

School Students, Question Formulation and Issues of Transfer: a Constructivist Grounded Analysis

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Abstract

This study aimed to evaluate the extent to which Year Seven students, teachers and teacher-librarians, in three rural Australian state schools, would value question formulation as an information literacy skill. Question formulation is defined here as students independently formulating their own questions for curricular assignments. It also aimed to evaluate the extent to which these students would transfer question formulation across subjects and across time. The study used a constructivist grounded theory approach and data were analysed using constructivist grounded analysis. The findings of the study indicated that most students, teachers and teacher-librarians valued question formulation as an information literacy skill, but that this value was often limited in scope, e.g. only in relation to information retrieval. Some students, and most teachers and teacher-librarians, saw extensive value in question formulation and took a more holistic view, e.g. linking question formulation with assignment writing. A small minority of students did not value question formulation as they found it a difficult concept. Students used written questions when required to do so by teachers but some students preferred to develop mental questions when doing assignments. There was some clear evidence of transfer, in that some students applied what they had learned about question formulation in a previous term to a new subject assignment. On the other hand, many other students did not transfer what they had learned, and the evidence showed that this was

either because they did not understand the concept of transfer (a small minority), or that they lacked motivation to transfer, or that they expected the teacher and/or teacher-librarian to tell them to formulate their own questions. It was clear from the study that there was no *culture* of transfer in these schools and that this made it unlikely that students, apart from a well-motivated minority, would transfer skills.

Introduction

Question formulation by school students can be defined as the ability of students to draw up a list of questions relevant to their assignment topic and to carry out this task on their own. Question formulation can be seen as a skill to be acquired, an activity to carry out, but also as a means of identifying a clear purpose for students. The benefits of question formulation are that students are encouraged to think for themselves and to identify areas of relevant research for their assignment.

This study, part of a larger project on information literacy and transfer, took place in three rural Australian state secondary schools. The participants in the study were Year Seven (first-year high school) students, teachers and teacher-librarians. Two of the schools are situated in small towns and one school is in a regional city. All three schools have full-time teacher-librarians. For the study, students in all three schools completed a history assignment in term three and were given guidance on the use of a range of information literacy skills, including question formulation, by the teacher and teacher-librarian. Students were required to participate in question formulation by their teachers. Students were also given guidance in information retrieval, evaluating information sources such as books and websites, interpreting information and ideas retrieved, and writing the assignment. In term four, students completed an assignment in science (School A), Japanese (School B) and English (School C). At the beginning of term four, students were reminded of how they had formulated questions in term three but they were not required to use questions in term four.

An examination of student views on question formulation in schools was part of research by Herring, Tarter and Naylor (2002), Herring (2006), Herring and Hurst (2006) and Herring and Tarter (2007). In this previous research, only one school was used as the focus of the study, and question formulation was a less prominent feature of the research than in the present study. The methodology used in the previous research was less sophisticated than the constructivist grounded analysis used in the present study. Apart from the study by Herring and Hurst (2006), aspects of transfer were not a feature of the author's previous research. Herring and Hurst (2006) examined students in an upper primary independent school and, using student diaries and questionnaires to collect data, found that there was some evidence of transfer amongst some students. This transfer was limited, with students using some elements of skills, e.g. question formulation, for a new assignment.

The present study aimed to evaluate and interpret the views of students, teachers and teacher-librarians on students' attitudes to, use of, and reflections on, question formulation when completing a curricular assignment. It also aimed to examine the issue of transfer in relation to question formulation. The key research questions were:

- To what extent did Year Seven students value question formulation as an information literacy skill?
- To what extent did teachers and teacher-librarians value question formulation as an information literacy skill?
- What factors were likely to influence whether Year Seven students transfer question formulation across subjects and across time?

Literature review

This section will review the literature on information literacy in schools in general, question formulation in schools, and transfer.

