Information literacy and student research

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set 1 for this year included the first of three articles on research as a student learning activity. That article reported on secondary students' experiences of carrying out research projects that would be assessed for the NCEA. The data was drawn from New Zealand Council for Educational Research's Learning Curves project. We found that it is common for students to see research as a process of information retrieval and repackaging, and many of them felt they were not taught the skills they needed to carry out their own research projects. In that first ***set*** article, I suggested that students are more likely to see research as information retrieval and repackaging when their teachers also see research in this way. I argued that such views are linked to the idea that research primarily involves the use of a set of *generic* skills. Teachers who hold this view may not see the necessity of including practical research experiences among the aspects of their subject curriculum that are assessed because they think they will be duplicating students' learning experiences in other subjects (Hipkins, 2005).

In this second article I develop the discussion a step further by exploring the idea of "information literacy". While I do see a generic cluster of *types* of research skill, I argue that different school subjects provide differences of context that students need to experience and learn to critique. For this reason I suggest that information literacy skills need to be developed in every subject, albeit with some co-ordination between the "messages" that different teachers give.

The third article in the series will take this argument one step further again, by discussing research skills that are not generic but are quite specifically related to particular types of knowledge system.

Is there *really* a problem?

The findings from Learning Curves provided us with a snapshot of issues likely to be associated with the teaching (or not) of skills for research (Hipkins, Vaughan, Beals, & Ferral, 2004). But there are just six Learning Curves schools, and so they cannot provide a gauge of the full extent of the problem. Are these schools an exception or is this pattern of research as information retrieval and repackaging, with or without explicit teaching of critical information skills, one that pertains to many schools?

Several years ago, Penny Moore researched the views of information literacy held by 40 New Zealand primary teachers from four schools. When she asked them to describe a model or process for researching and using information she found that:

> The few teachers who could describe this process tended to focus simply on *finding* information, without looking at how it was used in any way.… All the participants were in agreement that information skills are essential to lifelong learning; but at the same time, more than half agreed that these would develop naturally as children worked with a variety of resources. This view implies that there is little need to explicitly teach information skills.
>
> Moore, 2002, p. 17.

This pattern of primary teacher responses is congruent with the Learning Curves students' view that they were not explicitly taught research skills, suggesting that the issues might be the same at both levels of the school system.[1]

Information skills are assessed as part of the National Education Monitoring Project

(NEMP) and were last reported on in 2001 (Flockton & Crooks, 2001). While NEMP monitoring found some improvement in students' information skills at Year 8 compared with Year 4, it is food for thought that just 43 percent of Year 4 students thought they often or sometimes had "really interesting" projects to research and that this declined to 35 percent at Year 8. The researchers commented that:

> Most students were quite successful at locating specified information in printed resources, understanding how these were structured, and understanding which were most suitable for particular purposes. Fewer had clear understanding of how libraries are organised, were good at notetaking, or explained fully the range of processes involved in project work. Few year 4 students were successful with two tasks that simulated web searching.
>
> Flockton & Crooks, 2001, p. 3.

These findings are in accord with international research we have found. For example, our literature search located a survey of 543 American college students' ability to evaluate research sources (Burton & Chadwick, 2000). These researchers found that more students received training in information literacy in a library context than in an Internet context, which echoes that part of the NEMP finding about students' relatively greater success with accessing information in printed resources. In Burton and Chadwick's study, high school teachers and librarians were the most common providers of information literacy training. However, a sobering 42 percent of these 543 American college students said they hadn't received any library training, and only about a third had received training in evaluating Internet sources (i.e., two-thirds had not). In view of this, Burton and Chadwick questioned whether teachers who are assigning research see it as the responsibility of others to teach the necessary research skills. These findings clearly resonate with the snapshot of "caught not taught" skills that has emerged from Learning Curves (Hipkins, 2005) and with the primary teachers' comments reported by Moore (2002).

In their survey, Burton and Chadwick also asked students about the criteria they used to evaluate information sources they might use. They found that the top-rating criteria were all related to the general category of *access to information.* They included sources that are easy to understand, are available, and are easy to find. In their literature review, Burton and Chadwick cited other research that had also found that accessibility is related to *familiarity.* They suggested that when students *seem* to lack discrimination among sources it might actually be that ease of access is dominating their decision making.

Some other categories students *could* use to evaluate research were not rated as highly for actual use. These included how up-to-date or recently published the source was and the reputations of the *publication,* the *author*, and/or the *publisher.* They also noted that students gave relatively low rankings to criteria related to citation of other sources or to a source's being cited by others. In fact, the latter was *lowest*-ranking Internet criterion. Yet hyperlinks make it relatively easy to check other Internet references. This pattern of ratings led them to suggest that students do not use the bibliographies provided in the research that they cite to carry out further research of their own.

