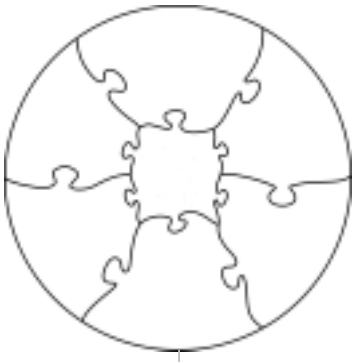

Focus on Inquiry

A Teacher's Guide to Implementing Inquiry-based Learning

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Teachers	✓
Administrators	✓
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Other	

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Contents

Acknowledgements vii

Foreword ix
How can I use this document? ix
Why would I use inquiry-based learning? x

Chapter 1: Building a Culture of Inquiry 1
What is inquiry? 1
What is inquiry-based learning? 1
What does the research say? 1
Inquiry and metacognition 3
Inquiry across the curriculum 3
A systematic approach to inquiry 3
Characteristics of classrooms using the inquiry process successfully ... 4
References 5

Chapter 2: A Model for Inquiry 7
What happened to the 1990 research process model? 7
Why is a model useful? 7
The Inquiry Model 9
Phases of the Inquiry Model 11
References 14

Chapter 3: Curriculum Connections 15
Why use cross-curricular inquiry-based learning projects? 15
What makes inquiry-based learning successful? 15
Inquiry models throughout the Alberta curriculum 16
References 21

Chapter 4: Designing Inquiry Activities 23
Facilitating inquiry-based learning 23
Focus on success: Planning an inquiry-based learning activity 25
Cooperative planning 26
Assessing inquiry 29
Structuring inquiry-based learning activities 31
References 36

Chapter 5: How Do I Teach Reflecting on the Process? 37
Key learnings 37
Building student skills for Reflecting on the Process 37
Teaching Reflecting on the Process 37
Metacognition during the phases 38
Assessing Reflecting on the Process 41
Thinking about Reflecting on the Process 41
References 43

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Chapter 6: How Do I Teach Phase 1—Planning? 45
Key learnings 45
Building student skills for Planning 45
Teaching Planning 46
Assessing Planning 47
Thinking about Planning 48
Gauge the feelings 49
Reflecting on the Process during the Planning Phase 50
References 51

Chapter 7: How Do I Teach Phase 2—Retrieving? 53
Key learnings 53
Building student skills for Retrieving 53
Teaching Retrieving 54
Assessing Retrieving 55
Thinking about Retrieving 55
Gauge the feelings 56
Reflecting on the Process during the Retrieving Phase 57
References 57

Chapter 8: How Do I Teach Phase 3—Processing? 59
Key learnings 59
Building student skills for Processing 59
Assessing Processing 60
Thinking about Processing 60
Gauge the feelings 61
Reflecting on the Process during the Processing Phase 61

Chapter 9: How Do I Teach Phase 4—Creating? 63
Key learnings 63
Building student skills for Creating 63
Teaching Creating 64
Assessing Creating 64
Thinking about Creating 64
Gauge the feelings 65
Reflecting on the Process during the Creating Phase 65

Chapter 10: How Do I Teach Phase 5—Sharing? 67
Key learnings 67
Building student skills for Sharing 67
Teaching Sharing 67
Assessing Sharing 68
Thinking about Sharing 68
Gauge the feelings 68
Reflecting on the Process during the Sharing Phase 69
References 69

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Chapter 11: How Do I Teach Phase 6—Evaluating? 71
Key learnings 71
Building student skills for Evaluating 71
Teaching Evaluating 71
Assessing Evaluating 72
Thinking about Evaluating 73
Gauge the feelings 73
Reflecting on the Process during the Evaluating Phase 73
References 74

Chapter 12: Thinking Ahead 75
Reducing cognitive overload 75
Reducing affective overload 76
Time demands 77
References 78

Chapter 13: Professional Growth 79
Research foundations of inquiry-based learning 79
Constructivist learning theory 80
Metacognition 81
Leaders in inquiry-based learning 82
References 87

Appendices 89

Glossary 109
References 111

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Foreword

This document is an update of *Focus on Research: A Guide to Developing Students' Research Skills* (Alberta Education, 1990). *Focus on Research* was developed in response to suggestions from Alberta teachers during the implementation of *Focus on Learning: An Integrated Program Model for Alberta School Libraries* (Alberta Education, 1985).

Research, as well as suggestions from teachers and teacher-librarians, indicated that it was time to enhance and rethink the 1990 research process model. Although the essential elements of the *Focus on Research* model are strong, changes in curriculum, students, technology, professional development, research findings and the world of work all point to the timeliness of this update. Additionally, research and practice point to a need for a deeper consideration of the implications of technology and the implications of the affective nature of inquiry-based learning.

With the support from teachers and teacher-librarians across the province, this update brings together 13 years of research, practice and reflection. Colleagues in school librarianship education and research around the world have also supported this work.

How can I use this document?

Inquiry-based learning is not an "add-on," but rather a way to achieve the goals of the Alberta programs of study, since inquiry-based learning is a component of all Alberta curricula. This document provides supports for implementing inquiry-based learning activities in the classroom and is intended for teachers working on their own or in teams, with or without the support of a teacher-librarian or other library personnel. It provides an instructional model that can be used by all teachers, Kindergarten to Grade 12, in guiding inquiry with students.

Inquiry-based learning activities can be used in various ways to accomplish the learning outcomes of Alberta programs of study:

- within core programs
- within optional programs
- across two or more curricula
- within the Information and Communication Technology curriculum.

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Why would I use inquiry-based learning?

As administrators and teachers, we need to know that what we do in the classroom makes a difference to student learning. Inquiry-based learning is one of those activities that positively impacts student success (see Chapter 1), but both teachers and administrators need to ask the following questions as they consider how to implement inquiry-based learning:

- Will inquiry-based learning increase my students' understanding of the learning outcomes mandated by the curriculum I must cover?
- Will inquiry-based learning increase my students' ability to read, write and reason?
- If I allow students to spend time on inquiry-based learning, what do I remove from my program? How do I make time?
- Which strategies are the most effective in teaching inquiry-based learning?
- What are the biggest obstacles I must overcome to implement inquiry-based learning?
- When is inquiry-based learning worth doing?
- Will inquiry-based learning help me meet the curriculum standards?
- How do I manage an inquiry-based learning activity by myself?
- Will inquiry-based learning improve my students' test scores?

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1

Chapter 1: Building a Culture of Inquiry

Think back to your own experiences in school. Do you remember your favourite project? What was your topic? How did you share your information? What made the experience so special?

This kind of learning remains a strong and compelling memory for those of us lucky enough to have experienced a self-directed or inquiry-based project. The feelings are the same whether we experienced this learning in the early elementary grades, as a high school student, or as a graduate student. Many of us, when asked about a positive memory of school, will remember a project with real-world applications that engaged our emotions and our thinking. Often, it was a research project that we shared with friends and family.

Some teachers have not had the experience of a research project in their own schooling, but they have taken up the challenge of creating inquiry-based learning experiences for students and are aware of the wonder and excitement that an inquiry project can bring to learning.

What is inquiry?

"Inquiry is the dynamic process of being open to wonder and puzzlements and coming to know and understand the world" (Galileo Educational Network, 2004).

What is inquiry-based learning?

Inquiry-based learning is a process where students are involved in their learning, formulate questions, investigate widely and then build new understandings, meanings and knowledge. That knowledge is new to the students and may be used to answer a question, to develop a solution or to support a position or point of view. The knowledge is usually presented to others and may result in some sort of action.

What does the research say?

Research suggests that using inquiry-based learning with students can help them become more creative, more positive and more independent (Kühne, 1995). This is true for all students, including those with special needs who require more individual attention during the process.

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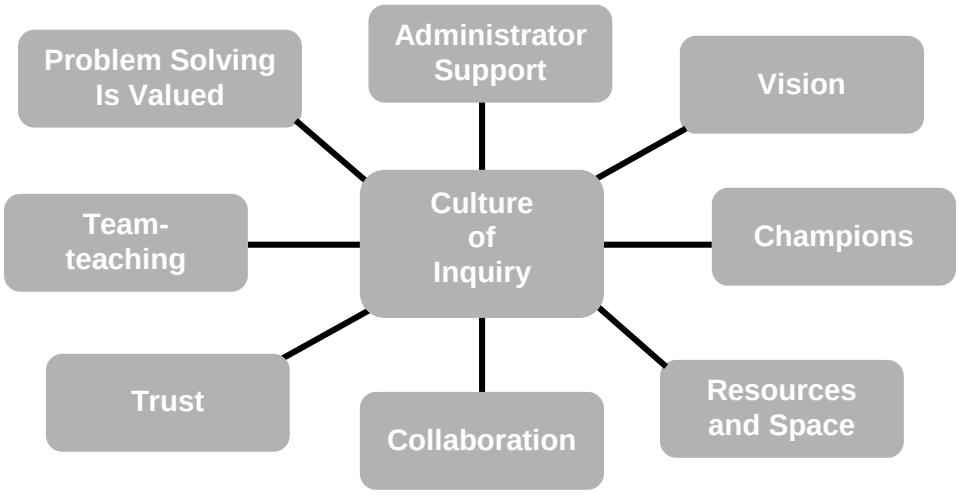
1

Other academic research shows that inquiry-based learning improves student achievement (GLEF, 2001). Some of the research on this effect comes from studies of effective school library programs that are centres of inquiry-based learning. A school library program that is properly equipped and staffed can make a difference in terms of measurable gains in student achievement. School library factors alone can account for improvements of 2% to 9% in student achievement (Lance, 2001).

Success with inquiry-based learning often requires a change in school culture. Some schools, individually or as part of a district-wide initiative, have made inquiry-based learning their instructional priority. Studies investigating the implementation of inquiry-based science education, inquiry-based information literacy programs and other inquiry-based educational innovations have resulted in guidelines for building a culture of inquiry (Falk & Drayton, 2001; Fullan, 1991; Kuhlthau, 2001):

- Administrators in the school or district have a clearly articulated vision for inquiry.
- The vision for inquiry is carried forward despite competing pressures.
- Two or more champions promote the vision for inquiry.
- Resources and space for inquiry are readily accessible.
- Teachers collaborate and support each other.
- Teachers, students and parents trust each other.
- Small, interdisciplinary teams of teachers work together.
- Problem-solving and investigative skills are valued throughout the school/school system.

Requirements for Building a Culture of Inquiry



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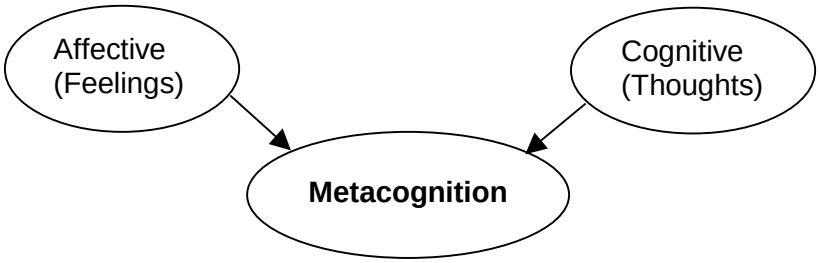
Inquiry and metacognition

In the inquiry process, metacognition means becoming aware of one's own thinking processes (thinking about thinking) and acknowledging and understanding the feelings associated with each of the phases.

