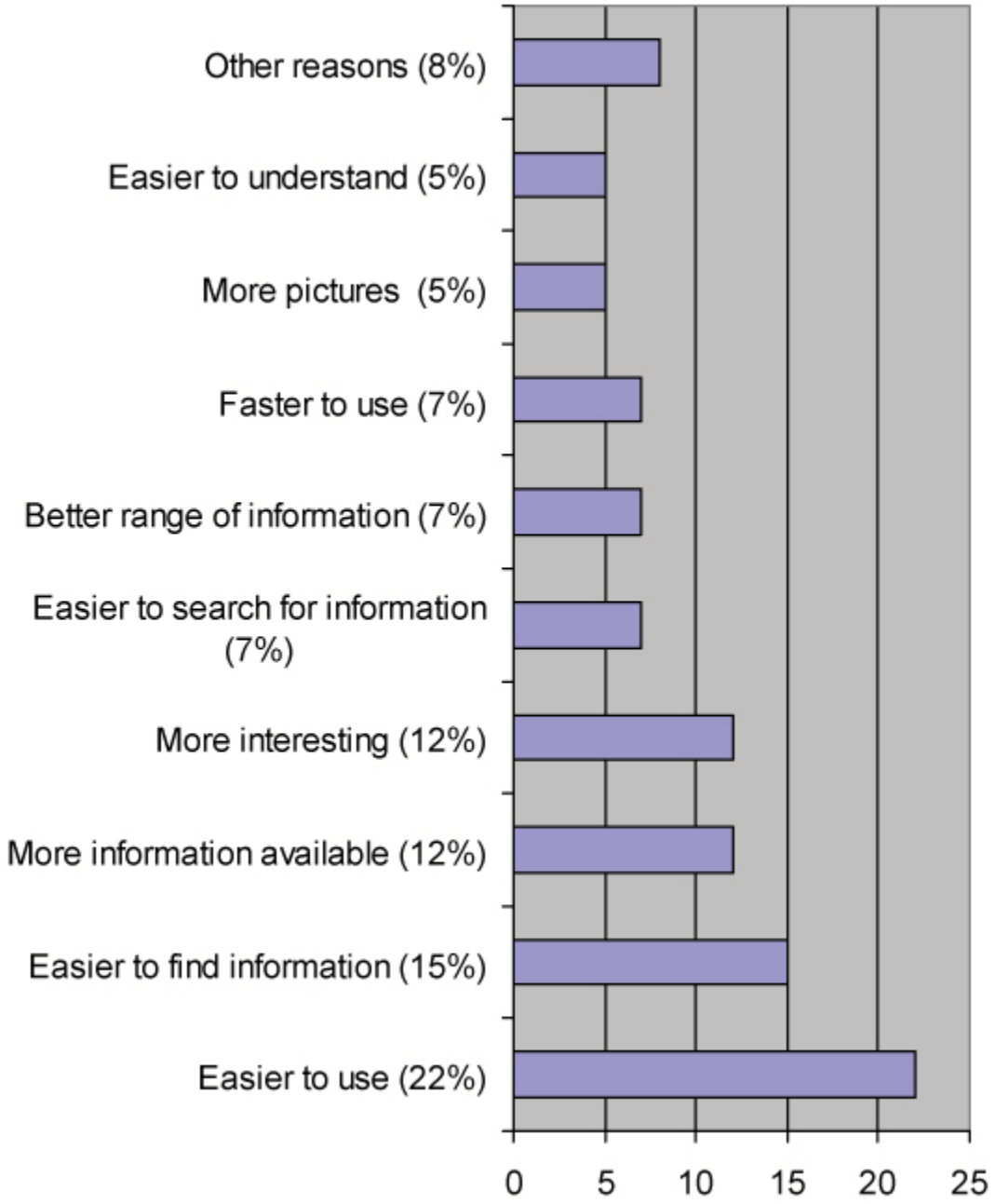
The students are clearly able to reflect on the usefulness of categorization of notes whether it is in advance, with headings, or post note-taking organization. One student is able to alter headings as a result of reading. The use of spider diagrams or concept maps show that students appreciate different forms of categorization. Dobbs (2003, 25) states that structured note taking can help students to be more effective in note taking, record and recall information, and "offers a visual framework that helps students select important information." Fisher, Frey, and Williams (2002, 72) argue that "teachers have remarked that note taking is not simply a way to record facts; it also leads to deeper student engagement and reflection." The findings here reflect those found in the literature, particularly in relation to note taking being effective in creating reflective students.