In another American project, Streitenberger and McGregor (1999) described studies in three different American states that compared the research skills of Grade 3 and Grade 11 students. They too found that students viewed research as a process of finding out and reporting—with emphasis on the final written product. Interestingly, this view of research as information retrieval and repackaging remained essentially unchanged, despite the wide age gap between Grades 3 and 11. These researchers found no evidence of progression in skill development across the eight years, apart from older students' being more likely to include citations and being better at paraphrasing. They concluded:

> Something is definitely lacking in educational experiences if students begin and end them without significant growth. Teachers, researchers, and library media specialists should be mortified that between third and eleventh grade students do not gain in sophistication in their use of information and writing.
>
> Streitenberger & McGregor, 1999, p. 8.

Addressing the "so what" question

So far, I have presented a range of findings that collectively suggest that research skills are not being actively taught. When students carry out activities that require them to work with information they have retrieved, it seems that teachers may think they will know what to do next and perhaps that practice alone will improve their skills. The story I am about to tell frames my thinking about the complexities of this situation.

I well remember my disappointment when, as a young teacher, I gave my Year 12 students a pamphlet from our local city council on options for addressing our community's sewage treatment problems. It was intended to be a starter for a research project on this issue that was being widely discussed at the time. While various options were outlined, one direction was favoured in the council's presentation and summing up. I had hoped my students would see past this to inquire into all the options, but by the time I'd finished reading a whole class worth of assignments that summarised the council's position, I was sadly disillusioned. I wanted my students to show they could think critically about an issue they had researched. They seemed to think I wanted a nice, clean summary of existing information. In the light of all that I have said above, this is not unsurprising. I gave them accessible, easy-to-understand information and then expected them to be critical of it! But I didn't know how to explain the problem or what to do about it at the time.

Why wasn't I more directive about what I expected? Why didn't I give more support? I suspect that I thought my students needed to demonstrate *autonomy*, and, as is common amongst teachers, at the time I saw this as not helping them, so that they had to "do it for themselves". This view of autonomy is strongly critiqued in educational research literature. For example Rychen and Salganik (2003) say that "acting autonomously means to act rather than be acted upon, to shape rather than be shaped, and to choose rather than accept choices decided by others". These are powerful indicators of an independence of thought that they and others (for example, Ecclestone, 2002) think needs to be fostered by *active* teaching at all levels of the school system, from primary to tertiary education. Such teaching would include opportunities to identify different points of view and to discuss these in respectful ways that allow students the intellectual space to decide for themselves, yet provide them with some means of weighing the relative merits of different arguments. That's quite a tall order!

This more complex view of student autonomy is about to be given a strong boost by the introduction of five key competencies into New Zealand's school curriculum. One of them is called "managing self",[2] and the draft descriptor makes it clear that it is about developing appropriate levels of autonomy, with support as needed:

> Managing self is about making good decisions for oneself while recognising that we are part of a wider,

> interdependent social context. It is about the *inner independence* that comes from being given manageable amounts of responsibility and choice
>
> Ministry of Education, 2005, p. 2 [emphasis added].

If this sounds similar to the view of autonomy expressed by Rychen and Salganik, that is not accidental. They were lead researchers on the OECD project that devised the international version of the key competencies on which the New Zealand version has been based. Rychen and Salganik called their book *Key Competencies for a Successful Life and a Well Functioning Society.* That is, developing this type of critical autonomy contributes to both personal success and good citizenship.

Another of the key competencies links the idea of autonomy and the activity of doing research. In the Ministry of Education pamphlet I have cited above (2005), this competency was called "thinking". However, thinking is a necessary part of every competency, including learning to be more autonomous. So the name of this competency has been changed in a subsequent revision to "pursuing information". This clearly hints at the importance of research and will have implications for the relative emphasis attached to this process in future curriculum planning.

So the next question we must address is how to teach research skills in ways that can foster the development of greater autonomy. That's where critical literacy skills (and, specifically, information literacy skills) enter the picture.

Teaching for information literacy

Moore (2002) says information literacy can be described deceptively simply as the "ability to access, evaluate and use information from a wide variety of sources" (p. 12). She also describes it as a "broad educational goal" where:

> The outcome of that goal is usually discussed in terms of self-directed learning, complex critical thinking, effective communication, and responsible use of information in educational settings and beyond.
>
> Moore, 2002, p. 13.