Building a culture of inquiry also means recognizing, supporting and teaching the role of metacognition. Metacognitive skills are part of the "learning to learn" skills that are transferable to new learning situations, in school and out of school. Through reflecting on the process during inquiry-based learning activities, students are given opportunities to explore and understand both the cognitive and affective domains of "learning to learn" (Hacker, 1999; Kuhlthau, 1988). Understanding and dealing with thoughts and feelings makes inquiry-based learning a powerful learning experience for students and teachers.



Inquiry across the curriculum

The model for inquiry-based learning presented in this document is one that can be used in all programs of study and in all grades, since inquiry-based learning is embedded in all Alberta curricula. Although different terminology and process emphases are used in the different curricula, this document emphasizes common aspects or elements and supports an integrated, cross-disciplinary approach to inquiry. Using an inquiry model helps students to internalize a process for inquiry that is transferable to everyday life situations. Thinking about inquiry as a puzzle can help students to relate inquiry-based learning to their lives outside school.

A systematic approach to inquiry

Inquiry-based learning provides opportunities for students to:

- develop skills they will need all their lives
- learn to cope with problems that may not have clear solutions
- deal with changes and challenges to understandings
- shape their search for solutions, now and in the future.

A systematic approach to the development of these skills is essential to prepare students for problem solving and lifelong learning. A systematic approach ensures that students have the opportunity to engage in inquiry, to learn an overall process and to understand that this general inquiry process can be transferred to other inquiry situations.

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Using these same process skills as they proceed from primary grades through senior high school will enable students to:

- become familiar with the inquiry process
- understand a framework that supports searching for and using information
- internalize a variety of inquiry skills and strategies for independent and group use
- adapt procedures to various inquiry situations (adapted from Alberta Education, 1990, p. 9).

Characteristics of classrooms using the inquiry process successfully

Classrooms where teachers emphasize inquiry-based learning have the following characteristics (Drayton & Falk, 2001):

- Inquiry is in the form of authentic (real-life) problems within the context of the curriculum and/or community.
- The inquiry capitalizes on student curiosity.
- Data and information are actively used, interpreted, refined, digested and discussed.
- Teachers, students and teacher-librarian collaborate.
- Community and society are connected with the inquiry.
- The teacher models the behaviours of inquirer.
- The teacher uses the language of inquiry on an ongoing basis.
- Students take ownership of their learning.
- The teacher facilitates the process of gathering and presenting information.
- The teacher and students use technology to advance inquiry.
- The teacher embraces inquiry as both content and pedagogy.
- The teacher and students interact more frequently and more actively than during traditional teaching.
- There is an identifiable time for inquiry-based learning.

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Tips for Teachers: Building a Culture of Inquiry

- Approach inquiry with enthusiasm and excitement.
- Admit that inquiry involves the unexpected for you and for students.
- Model the inquiry process in your instruction (show as well as tell).
- Use the language of inquiry.
- Post the Inquiry Model (see p. 10) in your classroom and the school library.
- Facilitate the process—discuss, clarify, support and monitor.
- Evaluate the process (and make it really count).
- Use technology to do what would be impossible otherwise.
- Set a specific time for inquiry-based learning.

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2

Chapter 2: A Model for Inquiry

What happened to the 1990 research process model?

The research process as presented in *Focus on Research: A Guide to Developing Students' Research Skills* (Alberta Education, 1990) is alive and well. The Inquiry Model presented here is an update of *Focus on Research* and was developed in response to suggestions from Alberta teachers and teacher-librarians. Research on the *Focus on Research* model indicated that the time had come to review the 1990 model.

Although the essential elements of the *Focus on Research* model were and continue to be strong, changes in curriculum, students, professional development, technology, research findings and the world of work all point to the timeliness of this update. Building on the core components of the 1990 model, the Inquiry Model:

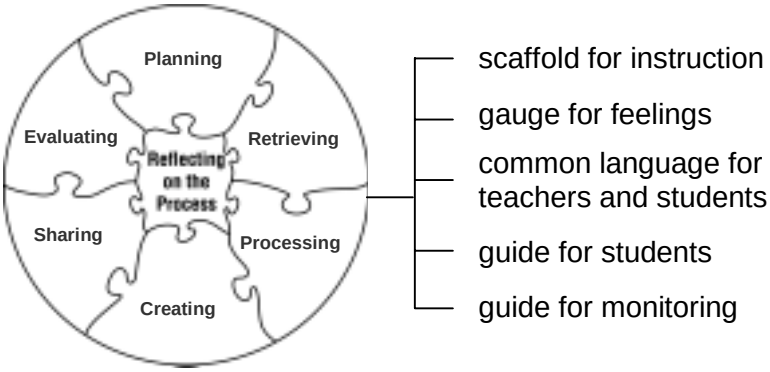
- updates and enhances the research process strategies and skills
- includes new approaches to the delivery of instruction
- includes information and communication technology and new curricula
- includes new research findings on the impact of emotions on learning.

Why is a model useful?

A model is a description or physical representation that increases understanding of something that cannot be directly observed. It is a way of connecting our learnings. Think how much easier it is to understand the workings of the solar system or a DNA molecule when you are able to study a model of these concepts.

An instructional model, such as the Inquiry Model, supports the work of teachers and students and can be used in a variety of ways (Donham, 2001).

Inquiry Model



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The Inquiry Model as a scaffold for instruction
The Inquiry Model provides the content and structure for instruction—outlining the skills and strategies that need to be taught explicitly in each phase of the process. Referring to the model frequently and consistently during the planning of inquiry-based learning activities keeps instructional concerns in the forefront as lessons are prepared and as instructional materials are created.

The Inquiry Model as a gauge for feelings

Students need to be taught that these feelings are a normal part of the inquiry process, experienced by all inquirers.

The inquiry process, like any demanding learning experience, brings with it various feelings, including enthusiasm, apprehension, frustration and excitement. These feelings are experienced in a definite pattern in the various phases of the inquiry process. By referring to the model throughout the inquiry-based learning activity, teachers are able to anticipate and recognize when students are experiencing strong feelings and are able to design support systems and reflective activities that help students move through the process.

The Inquiry Model as a common language for teachers and students
A common language for both teachers and students helps students to internalize the model and to talk about the learning processes involved. It increases effective communication among all inquirers in a school since it gives teachers and students the words to talk about the parts of the process. Posting a model in classrooms and in the library (or any place in the school where inquiry learning takes place) encourages students to recognize each phase as part of the whole process.

The Inquiry Model as a guide for students
The Inquiry Model guides students in using an analytical approach that includes all phases in the inquiry process. Without learning an inquiry process, students often develop a very limited and narrow view of inquiry. They may think that inquiry is finding the answer to other people's questions for the satisfaction of their teacher, rather than understanding inquiry as the process of being puzzled about something, generating their own questions and using information to satisfy their own interests and to develop their own knowledge.

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The Inquiry Model as a guide for monitoring

Teachers use the Inquiry Model to assess how effectively students have engaged in the inquiry process, how deeply they understand it, and how effectively the process has been sequenced across grades. For example, a school or district matrix that maps the topics of the inquiry-based units and the skills and strategies introduced, developed and extended across the grades, provides a basis for articulation, coordination and equity. Such a matrix can also be used to balance large-scale and small-scale inquiry activities. Students can get the experience and practice they need in inquiry-based learning without overloading teachers in a particular grade or subject area.

The Inquiry Model

The Inquiry Model is based on more than 30 years of research from around the world, with thousands of children, adolescents and adults in a variety of inquiry settings, and holds true whether the inquirer is a six-year-old, a senior high school student, an undergraduate student at university, a lawyer, a teacher or a researcher. Some of the key researchers interested in inquiry-based learning are featured in Chapter 13 of this document.

Research shows that inquirers follow a general cognitive and affective pattern. However, the inquiry process is not linear or lock step. It is highly individual, nonlinear, flexible and more recursive than might be suggested in traditional models of the research process. Experienced inquirers tend to do more “looping back” since they are comfortable with the process. Through reflecting on the process, all learners can become comfortable with the nonlinear, individual, flexible and recursive nature of inquiry.

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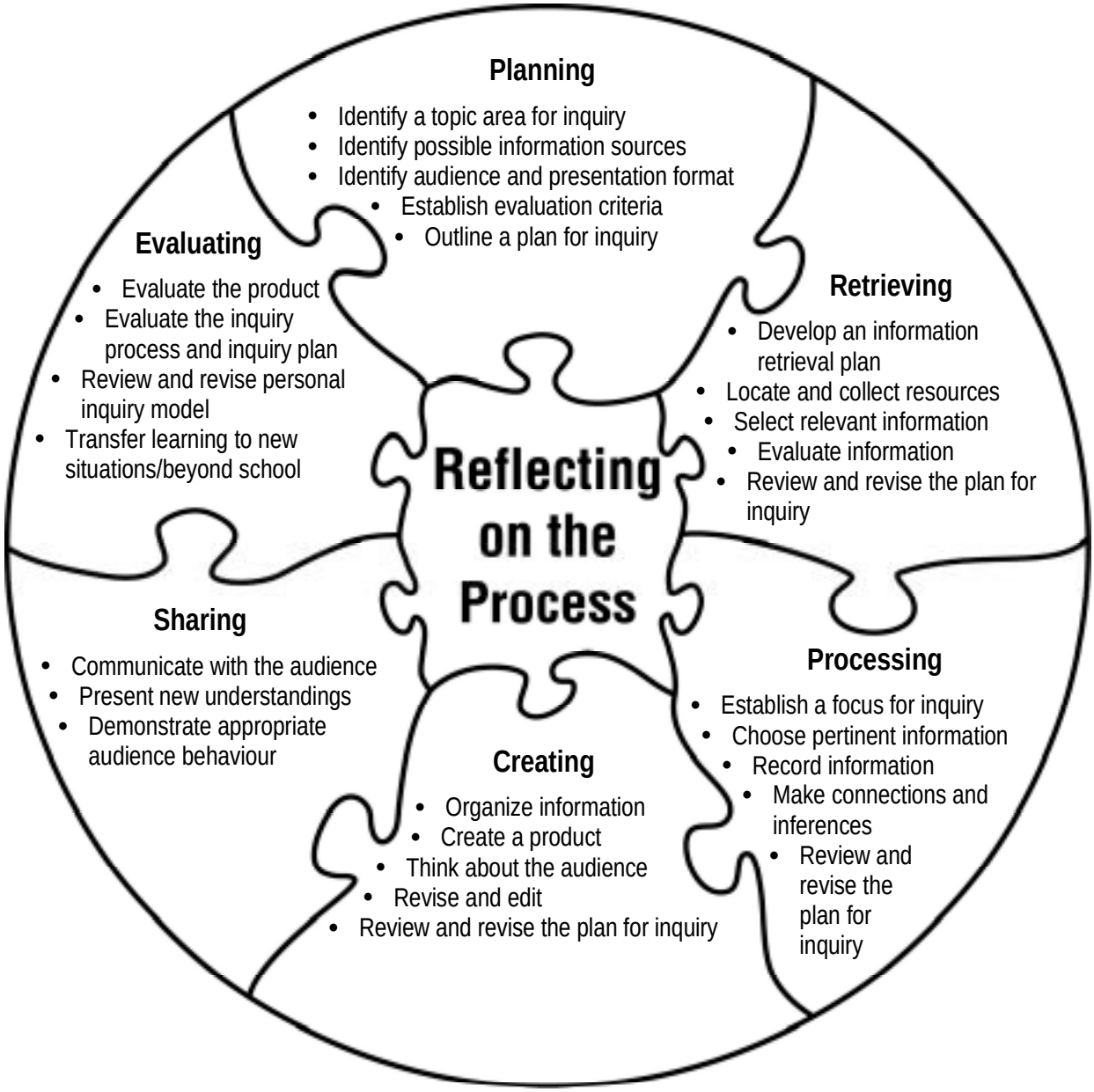
Inquiry Model



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Phases of the Inquiry Model

Reflecting on the Process
Reflecting on the process is integral to all phases in the Inquiry Model—Planning, Retrieving, Processing, Creating, Sharing and Evaluating—and includes both the affective and cognitive domains associated with metacognition.