Student Views on Preferences for Print or Online Information Resources

In the questionnaire, students were firstly asked to indicate roughly what percentage of their information came from Web sites and what percentage came from books and journals in the school library or elsewhere. When the students' responses were averaged out, it was apparent that 65.5 percent of students' information came from Web sites and 35.5 percent came from books and journals. Students were then asked to indicate how they felt about using Web sites instead of books and journals and were asked to indicate their preferences for using Web sites or books and journals or to indicate if they did not have a preference for either. The responses showed that 60 percent of students preferred to use Web sites, 10 percent preferred to use books and journals, and 30 percent did not have a preference for either.

When students were asked to explain their choice, those indicating a preference for using Web sites identified a wide range of reasons which can be viewed diagrammatically in figure 6, in which percentages are of student responses and not number of students because some students identified more than one reason. Students indicated that Web sites were generally easier to use or read, and student comments included "Because they are easier to read." Students also indicated that Web sites were more useful in terms of finding information (although it was not clear whether these students include searching for information when they referred to "finding"), and these comments included "It is easier because I think you can find information about the topic [better] than looking in a book." Students also observed that more information could be found in Web sites, and their comments included "Because you can get so much more information on Web sites but in books there is just a limited amount of information." Some students found Web sites to be more interesting than books, and their comments included "I get more interested in it [the Web] and there's lots of sites and pictures in it." While only 7 percent of student responses related to searching, as indicated above, searching and finding may be similar in the students' minds. Comments relating to searching included "Because you can search for things more easily." Students also identified Web sites as being faster to use, and their comments included "Easier to use and you can find more information faster." Other reasons for preferring Web sites identified by students were that Web sites had more "pictures," were easier to understand, could be used for copying and pasting, and could be accessed at home. One student made the general comment, "Because I like using computers better than I [like] read[ing] books."

Figure 6. Students Reasons for Preferring to Use Web Sites



The above observations reflect the views of the students in their questionnaire responses. It is clear that there is mixture of opinion, experience, and perhaps unsubstantiated prejudice in some of the responses. Some students reflected fairly deeply on Web site use, whilst others made superficial responses. What this study does not show is *why* these students think this way and whether these students are taking a more quantitative rather than a qualitative approach to finding information on Web sites.

Students who stated that they preferred to use books and journals were in a clear minority; they identified such reasons for preferring books and journals as their mistrust of Web site information (four out of five students), responding with such comments as “Because some stuff

on the Internet is false" and "Web sites might not necessarily be true." Other reasons identified were that Web sites were often slow to access and that books were more reliable and easier to understand.

Students who stated that they had no preference between Web sites and books and journals were often more reflective in their responses and identified strengths and weaknesses of Web sites and books and journals in such comments as "I really like to read books and though I find the Internet sometimes frustrating, it can be updated unlike books." Students in this category also took a very practical approach with such comments as "Both can be just as useful as each other. I really don't mind as long as I get the info[rmation] I need."

In the group interviews, students were more positive about using books and journals and most students stated that they had used both kinds of resources for their assignment. In one group, there was a definite preference for Web sites, and these comments included "The internet definitely has more information on a topic and it's easier to read through" and "Web sites set out information so it's easier to read--they're more user friendly." In the other groups, there was a range of views, with most students taking a balanced stance, although one student commented, "I like books better--they're properly published and there's rubbish in the Internet," but this was clearly a minority viewpoint. The balanced views included such comments as "I use both but you have to be careful with the Internet as it's not all true," and "I use the Internet first and then the books if there are any in the library on my topic."

As might be expected, the students were more articulate and reflective in the group interviews than in the questionnaires but there is clear evidence in both the questionnaire and the group interview responses that students are able to reflect on their use of resources and do make choices based on their experiences and opinions. One key issue for teachers and teacher librarians is whether the students' opinions have more impact than their experiences and whether students' preferences are influenced more by quantity (especially in relation to Web sites) than quality. These aspects were not pursued in this study but future research might clarify these factors. Recent research into students' use of the internet indicates the strong preference that students have for internet resources and the NetDay (2003, 3) report produced evidence that

> The Internet has dramatically changed the way students conduct research and write school reports. Confronted with an assignment to write a report about a topic that they know little about, the first response for 67 percent of students in grades 7-12 is a technology-based response--do an Internet search or visit a bookmarked Web site--over visiting the library to find a book on the topic (10 percent), asking their teacher for help (9 percent) or looking for information in their textbook (5 percent).