On the Information Literacy Online website, Gwen Gawith also describes a complex mix of skills. She calls this a "skills spaghetti", and it involves finding, reading, comprehending, analysing, synthesising, interpreting, applying, and communicating information (http://infolit.unitecnology.ac.nz). This website expands on the NEMP information literacy framework to identify a wide range of information literacy skills that can be taught at each of levels 1–3 of the curriculum (Gawith, n.d.). There are other similar models of information literacy freely available on the Internet. What they have in common is a focus on evaluation and critique of sources of information and of the research processes used. Models that support higher-order thinking typically entail subcycles of review and critique as the overall research proceeds. It is these iterative critical aspects that set them apart from the view of research as information retrieval and repackaging.

Who should teach these research skills? This is an important question, especially in the secondary sector where students have different teachers for most subjects. Two of our six Learning Curves secondary schools had teacher librarians who were keen to see a wide range of information literacy skills developed as part of each research project carried out in their schools. Understandably, given their roles, they also tended to view these skills in more generic terms. In both schools, students were being taught and assessed on specified research skills in Years 9 and 10—before they had to face level one NCEA assignments in Year 11. One of the teacher-librarians expressed strong concerns about the practice of expecting students to carry out research projects without support. In her view teachers should help students with skills for note taking, shaping questions, using the Internet, carrying out interviews, and so on, as relevant.

She worked with subject teachers to help them refine research topics and to decide which skills should be focused on. This allowed her to co-ordinate between subject teachers as she had an overview of what had been taught to those students in previous research assignments in other subjects. In her view, a suitable topic needed to relate to the overall topic area that students were working on at the time and needed to be designed to extend their knowledge in that topic in a way that they found challenging and interesting. This would happen when the questions that students initially framed, and then refined as the research proceeded, "had a point"—that is, when students could specify how each question was of use to them within the overall research topic.

I see this point of view as a sort of halfway house. The skills may be generic, but the subject context acts to shape the way they are applied. This makes research a different "experience" in every subject. Congruent with this stance, the teacher-librarian thought many of the current research achievement standards needed work to reflect the types of information literacy skill she saw as important to teach and learn. Whereas the current standards reflected the interests and knowledge of the subject specialists who had developed them, she believed that teacher-librarians would be able to add important literacy perspectives in any future redevelopment. That is, the standards should explicitly integrate more generic information skills with the subject's knowledge perspectives, and both aspects should be visible in the standard.

In the light of this call for change, it is interesting to compare a typical research-based achievement standard (see Box 1) with the summary of a standard developed to assess the researching skills of second-chance learners in American foundation learning programmes (see Box 2). This summary of one of 16 Equipped for the Future (EFF) standards (Stein, 2000) shows a range of more generic information skills that could be more closely linked to our achievement standards, if they were modified from their present format. A skillful combination of the helpful but generic detail in the EFF standard and the subject-specific focus in the achievement standard could help bring research alive for teachers and students.

Do information literacy skills only need to be taught once?

As we have seen, there is a lot that could be addressed in the active teaching of information literacy skills. Can manageability be addressed by dividing them up among subject areas, at least at secondary level? In this short final section I begin a discussion of why I don't think this is a good idea, although I know it is a commonly expressed idea (Hipkins et al., 2004). I pick up just one aspect of information literacy—the idea that information sources need to be evaluated—for this discussion.

The source evaluation criteria identified by Burton and Chadwick (2000, see first section) can be explicitly taught. However, I think some of them would need to be taught in a range of subjects before students really understood their significance. For example, what counts as a quality information source is likely to be discipline specific. Every community of scholars has its own communally agreed hierarchies of merit of publications, of researcher and institutional reputations, and so on. Even being aware that such differences exist is an important step on the way to knowing the right questions to ask and the best sources to seek out when researching a topic of interest.

The student who is aware of the need to do this is on the way to becoming critically literate in the subject area.

To illustrate, Bingle and Gaskell (1994) describe how this type of evaluation of sources might help students address contentious science research in areas where questions about the quality of the actual science may be too hard for them to shape. The example they use concerns whether or not space probes contaminate other planets with human micro-organisms—a question about which scientists are still in disagreement. They suggested that students could look at where researchers worked. Those working for space probe developments, for example, might be more likely to downplay the likelihood of contamination. Research publications funded by organisations that sponsor space research might do the same.

Sources that have been written for a more generalist audience might lead information-literate students to ask similar questions. What is the author and/or publisher's agenda? Do they have an identifiable political orientation? Might there be other points of view that should also be sought? Knowing that these were questions they needed to ask would certainly have helped my Year 12 students when they looked at the sewage issue, for example. However, as I noted, making autonomous decisions must also involve an element of weighing up the merit of the arguments found and of the relative levels of importance to attach to the answers to the questions about sources. To do that, knowledge of the *content* of the arguments comes into play—that is, subject knowledge is needed. That's where, I think, it becomes much more difficult to say the skills are generic. Conversely, this type of consideration shows how and why the key competencies do need to be "woven" into every curriculum area.