Planning Phase
Inquirers should understand that the underlying purpose of inquiry-based learning projects is to develop their "learning to learn" skills. Inquiry-based learning begins with the inquirers' interest in or curiosity about a topic. It is the puzzle that needs to be solved. At this phase of the inquiry process—the most important phase of the whole process—inquirers often experience a sense of optimism about the tasks ahead.

Tips for Teachers: Building for Student Success
For those students with little or no background knowledge of a topic, teachers must provide information and background that motivate students. Students need past experience and knowledge of a topic in order to do productive inquiry (Jonassen, 2000).

Once students are interested in a broad topic or theme, they need to be involved in:

- determining what questions will be investigated
- how they might find the information they need about a particular topic
- how to present information to a particular audience
- suggesting criteria for evaluating their research product and process.

Retrieving Phase
The inquirers next think about the information they have and the information they want. Inquirers may need to spend considerable time exploring and thinking about the information they have found before they come to a "focus" for their inquiry.

This pre-focus phase is at first enjoyable for students, as they actively search for information related to their topic. But as the amount of resources they find increases, students sometimes "tune out" and stop searching, since they may not know how to handle the irrelevant data or cannot find the data specific to their

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inquiry. Since many students are set in what they want to find out, they often become frustrated at this point in the process. Teachers help students past these feelings of frustration by teaching them that these feelings are ones that all inquirers experience, and by teaching them the skills and strategies for selecting relevant information and for adjusting and modifying inquiries.

Tips for Teachers: Building for Student Success
Teachers often need to help inquirers understand that the information they find, whether in a library book, in a newspaper or on an Internet site, was created by people with particular beliefs and purposes and that information is not just objective facts.

Processing Phase
This phase begins when the inquirer has found a "focus" for the inquiry. A focus is the aspect of the topic area that the inquirer decides to investigate. Coming to a focus can be very difficult for students, as it involves more than narrowing the topic. It involves coming to an authentic question, a personal perspective and/or a compelling thesis statement.

Inquirers usually experience a sense of relief and elation when they have established a focus for their inquiry. Even so, choosing pertinent information from resources is often a difficult task; there may be too little information or too much information, or the information may be too superficial or too in-depth for the inquirers. Often the information that is found is confusing and contradictory, so students may feel overwhelmed.

Tips for Teachers: Building for Student Success
Teaching students how to compare, contrast and synthesize data helps them through the disorder that can occur in this phase.

Creating Phase
Organizing the information, putting the information into one's own words and creating a presentation format are the next tasks in the process.

Students feel more confident at this phase and want to include all their new learnings in their product, resulting in too much information.

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Tips for Teachers: Building for Student Success
Teachers build on their students' feelings of confidence and teach the skills and strategies that enable students to narrow down or focus their creation.

Sharing Phase
If students have been given enough supports throughout the inquiry process, they are proud of their product and eager to share it, regardless of the format or audience. They may feel a bit nervous about presenting something in which they take such ownership, and they may feel anxious that others may not understand or appreciate their efforts. Nevertheless, they feel that they have done well on this assignment.

Tips for Teachers: Building for Student Success
Teaching students audience appreciation skills and strategies and focusing on the positive helps to support students through this phase.

Evaluating Phase
Finally, when a research project is complete, inquirers feel relieved and happy. They are excited about their new skills and understandings, and they want to reflect on the evaluation of their product and their inquiry process. In order to make sense of the inquiry process, they need to understand and question the evaluation criteria, to identify the steps in their inquiry process, and to share their feelings about the process.

Students should be able to articulate the importance of this kind of work for developing their "learning to learn" skills, and they should be able to see the connections between their inquiry work done in school and their work or activities that are done outside of school. They should also be able to reflect on how their experience has influenced their personal inquiry model and on what they have learned about themselves as inquirers.

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3

Chapter 3: Curriculum Connections

Why use cross-curricular inquiry-based learning projects?

Teachers recognize the commonalities of curricula across grades and subjects, particularly in the specific outcomes related to skills and attitudes. Inquiry-based learning projects that are integrated with the curriculum and that are cross-disciplinary benefit students by reducing the time required for achieving these outcomes.

Inquiry-based student learning outcomes occur in all curricula and grades. For example, in the English language arts programs of study, Kindergarten to Grade 12, inquiry is promoted within all five general outcomes, but it is most strongly emphasized in General Outcome 3: "Students will listen, speak, read, write, view and represent to manage ideas and information" (Alberta Learning, 2000, 2003a). The *Senior High School English Language Arts Guide to Implementation* clarifies that:

> Although self-contained "research projects" may be described as inquiry projects, the term "inquiry" has a larger meaning than research. It encompasses the habits of mind that promote learning and the processes that can be woven through all classroom activities to enable students to broaden and deepen their understanding of the world. Inquiry processes begin and are sustained by student curiosity. These processes are supported by teachers and students who ask, "What do we need to know?" and "How can we find out?" Inquiry-based instruction fosters and sustains an attitude of inquiry that connects with lifelong learning and metacognition (Alberta Learning, 2003e, p. 242).

What makes inquiry-based learning successful?

The most successful curriculum inquiry projects emerge from topics that are of personal interest to the students (Wiggins & McTighe, 1998). In a teacher-directed inquiry project, students need to have a choice of topics about which they truly wonder and care, and there needs to be an identifiable time when students work on their inquiries, rather than inquiries being what they do virtually all day. In student-directed inquiry projects, the teacher may provide curriculum-related themes and allow students to generate their own topic questions.

Theme selection also helps teachers align students' inquiries with the curriculum. It is important to ensure that resources, technology and other materials are available for students as they engage in the inquiry process.

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Tips for Teachers: Building for Student Success
Many schools develop a school-wide plan for teaching inquiry-based learning skills and strategies so that all students build on past learnings and experience inquiry-based learning projects.

Inquiry models throughout the Alberta curriculum

Alberta programs of study present inquiry models that are useful to compare and contrast with the Inquiry Model presented in this guide. While terms may change, the concepts of inquiry-based learning are included in all programs of study. The curriculum links presented on the following pages represent only some of the inquiry-based components and reflect the curriculum in place at the time of this guide's publication. Therefore, teachers need to use the latest version of curriculum documents to ensure that they have the fullest and most current information in relation to the inquiry-based outcomes for each program of studies.

The following curriculum links demonstrate that well-designed inquiry-based learning projects are a means by which many curricular outcomes can be accomplished by students each year.

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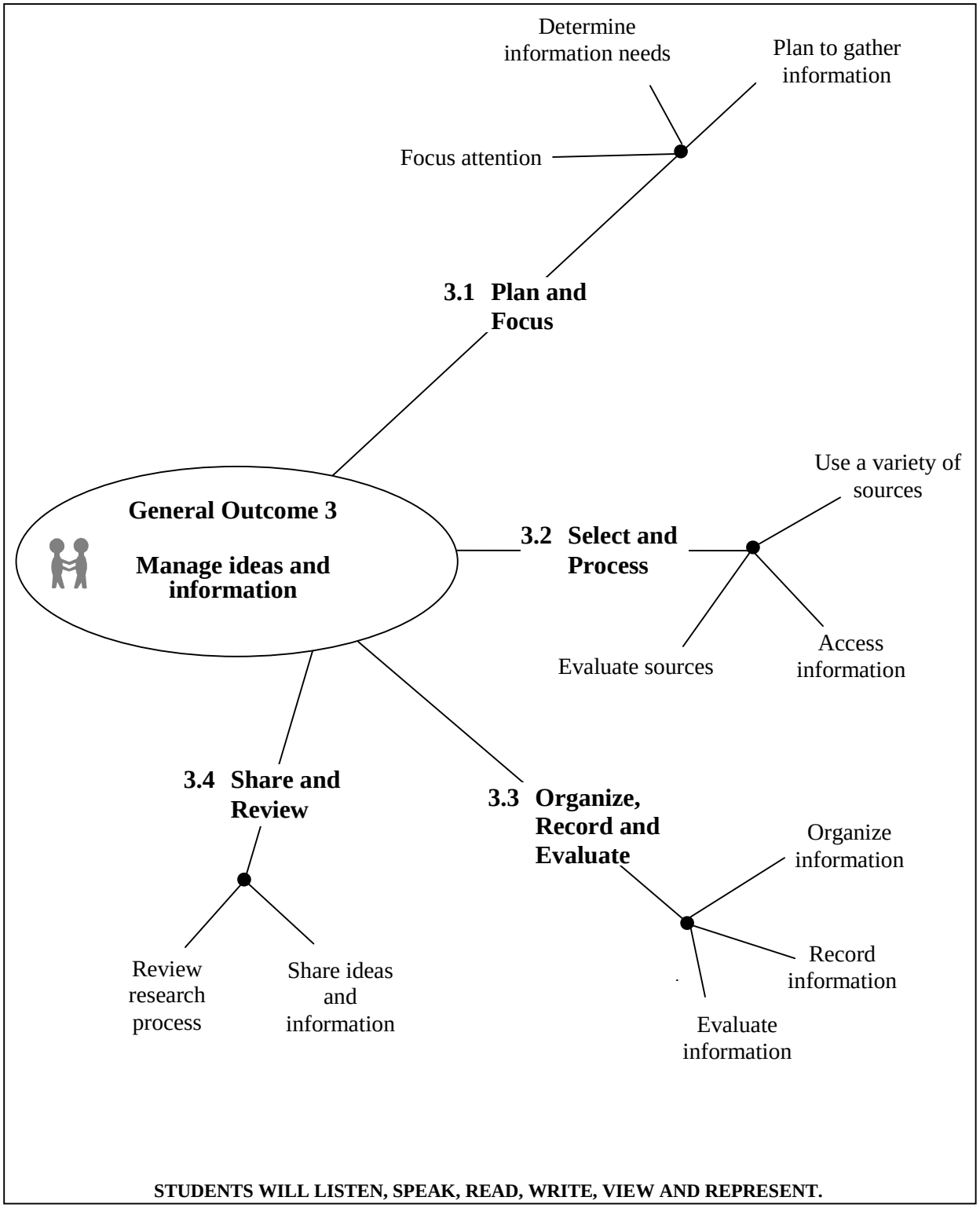
English Language Arts Kindergarten to Grade 9



English Language Arts Kindergarten to Grade 9: From Alberta Learning, 2000, p. 46.