The Teachers' and School Librarian's Views

A group interview was held with four teachers and a single interview was held with the school librarian. The teachers' group was asked to discuss possible benefits of providing students with an information skills scaffold such as the PLUS model. There was agreement among the teachers that the key observable benefit was that students were better adept at thinking and analytical skills. Teacher A commented, "There's a temptation for them to jump straight into a topic--any topic and rushing to get it done as fast as possible. I think this is to get it out of the way rather than any pressure on time that we put on them. This makes them stop and *think*." Teacher B

stated, “I agree--they have to stop and think what the big topic [sound technology] is about first before choosing their own topic. The brainstorming makes them think about what they know and also *interpret* what they know before choosing their topic. I think they make better choices of topic this way--well, almost all of them do.”

The second key benefit identified by the teachers was in the way that students found and used resources. Teacher C, a geography teacher not involved in the sound technology project but who had used similar methods in a different subject, commented, “I think that before we introduced this model or structure or scaffold--call it what you will--that only the best students really used a range of sources and used them well. The difference now is that we can see almost all the students using a fairly good range of resources.” Teacher D, an English teacher, agreed and commented, “Yes, and the other difference I think is that when the students are finding suitable sources, they do seem to be asking themselves questions about whether what they find is, *in fact*, relevant to them. What I mean is that it’s not just *any* resource on the topic. I think their reading is, in general, better although with some students, of course, we have problems.”

All the teachers had discussed note taking with students in different classes and there was general agreement that, because students had improved their note-taking methods, their written work had improved. Teacher B stated “The students *do* seem to think more about not just how to take notes--they are offered different formats--but why they take notes and how note taking is a form of thinking and interpreting. I don’t think they thought of it in this way before.” Teacher D commented, “I had a new student who wanted to take down copious linear notes on *everything* she found. It was quantity that seemed to matter. However, when note taking was discussed in the library and by me, she realized that by structuring her notes, she was engaged in some fairly high-order thinking and that this made her writing easier.”

The third element deemed to be important to teachers was that when students were supported in their learning by information skills teaching, this constituted a way of meeting the criteria of the curriculum. Teacher C commented, “Having the PLUS scaffold helps to meet a number of indicators for the geography curriculum--it’s not just about content these days--and students have to be seen to be demonstrating a range of skills in finding, evaluating, and interpreting information and ideas in geography. As [teacher D] said, higher order thinking--and showing evidence of it.”

The teachers agreed that there was evidence, albeit anecdotal and from their own observations, that students were transferring skills. Teacher A stated “They do pick up the good habits--I mean thinking about not just *what* they’ve got to do but *how* they are going to do it. I think quite a few of our students are now aware that they are engaged in a process and that looking at their purpose is the key to that process.” Teacher B agreed and commented, “It takes some of the students a while, of course, and the brighter students seem to know it anyway but after say four or five projects they pick up the habits.” Teacher D expanded on this, stating that “I think it goes right up the school--we’ve been using the model for a few years now and just recently in year 12 [final year of school] I could see clear evidence of how students had used their information skills to produce what turned out to be a highly sophisticated oral presentation. So it does come through.”

Teachers were also asked what they thought about how working with the school librarian in developing information literacy among students. The teachers were overwhelmingly positive about this. Teacher A stated “[School librarian’s name] introduced me to the PLUS model and

really to the whole idea of a wider view of information skills than I ever had. I think teachers obviously relate to skills in their own subject but we were never taught about the idea of information literacy--I mean the whole complicated spectrum of skills that we expect of students." Teacher C agreed, "Yes--she brings really interesting ideas. I had heard of brainstorming but wasn't really sure if the students would take to it--they did. Also, her knowledge of how to get the kids to think about searching for Web sites before they dive in is a real benefit." Teacher B commented, "We spark off each other and I get enthusiastic as well. It's taken some time but I think we have together developed a system that really helps the students and develops their skills--there's no doubt that the students do more thinking now. It doesn't work with all the students but I think it would be naive to think that it would." Teacher D stated, "[School librarian's name] doesn't just bring books and information, like most librarians do, she brings organization, and I don't mean organizing the library. She brings ideas that help students to be think in an organized way about, for example, what suits them best as individuals. I know we use the PLUS approach, but it's not a one-fits-all approach. Students are given choices--to choose their topic, to do their own concept map or mind map, to take notes in *their* way. It's what we said before--working together we can make the students think more and, of course, learn more."

