Inquiry skills in the Australian Curriculum

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Biography

Dr Mandy Lupton is a lecturer in teacher librarianship at the Queensland University of Technology. She is the author of* The Learning Connection: Information literacy and the Student Experience *(2004) and* Information Literacy and Learning *(2008), both published by Auslib Press. Mandy is interested in the way people use information to learn. She has researched university students' experiences of using information to complete assignments in environmental studies, music and tax law. Her interest in inquiry learning commenced when she was coordinator of an inquiry learning project in first year curriculum at the Australian National University in 2002–2003. She is currently researching teacher librarians' inquiry learning pedagogical practices.

Abstract

This paper presents an analysis of inquiry skills in the Australian Curriculum, specifically in Science, History and Geography. It examines how inquiry is portrayed in the three subjects, and how it is developed and sequenced from Foundation to Year 10. It analyses how information literacy is represented in the inquiry skills strands. It provides recommendations for teacher librarians to leverage information literacy as an integral part of the inquiry process, and as an integrating framework that unites the strands.

Introduction

Inquiry is a feature of the Australian Curriculum in Science, History and Geography. This paper analyses the understanding of inquiry presented in the inquiry skills sequence in the Australian Curriculum. It is important for teacher librarians to understand how inquiry is portrayed and sequenced in order to work with classroom teachers to implement the Australian Curriculum. (It should be noted that it is the intention of the author that this paper be read in conjunction with the inquiry skills strand sequence in Science, History and Geography.)

Inquiry learning is a constructivist pedagogy that takes student-posed questions as the starting point for learning (Hmelo-Silver, Duncan & Chinn 2007). Those who see student-directed, authentic learning as being central to contemporary education advocate inquiry learning (Alberta Learning 2004; Kuhlthau, Maniotes & Caspari 2007). Inquiry learning regards teachers and students as co-learners and co-constructors of knowledge (Callison 2006). The process of inquiry includes collecting and analysing data and information to answer questions. Inquiry learning involves higher order problem-solving, critical thinking and reflection (Callison 2006).

In many disciplines, the way that disciplinary concepts are investigated is just as important as the concepts themselves. Furthermore, inquiry learning is interpreted differently according to the discipline within which it is used. In the following section, I examine the ways that inquiry learning is portrayed from Science, History and Geography perspectives.

Scientific inquiry

Inquiry learning has traditionally been dominated in the literature by scientific inquiry. Scientific inquiry as practised by scientists is a complex, rigorous research process based on experimental methods. It involves posing a research question/hypothesis, planning and conducting experiments, analysing and presenting findings, making conclusions and constructing and verifying theories. Scientific inquiry is seen as content to be taught as well as being a vehicle for learning science content (Asay & Orgill 2010).

Chinn and Malhotra (2002, pp. 180–182) outline the scientific inquiry process thus:

- Generate research question.
- Select variables and plan procedures.
- Control variables; incorporate multiple measures of variables.
- Employ techniques to guard against researcher bias.
- Present observations in multiple formats.
- Critique for flaws in results.
- Employ complex and indirect reasoning including making generalisations to dissimilar situations.
- Construct theories based on observable and unobservable entities.
- Coordinate results from multiple studies.
- Study research reports from other scientists.

Likewise, the American NRC (National Research Council 1996, p. 23) describes scientific inquiry as:

> *A multifaceted activity that involves making observations; posing questions; examining books and other sources of information to see what is already known; planning investigations; reviewing what is already known in light of experimental evidence; using tools to gather, analyze, and interpret data; proposing answers, explanations, and predictions; and communicating the results. Inquiry requires identification of assumptions, use of critical and logical thinking, and consideration of alternative explanations.*

It presents the five essential features of inquiry learning thus:

1. Learners are engaged by scientifically oriented questions.
2. Learners give priority to **evidence**, which allows them to develop and evaluate explanations that address scientifically oriented questions.
3. Learners formulate **explanations** from evidence to address scientifically oriented questions.
4. Learners evaluate their explanations in light of alternative explanations, particularly those reflecting scientific understanding.
5. Learners communicate and justify their proposed explanations. (National Research Council 2000, p. 25, original emphasis.)