Information literacy in schools

There has been wide debate around the world, since the 1980s, on information literacy in primary and secondary schools. What are now referred to as 'information literacy skills', were previously termed 'study skills', 'research skills', or 'information skills'

and, before these terms became common, 'library skills' was used. (Marland 1981; Irving 1985; Kuhlthau 1989; Doyle 1994; AASL/AECT 1998). By the 2000s, the term 'information literacy' was accepted in schools across the world but the debate on definitions of information literacy and the development of information literate students in schools, continued apace.

Definitions of information literacy

There remains no agreed definition of information literacy in the schools context. Langford (1998, 59) posed the questions: "Is it [information literacy] a concept or a process? ... Or is it a new literacy that has been transformed from existing literacies to complement the emerging technologies for which the Information Age students must be skilled?" and these questions remain relevant today. Moore (2002, 1) stated that information literacy in schools is a "dynamic concept [which] extends basic reading, writing and calculating skills" while Abilock (2004, 1) also took a wide view, arguing that information literacy was a "transformational process" which would help students to find and use information more effectively. Herring and Tarter (2007) outlined the attributes of an information literate student, and included a reference to transfer, which had not previously been included, either in definitions of information literacy in schools or in the lists of student attributes. Definitions of information literacy have been criticised by Williams (2001) who questioned the connection between information literacy skills and student learning.

Information literacy research

While there are a large number of professional articles on information literacy in schools in different countries, the range of research based literature is much smaller. In the school context, the work of Kuhlthau (1989, 1993, 2004) has been the most influential and is the most quoted. Kuhlthau (2004) outlined a number of research projects carried out from the 1980s onwards. Kuhlthau's (2004, 37) studies broke new ground in information literacy research in the school context by examining not only how students went about finding relevant information for an assignment, with a focus on the task the students faced, but also on "thoughts, feelings, actions, strategies and mood." Information literacy research in schools has also focused on brainstorming (Herring, Tarter & Naylor 2002; Herring 2006; Herring &

Tarter 2007); concept mapping (Gordon 1999, 2000; Cain 2004); development of students' information literacy skills (Ryan & Hudson 2003); affective aspects of information literacy (Farmer 2005); students' information seeking (Kuhlthau 2004; Branch 2003; Chelton & Cool 2004; Bilal, Sarangthem & Bachir 2008); and information literacy models (Herring, Tarter & Naylor 2002; Herring 2006; Wolf, Brush & Saye 2003). While the above research has added to the literature on information literacy in schools, it can be criticised (Kuhlthau is an exception) for a lack of depth, in that studies have mostly been restricted to one school, and for a lack of a sound methodological approach, in that many studies only identify the techniques used (e.g. student diaries).

Question formulation

One aspect of information literacy skills in schools that has been under-researched is question formulation by students. While some of the research into information literacy has included question formulation, few studies have focused on this topic in any depth. In the information literacy in schools context, an examination of student views on question formulation in schools was part of research by Herring, Tarter and Naylor (2002), Herring (2006), Herring and Hurst (2006) and Herring and Tarter (2007). Herring (2009) used grounded analysis to evaluate Year Seven (first year of high school) students' views on question formulation. The results showed that students, most of whom had no previous experience of question formulation, saw clear benefits in formulating questions, in relation to information retrieval, evaluation of information, structuring and writing their assignment. The teacher in this study was of the opinion that question formulation had improved the written work of most students in the class. Gross (1999) compared imposed questions with self-generated questions in the school library and McKenzie's (2010) journal seeks to explore a range of aspects relating to questions and question formulation, but this is not based on research.

Outside the information literacy context, question formulation is addressed in science education by Ben-David and Zohar (2009) who examined eighth-grade students' use of question formulation, which the authors view as a metacognitive strategy in science. In the same field, Chin and Teou (2009) studied upper primary school students' use of concept cartoons and concluded that student generated ques-

tions encouraged students to share and develop ideas. Yu (2009) examined the use of scaffolding to assist students with question formulation in an online learning system and found that most students benefited from using such scaffolds.