To round off this second article, I want to illustrate the application of subject specific critical information literacy skills by drawing on another of our recent NCEA research projects (Hipkins, Conner, & Neill, in press). In this research, teachers have talked to us about the importance of critical evaluation of geographical statistics. One teacher described helping students to evaluate the manner in which data are selected and compiled to create indicators (such as relative poverty levels) for use in geographic decision making. Different methods of compilation can result in different types of trend being represented, so this is an important piece of subject-specific knowledge for critical reading of compiled statistics.

BOX 1. GEOGRAPHY 1.5: CARRY OUT AND PRESENT DIRECTED GEOGRAPHIC RESEARCH

This achievement standard involves carrying out and presenting directed geographic research, describing the relevance of geographic ideas to the research, and evaluating the research process.

ACHIEVEMENT	ACHIEVEMENT WITH MERIT	ACHIEVEMENT WITH EXCELLENCE
Carry out and present directed geographic research.	Accurately carry out and present directed geographic research.	Accurately carry out and present directed geographic research.
Describe the relevance of a geographic idea to the research.	Describe, in detail, the relevance of a geographic idea to the research.	Describe, in detail, the relevance of geographic ideas to the research.
	Evaluate the research process.	Evaluate, in depth, the research process.

BOX 2. PARAPHRASED SUMMARY OF DESCRIPTIONS FOR THE PERFORMANCE CONTINUUM OF THE DRAFT EFF STANDARD "LEARN THROUGH RESEARCH" (http://eff.cls.utk.edu/assessment/standards.htm)

ASPECT OF PERFORMANCE ADDRESSED	PARAPHRASED SUMMARY OF DESCRIPTIVE INDICATORS OF PERFORMANCE		
	LEVEL ONE	LEVEL TWO	LEVEL THREE
Ability to pose question or problem to guide research	Pose simple questions or predictions that can be a dequately researched using a few familiar resources.	Pose a question or prediction that can be adequately researched using a range of resources.	Pose complex, sometimes novel, precise questions for purposeful development of a coherent inquiry.
Sophistication of information gathering strategies	Use multiple simple strategies to draw information from a range of sources.	Use multiple strategies to gather a store of information from a range of familiar and less familiar sources.	Use a range of sophisticated strategies to gather information and adjust as necessary to enhance comprehension.
Cognitive processes involved in organising, analysing, and evaluating	Evaluate usefulness of the information gathered and integrate it with prior knowledge.	Restate, summarise, compare and contrast, and evaluate information, integrating as relevant with prior knowledge.	Analyse and synthesise information from multiple sources, and use a range of evaluation strategies, such as cause/effect analysis.
Metacognitive aspects of research process	Use simple strategies to monitor effectiveness of inquiry.	Use a range of strategies, including expert feedback and prediction based on pattern recognition to monitor and adjust progress.	Use strategies such as interim summary and verification via multiple lines of inquiry, and adjust approach based on feedback.
Interpretation and reporting of findings	Make brief but accurate oral report of findings.	Communicate through accurate oral or written presentations.	Communicate through extensive oral or written reports and/or complex graphics.

Another teacher described setting up situations where her students compared statistics published in textbooks with those published on the Internet. Where a situation is changing rapidly, as with AIDS mortality rates in African nations, Internet data are more likely to be up to date, and differences between data sources do show up. Of course, the quality and grounds for authority of the Internet sources also need critical scrutiny. The checks and balances that are usually built into the lengthy process for the publication of books do not operate on the Internet. Thus this teacher emphasises to students the care they need to take when selecting data sources to present as evidence and the different types of question they may need to ask of different types of source.

We could say that we hope students will learn to critically evaluate the statistics they might access in any subject. However the geography examples I have used, like the science example above, show that one component of being critical concerns knowing about contexts in which information is located, along with being able to select critically between the possible sources, using *subject-specific* filters.

I hope that even this short discussion has supported my argument that skills which look generic on first glance actually often have a component of subject-specific knowledge. This is a challenge I will return to the next ***set*** article, when I will use history to illustrate that there are research skills that are special to some disciplines, posing even more challenges to teachers who want to help students to become information literate.

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Footnotes

1 Email in response to the first article in ***set*** 1, 2005 also supports this view. A number of messages were received from both primary and secondary teachers, all of whom were in agreement that the students' voices documented an issue of concern.

2 The names of the key competencies used in this paper were current at the end of June 2005 when the paper was written. At this time the descriptions of the competencies, including their titles, were still undergoing revision following extensive consultation with teachers and others.

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