Constructivist pedagogical models of science inquiry focus on the role of the teacher and student in relation to inquiry questions and the inquiry procedure used to answer the

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questions. Two prominent science models (Martin-Hansen 2002; Bell, Smetana & Binns 2005) are juxtaposed in Table 1. The table illustrates the role of the teacher and student. In both models 'guided' inquiry starts with a question posed by the teacher, while 'open' or 'full' inquiry starts with a question posed by the student. In both forms, the student decides on the procedure to answer the question. The difference between the models is that Bell *et al*. (2005) include 'confirmation' and 'structured' forms of inquiry, which are completely teacher-directed.

The models can be used to design curricula where students are scaffolded from structured, through guided, to open inquiry. As will be seen later, these models, while relating to science education are just as relevant to other disciplines. It is important to note that the 'guided inquiry' in these models is not the same as 'Guided Inquiry' as espoused by Kuhlthau (Kuhlthau, Maniotes & Caspari 2007). In her model, Kuhlthau emphasises the role of the teacher librarian and the Information Search Process (ISP), whereas in the science models the term 'guided' relates only to the level of teacher direction. The role of the teacher librarian and information seeking is not considered. Indeed, Bell *et al*. (2005, p. 31) argue that:

> *… having students conduct research by solely searching library or internet resources does not constitute an inquiry lesson. In these activities, students are gathering information but are not analysing data to answer their questions of interest.*

Australian Science Curriculum

The Australian Science Curriculum consists of three strands: *Science Understanding, Science as a Human Endeavour* and *Science Inquiry Skills*.

Science inquiry is presented as involving:

> *Identifying and posing questions; planning, conducting and reflecting on investigations; processing, analysing and interpreting evidence; and communicating findings. This strand is concerned with evaluating claims, investigating ideas, solving problems, drawing valid conclusions and developing evidence-based arguments.* (ACARA c2011g)

In the Science glossary, 'guided investigation' (introduced in Year 1) is defined as 'an investigation partly directed by the teacher', which is consistent with the descriptions in Table 1. Open inquiry is advocated throughout: 'Opportunities for student-led open inquiry should also be provided within each phase of schooling' (ACARA c2011f).

The general description of inquiry quoted above is quite generic and could be applied to any discipline. However, the Science Inquiry Skills sequence (ACARA c2011h), demonstrates particular characteristics of the scientific method/experimental method such as the control of variables (introduced in Year 5), use of fair tests (where one variable is changed while keeping other variables constant) (introduced in Year 7) and consideration of the concept of uncertainty (introduced in Year 9).

What seems to be missing from the *Science Inquiry Skills* sequence is the consideration of science in a larger social, cultural and economic context. Furthermore, there is no indication of action as an outcome of a scientific investigation apart from simply communicating the findings. However, this consideration is seen in the *Science as a Human Endeavour* strand:

> *Science influences society by posing, and responding to, social and ethical questions, and scientific research is itself influenced by the needs and priorities of society. This strand highlights the development of science as a unique way of knowing and doing, and the role of science in contemporary decision making and problem solving. It acknowledges that in making decisions about science practices and applications, ethical and social implications must be taken into account.* (ACARA c2011g)

ACARA claims that the three strands of *Science Understanding, Science as a Human Endeavour*, and *Science Inquiry Skills* should be integrated. If this were the case, one might expect that scientific inquiry would incorporate gathering information on the context of the inquiry, in terms of how the question or hypothesis fits with what is already known, the 'needs and priorities of society' and the social and cultural implications of undertaking such an inquiry. However, information gathering is only mentioned briefly, in Years 1–2 under *Planning and Conducting* where students 'Access information sources', in Years 7–8 under *Processing and analysing data and information* where they 'Summarise data, from … secondary sources' and in Years 9–10 under *Evaluating* where students 'Critically analyse the validity of information in secondary sources'.