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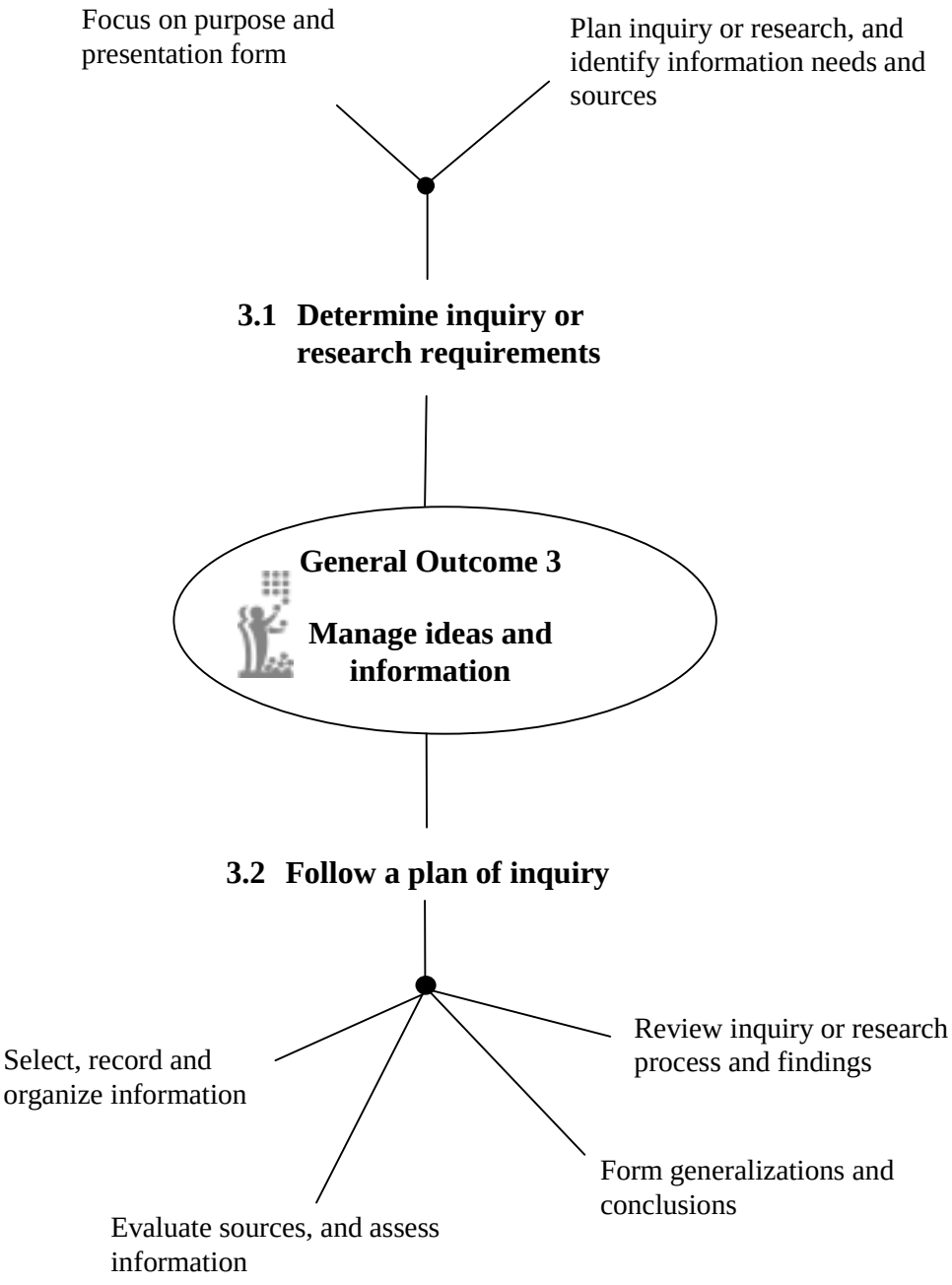
English Language Arts Grades 10 to 12

STUDENTS WILL LISTEN, SPEAK, READ, WRITE, VIEW AND REPRESENT TO:



English Language Arts Grades 10 to 12: From Alberta Learning, 2003a, p. 38.

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Information and Communication Technology (ICT) All Grades
The general and specific outcomes of the Information and Communication Technology Kindergarten to Grade 12 Program of Studies, which are infused throughout Alberta curricula, fall under the following three categories:

- Communicating, Inquiring, Decision Making and Problem Solving
- Foundational Operations, Knowledge and Concepts
- Processes for Productivity

The category closely aligned with the inquiry process is that of Communicating, Inquiring, Decision Making and Problem Solving (Alberta Learning, 2000–2003, p. 2). The general and specific outcomes for this category provide further details.

Mathematics Kindergarten to Grade 12
An inquiry approach to mathematics is evident throughout the curricula. Each program of studies includes an Instructional Focus that emphasizes that "problem solving, reasoning and connections are vital to increasing mathematical power and must be integrated throughout the program" (Alberta Learning, 1996, p. 13; Alberta Learning, 1997, p. 13; Alberta Education, 1998, p. 15; Alberta Learning, 2002, p. 3; Alberta Learning, 2003b, p. 14).

Science Grades 1 to 6
Learner expectations for elementary science are linked to two main areas of skill emphasis: science inquiry and problem solving through technology. "Inquiry is the process of finding answers to questions…. Engagement in inquiry is not a linear process; it can have a variety of starting points, and the steps followed may vary from one inquiry activity to another" (Alberta Education, 1996, p. A.3).

"The skills of science inquiry include asking questions, proposing ideas, observing, experimenting, and interpreting the evidence that is gathered" (Alberta Education, 1996, p. A.3).

Science Grades 7 to 12
The science programs for grades 7 to 9 and Science 14–24 are based on four foundations; the third foundation reflects the inquiry process:

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Foundation 3: "Students will develop the skills required for scientific and technological inquiry, for solving problems, for communicating scientific ideas and results, for working collaboratively and for making informed decisions" (Alberta Learning, 2003c, 2003d, p. 3). The skills that students need to develop are: Initiating and Planning, Performing and Recording, Analyzing and Interpreting, and Communication and Teamwork (Alberta Learning, 2003c, 2003d, p. 3).

The program rationale and philosophy in Science Grades 7–8–9 and Science 14–24 states that students "must also develop the broad-based skills needed to identify and analyze problems; explore and test solutions; and seek, interpret and evaluate information" (Alberta Learning, 2003c, 2003d, p. 1).

Other senior high school science programs, including Science 10, Biology 20–30, Chemistry 20–30, Physics 20–30 and Science 20–30, "place an increased emphasis on developing methods of inquiry that characterize the study of science. For example, students will further their ability to ask questions, investigate and experiment; gather, analyze and assess scientific information; and test scientific principles and their applications. They will develop their problem-solving ability and use technology" (Alberta Education, 1994, p. 1).

Social Studies Kindergarten to Grade 12
Although the current social studies curriculum is under revision, both the existing and the proposed programs reflect an inquiry process throughout. The existing programs of study use models for problem solving and decision making from grades 1 to 12.

The new programs of study provide learning opportunities for students to:

- engage in active inquiry and critical and creative thinking
- use and manage information and communication technologies critically
- conduct research ethically using varied methods and sources; organize, interpret and present their findings; and defend their opinions
- apply skills of metacognition, reflecting upon what they have learned and what they need to learn
- communicate ideas and information in an informed, organized and persuasive manner (Alberta Learning, 2003f, p. 2).

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The Social Studies Kindergarten to Grade 12 Program of Studies, Validation Draft, September 2003, states that social studies "is designed to promote metacognition through critical reflection, questioning, decision making and consideration of multiple perspectives on issues" (Alberta Learning, 2003f, p. 6). Four core outcomes related to skills and processes are identified:

- Dimensions of Thinking
- Social Participation as a Democratic Practice
- Research for Deliberative Inquiry
- Communication (Alberta Learning, 2003f, p. 8).

Research for Deliberative Inquiry emphasizes that "the research process develops learners who are independent, self-motivated problem solvers and co-creators of knowledge. Developing research skills prepares students for the world of work, post-secondary studies, lifelong learning and citizenship in a complex world" (Alberta Learning, 2003f, p. 10).

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4

Chapter 4: Designing Inquiry Activities

The Planning Phase of inquiry is the key to success for teachers, who develop the lesson plans for the inquiry activity, and for students, who are involved in the inquiry. Teachers who plan successful inquiry-based learning activities take the time to think through the process. This planning determines the success of an activity and cannot be overemphasized. In designing an inquiry activity, teachers also follow their own inquiry process.

Inquiry-based learning requires many skills and strategies and a wide range of resources from beyond the school library and classroom. It is important that teachers select a curriculum theme that is worthy of the time and effort involved and that will be interesting to students for more than a short-term period. Early selection of a theme and inquiry activity will give teachers the time to build the students' background knowledge, to develop the inquiry skills and strategies that students will need, and to acquire or add to the required resources.

Facilitating inquiry-based learning

Students learn inquiry skills, strategies and processes more readily when inquiry-based learning activities are:

- integrated with curriculum
- taught with the focus on developing lifelong learners and critical thinkers
- viewed by students as relevant to their needs
- related to the students' past experiences
- shared through cooperative learning.

To help students develop an understanding of the inquiry process, the teacher(s) and/or teacher-librarian:

- identifies a curriculum entry point
- designs an inquiry-based learning project/activity
- supports students as they generate and refine a topic
- models the process out loud to help students.

As students work through the inquiry process, the teacher(s) and/or teacher-librarian:

- motivates students to locate, analyze and use information
- assists students to clarify thinking through questioning, paraphrasing and talking through tasks
- provides students with opportunities to record information

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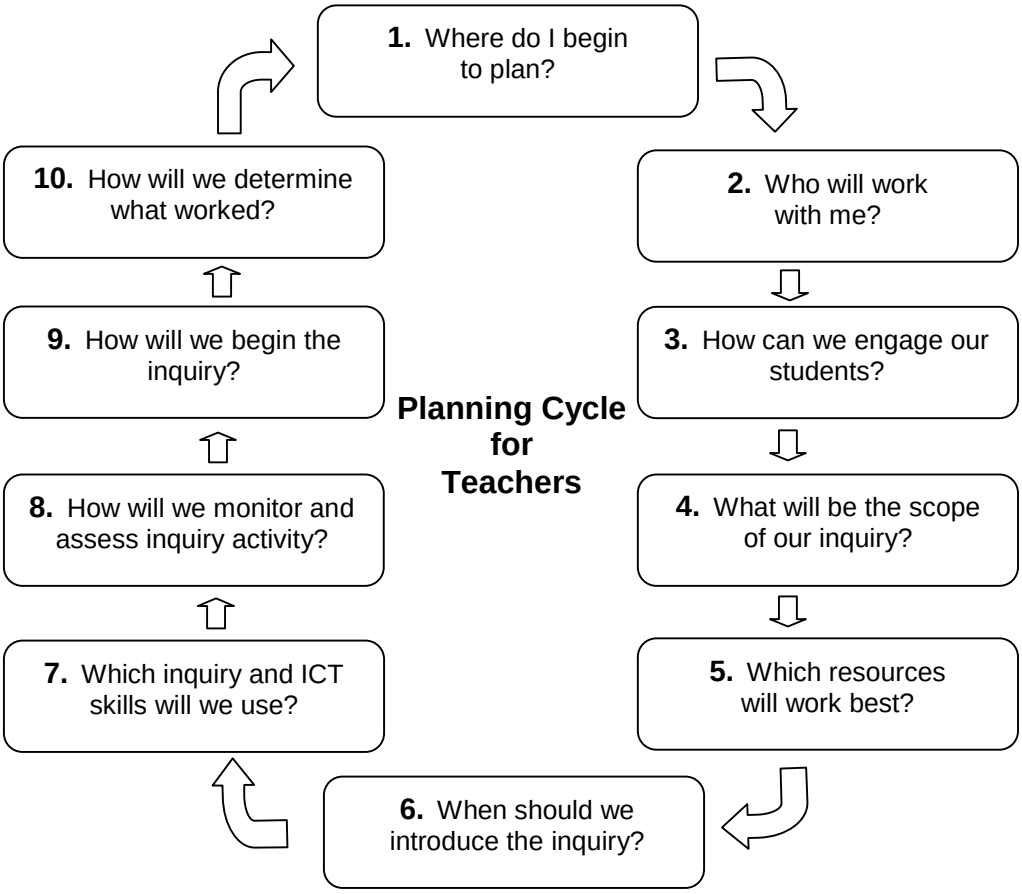
- provides students with opportunities to focus on steps required to complete their inquiries
- individualizes teaching
- evaluates student progress in content and process areas
- models inquiry behaviours (e.g., demonstrating and modelling the inquiry-based learning process)
- facilitates and models questioning behaviours (e.g., providing opportunities for students to develop and ask questions).