Transfer

In the literature on information literacy in schools, there is scant attention paid to the issue of transfer. In the field of education, transfer has been studied for over one hundred years. As with information literacy, there is no one agreed definition of transfer, with traditional definitions (Detterman 1993) focusing on repetition. Royer, Mestre and Dufresne (2005) define transfer as "a term that describes a situation where information learned at one point in time influences performance on information encountered at a later point in time", stressing prior learning more than repetition. Haskell (2001) identified fourteen types of transfer, of which the most widely recognised are near transfer (similar situations) and far transfer (dissimilar situations). The types of transfer referred to by Haskell (2001), Fogarty and Pete (2004) and Royer *et al.* (2005), reflect the environmental, cognitive and socio-cultural perspectives on transfer. Greeno, Moore and Smith (1993) were early proponents of examining transfer in context and this view was supported by Haskell (2001) and Royer *et al.* (2005). The benefits of taking a socio-cultural perspective on transfer was emphasised by Volet (1999) and Royer *et al.* (2005) took a similar view, identifying the need for transfer studies to take account of the influence of the wider environment (e.g. places and people). Haskell (2001) argued that unless a culture of transfer existed in an educational context, then transfer was unlikely to happen.

The literature on information literacy in general, question formulation in particular, and transfer, informed the present study and encouraged the use of constructivist grounded analysis, allied to a socio-cultural perspective.

Methodology

The theoretical perspective for this research is a socio-cultural one. This perspective (Lloyd 2007) examines learners within their environment and recognises the influence of social and cultural factors on how learners construct knowledge. This study uses constructivist grounded analysis to analyse and

interpret data. A constructivist approach implies that the researcher views knowledge and data collection and analysis as being constructed by individuals (Phillips 1995) and that the researcher interprets the constructions of reality which research participants offer. Grounded analysis is part of the wider grounded theory method. Grounded theory was originally designed by Glaser and Strauss (1967) but has since been developed by others, including Strauss and Corbin (1998) and Charmaz (2006). Data collection techniques employed in the study were student diaries, student questionnaires and interviews with students, teachers and teacher-librarians in three schools in rural Australia. The diaries, questionnaires and interviews were completed for a larger study by this author and the data reported, analysed and interpreted in this paper refers only to question formulation. Students completed diaries during term three of the school year, when they were completing a research-based assignment in history. Students completed the questionnaires after completing a research-based assignment in term four, in a different subject. Interviews with students took place in the latter part of term four. In each school, a group of three teachers plus the teacher-librarian were interviewed at the start of term three and again at the end of term four. Within each school, classes, individual students and teachers were selected using convenience sampling (Johnson & Christensen 2007).

Data analysis followed the key elements proposed by Charmaz (2006) and Pidgeon and Henwood (2004). Student diary data was coded and potential categories were identified. Student questionnaires were then coded and potential categories were revised in the light of a re-examination of both the diary and questionnaire data. The potential categories were used as the basis for interview questions and interview data was coded and categorised. In order to create substantive categories (e.g. students valuing question formulation), all potential categories identified from the diary, questionnaire and interview data were revised.

Findings

The findings from the study are presented in relation to student diaries, student questionnaires, student interviews, and interviews with teachers and teacher-librarians. The schools are referred to as School A, School B and School C.

Student diaries

In all three schools, in term three, students were encouraged to write out questions about their topic before seeking information on that topic. Students were asked to comment, in their diaries, on question formulation and use, and in particular:

- How easy or difficult they found it to formulate their assignment questions;
- How they thought writing questions would be an aid to information retrieval for their assignment; and
- How well they thought they had used their questions when doing the assignment.

In relation to writing out questions for their assignment, most students commented that they found it easy to do. Many students merely commented briefly, stating "It was easy." Some students extended their comments, and stated that question formulation was easy as they had prior knowledge e.g. "It was easy to write them because I know a little bit about knights", or they used standard approaches e.g. "It was pretty easy because they were simple questions, starting with where, who, how, what, when." The diaries showed what students thought about the process of formulating questions and some reasons why it might be easy, but in the diaries, there was evidence of students' questions being effective or ineffective, for example in relation to information retrieval. A small minority of students admitted that they found question formulation difficult and some of this minority of students found the process confusing, with one student commenting: "I found it hard because most of the questions go back on each other."