Historical inquiry

Historical inquiry involves asking questions, gathering and evaluating evidence and drawing conclusions about the past (Foster & Padgett 1999; Obenchain, Orr & Davis 2011). Historical inquiry is underpinned by 'source work', where primary and secondary sources are gathered and interrogated for accuracy, context and perspective (Burenheide 2007; Vansledright 2010). The outcome of historical inquiry is 'an account that explains the past — a "history" of the event' (Vansledright 2010, p. 115). Thus, 'history' is created through the construction of historical narratives.

Table 1. Inquiry learning science models.

	Martin-Hansen (2002)	Bell, Smetana & Binns (2005)
Teacher-directed		Confirmation • Confirm principle • Results are known in advance
		Structured • Teacher question • Teacher-prescribed procedure
Teacher- and student-directed	Guided • Teacher question • Student procedure Coupled • Progresses from guided inquiry into open inquiry	Guided • Teacher question • Student procedure
Student-directed	Open or full • Student question • Student procedure	Open • Student question • Student procedure

The importance of students undertaking historical inquiry is argued to be a personal good, as it helps students understand the human condition, develop their own identity and understand their own values and beliefs (Foster & Padgett 1999). Furthermore, it is a social good, as 'by examining and appreciating the struggle of people in the past … historical inquiry can prompt students to think about the conditions necessary for a fairer and more just society' (Foster & Padgett 1999, p. 358).

Australian History Curriculum

As might be expected, in the Australian Curriculum historical inquiry is presented as being dependent on analysing primary and secondary sources. Questions and method are prominent:

> *The process of historical inquiry develops transferable skills, such as the ability to ask relevant questions; critically analyse and interpret sources; consider context; respect and explain different perspectives; develop and substantiate interpretations, and communicate effectively.* (ACARA c2011e)

The process is scaffolded, where students are encouraged to become more independent.

> *The skills of historical inquiry are developed through teacher-directed and student-centred learning, enabling students to pose and investigate questions with increasing initiative, self-direction and expertise.* (ACARA c2011d)

There are two strands in the Australian History Curriculum: *Historical Knowledge and Understanding* and *Historical Skills*. ACARA states that the 'Knowledge and Understanding strand provides the contexts through which particular skills are to be developed' (ACARA c2011b). Thus, each year level is provided with 'key inquiry questions', where the two strands are integrated. For example, the Year 2 questions are:

1. What aspects of the past can you see today? What do they tell us?
2. What remains of the past are important to the local community? Why?
3. How have changes in technology shaped our daily life? (ACARA c2011c)

It is evident from these questions that a range of sub-questions could be posed and investigated by the students, both by gathering empirical data (for example observations and interviews) and by gathering a range of primary and secondary sources.

Geographical inquiry

At its most basic, geographical inquiry involves posing questions, gathering data and information, analysing and interpreting data and information and reaching conclusions (Roberts 2007). However, geographical inquiry is distinct from scientific and historical inquiry in terms of the questions it asks (Sorensen 2009). These questions include: 'What is it? Where is it? Why is it there? How did it get there? How has it changed over time? How is it affected by people? How are people affected by it? Should it be like this? What action is appropriate? What might it be like in the future?' (Kleeman 1997, p. 87). It is also distinct in that it assumes that the outcome of a geographical inquiry will be action, at a personal, local, national or global level.

The importance of undertaking geographical inquiry is seen in the way it:

> *bridges the social and the biophysical sciences … [and] incorporates the analytical, critical and speculative methodologies from the humanities as students of geography examine the impact of space, place and systems on the human condition* (Sorensen 2009, p. 12).

As such, Geography is a personal and social good as 'students of school Geography think about alternative futures, different perspectives of risk and increasing peoples' capacity to cop with variables' (Sorensen 2009, p. 15). Furthermore, when undertaking fieldwork, 'students also learn the ethical responsibilities of conducting geographical inquiry such as: respecting confidentiality and anonymity; avoiding use of deception or coercion; [and] minimising damage to landscapes' (Bliss 2009, p. 11).