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Focus on success: Planning an inquiry-based learning activity

Step 1: Where do I begin to plan?
If your school has developed a school-wide plan so that all students can experience inquiry-based learning activities throughout their school career, then consult this plan first. School plans vary the content areas and ensure that students are learning, practising and improving their inquiry skills and strategies as they progress through the grades.

If your school has not yet developed a school-wide plan for developing student inquiry skills and strategies, begin with the programs of study, which all have inquiry-based outcomes (see Chapter 3), and select an area that will intrigue and interest both you and your students.

Step 2: Who will work with me?
Collaborative teacher teams produce better results from students. The following are some possibilities for teams:

- Work with another teacher or with all teachers in a particular grade or level to team teach and develop the inquiry unit. Working collaboratively allows each teacher to share unique experiences and skills. More importantly, when students in the same grade get the opportunity to do an inquiry, it promotes equity and ensures that they all receive instruction in the same skills and strategies.
- Cooperative planning of an inquiry with a colleague or a team of teachers should be approached in the same manner as with the teacher-librarian, except that two or more classes are now involved. In the team-planning approach, each teacher brings special talents that can be used. The team approach also divides the labour and lightens the workload. After the unit planning is complete, each teacher adapts the unit to the needs of his or her students.
- Work with a teacher-librarian to plan inquiry-based learning units together. The teacher-librarian brings to the activity expertise in inquiry-based learning, resource selection, Web site selection and evaluation, and, most importantly, strategies for integrating information literacy skills into the inquiry.
- If no teacher-partners are available, discuss your inquiry with the library technician or assistant and ask for support to locate a variety of print, nonprint and Internet resources.

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Integrating inquiry-based learning activities into the curriculum is evolutionary. For teachers who are new to integrating inquiry activities, begin slowly. As teachers and students experience positive development in teaching methods and skills, their commitment to inquiry will increase. The ideal situation for developing an inquiry unit occurs when team teaching or cooperative planning occurs between a teacher-librarian and teacher or between teachers (Alberta Education, 1990, pp. 28–29).

Cooperative planning

Cooperative planning of an inquiry activity involves a teacher working with a teacher-librarian, or teachers working together. The first step is to set out objectives for the inquiry and plan the activities with the teacher-librarian or other teachers. The teaching of inquiry and information literacy skills should be integrated into the plan. Cooperative planning allows for variations in group size (e.g., whole class, two teaching groups, small groups).

Step 3: How can we engage our students?
Decide which unit provides the best opportunities for inquiry-based learning.

- Begin with the program of studies and your yearly plan.
- Think about resources in your school and community.
- Look for entry points, as well as topics that will engage students' interests and involve a problem or issue.
- Choose a curriculum-based theme for which:
  - background knowledge will be developed prior to the inquiry
  - students bring a strong background of experience or knowledge.
- Consider if the theme presents many opportunities to engage all students in your class, including male and female students, the highly motivated and those who require a lot of encouragement.
- Consider that a complex topic may require additional guidance for students so that they realize the importance of the issue and its potential impact on the lives of people.
- Keep in mind that some themes popular with young children may not have resources available at the appropriate reading level.

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Tips for Teachers
To integrate inquiry skills into the curriculum, the teachers and/or teacher-librarian:

- understand the skills involved in inquiry
- are committed to student-centred learning
- plan for the inquiry process and thinking skill development
- are flexible in teaching styles
- assess the inquiry skills that students have and need
- are aware of children's needs and capabilities (see Appendix A, p. 91)
- adapt to new findings in learning theory and child development.

Step 4: What will be the scope of our inquiry?
Decide on the scope and end product of the inquiry activity.

- If teaching inquiry-based learning for the first time, limit the scope of the project in terms of time, topic selection and end product. Focus on ensuring success for your students.
- Consider how many product formats you are willing to teach.
- Make sure that students will share information in a way that is very simple or very familiar to them.
- Set timelines and specific classes for the inquiry activity.

Step 5: Which resources will work best?
Select appropriate resources and plan for their use. The inquiry activity may have to be redefined at this point to take into account available resources.

- Choose resources in different formats (e.g., print, nonprint, digital, multimedia) and at different reading and literacy levels.
- Use a station approach in the classroom or school library if resources are very limited.
- Confirm, arrange and/or set up access to resources.
- Schedule time for students to browse through resources in the school library or classroom before the inquiry begins, so they become comfortable with resources other than textbooks.

Roles of the teacher in an inquiry-based classroom

1. Motivator
2. Diagnostician
3. Guide
4. Innovator
5. Experimenter
6. Researcher
7. Modeller
8. Mentor
9. Collaborator
10. Learner

(Crawford, 2000)

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Tips for Teachers: Building for Student Success
Using a classroom library to offer resources on a topic is one way of introducing a variety of resources to support the inquiry. Follow the school jurisdiction's Learning Resources Selection and Controversial Issues Policies.

Step 6: When should we introduce the inquiry?
Determine the order in which the unit and inquiry activity will be taught.

- Plan the inquiry project for the mid-point to the end of a unit, once students have learned background knowledge on the theme. Students will have developed interest in the topic and will have had a chance to think about questions of particular interest to them.
- Let students know in advance when they will start an inquiry activity—this allows students to think about topics, talk to friends and family about the topic, and gather resources in advance. It may also help with choosing and narrowing the topic, and in identifying any controversial issues (Alberta Learning, 2004, pp. 82–83).

Step 7: Which inquiry and ICT skills will we use?
Determine which inquiry and ICT skills, if appropriate, will be stressed throughout the inquiry and which will be taught prior to the inquiry activity.

- Assess students' competencies in a variety of inquiry skills. Students can help identify what skills they know and what skills require instruction.
- Analyze what inquiry skills will be required by a project and what to teach in advance.
- Limit the number of inquiry skills taught within an inquiry activity.
- Determine whether it is appropriate to specify skills for your inquiry activity.

Step 8: How will we monitor and assess inquiry activity?
Before implementing inquiry-based learning activities with students, plan for the monitoring and assessment of the inquiry process and the final product(s). Planning for assessment provides the foundation for thinking about what students already know, what they need to know, what instructional emphases will be given and what students will have learned when the inquiry activity is complete.

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- Determine how you will monitor and assess student progress in both content and process on an ongoing basis.
- Determine how you will make students aware of the monitoring and assessment (both formative and summative) requirements.
- Plan for differentiated instruction as the need arises (see Appendix B, p. 92).
- Plan for student self-evaluation.
- Plan for reflecting on the process.
- Plan for evaluating and revising the assignment at the end of the process.
- Determine how you will know if the process has been successful.

Step 9: How will we begin the inquiry?
Introduce the inquiry activity to the class as an integral part of classroom studies.

- Keep a list of questions, issues and problems that arise during the unit for further investigation.
- Spread the inquiry activity throughout the unit so that students have time to think about a topic of interest, talk to parents and other family members, and find a focus.

Step 10: How will we determine what worked?
During and after the inquiry activity, record those strategies that were most and least effective (see Appendix C, p. 93).

Assessing inquiry

Extensive resources to support teachers' assessment work are available from the Alberta Assessment Consortium (1997, 2000, 2003). These resources identify many criteria that improve student learning. In relation to the inquiry process, "Learning is enhanced when:

- assessment strategies match the learner outcomes and are aligned to instruction
- assessment is integrated with instruction (unit and lesson planning)
- assessment relates new concept(s) to previous learning
- students are involved with their own assessment
- students get immediate, meaningful feedback
- students of all abilities are able to demonstrate what they know and what they can do

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- assessment engages and motivates students" (Alberta Assessment Consortium, 2000, p. 2).

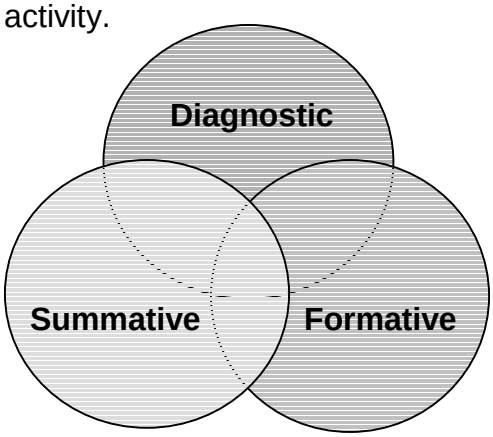
Teachers need to plan for diagnostic, formative and summative assessment when designing inquiry activities.

- **Diagnostic assessment** is used to find out which inquiry skills and strategies students know and can use, and then to build on these strengths during the inquiry. Areas of weakness and difficulty can be targeted for planned instruction during the inquiry activity. Diagnostic assessment also helps teachers recognize when individualized or differentiated instruction may be necessary for certain students in a class.

- **Formative assessment** is critical in the planning for inquiry activities. Inquiry-based learning assessment focuses on the inquiry process to monitor student progress and learning. Ongoing, formative assessment helps teachers to identify the development of students' skills and strategies and to monitor students' planning, retrieving, processing and creating skills during the inquiry activity. This ongoing assessment allows teachers to modify instruction, adapt the inquiry activity and support students with special instructional needs.

- **Summative assessment** is carried out at the end of the inquiry activity to provide information to students and parents about progress and achievement on the inquiry activity. This type of assessment helps the teacher and the students plan for further inquiries. Summative assessment assesses both the content and the process of the inquiry.

Planning for assessment requires that teachers consider the purposes for assessment in the inquiry activity; teachers then choose appropriate assessment strategies for each of the three types of assessment. All three types of assessment are essential to an understanding of what students learn during an inquiry-based learning activity.



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Assessment practices should:

- be part of an ongoing process rather than a set of isolated events
- focus on both process and product
- provide opportunities for students to revise their work in order to set goals and improve their learning
- provide a status report on how well students can demonstrate learner outcomes at that time
- be developmentally appropriate, age-appropriate, gender-balanced and consider students' cultural and special needs
- include multiple sources of evidence (formal and informal)
- provide opportunities for students to demonstrate what they know, understand and can do
- involve students in identifying and/or creating criteria
- communicate the criteria used to evaluate student work before students begin tasks so they can plan for success
- be communicated to students so that they understand expectations related to learner outcomes (Alberta Learning, 2003, pp. 7–8).