The teachers' views in many ways support the evidence gathered from the students. The teachers were very positive in their views which may reflect their close working relationship with the school librarian. It is not clear whether the views of these teachers reflect the views of other teachers in the school who have a less-close working relationship with the school librarian; therefore, the evidence from these teachers cannot be generalized across the school. The teachers' views on their limited knowledge of information literacy is reflected by Asselin (2005, 192), who states that "in many parts of the world, opportunities for preservice teachers to gain understandings about the role of the school library and teaching information literacy are limited." One aspect noted by teachers which has not been a focus of information literacy related research is the issue of the transfer of skills. Teachers noted anecdotally that some students appeared to transfer information skills across subjects and year levels, but more evidence is needed to substantiate or contradict the teachers' claims.

The interview with the school librarian focused primarily on the needs of the students with comments such as "What I try to do is to help the students get to the stage where they are not just seeing an assignment as something else to get through--although for students of course, there is always an element of that--but that they are aware that they are engaged in a process. The PLUS model simplifies that process for them and helps them to be aware, to think, to question and, if possible, be critical." The school librarian saw her main task as helping middle and lower ability students, and she commented, "There is no doubt that the top students seem to take this critical stance in their stride and for them it's not simply find, take notes and present and to be honest, a scaffold like PLUS probably seems an irrelevance to some of them as it reflects what they would do anyway--and some of them tell me this. For other students, however, there is no doubt that the process is complicated--for example, many of them really do find it hard to pose questions about their own topic. So they need my help and the teachers' help most. The support we give them does help the students and we can see real improvements in many students."

The school librarian also focused on how to improve students' use of learning resources and trying to get students to take a more qualitative approach to this, with such comments as "I think it's better to get the students to think about good resources as opposed to how many resources

they can find and I think by imposing a structure on them--for example getting them to do preliminary reading which they sometimes complain about taking too much time--we do help them engage more with the resources and help them learn more and not just find out more."

On collaboration with teachers, the school librarian stated that "I think that quite a few teachers in the school now use *elements* of the PLUS model in their teaching--even if they don't refer to it by name. It's not physically possible--or time wise--for me as the librarian to work closely with *all* teachers, but those who I do work with do seem to appreciate the fact that a librarian can bring different but equally valid ideas to teaching students and improving their learning. We've a long way to go but we can see progress."

The school librarian's views highlight some of the concerns of Limberg (2005) who urges teachers and school librarians to move away from merely teaching students about structures and to engage students in critical thinking about learning from resources.

Conclusions and Implications for SLMSs and Recommendations for Future Research

This study has gathered and analyzed evidence relating to students' and teachers' view of the use of information literacy skills when students are completing a school assignment. The study is based in one school and evidence is drawn from students in one year of the school, from four teachers, and the school librarian in the school. Given this context, it is not possible to generalize the findings across this school or across school populations as a whole. It is possible to draw tentative conclusions from the study, to identify some potential implications for teachers and SLMSs, and to suggest some directions for future research in this area.

Conclusions

This study has produced clear evidence that students in the second year of high school are well able to reflect on their use of information literacy skills and to articulate their views in a clear and sometimes sophisticated manner. Obtaining the views of students on their use of information literacy skills has produced evidence which can be used by the teachers and school librarian in this school to enhance their understanding of how successfully students think, learn, and apply skills in the context of this assignment. The study can therefore be seen as action research as well as an academic study.

In answering the research questions, the study has shown that there exists a range of understanding among students about the value of such information literacy skills as brainstorming, concept mapping, reading for information and understanding, note taking, and writing an assignment. It has also shown that students have a range of views on what they perceive to be the value of learning and applying information literacy skills and that these views range from the superficial (e.g., how easy it was to complete a concept map) to the more deep level (e.g., viewing the concept map as an aid to thinking and as valuable at subsequent stages of the assignment process).

The study has provided some insight into students' feelings about confidence in their ability to produce good work and also their feelings about the efficacy of some of the suggested strategies

given to them by the teachers and the school librarian. Students, for example, often cited time as a factor ("It was easier and quicker" or "It wasted time"), and some students obviously felt strongly about this factor, but it is not clear what these students *actually* mean when they refer to time. Drawing up an initial concept map does not take much time in quantitative terms, but (possibly less able) students may see some strategies, such as concept mapping and preliminary reading, as an impediment to the completion of their task. One teacher referred to students *rushing* and some of the students' responses may reflect the teacher's view. The evidence presented her has shown that students did not have a strong sense of confidence in their own ability to do a good assignment and that, for some students, use of the PLUS booklet helped to boost their confidence. Student confidence is a complex issue and this study did not explore the issue of confidence deeply.