Draft Australian Geography Curriculum

There are two strands in the draft Australian Geography Curriculum: *Geographical Knowledge and Understanding* and *Geographical Inquiry and Skills*. Geographical inquiry is presented as developing 'students' ability to ask geographical questions, plan an inquiry, collect and analyse information, (particularly through fieldwork and spatial technologies), reach conclusions based on evidence and logical reasoning, and communicate their findings in effective ways' (ACARA 2011, p. 17). The Geography Curriculum acknowledges that various methodological and theoretical paradigms can be used, including the scientific method and socio-cultural approaches such as critical literacy. Furthermore, Geography assumes that students will suggest and take action as an outcome of their inquiries.

Questions are primary to the process, as indicated by the questioning conventions explained in the glossary (ACARA 2011, pp. 121–122) which provides a series of question types for particular geographical questions from a range of perspectives:

- **Spatial** — for example: Where is it located? Why is it there? What are the consequences of its location and associations?
- **Humanistic** — for example: What is this place? What are my own perceptions of this place? What are the perceptions of other people?
- **Environment management** — for example: What do we need to find out in this environment? How suitable are current management practices in caring for this environment?
- **Cartographic** — for example: What is meant by the following map symbols? How long would this journey take travelling at 60 kph?
- **Global education** — How is my world interlinked by economic, social, political cultural and environmental factors?
- **Political** — Who has power in a particular place? Who decides about developments in a community?

These questions are introduced in Year 1 in the *Observing and Questioning* inquiry skills sub-strand.

The relationship between scientific inquiry, historical inquiry and geographical inquiry in the Australian Curriculum

From the analysis above, it seems that geographical inquiry in the Australian Curriculum is the most sophisticated and comprehensive. This is seen in the range of sources used, the range of perspectives employed, the consideration of different types of audience and the inclusion of action as an outcome of inquiry. History follows, with strong integration between the strands. In comparison, Science seems more limited. Inquiry skills are portrayed only as the experimental method. There is no apparent relationship between the strands. There is no action implied apart from communicating findings.

In the following section, the inquiry skills sequence in Science, History and Geography is compared and contrasted. Table 2 presents the author's rearrangement of the sub-strands so that they align for ease of comparison and contrast. A comparison of the sub-strands reveals some important distinctions. For instance, it is notable that both History and Geography explicitly recognise the role of interpretation, whereas Science does not.

The most striking difference is that of the *Chronology, terms and concepts* sub-strand in History (see Table 2). This step relates to the chronology of historical people and events and the use of terms and concepts such as 'abstract aspects or features of the past (for example colonisation, revolution, imperialism, democracy) and more specific features such as a pyramid, gladiator, temple, rock shelter' (ACARA c2011c). In terms of an inquiry process, this step seems inconsistent and would seem to be mixing subject content with the more generic inquiry process. This may be due to History representing this sequence as 'Historical Skills' (ACARA c2011c) rather than 'inquiry' skills as do Science and Geography.

The next phase of the analysis juxtaposed the sequence to compare and contrast the

types of activities, cognitive tasks and use of sources expected at the various year levels. Table 3 is the author's classification of the sub-strands and sequence into themes to highlight these aspects. In the table the sub-strands have been classified into broad categories thus:

- Questions.
- Guidance in planning and conducting investigations.
- Collecting and evaluating data and information.
- Using data and information.
- Evaluating and reflecting on the inquiry process.
- Communicating.

Some sub-strands are repeated as they fit into multiple categories. Actions that indicate the level of student autonomy and higher order development in the way students' approach and use questions and sources have been highlighted in bold. Actions that indicate the gathering and use of information (rather than data) have been highlighted with underlining. It should be noted that the underlining is simply a broad indication of where traditional aspects of information literacy are mentioned. Aspects that might also be considered information literacy such as the manipulation of data and communication of findings using digital technologies have not been emphasised.

Table 3 demonstrates that the levels of guidance varies across year levels; for instance in Science, students wait until Year 7 to pose and identify questions independently, whereas in History and Geography it is implied they do this from Foundation. In terms of guidance in planning and conducting investigations, Year 3 students start to make their own suggestions in Science and Geography, and from Year 7 are independent. By contrast, History does not mention levels of guidance, so it could be assumed that the process is student-directed from Foundation.