When students were asked how formulating questions might help with information retrieval, most students viewed the questions as a useful step prior to information seeking. Comments included: "Because you need to find information and those questions will help you because you can find answers to these questions." Some students reflected that questions were a tool which they could use to review what they needed to find out for their assignment, and comments included: "I will have something to look back on when I try to find stuff. I can change the questions any time I want." There were no negative statements about question formulation and information retrieval.

When students were asked to comment on how well they had used their questions during the assignment most students were of the opinion that they had used their questions well. A student in School A summed up this view, stating: "I used my questions very well because I got all the information for my assignment with my questions." Students also found questions to be of benefit and a School B student commented: "It was very helpful to answer my own questions about my character. It made me feel organised." A minority of students stated that they did not use their questions, including a School A student who commented that "I didn't really use them. I had an idea of how I was going to do it without them." While the diary responses showed that most students appeared to engage in effective question formulation, and found the use of questions to be beneficial, the researcher noted that the diary entries appeared to show that students saw value in question formulation and use. There was no indication in the student diaries as to whether students might use questions in the future.

Student questionnaires

Students were asked to fill in the questionnaires when they had completed their term four assignment. For this assignment, students had been reminded about the use of written questions in term three but were not directly asked by their teacher to write down questions. It was, therefore, left up to the student whether s/he engaged in question formulation for the term-four assignment. The questionnaire sections dealing with question formulation are listed in Appendix A.

Students were asked whether they wrote out questions for their assignments in term four. The findings indicate that, of those who responded (56/70 students), 32 students had not formulated written questions, and 24 students did formulate and write down questions. Those students who did not write down questions were asked to explain why they did not write down questions, and from those who responded, reasons included (in rank order by number cited): No need to have questions (5 students), Wrote notes instead (5), Did not think of it (3), Teacher provided questions (3), No time to do questions (2). Comments included: "no – because I didn't think I had to and didn't think I would have time." In relation to the teacher providing questions, none of the

teachers had provided questions, but these students appeared to interpret the assignment guidance as questions.

Students were then asked if they had mental questions, in order to find out if students had mental questions instead of, or as well as, written questions. Of those who responded, 30 students stated that they had mental questions and 25 students said that they did not. Students were given a list of options (see Appendix A) in relation to the benefits of having mental questions and could select one or more option. The findings demonstrated that students saw the benefits as almost equally divided between making the assignment easier to do (19 students), helping to find information better (18), and helping students identify what they needed to do (17). Helping with the assignment later on was seen by four students as a benefit. None of the students identified reasons in the "other" category.

Most of the students in the present study appeared to value the use of either written or mental questions when completing the term-four assignment. While this shows some evidence of transfer from term three, issues raised in the interpretation of the findings e.g. students' ideas of time in relation to question formulation, were explored in the interviews.

Student interviews

In each school, group interviews were held with two groups of four students, and individual interviews were held with a further four students. In the interviews, students were very positive about their use of questions, both in groups and individually, and the interviews closely reflected what students had indicated in their questionnaires. Students at this stage of the interview were asked about how they had used questions, and whether they thought question formulation was a useful skill. They were then asked about aspects of the transfer in relation to question formulation.

Students stated that they saw value in question formulation, in relation to gaps in knowledge ("You can write down questions about what you don't know, so you can put that into your project"); the term-four assignment ("You had to ask yourself about how people would survive and what kind of houses they'd need on the planet. So you had to ask *yourself* [student emphasis] these questions"); information retrieval ("The questions are good be-

cause then you know what to look for, and you can go back to the questions when you've looked up information and see if you need more information or sometimes you get new questions to ask"). As was the case with the questionnaires, some students preferred mental questions, and one School B student commented, "Writing questions is OK and it can be like, similar to a mind map but I prefer to have questions in my head, like, to go along with my mind map." For a School A student, question formulation was an important new strategy, stating "Questions I think is the best thing to do for an assignment. I've never used questions before because in primary school, the teachers gave us questions and we had to write down the answers. So it's good to have your own questions." In each school, one student in each group interview appeared to lack understanding about question formulation. For example, one School C student, when asked about questions being useful later in the assignment process, stated "I don't know what you mean."