The results show that most students viewed the existence of a scaffold--the PLUS model booklet in this case--as being beneficial to them in terms of providing them with a coherent structure, helping them to be more organized and being a useful guide to planning, searching for information and ideas, and note taking. It is clear that such a model as PLUS does not suit the learning styles of all students, but there is evidence presented here that this model (similar to the Big Six model in Wolf, Brush, and Saye (2003) study) can encourage students to take a metacognitive view of the information skills process. Whether the use of such a model makes students more information literate is not shown by this study.

The evidence from students demonstrated that students have a preference for electronic sources of information over printed sources and parallels the findings of other studies. This study shows the reasons why this group of students preferred electronic resources but did not explore this in-depth, for example by examining what factors influenced students' opinions and preferences.

All studies have limitations and while this study sought to identify students' and teachers' views on information literacy skills and has provided valuable insights as to how students reflect on and use these skills, the study does not show the extent of student *learning*, either about the students' selected topic or about information literacy. This does not invalidate the study and student learning was an implied rather than an explicit focus of this research. The study also touches on the key issue of the transfer of information literacy skills across subjects but did not have transfer as a research question and the extent of transfer is not explored with students.

Implications for Teachers and SLMSs

Teachers and SLMSS can, by taking a collaborative approach, benefit from this study by doing the following:

- Seeking and analyzing feedback from students on the extent to which students benefit from information literacy skills teaching in schools
- Examining the extent to which students transfer information literacy skills across subjects and school levels
- Exploring students' use of print and electronic resources in order to maximize student use of quality learning resources
- Reviewing information literacy skills programs in the light of Limberg's (2005, 47) focus on developing " a repertoire of understandings" for students

Suggestions for Future Research

As was demonstrated in the literature review, the approach to the teaching of information literacy skills in schools in many countries is being challenged with a number of researchers taking a revisionist approach. Future research would benefit students, teachers, and SLMSs by focusing on the relationship between information literacy and learning, as Williams' (2001) challenges remain.

This research is limited in that it presents evidence from one school and examines particular aspects of students' use of information literacy skills. Future research could examine the following research questions:

- Do students across a range of schools use an information literacy model in a similar fashion?
- Do students transfer information skills or information literacy attributes across time and school curricular subjects?
- Do students transfer information skills or information literacy attributes to situations outside the school?
- Do students' preferences for digital resources have any effect on the quality of student learning?
- What are the implications of students' views on their use of information skills for the teaching of information literacy in schools?

In tackling these questions, researchers would benefit from using a wider range of research methods than those used in this study. The use of student diaries or journals, which record students' views and feelings as they are engaged in using information literacy skills, can provide rich data for researchers. Such methods as constructivist grounded theory could be used to not only analyze and interpret data from student journals, student questionnaires, and student interviews, but could also involve the students themselves in discussions about how to effectively conduct research into their use of the information literacy skills or how we can develop information-literate students in our schools. As yet, there is no theory of information literacy in schools, only theories relating to information literacy.

A constructivist grounded theory approach might go some way to developing theory. Other methods that might be used include extended observation of students, for example, when they are brainstorming or using databases or the Web; focus group studies of classes as they progress through the school system; content analysis studies of student output (for example, written assignments or presentations) to examine whether these reflect students' use of information literacy skills; and interviewing students to discuss their use of mobile technologies relating to information use both in and out of school.