Also, assessment practices should help and encourage students to:

- be responsible for their own learning
- be involved in establishing criteria for evaluating their products or performances
- work together to learn and achieve outcomes
- feel competent and successful
- set goals for further improvements (Alberta Learning, 2003, p. 8).

Structuring inquiry-based learning activities

The developmental level of the students will have an impact on the nature of an inquiry-based learning activity, the end product and how it is shared. At all levels, appropriate positive feedback and support is necessary for student ownership of the activity.

The following checklists may be useful for teachers who are implementing inquiry-based learning:

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For students new to inquiry (usually Kindergarten to Grade 3)

- ❑ Students choose from teacher-selected, concrete topics.
- ❑ Students begin work on the project by relating it to their personal experiences.
- ❑ Teacher provides carefully selected resources, including Internet sites, for students.
- ❑ Students talk to others, using appropriate protocol, to gather information about their topic.
- ❑ Students are specifically taught skills for reading simple informational texts.
- ❑ Students are specifically taught note-taking skills to record their information, using a graphic organizer that is provided by the teacher.
- ❑ Students begin to use technology to locate, organize and create presentations.
- ❑ Students create a basic report or presentation based on specific guidelines.
- ❑ Students share their final report/project with small groups within the classroom and with family.
- ❑ Students talk about their feelings and progress each class.
- ❑ Teacher identifies and shares evaluation criteria for the process and the product.
- ❑ Students can play a role in setting evaluation criteria for the process and the product.
- ❑ Students understand evaluation criteria for the process and the product.
- ❑ Teacher monitors progress at the end of each class.
- ❑ Students talk about what went well and what was challenging.

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4

For students with limited inquiry experience (usually Grade 4 to Grade 6)

- ❑ Students, with guidance, select specific topics within a general curriculum theme selected by the teacher.
- ❑ Students work from background knowledge provided by the teacher or their own experiences and build basic understandings of the general curriculum theme.
- ❑ Teacher provides carefully selected resources, including Internet sites, for students and also encourages and supports student searches.
- ❑ Students talk to others, using appropriate protocol, to gather information about their topic.
- ❑ Students are specifically taught skills for reading more complex informational texts.
- ❑ Students are taught basic search engine strategies for the Internet, including how different search engines work.
- ❑ Students begin to use finding guides, such as online library catalogues, online subject directories, keyword and subject searches, indexes, tables of contents, and databases.
- ❑ Students are taught note-taking skills, using graphic organizers provided by the teacher.
- ❑ Students create a basic report or presentation based on specific guidelines. Students are encouraged to be creative in their product.
- ❑ Students use technology to locate graphics and media to enhance their presentations and reports.
- ❑ Students share their final report/project with small groups, with other classes and with family.
- ❑ Teacher identifies and shares evaluation criteria for the process and the product.
- ❑ Students can play a role in setting evaluation criteria for the process and the product.
- ❑ Students understand evaluation criteria for the process and the product.
- ❑ Students learn and apply appropriate peer-evaluation skills.
- ❑ Students talk about their feelings and progress each class.
- ❑ Teacher monitors progress at the end of each class.
- ❑ Students talk about what went well and what was challenging.

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4

For students with more inquiry experience (usually Grade 7 to Grade 9)

- ❑ Students, with guidance, select issues-based topics (arguing for or against or both for and against) within a general curriculum theme selected by the teacher.
- ❑ Students build on their general background understandings of the theme.
- ❑ Students carefully select and evaluate a variety of resources.
- ❑ Students develop in-depth understanding of the topic based on an information retrieval plan.
- ❑ Students work with others to monitor understandings of the topic and sensitivities to the topic.
- ❑ Students are specifically taught skills for reading and evaluating complex informational texts.
- ❑ Students use finding guides appropriately.
- ❑ Students use the Internet, with guidance and instruction from the teacher.
- ❑ Students are specifically taught interviewing skills that consider the appropriate protocol for each situation.
- ❑ Teacher provides a choice of notes or graphic organizers for students to record information.
- ❑ Students are specifically taught note-taking skills, including highlighting techniques.
- ❑ Teacher assists students in modifying and adapting their topics.
- ❑ Students create a report or presentation based on guidelines provided in the planning phase and in response to the needs and interests of the intended audience.
- ❑ Students use technology appropriately to enhance their presentations and reports.
- ❑ Students share the final report/project with larger groups, with other classes, in the community and/or with family.
- ❑ Teacher identifies and shares evaluation criteria for the process and the product.
- ❑ Students can play a role in setting evaluation criteria for the process and the product.
- ❑ Students understand evaluation criteria for the process and the product.
- ❑ Students learn and apply appropriate peer-evaluation skills.
- ❑ Students share their feelings and progress each class.
- ❑ Teacher monitors progress at the end of each class.
- ❑ Students talk about what went well and what was challenging.

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4

For students who are advanced inquirers (usually Grade 10 to Grade 12)

- ❑ Students select specific topics (e.g., issues-based, cultural, comparative, informative, historical, current events, biographical) within parameters set by the teacher.
- ❑ Students develop and support a position or point of view for thesis-based inquiry, which may involve social action that meets community standards.
- ❑ Students build on their general background understandings of their topic to develop an in-depth understanding of the topic, based on their own information retrieval and processing plan.
- ❑ Students carefully select and evaluate a variety of resources.
- ❑ Students work with others to monitor understandings of the topic and sensitivities to the topic.
- ❑ Students are specifically taught, as needed, skills for reading and evaluating complex informational texts.
- ❑ Students use finding guides appropriately.
- ❑ Students use the Internet, with guidance and instruction.
- ❑ Students conduct interviews in an appropriate and ethical manner (including consideration of privacy and confidentiality).
- ❑ Students record information using the most appropriate note-taking strategies.
- ❑ Students create a report or presentation based on guidelines developed in the planning phase and in response to the needs and interests of the intended audience.
- ❑ Students use technology appropriately and creatively to enhance their presentations and reports.
- ❑ Students share their final report/project with larger groups, with other classes, in the community and/or with family.
- ❑ Teacher identifies and shares evaluation criteria for the process and the product.
- ❑ Students are involved in setting evaluation criteria for the process and the product.
- ❑ Students provide appropriate self-evaluation and peer evaluation of the final product and the inquiry process.
- ❑ Students monitor and adapt their own inquiry skills and strategies during the process.
- ❑ Students share their feelings and progress each class.
- ❑ Teacher monitors progress at the end of each class.
- ❑ Students talk about what went well and what was challenging.

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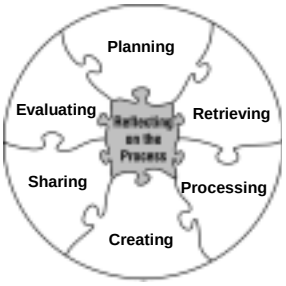
5

Chapter 5: How Do I Teach Reflecting on the Process?



Reflecting on the Process is the core component of the Inquiry Model and part of every phase.

Key learnings

Students will learn to:

- understand that inquiry is a personal learning process
- understand that the inquiry process is transferable to other learning situations
- develop their metacognitive skills—thinking about their thinking and thinking about their feelings
- develop strategies for monitoring and enhancing their thinking and feelings.

Building student skills for Reflecting on the Process

Students will be more successful in inquiry when teachers provide, in the context of classroom activities, opportunities for students to:

- understand how they learn best (see Appendices D, E and F, pp. 94–96)
- write/talk about how they learn best (see Appendix G, p. 97)
- write/talk about how they find answers to questions outside of school
- write/talk about previous successes and challenges when doing inquiry
- write/talk about their feelings in a supportive environment when learning new and difficult ideas
- review their processes of learning at the end of a lesson, day or week.

Teaching Reflecting on the Process

In the context of an inquiry-based learning activity, the teacher provides students with opportunities to:

- write/talk about their current phase in the inquiry process
- write in a journal or log about their feelings and strategies during the inquiry process
- share with others (peers, teachers, parents) their successes and frustrations at each phase during the inquiry process

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- brainstorm and/or post the affective and cognitive challenges that they are experiencing each day
- write/talk about things that surprise them during the inquiry process
- develop lists of ways to address their frustrations during the inquiry process
- review and comment on new learnings at the end of the inquiry process by examining their journals/logs.

Metacognition during the phases

Inquirers undergo the following thoughts (cognitive domain) and feelings (affective domain) during the phases of the inquiry process:

Phase	Cognitive Domain (thoughts)	Affective Domain (feelings)
Planning	• get a picture of the whole process with its parts • plan the whole process • generate topic ideas	• feel optimistic, yet uncertain and worried • understand that feelings will change during the process
Retrieving	• brainstorm sources • generate search words • understand different kinds of searching patterns	• feel confused, doubtful, angry and sometimes threatened
Processing	• begin with a focus • recognize the difference between relevant and pertinent information • recognize potential impacts on others	• feel optimistic initially and confident in their ability to complete the task • feel increased interest • feel overwhelmed
Creating	• organize information • select a genre/format • create a new knowledge product	• feel excitement and interest but also pressure to complete the product
Sharing	• think about their audience • respond appropriately to their audience	• feel excitement and interest but also pressure to perform
Evaluating	• ask what they learned about the topic (content) • ask what they learned about inquiry (process) • ask why inquiry is important (goals and purpose) • ask what they learned that they can use elsewhere (transfer)	• feel a sense of relief • feel satisfaction or dissatisfaction • understand how their feelings change during inquiry • understand how to cope with their changing feelings

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Tips for Teachers: Helping Students Develop Metacognitive Skills

Teachers work with students to assist them in understanding their thoughts during the inquiry process. The following questions can be used by students to develop their metacognitive processes, are framed from the perspective of a senior high school student and can be adapted by teachers for any grade level:

Phase	Cognitive Domain (thoughts)	Affective Domain (feelings)
Planning	• *What are the phases of the inquiry process?* • *Does my plan include all the phases?* • *What are some possible ideas about my topic that I am interested in?*	• *What am I feeling now about my inquiry (optimistic, yet uncertain and worried)?* • *How are my feelings likely to change during the inquiry process?*
Retrieving	• *Which phase am I working on now?* • *What sources of information have been useful? What is important to know about these sources?* • *What search words/searching approaches have been most useful?*	• *What am I feeling at this phase about my inquiry (confused, doubtful, angry and sometimes threatened)?* • *How can I deal with these feelings in ways that will enhance my success?*
Processing	• *Which phase am I working on now?* • *What is the focus of my inquiry?* • *How do I recognize the difference between pertinent and relevant information?* • *Does my inquiry relate to or impact my community? How?*	• *What am I feeling at this phase about my inquiry (perhaps optimistic initially and confident in my ability to complete the task; increased interest as knowledge increases)?*
Creating	• *Which phase am I working on now?* • *How might I organize my information and ideas?* • *What is important to know about the genre/format I am using?* • *How do I know when my work is finished?*	• *What am I feeling at this phase about my inquiry (excitement and interest; pressure to complete the product)?*

(continued)

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(continued)

Phase	Cognitive Domain (thoughts)	Affective Domain (feelings)
Sharing	• *Which phase am I working on now?* • *How can I make my product/ presentation most appropriate for my audience?* • *How will I get the response I want from my audience?*	• *What am I feeling at this phase about my inquiry (excitement and interest; pressure to perform)?* • *How can I deal with these feelings in ways that will enhance my success?*
Evaluating	• *What have I learned about the topic (content) of my inquiry?* • *What have I learned about the nature of inquiry (process)?* • *Why is it important to engage in inquiry activities (goals and purpose)?* • *What have I learned that I can use elsewhere (transfer)?*	• *What am I feeling now about my inquiry (a sense of relief; satisfaction or dissatisfaction)?* • *How have my feelings changed during the inquiry process?* • *What have I learned about coping with my feelings during the inquiry process?*

Tips for Teachers: Reflecting on the Process at any Phase

- Teach students that inquiry involves the unexpected for teachers and students.
- Teach students to self-check: "Is this information even remotely connected to my question?"
- Share the "high point of the day" and the "frustration of the day."
- Teach students to self-check: "What did I learn? How well did I achieve my goal? What changes did I have to make to meet my goal? What changes will I make the next time I do this? Where else can I use these strategies?"