Students were then asked about aspects of transfer. Students were asked what they had learned about question formulation in Year Seven, and whether they were likely to transfer this skill into Year Eight. Students were then asked whether their Year Eight teachers should *remind* them about question formulation, or whether the teachers should *insist* on them using questions as part of the assignment process. The intention was to test the extent to which students were likely to transfer skills independently.

Students' responses to what they learned about question formulation in Year Seven were varied. Most of the students questioned stated that question formulation was a new skill for them e.g. "Yeah – we learned lots about doing assignments. Like doing questions. We did our questions because the teacher told us to. We never thought of it ourselves, like to write questions out. We've never written out questions before" (School A).

Students in all three schools referred back to their primary school experiences to illustrate what they had learned, and a School C student stated "You have to do your own questions mostly here in school whereas like in year six [primary school], the teacher would always give you questions. So you're more independent in high school."

Two or more students in each school referred to an improvement in the organisation of their work, and this is illustrated by a School A student who

commented "When we do our questions, it's like it helps to put it all together now and organise it. In primary school, we never used questions and we just used to write it out any old way but now it's more organised."

Not all students claimed to have used questions to improve their assignment work. Responses from some of the students who appeared to lack understanding of what was being asked, tended to be short, such as "I didn't see much point in using questions" (School A) and "I'm not sure" (School C).

Students were then asked about whether teachers in Year Eight should remind them of what they had been taught about question formulation in Year Seven, or whether teachers should insist on them using questions. Students were asked to comment as a group or individually, but students in School A, where the first interviews took place, without prompting, also talked about *other* students in the class, and the researcher added this aspect to the questions asked in Schools B and C.

Most students were confident that *they* would transfer question formulation and comments included: "No – they don't need to remind me because when I do another assignment, I'll just remember back to here, and I'll do what we were taught this time" (School A). On the other hand, none of the students interviewed were confident that some *other* students in the class would transfer question formulation, without being either reminded or being told what to do. Opinions differed but most students argued that some students in their class would only use these question formulation if told to do so. Students who favoured reminding students made comments such as "I think it would be good to get a reminder. I don't think the teachers should tell us that we must have questions. We should have a choice" (School B). Comments from those arguing that some students would not transfer skills and therefore needed to be told, were varied and included: "Some people – mainly boys – they just want to get into the work right away, so they rush into it. So it would better for them to be told by the teacher to have questions – to slow them down" (School C).

Some students found the concept of transfer difficult, and appeared not to understand what was being asked about what teachers might do. Two of the students in group two in School B appeared puzzled, and stated that it was the *teacher's* choice about reminding or telling students about question formula-

tion. In group one in School C, a student stated “I’m not sure what you mean here” and was helped out by the other students.

In the interviews, students were more explicit in their comments about question formulation than they were in the questionnaires, particularly about linking questions to later parts of the assignment process such as information retrieval.

Interviews with teachers and teacher-librarians

In each school, a group of three teachers and the teacher-librarian were interviewed at the start of term three and again at the end of term four of the school year.

Term-three interviews

Teachers and teacher-librarians were firstly asked about what assumptions they had about students’ ability to formulate their own questions. In each school, there was a variety of responses. Most of the teachers and all of the teacher-librarians were of the opinion that question formulation was a difficult skill for students to learn but that the majority of their students would be able to formulate questions. In School A, a teacher commented, “I think that most of them [students] can think of questions to ask and that most of them can learn how to use their questions for their assignment. For some students, it will be a difficult concept.” In each school, one teacher was less optimistic. A School C teacher stated, “I think that formulating questions – good questions, not just who, what when etcetera – is *very* [teacher’s stress] difficult and for most students, it will be a big challenge. I think the most able students will cope.”