The three subjects are similar in terms of when students start collecting data and information (Foundation – Year 1) and when they conduct fieldwork (Year 7). However, the critical evaluation of sources does not align between subjects, starting in Year 5 for Geography, Year 7 for History and Year 9 for Science. Acknowledgment of sources is mentioned only in History from Year 7.

Using data and information is consistent across the three subjects, while the developmental sequence in evaluating and reflecting on the inquiry process is similar in Science and Geography. In History, the inquiry process seems to be seen more as information gathering rather than a methodology as such. This may be due to the emphasis in Science and Geography on gathering *data*, whereas History is concerned with gathering *information* such as primary and secondary sources.

Table 2. Commonalities in Australian Curriculum inquiry sub-strands.

Science	History	Geography
Questioning & predicting	Historical questions & research	Questioning & observing
Planning & conducting		Planning, conducting & evaluating
Processing & analysing data & information	Analysis & use of sources	Processing, analysing, interpreting & concluding
Evaluating	Perspectives & interpretations	Reflecting & responding
Communicating	Explanation & communication	Communicating
	Chronology, terms & concepts	

Communicating findings seems consistent across the three subjects. However, Geography is more sophisticated in that from Year 3 it places emphasis on using appropriate formats for particular audiences, while Science and History do not mention audience.

In summary, the analysis of the inquiry process reveals consistencies and inconsistencies across the three subject areas. The level of guidance varies and is not mentioned in History. The critical evaluation of sources is an aspect of interest to teacher librarians in terms of developing information literacy, but most teacher librarians would start working with students on this aspect much earlier than mentioned in the sequence. Likewise, acknowledgement of sources would be encouraged earlier than Year 7 in all subject areas. Finally, it is notable that Geography is the most sophisticated and holistic. Also, the draft Geography inquiry sequence has an extensive detail, in contrast to the pared down Science and History skills sequence.

The role of information literacy in the development of inquiry skills in the Australian Curriculum

The unfortunate omission of information literacy from the Australian Curriculum has placed teacher librarians in a difficult position. It means that teacher librarians need to examine the dimensions of the Curriculum to find the elements of information literacy that are present, and make links between these elements. The inquiry skills strands are an obvious place for the development of information literacy.

As seen by the underlining in Table 3, in the Science Curriculum the role of information literacy is weak. Empirical data gathering through the experimental method is emphasised. There is no explicit role for information literacy in terms of searching for and gathering information to use to frame and contextualise research questions or hypotheses. This is surprising, given that the US National Research Council (1996) states there is a clear role for information literacy, as evidenced in their description of scientific inquiry in terms of 'examining books and other sources of information to see what is already known … [and] reviewing what is already known in light of experimental evidence'. The omission of information literacy is consistent with Chinn and Malhotra's (2002) criticism of school science inquiry versus authentic science inquiry. They argue that in authentic science, scientists will study research reports from other scientists in order to design their experiments and to situate their inquiry within the existing body of knowledge. However, they found in school science, this crucial aspect is omitted.

Herein lies an opportunity for teacher librarians to do the work themselves to integrate the strands of *Science Understanding, Science as a Human Endeavour* and *Science Inquiry Skills*. Thus, the teacher librarian's role could be to use information literacy as a framework to unite the strands, and assist classroom teachers in making the links.

In the History Curriculum the role of information literacy is strong. It is developed in the History skills sequence through the gathering and use of primary and secondary sources. The key inquiry questions provided by ACARA further strengthen this connection through integrating the *Historical Knowledge* and *Understanding* and *Historical Skills* strands.

In the draft Geography Curriculum the role of information literacy is strong. Information literacy is fully developed in the *Geographical Inquiry and Skills* sequence through gathering and using information. In particular, the range of geographical questions offers a strong framework for the use of information and data from a range of sources.