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Assessing Reflecting on the Process

In the context of classroom activities or an inquiry-based learning activity, the teacher provides students with opportunities to:

- submit their journals/logs on an ongoing basis and at the end of the inquiry process
- write/talk about new learnings as a result of reflecting on the process
- give examples of other situations where the inquiry process could be or is used
- compare and contrast their learning process with that of others in the class
- write/talk about strategies that they can use to cope with the frustrations of doing inquiry
- write/talk about their own inquiry process and compare it with the process of others in the class
- write/talk about the strategies that they can use to support their learning in each of the phases of the inquiry process.

Thinking about Reflecting on the Process

The core purpose of the Reflecting on the Process component in the Inquiry Model is to involve students in their own learning by developing their metacognitive skills. This component is key in each and every phase of the inquiry process, is integral to the success of inquiry-based learning activities, and is actively practised throughout the inquiry process. Students are taught reflection skills and strategies so that inquiry becomes a natural process.

Inquiry work with students is an active interchange between students and teachers of ideas, information, learnings, experiences, activities and feelings, through which meaning is constructed. This interchange is supportive, discursive, adaptive, interactive and reflective. Teachers suggest how students can move forward, see things from new perspectives, make connections between previous and new knowledge, and see the patterns of their learning.

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Establishing Internal Standards (Alberta Education, 1990, p. 44)
Students can be asked to identify particulars of things they have done well. They can invite feedback from peers, parents and teachers, and integrate this information into their own standards. They can generate a "pat my own back" list in journals or diaries. These can be reflected on after completing a task. Standards can be compared with others and raised as necessary. Students can be made conscious of evaluating a standard to see if it is truly their own or one borrowed from a peer with little critical thought.

Differentiating Between I Can't and I Won't Behaviours
(Alberta Education, 1990, p. 44)
Some students may express attitudes such as I can't, I'm bored or this is too difficult, especially if they have not experienced inquiry-based learning or previous success in inquiry learning. Such students need support and guidance from teachers in order to view their situations differently and to take ownership of their learning. *Ownership has to move to the learner to determine the difficulty, the problem or state of dissatisfaction and determine a plan to move forward. "I am having difficulty and I need to know _____ and _____ and _____ to complete this task," or "This activity would be more exciting if I could also do _____ and _____ ," are more acceptable responses. Teachers and parents can be too quick to take responsibility for student difficulty and lack of interest, making students dependent on them for planning and monitoring tasks.*

Sample Activity for Reflecting on the Process: Planning Phase

Prior to beginning an inquiry-based activity, the teacher asks students to reflect on the way they would solve a hypothetical problem—perhaps choosing a new skateboard, snowboard or bicycle or doing a research project. Students write down the list of steps in their inquiry process. Divide the blackboard into three sections—Beginning, Middle and End—and record student suggestions from their inquiry steps for each of the three sections. Once the class has included their steps in the sections, ask students to share and compare their feelings during the beginning, middle and end of the inquiry process. Compare the students' personal inquiry plan to the Inquiry Model in this document.

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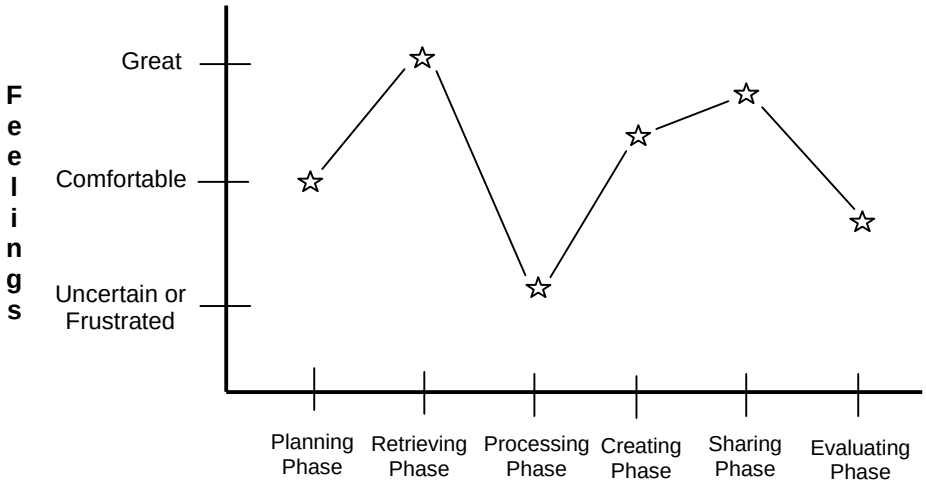
Sample Activity for Reflecting on the Process: All Phases

- Provide graphs for students to track their feelings throughout the activity.



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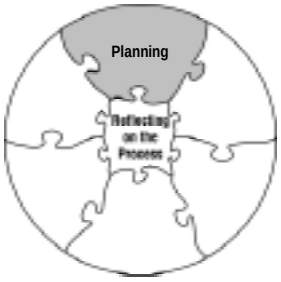
6

Chapter 6: How Do I Teach Phase 1—Planning?



Skills and Strategies	• Identify a topic area for inquiry • Identify possible information sources • Identify audience and presentation format • Establish evaluation criteria • Outline a plan for inquiry

Key learnings

Students will learn to:

- explore ideas and questions and identify a topic area for their inquiry
- develop a plan for their inquiry
- develop an information pathfinder (step-by-step plan for gathering resources) to identify, locate and evaluate information
- consider the needs of the audience in terms of creating and sharing
- understand or help develop assessment criteria for both process and product
- recognize the process nature of the work and acknowledge that reworking, rethinking and refocusing are integral to the inquiry process
- acknowledge the feelings that accompany this phase.

Building student skills for Planning

Students will be more successful in inquiry when teachers provide, in the context of classroom activities, opportunities for students to:

- brainstorm possible questions, ideas and issues
- use concept mapping software, mind maps or topic webs to record ideas
- use a three column, *What I **Know**, What I **Want** to Know, What I **Learned*** (KWL) chart to develop questions about the topic of inquiry

What I **Know** (**How** do I know it?)	What I **Want** to Know (**Why** do I want to know?)	What I **Learned** (**How** can I apply what I learned?)

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- brainstorm possible information sources, including print and electronic resources
- brainstorm and evaluate a list of creating/sharing formats, based on the needs of the audience and on the assessment criteria
- understand and/or help develop the criteria for process (e.g., checklist) and product (e.g., rubric) evaluation with assistance from the teacher and other students in the class
- discuss possible challenges/difficulties that may arise and offer possible solutions—especially for reworking or changing an inquiry.

In building student skills for Planning, also consider the following:

- Limit the number of new concepts and skills you and your students can reasonably handle during the time available for the inquiry.
- Have students use a planning checklist similar to a teacher preparedness checklist:
  - Does each student clearly understand the essential or big question for this activity?
  - Has each student chosen a topic within that essential question or concept which both you and your teacher team have reviewed and approved?
  - Have you helped your students to develop secondary questions about their topics to guide their inquiries?
  - Do your students understand that dealing with controversial issues involves sensitivity to the community, ethics and confidentiality?
  - Have you selected formative assessments (daily, weekly) as well as summative assessments for this project?
- See Appendices H, I and J, pp. 98–100.

Teaching Planning

Help students prepare for the Retrieving phase by modelling and facilitating brainstorming of potential information sources. Once potential sources have been identified, teachers help students generate the search words that will help them access the information they need. Depending on the focus of the inquiry project, students may need to use one or more kinds of searching: subject, author, title, keyword, Boolean (combining search terms using “and,” “or,” or “not”), full text, or call number.

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When students have problems generating subjects or keywords for searches, teachers may find it useful to teach one or more of the five basic patterns of keyword searching (Wehmeyer, 1984):

Pattern	Ask the Question	Examples
Synonyms	"Is there another way to say or spell it?"	Cars or Automobiles; Vikings or Norsemen; Leonardo da Vinci or Da Vinci or Leonardo or Vinci; Grey Owl or Archie Belaney; Literature, Canada or Canadian Literature
Larger subjects	"Is there a larger subject that might include it?"	Ants—try Insects Model Airplanes—try Models and Model Making D-day—try World War II
Smaller subjects	"Is there a smaller subject that might be worth looking up?"	Amphibians—try Frogs, Toads or Salamanders Funny Poems—try Limericks
Intersecting subjects	"Does it overlap another topic?"	Festivals in China—try Festivals and try China
Time/place/ field/works	"When and where did this person live? What is she or he famous for?"	Leonardo da Vinci—try Renaissance; Italy, History; Art, History; Mona Lisa Emily Carr—try Art, Canadian; Painters, Canada; Vancouver Artists

Assessing Planning

In the context of classroom activities or an inquiry activity, the teacher provides students with opportunities to:

- develop and write a plan for their inquiry (see Appendix I, p. 99)
- write/talk about why they are interested in their topic (more or less depending on grade level)
- write/talk about the perceived needs of their intended audience
- write/talk about what criteria should be used to assess the inquiry process and the final product
- write/talk about their own inquiry process.

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Thinking about Planning

The time spent by both the teacher and students in the Planning phase determines the success of the inquiry-based activity.

At the beginning of an inquiry-based learning activity, students need to be given the opportunity to visualize the entire inquiry process. Getting a sense of the project as a whole supports student success. Engaging students in the preparation and planning of the activity is crucial. Even the youngest inquirers, with the teacher's guidance:

- can identify what they know and how they know it
- can identify what they want to know about the theme and why they want to know it
- can develop authentic questions
- can generate ideas about potential information sources
- can discuss potential audiences and evaluation criteria for their work.

Identifying a topic (i.e., developing the authentic question or topic) is an important task for students in this phase. To do inquiry well, students need prior knowledge about the theme, and the topic must be at the appropriate level of abstraction:

- Young researchers (i.e., 5- to 11-year-olds) or inexperienced researchers of any age are more able to handle general knowledge topics where the emphasis is on fact-finding and organization of ideas.
- Junior high school or middle school students (i.e., 12- to 15-year-olds) are just beginning to be able to handle the abstract reasoning involved in narrowing a topic or for developing a position paper (Loerke, 1992).
- Senior high school students (i.e., 16- to 18-year-olds) can develop and support a thesis statement if they have had good research experience in earlier years.
- Students with learning difficulties process on a continuum and may need more time and additional supports to work through the inquiry process.