Each group was asked what experience they thought students would have of question formulation. Again, there was a mixed response. In School A, it was agreed that students were unlikely to have any experience of question formulation as primary school teachers tended to provide students with questions. The School A teacher-librarian commented, “It’s very rare for students to come to high school with experience of writing their own questions. It’s not done much in primary schools.” In Schools B and C, most took a similar view to that of School A, but one teacher took a different view. A School B

teacher argued that, “I think that students have been asked to at least think about writing out questions for an assignment in primary schools. I doubt if they would do it in high school without us suggesting it.” The School C teacher took a similar view.

Each group was then asked whether they thought students might transfer question formulation as a skill from term three to term four. There was general agreement that very few students would transfer skills, particularly across the curriculum. A School A History teacher stated “I don’t think they would be able to do it at this stage, off their own backs - they would need prompting.” This view was reflected by other teachers. For example, a School B Japanese teacher argued that for many year-seven students, transfer was a difficult concept for most students.

Teachers were also in agreement that most students were unaware of the need for transfer or the benefits to be derived from transfer. A School B teacher explained: “I think that it’s clear that some students do transfer – I’m not sure if they’re conscious of doing any transferring. What I mean is that I don’t think they reflect on what they’re doing. They just do it.” Teachers agreed that students appeared to be unaware that they could use question formulation and other subject based (e.g. science) skills in other curricular subjects.

Term 4 interviews

Teachers and teacher-librarians were asked questions which were derived from the categories which the author had formed from the analysis of the student data and the previous interviews with teachers. These categories covered the following areas:

- Students valuing question formulation;
- Students making connections from question formulation;
- Students not valuing question formulation;
- Transfer and question formulation.

The groups were asked about the extent to which they believed that students valued question formulation. There was general agreement that most students saw some value in question formulation but there were differences of opinion as to how strongly students’ value was. The School B teacher-librarian argued “I think that most students can understand why

they might generate their own questions and some students – probably the most able – really do value it. They see it, I think, as motivational. It's their questions, not the teachers." The School A teacher-librarian took a more pessimistic view. "Do they value writing their own questions? Very few students think enough about this kind of skill to actually value it. They'll do it if you tell them, but otherwise, I doubt it." The teachers were similarly divided and, while all agreed that the most able students appeared to value question formulation, there was scepticism about most students' attitude towards generating questions. The School C English teacher was the most optimistic, arguing that,

I think most students can be convinced of the value of questions, but only if we get them thinking – as I said before – of how questions can be so useful to them. Some of my students' writing this year has improved greatly because they've used their questions very well – and they've *thought* [teacher's emphasis] about how to use questions.

When the groups were asked about their year-seven students' ability to make connections from their questions i.e. to use their questions later in the assignment process, there was a unanimous response from the interviewees that not all students could make connections, and they differed only in the extent to which they believed a higher or lower percentage of students made connections. The teacher-librarian in School B argued that, "Most were middle of the road but there were a few at the top that did it naturally and it came through but the bulk of them needed support", and this was confirmed by other interviewees. It was agreed in all groups that students might make connections, but only if they were reminded to do so.

The groups were asked to comment on findings that some students did not value question formulation, either because they did not understand the concept or they saw some skills or techniques as a hindrance. All the groups agreed that some students – a small minority in each class – struggled with some of the concepts underlying question formulation. The School B teacher-librarian commented, "Maybe that's a skill or abstract thinking too far for somebody at the age of 12 or 13 and they haven't actually worked that out for themselves or perhaps they

don't have the mental skills to be able to." A School B teacher concurred, stating that for some students, trying to understand that question formulation was more than just a group of keywords, was very difficult, and argued, "We tend to assume that they all understand this kind of thing – but they don't."

Each group was then asked to discuss the issue of transfer. There was no general agreement about the extent to which teachers and teacher-librarians had observed the transfer of question formulation from term three to term four. The School B Japanese teacher argued that there was some evidence, stating "I have to say that I was surprised this year because I'd say about half the students used their questions to some extent to frame their assignment and some actually used questions as subheadings. I've rarely seen this before." The School A science teacher was not convinced, commenting "Well, I was disappointed, I have to say, as I was expecting more students to show me evidence of asking good questions, but only a few at the top of the class actually did. Next year, I'll put more emphasis on it."