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Table 3. Comparing the sequence (adapted from the Australian Curriculum Inquiry Skills sequence – in bold are actions that demonstrate students' autonomy and higher order thinking, underlined are traditional information literacy actions).

	Science	History	Draft Geography
Questions	F – **Respond** to questions about familiar objects & events 1 – Respond to & pose questions, & **make predictions** about familiar objects & events	F – **Pose** questions about the past using sources provided	F – **Pose** questions about place, space & environment 1 – Pose & respond to questions for an inquiry, based on a **variety of question stems** & stimulus
	3 – With guidance, **identify** questions in familiar contexts that can be investigated scientifically & predict what might happen based on prior knowledge 5 – With guidance, **pose** questions to clarify practical problems or inform a scientific investigation, & predict what the findings of an investigation might be	5 – **Identify** questions about the past to inform an historical inquiry	3 – Pose questions about place, space or environment & make some **predictions** about their answer, **determine** which questions prompt geographical inquiry 5 – Pose geographical questions that range in **complexity & guide deep inquiry**, then **speculate** on their answers
	7 – Identify questions & **problems** that can be investigated scientifically & make predictions based on scientific knowledge 9 – **Formulate questions or hypotheses** that can be investigated scientifically	9 – **Identify** & select **different kinds of questions** about the past to inform historical inquiry	7 – **Determine a focus** for the inquiry within an area of interest, for example, **make a prediction or develop a key question; develop & evaluate questions through perspectives** of place, space & environment & other relevant concepts 9 – Determine a focus for the inquiry, for example, **propose a hypothesis** or develop a series of questions that are inclusive of the concepts, including place, space & environment; **evaluate questions** in terms of their ability to examine place, space environment & other concepts
Guidance in planning & conducting investigations	1 – Participate in different types of **guided investigations** to explore & answer questions, such as manipulating materials, testing ideas, & accessing information sources	F – Pose questions about the past **using sources provided**	1 – Participate in a **guided inquiry** & use a range of information sources
	3 – **Suggest ways** to plan & conduct investigations to find answers to questions	3 – **Identify** sources	3 – **Suggest** some inquiry sources & use a range of oral, graphic, written & digital information sources, including spatial technologies where appropriate; **select appropriate geographical methodologies** to collect data, including following protocols for consultation with local Aboriginal communities &/or Torres Strait Islander communities 5 – **Identify** a variety of information sources that will be used for inquiry, considering their validity; identify & create appropriate materials, geographical tools or equipment to collect data or observations, using formal measurements & digital & spatial technologies as appropriate
	7 – Collaboratively & **individually plan** & conduct a range of investigation types, including fieldwork & experiments, ensuring safety & ethical guidelines are followed		7 – **Determine** a purpose & operational scale & then **design** the sequence of the geographical inquiry; **design** the inquiry & develop a plan to determine which data will be needed, & to locate this data from fieldwork, library & online research using spatial technologies, maps, statistics, photographs & other images 9 – **Independently** design the inquiry to identify & locate data data from fieldwork, library & online research using spatial technologies, maps, statistics, photographs & other images
Collecting & evaluating data & information	F – Explore & **make observations** by using the senses 1 – Use **informal measurements** in the collection & recording of observations, with the assistance of digital technologies as appropriate; participate in different types of **guided investigations** to explore & answer questions, such as manipulating materials, testing ideas, & **accessing information sources**	F – Pose questions about the past **using sources provided**	F – **Observe** familiar places & explore other information sources, **collect** information about the school or a favourite place in the local area 1 – Collect information about the local area
		3 – **Locate** relevant information from sources provided 5 – Locate information related to inquiry questions in **a range of sources, compare** information from a range of sources	3 – Suggest some inquiry sources & use a range of oral, graphic, written & digital information sources, including spatial technologies where appropriate; **use appropriate materials, geographical tools or equipment to collect data or observations, using formal measurements & digital & spatial technologies as appropriate** 5 – Identify a variety of information sources that will be used for inquiry, considering their **validity; identify & create** appropriate materials, geographical tools or equipment to collect data or observations using formal measurements & digital & spatial technologies as appropriate.