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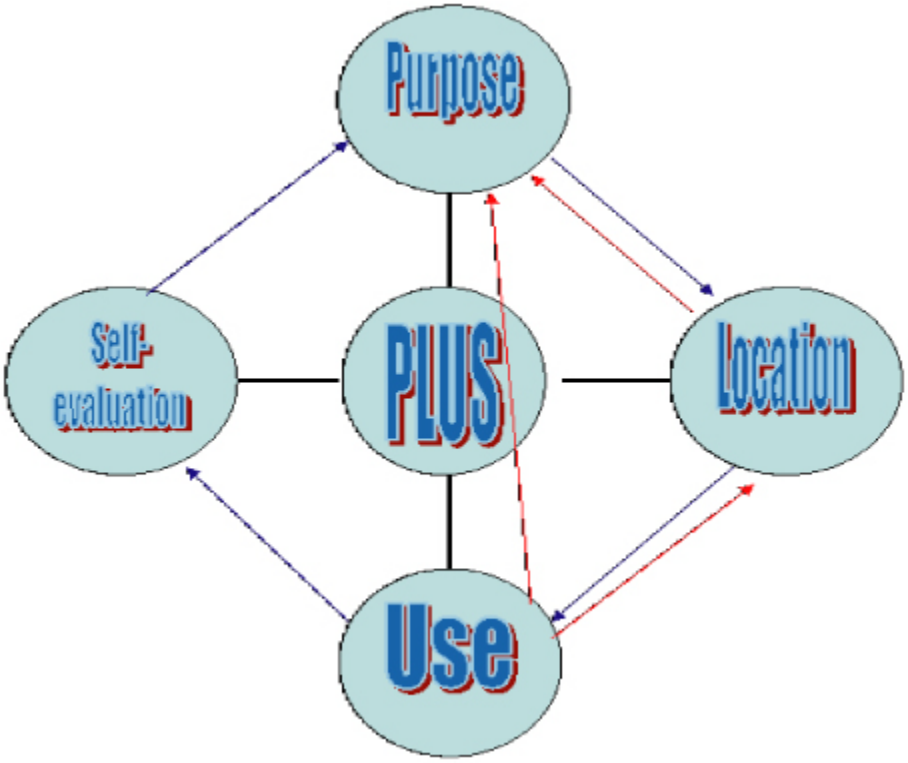
Appendix A. The PLUS Model



The blue arrows above show the linear progression which a student with highly developed information skills may make. The red arrows show the steps back which many students will have to make during the course of an assignment.

Appendix B. Student Questionnaire

1. You were given advice on PLUS to help you do your Sound Technology assignment. How did you use this advice when you were doing your assignment?

2. Were you given enough advice to help you with your assignment?

Yes No (Please circle)

If you circled NO, what you would you have liked more help with?

3. How did you feel when you started your sound technology assignment? (Please circle ONE only)

a) I was very confident I could write a good assignment

b) I was quite confident I could write a good assignment

c) I wasn't sure if I could write a good assignment

d) I didn't think I'd be able to write a good assignment

4. When you used the PLUS booklet, did it (Please circle ONE only)

a) Make you feel more confident about doing a good assignment

b) Make you feel less confident about doing a good assignment

c) Have no effect on how you did the assignment

Please explain why you felt this way about the PLUS booklet.

5. When you did brainstorming, what did you like about it (list up to three things you liked)

a)

b)

c)

6. When you did brainstorming, what did you NOT like about it? (List up to 3 things you did not like)

a)

b)

c)

7. After your brainstorming, you did some preliminary reading round your topic and then you made a list of terms to use to skim and scan (keywords) for information on your topic. How did this help with your project. Please circle one or more

a) It helped me identify the right keywords to use to find information

b) It helped me find the right information sources

c) It helped me take notes

d) It helped me write my project

Please write other ways you thought your preliminary reading and keywords helped you in your work:

8. When you got into one of the books or websites you chose to look at, what did you do first? (Please circle one)

a) I read it all the way through

b) I skimmed through it to see what it was all about

c) I scanned it to see if it had any of the keywords I was looking for

d) I looked for photographs and illustrations

e) Other (please explain)

9. If you found something on a Web site or in a book that you didn't understand, what would you do? (Please circle one)

a) I'd read on to if there was a better explanation later on

b) I'd ignore it

c) I'd leave that site or try another website or book

d) I'd use a dictionary or encyclopaedia in the library

e) I'd ... (Please write what you'd do in your own words)

10. How did you take notes from the books or Web sites you looked at? (Please circle one)

a) I wrote notes in my own words in my jotter

b) I wrote notes in my own words in Word/Notepad

c) I cut and pasted sections into Word/Notepad

d) Other (Please explain)

Please explain why your prefer to take notes in this way

11. When you wrote your assignment, roughly how much of your information came from Web sites you used and how much from books/journals in the school library or outside?

Books/journals _____%

Web sites _____%

12. How do you feel about using Web sites instead of books/journals (Please circle ONE)

a) I prefer to use websites

b) I prefer to use books/journals

c) I don't mind which ones I use

Please explain why you feel this way about using websites and books/journals.

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