The groups were finally asked if they thought that there was a culture of transfer in their schools and there was unanimous agreement that no culture of transfer existed. The School A history teacher, who was also acting deputy principal, was most adamant on this topic, stating,

No. Categorically not! It's very hard to look at. It's something that the principal and I are trying so hard to look at, so that other members of staff could analyse each other's curriculum and find cross curriculum content, cross curriculum skills. It doesn't happen. We all go our own way.

All the groups argued that transfer was a topic that was discussed from time to time, but only informally. The School A teacher-librarian commented, "Yes, everybody agrees that it's important but it's never been on the formal agenda, say at the beginning of the year. People just assume it will happen."

Discussion

The analysis of the data generated from students, teacher and teacher-librarians led to an interpretation of the key issues relating to question formulation in these schools. This section discusses the findings in relation to:

- Valuing question formulation;
- Thinking, making connections and using question formulation;
- Not valuing question formulation;
- Transferring question formulation;
- Culture of transfer.

Valuing question formulation

This author defines “value” in this context as meaning that some students were able to recognise the significance and benefits of question formulation, and that this was not merely a utilitarian approach on the students’ parts. Students did recognise how they could use question formulation for a practical end i.e. producing an assignment. It would be possible for students to take this approach without necessarily seeing value in question formulation. However, some students saw value in question formulation in relation to how they thought about their approach not only to their assignment, but also to their own learning, and how they interpreted the use of such skills by other students. Those students who did value question formulation expressed their notions of value in a variety of ways. For example, when students cited what they had learned in Year Seven, they referred to the benefits they saw in being taught what they regarded as new skills. The students expressed value in terms of the benefits to them in learning how to formulate their own questions, and some students indicated that question formulation had increased their confidence and motivation. The views of teachers and teacher-librarians confirmed the evidence from students that some students did value question formulation, and some of the staff linked value to both understanding and motivation to learn.

This concept of students valuing question formulation appears to be missing from much of the literature on information literacy in schools. Kuhlthau (2004), Harada (2002), Barranoik (2001, 2004) and Ryan and Hudson (2003) examined aspects of information literacy, including question formulation but the question of students valuing question formulation is not covered in any depth.

Thinking, making connections and using question formulation

In relation to students’ thinking, making connections and using question formulation, the evidence sug-

gests that there were differences in students’ ability or willingness to engage with question formulation. What was clear, particularly from student interviews, was that while most students were capable of thinking about question formulation, only a minority of students were likely to do so without prompting by the teacher or teacher-librarian. The reasons for this appear to be complex. Some students were clearly engaged in critical thinking not only about how they formulated and used questions, but why they used questions. Students in this category reflected on question formulation in relation not just to an immediate assignment, but also to their own personal approach to learning. Examples from the data include students who argued that question formulation was an aid to their own thinking about what information they needed to find – the utilitarian approach – but these students also argued that question formulation helped them to think about the parameters of their topic – a personal, reflective approach. It was also clear from the evidence provided by students and staff, that a second, and probably larger, group of students took a more restrictive view of question formulation. These students used question formulation – both written and mental – but lacked the reflective approach of the first group of students. Where the second group of students made connections, it was restricted, mainly to information retrieval. A third group of students – a small minority – clearly failed to engage in thinking about question formulation and did not make connections. These students are discussed below.

In the literature on information literacy in schools, Moore (2002), Kuhlthau (2004), Barranoik (2004), Ryan and Hudson (2003) and Herring (2006) discuss aspects of students’ reflecting on the skills they use, and the critical and reflective group of students referred to above fall into the same category as those students identified by Wolf *et al.* (2003) who demonstrated metacognitive attributes. In relation to question formulation, Herring (2009) found that students were able to take a metacognitive view, and Ben-David and Zohar (2009) came to a similar conclusion.