Table 3 – Continued

	7 – Collaboratively & individually plan & **conduct** a range of investigation types, including **fieldwork & experiments**, ensuring safety & ethical guidelines are followed 9 – **Critically analyse** the validity of information in secondary sources & evaluate the approaches used to solve problems	7 – **Identify & locate relevant sources**, using ICT & other methods; identify the origin & purpose of **primary & secondary sources**; draw conclusions about the **usefulness** of sources 9 – Evaluate the **reliability** & usefulness of primary & secondary sources	7 – Design the inquiry and develop a plan to determine which data will be needed, and locate this data from **fieldwork, library & online research** using spatial technologies, maps, statistics, photographs & other images; assess the effectiveness of methodology & suitability of collected data 9 – **Evaluate data & collection methods for reliability & representation** & make necessary adjustments
Using data & information	F – **Engage in discussions** about observations & use **methods** such as drawing to represent ideas 1 – Through discussion, **compare observations with predictions**	F – **identify & compare** features of objects from the parts & present, **explore a point of view**	F – **Share & sort** observations & information 1 – Sort information & **identify patterns, draw conclusions** based on their investigations & share these conclusions
	3 – Compare results with predictions, **suggesting possible reasons** for findings 5 – Compare data with predictions & use as evidence in **developing explanations**	3 – **Identify** different points of view 5 – **Compare** information from a range of sources, identify points of view in the past & present	3 – Sort information & data & **look for relationships or patterns**, using maps & spatial technologies as appropriate 5 – **Manage data & information** collected & look for patterns or relationships; **combine** data & information to **draw & share conclusions, considering their impacts**
	7 – **Summarise** data, from students' own investigations & secondary sources, & use scientific understanding to **identify relationships & draw conclusions** 9 – Use knowledge of scientific concepts to draw conclusions that are **consistent with evidence**	7 – Identify & **describe** points of view, **attitudes & values** in primary & secondary sources 9 – **Process & synthesise** information from a range of sources for use as **evidence in an historical argument**; identify & **analyse** the **perspectives** of people from the past, Identify & analyse different historical **interpretations** (including their own)	7 – **Analyse** different sources of data to **identify relationships, trends, patterns, anomalies & generalisations**; **synthesise** data & develop conclusions in response to the inquiry, for example, a prediction or a key finding; **propose alternatives, strategies or solutions** to the inquiry & **make decisions on a course of action** 9 – Synthesise data & draw conclusions that link to the focus of the inquiry; **evaluate alternatives** by **applying criteria** & make a recommendation on a course of action
Evaluating & reflecting on inquiry process	1 – **Compare observations** with those of others		F – **Reflect** on their learning & ask further questions 1 – **Review** their inquiry process in order to identify **ways of improving** the process for next time, **planning individual or collective action** based on what has been learned
	3 – **Reflect** on the investigation, including whether a test was fair or not 5 – **Suggest improvements** to the methods used to investigate a question or solve a problem		3 – **Reflect on the quality** of the inquiry, planning action that is needed to respond to their inquiry & how it could be done, **identifying the cause & effect of their suggested action or inaction** on an issue 5 – Reflect on what has been learned, feelings about conclusions & what should happen as a result
	7 – Use scientific knowledge & findings from investigations to **evaluate claims** 9 – Evaluate conclusions, including **identifying sources of uncertainty** & possible alternative explanations, & describe specific ways to improve the quality of the data		7 – Reflect on the inquiry process, including a **review of all methods of collection, retrieval, analysis & presentation of data, examine conclusions**, & if necessary revisit earlier phases with further questions or change techniques; **select key findings** from an inquiry to inform decisions on how to best respond to the question, issue or problem & where appropriate, plan for action 9 – **Appraise the effectiveness** of the **inquiry process & its findings**, including a review of all methods of collection, retrieval, analysis & presentation of data; **plan how an inquiry could be improved**; use decision-making methods to decide on the most appropriate plan for action, as an individual or part of a group
Communicating	F – **Share** observations & ideas 1 – **Represent & communicate** observations & ideas in a variety of ways such as **oral & written language, drawing & role play**	F – **Develop a narrative** about the past, use a range of communication forms (oral, graphic, written, role play) & digital technologies	F – **Share** observations & ideas 1 – **Present findings**, using appropriate communication methods, geographical tools & skills & geographical vocabulary
	3 – Represent & communicate ideas & findings in a variety of ways such as **diagrams, physical representations & simple reports** 5 – Communicate ideas, explanations & processes in a variety of ways, including **multi-modal texts**	3 – **Develop texts**, particularly narratives 5 – Develop texts, particularly narratives & descriptions, which **incorporate source materials**	3 – Present & **compare findings**, choosing an appropriate communication method **for a particular audience**, using geographical tools & skills & geographical vocabulary 5 – Present findings, choosing an appropriate communication method for **more than one audience**, using appropriate geographical tools & skills & geographical vocabulary
	7 – Communicate ideas, findings & solutions to problems using scientific language & representations **using digital technologies** as appropriate 9 – Communicate scientific ideas & information **for a particular purpose**, including **constructing evidence-based arguments** & using appropriate scientific language, conventions & representations	7 – Develop texts, particularly descriptions & explanations that use **evidence from a range of sources that are acknowledged** 9 – Develop texts, particularly explanations & discussions that use **evidence from a range of sources that are referenced**	7 – **Develop geographical texts** using appropriate geographical vocabulary, concepts & geographical conventions to communicate effectively in one or more of the following forms: written, oral, visual & graphic 9 – Develop a range of geographical texts such as written, oral, visual & graphic, based on data from primary sources & secondary sources, using appropriate graphical techniques including spatial technologies, maps, statistics, photographs; use appropriate geographical vocabulary, concepts & geographical conventions to communicate effectively