Not valuing question formulation

It was clear from the findings that a small group of students did not value question formulation because they did not understand the concept. These students

provided often very brief comments in their diaries and questionnaires and none of these students was willing to take part in an individual interview. This small group of students was identified by both staff and other students. In the literature on information literacy and question formulation, there is very little evidence of any recognition that some students find concepts and practices such as question formulation very difficult. Herring, Tarter and Naylor (2002) and Herring (2009) briefly refer to a minority of students lacking understanding of question formulation but this group of students appears to have been largely ignored. Both staff and other students implied that this minority was not able to understand the potential benefits of question formulation and some teachers were of the opinion that a lack of maturity may be one factor. The evidence, however, is only anecdotal from this study and no firm conclusions can be reached as to why these students found question formulation so difficult to understand and implement.

Transferring question formulation

There was some evidence of the transfer of question formulation from term three to term four in this study, from both students and from teachers and teacher-librarians. As with valuing question formulation, there appeared to be three distinct student groups and this was noted by both students and teachers/teacher-librarians in the interviews. The first group, those who valued question formulation and took a metacognitive view of the formulation and use of questions, may be seen as actual transferors. This group is likely to think about using questions in future assignments across the curriculum and also to practice question formulation. The second group, who professed a belief in transfer and valued some aspects of transfer, nevertheless were seen to be unlikely to transfer question formulation as a skill, unless prompted to do so or required to do so, by their teachers and teacher-librarians. Such students appear to lack the motivation to transfer. This group may be seen as propositional transferors, whose belief and value in transfer (e.g. for future Year Seven students) makes it likely that they could be persuaded to transfer question formulation as a skill. The third group of students was identified as having a different attitude to transfer. This small minority of students are non-transferors, as they lack

an understanding of the value of transfer, and this is based on their lack of understanding of the potential value of question formulation.

In the transfer literature, Haskell (2001), Determan (1993) and Royer *et al.* (2005) argued that transfer is unlikely to take place in most learning situations unless there are very specific instructions to learners. Greeno *et al.* (1993) referred to affordances in learning situations, and that affordances can include personal or group characteristics. The need for instruction and the characteristics of the group relate well to the propositional transfer group of students.

Culture of transfer

The findings showed that, while there a belief in transfer amongst both staff and students, there was no evidence of a culture of transfer in any of the schools. A culture of transfer implies that, in a school, there would be an awareness of the importance of transfer across the school and that teachers and teacher-librarians would be actively involved in promoting transfer across the curriculum. The teachers and teacher-librarians noted a lack of formal discussion of transfer and implied a lack of policy of transfer in their schools. It also appeared that most staff were waiting for others, e.g. senior management in the school, to initiate action on transfer and this action would clearly be supported by teachers and teacher-librarians, given their stated belief in and value of transfer. Thus if question formulation is to be transferred across the curriculum – and this was supported by both staff and students – a culture of transfer would have to be generated in the schools. Hatano and Greeno (1999) cited school culture as an inhibiting factor in promoting transfer and Haskell (2001) discussed the need for a culture of transfer to be created in schools.

Conclusion and recommendations

This study has shown that, in the schools where the research took place, there was widespread belief in the value of question formulation as a skill and as a reflective practice amongst Year Seven students. There was an equal belief in the value of the transfer of question formulation across the curriculum. The schools, for a variety of reasons, failed to put these beliefs into practice and only a small number of stu-

dents could be seen to be actual transferors. It is recommended that,

- senior management in schools examine the need for the creation of a culture of transfer in their schools;
- teacher-librarians focus more on question formulation as a key information literacy skill;
- teachers actively encourage students to practice question formulation and to transfer this skills and reflective practice across the curriculum;
- teachers and teacher-librarians acknowledge the existence of a minority of students who lack understanding of both question formulation and transfer, and seek to help these students; and
- further research be carried in relation to question formulation and transfer at year-seven level but also at the middle and senior stages of secondary education.

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Appendix A – Questionnaire.

Section on question formulation:

6. Did you write out questions for your science assignment? (Please circle) Yes No
If No, please explain why you did not write out your questions
7. Do you think that you had mental questions (i.e. in your head)? (Please circle) Yes No
If Yes, do you think your mental questions:
1. Helped you to find information better
 2. Made your assignment easier to do
 3. Helped you identify what you needed to do
 4. Helped you with your assignment work later on
 5. Other – please explain

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