Conclusion

It is evident that the way inquiry is portrayed in the Australian Curriculum offers challenges and opportunities to teacher librarians. Teacher librarians have the advantage of a whole-of-curriculum responsibility. They have a bird's-eye view of the Curriculum across year levels and subjects, rather than a narrow one that the classroom teacher may take. Given that there are some important differences in the inquiry skills sequence in Science, History and Geography, teacher librarians are in a position to point these out and develop synergies. For instance, as mentioned above, in Geography students communicate their findings to a range of audiences from Year 3. There is no reason that this cannot also be done in Science. Furthermore, there is no reason why students cannot start critically evaluating information much earlier than Year 5 in Geography, Year 7 in History and Year 9 in Science.

In this way, the role of the teacher librarian should be to work with classroom teachers to strengthen and bridge the gap between inquiry skills and information literacy. Other opportunities for this can be seen in the application of the general capabilities. In particular, the *Literacy, Information, Communication and Technology (ICT)* and *Creative and Critical Thinking* capabilities all have strong elements of information literacy embedded in them, such as reading and creating a range of texts, accessing information, collecting and analysing data and information, synthesising and presenting data and information and critically evaluating information. The development of these capabilities is presented by ACARA in a three-stage sequence by the end of Years, 2, 6 and 10 (see ACARA c2011a for the information collected together in one PDF file).

Finally, another aspect that is worth noting is the theoretical distinction between inquiry *learning* and inquiry *skills*. The Australian Curriculum uses the term 'inquiry' and 'inquiry skills', but never the term 'inquiry learning'. It could be argued that inquiry skills are a part of inquiry learning. For instance, inquiry skills can be regarded as procedures and processes undertaken by the student, while inquiry learning can be regarded as the pedagogical and curriculum approach. It is possible that, like the omission of information literacy, the lack of a coherent understanding of inquiry learning in the Australian Curriculum is a lost opportunity for ACARA.

A lost opportunity for ACARA may result in a new opportunity for teacher librarians. If teacher librarians see their role as curriculum innovators, then integrating the Australian Curriculum strands into a coherent inquiry-learning framework that explicitly integrates information literacy may be one of the most significant ways we can contribute to the implementation of the Australian Curriculum.

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