Teachers need to plan the inquiry project and its parameters long before the students begin work on their projects. Curricular themes and topics that students find personally compelling and that link to the out-of-school world are the best choices (Tallman, 1998; Jonassen & Land, 2000). The teacher must facilitate careful and thoughtful work to ensure that topics and research questions require higher level thinking skills, that they will challenge students and that they will engage student interest and

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curiosity. Students feel more positive toward investigative activities when they are involved in choosing or developing research topics. Contrary to expectations, students in the senior grades often have less involvement in topic and question generation than do younger students (Gross, 1997).

For complex topics or for assignments where students are given wide choices, students need more opportunity to do general reading, to assess sources of information, to develop their interest and focus, and to develop an understanding of the implications of the topic for others.

Gauge the feelings

As students begin their inquiry, they feel optimistic, yet uncertain and worried. They need to know that their feelings will change as they proceed through the inquiry process.

Sample Activity for Planning

Developing Good Inquiry Topics and Questions
Teach students, as they brainstorm possible questions, ideas and issues, to keep asking: "Am I going to be telling my audience something they didn't know before?" (commonly called the Who Cares? Test). The following question stems (Owens, Hester & Teale, 2002, p. 618) assist in the development of engaging topics:

How is _____ related to _____?
What is a new example of _____?
What are some possible solutions for the problem of _____?
Explain why _____.
What do you think would happen if _____?
Why is _____ important?

Example theme: Football
A student in Grade 5 wants to conduct an inquiry about football. Her initial questions are primarily information seeking.

1. When was Canadian football invented?
2. Who invented it?
3. Where was it invented?
4. Who were the first teams?
5. What are the rules?
6. What equipment is used?
7. Which team has won the most Grey Cups?

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Using question stems
However, when she considers question stems such as those listed above to generate possible topics, more intriguing topics are developed:

1. How is Canadian football related to games played in other countries?
2. How has the game of Canadian football changed since it was invented?
3. Why are football injuries so common?
4. How do Canadian football players' salaries compare to salaries of other Canadian professional athletes?
5. Why is football such a popular sport to watch?
6. Why does the CFL (Canadian Football League) have a hard time catching on in the United States?

Exploring perspectives
The student is then taught ways to explore the theme from various perspectives, using questions about the theme from the viewpoint of specialists in different disciplines (e.g., science, mathematics). Samples of questions include:

1. What would be a good science (or mathematics, history, art) question related to this topic?
2. What kind of question would a professional, such as a doctor, ask about this topic?

After considering the question stems and perspectives, the student decides that the question she will begin her inquiry with is:

"What are some possible solutions for the problem of common football injuries?"

Reflecting on the Process during the Planning Phase

Teach students to ask questions such as:

- Why did I choose this question?
- How will what I learn be of use to me later?
- What were my feelings as I worked through this phase?

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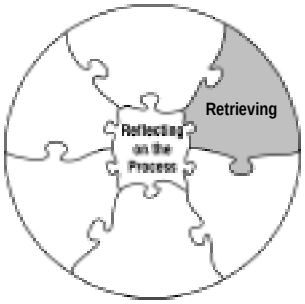
7

Chapter 7: How Do I Teach Phase 2—Retrieving?



Skills and Strategies	• Develop an information retrieval plan • Locate and collect resources • Select relevant information • Evaluate information • Review and revise the plan for inquiry

Key learnings

Students will learn to:

- understand that successful retrieving depends on preplanning
- develop an effective search strategy, including keywords, Boolean searching, subject searching, synonyms, narrowing/broadening the topic, subject directories
- understand how information is organized in libraries
- create a working bibliography of appropriate print, nonprint and electronic resources
- understand that different sources (including interviews) provide different kinds of information
- evaluate search strategies and offer suggestions for improvement next time
- determine if modifications to the topic are necessary
- acknowledge the feelings that accompany this phase.

Building student skills for Retrieving

Students will be more successful in inquiry when teachers provide, in the context of classroom activities, opportunities for students to:

- refine and develop a list of search terms, keywords and subject headings prior to searching
- use online library catalogues to locate materials in school and public libraries
- use the Online Reference Centre (www.LearnAlberta.ca) to locate information
- use full-text databases (e.g., SIRS, eLibrary)
- use indexes to locate print, nonprint and electronic information
- learn how to efficiently use the Internet to locate information
- develop and practise interview questions and techniques.

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7

Teaching Retrieving

During and in the context of an inquiry-based learning activity, the teacher provides students with opportunities to:

- understand that the Retrieving phase of the inquiry process is a method of problem solving that requires both critical thinking and imaginative thinking
- create a search strategy (e.g., information pathfinder—see page 57)
- explore a variety of print, nonprint and electronic sources
- access resources within the school and beyond
- communicate with experts, both locally and beyond
- record bibliographic information for print sources, including title, author, date, page numbers, publisher and place of publication
- record bibliographic information for nonprint (multimedia) sources, including title, author, date, running time and/or number of images, producer and/or distributor, location of producer/production company
- record bibliographic information for electronic sources, including title, author, date, URL and date retrieved
- use a variety of grade-appropriate strategies for recording and organizing bibliographic information, such as index cards, recording templates, word processing programs or software tools.

Tips for Teachers: Retrieving

- Teach the difference between relevant (generally related) and pertinent (directly related) information.
- Beware of hyperleaping—teach searching skills for databases and for the Internet.
- Teach students to self-check—“Is this information even remotely connected to my question?”
- Expand resource horizons—use databases.
- Teach critical reading skills—skimming and scanning skills.
- Teach critical thinking skills—comparing and contrasting.
- Teach interviewing skills and protocols.
- Use the Internet to delve into topics—preview and bookmark appropriate sites.
- Help students to evaluate Web sites—currency, coverage, objectivity, accuracy, authority.
- Teach students what to do when they come across inappropriate materials (variation on “stop, drop and roll”).
- See Appendix K, p. 101.

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Assessing Retrieving

In the context of classroom activities or an inquiry activity, the teacher provides opportunities for students to:

- create an information pathfinder (step-by-step plan for gathering resources); see the sample activity on page 57
- complete a list of sources consulted
- hand in notes, webs, note cards or other note-taking formats
- write/talk about their retrieval strategy and what worked and did not work
- write/talk about the sources they found most useful and why.

Thinking about Retrieving

In this phase, students collect sources of information. If students are young or inexperienced, or if information on the topic is very hard to access, use a stations approach—providing and organizing the materials by format or media. If students are to be successful in finding their sources independently, teach them to have a good working knowledge of information finding tools, such as indexes, online library catalogues and one or two search engines, and of the systems used for organizing information. Students also need to be taught search strategies, such as using Boolean logic, and how to develop and use an information search plan or pathfinder.

Information seeking, even before the Internet, has always been a complex aspect of inquiry. Retrieving information is often a frustrating experience for students and their teachers. This is because the students' "need to know" is often not easily translated into the terminology and structure of the information system, and the information systems—such as the Dewey decimal system, online library catalogues, magazine and newspaper (periodical) indexes, and the World Wide Web—often are not particularly intuitive or user-friendly.

The English language arts CD–ROM *Researching and Making Presentations: Grades 5 to 12*, provides templates for teachers. Teachers need to have a basic knowledge of information systems and search strategies in order to prepare students to be flexible and creative searchers and in order to assist students when they hit dead ends in a search or end up with thousands of hits in an Internet search. Students need to know that Internet sources must be confirmed, since no editing is required to post something on the Internet.

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Tips for Retrieving

Most information searching today is electronic, and although most students feel very much at home "online," they often do not realize that some of the search strategies recommended for the Internet are the opposite of those recommended for online library catalogues or other more structured finding tools, such as indexes and databases.

Search strategies that students need to know:

- Avoid plurals on the Web (e.g., dog, not dogs), but use plurals with online library catalogues (e.g., dogs, not dog).
- Always start an Internet search with at least 6 to 8 words; start an online library catalogue subject search with no more than 1 to 3 words.
- Browse the shelves close to a book on the topic—materials in libraries are arranged by topics.
- Search resources on larger subjects (see p. 47) by using the resources' finding aids (i.e., tables of contents and indexes).
- Consult reference sources, such as encyclopedias and handbooks, in book, CD–ROM or online formats.
- Use Rankin's "First Aid for Electronic Searching" (1999, pp. 84–85).

Gauge the feelings

Students often experience information overload during the Retrieving phase (Akin, 1998). Teachers need to be alert to the feelings and physical outlets that may characterize information overload—anger, frustration, fatigue, irritability, leg jiggling, lack of focus—and help students to recognize these signs of overload. In addition to helping students understand that it is normal to experience such feelings during the inquiry process, teach students useful coping strategies, such as omission or filtering (ignoring or selecting certain categories of information), generalizing or twigging (broadening or narrowing the topic), or asking for help.

Getting a large picture of the topic and its subcategories, by using whole-class or small-group activities, such as concept mapping or deciding what kinds of information might be appropriate for the topic, are helpful strategies for this phase, especially when information overload is, or may be, a problem.

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Sample Activity for Retrieving

Developing a Pathfinder or Step-by-Step Search Plan
Teach students the following procedures:

- Start with general works (dictionaries, print and electronic encyclopedias, atlases, almanacs).
- Look for and record keywords, search terms and subject headings while reading.
- Use these terms with the online library catalogue.
- Note any new search terms from the online library catalogue.
- Locate materials in the school library.
- Search the Online Reference Centre or other electronic databases, using keywords, search terms and subject headings.
- Ask other people.
- Search the Internet, using a specific search engine and key terms identified earlier.

Reflecting on the Process during the Retrieving Phase

Teach students to ask questions such as:

- Which resources are most useful?
- Where did I find the most useful resources?
- Will my topic focus still work?

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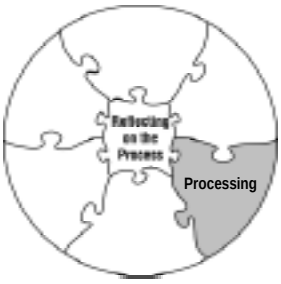
8

Chapter 8: How Do I Teach Phase 3—Processing?



Skills and Strategies	• Establish a focus for inquiry • Choose pertinent information • Record information • Make connections and inferences • Review and revise the plan for inquiry

Key learnings

Students will learn to:

- evaluate print, nonprint, digital and electronic information, using established criteria
- interpret graphs, charts, illustrations, photographs, audio and video clips, and animation
- record information, using appropriate note-taking strategies
- focus the topic, incorporating new ideas and connections
- recognize the emergence of new questions, issues and ideas as information is gathered and new knowledge is created
- evaluate processing strategies and offer suggestions for improvement next time
- acknowledge the feelings that accompany this phase.

Building student skills for Processing

Students will be more successful in inquiry when teachers provide, in the context of classroom activities, opportunities for students to:

- evaluate information from print, nonprint and electronic sources
- evaluate Internet sites, using specific criteria
- ask and answer questions based on graphs, charts, illustrations, photographs, audio and video clips, and animation
- use a variety of graphic organizers to take notes from textbook readings or other classroom activities
- choose an appropriate graphic organizer given the type of information needed to explore the inquiry
- connect new information with previous knowledge by talking to others and reflecting on their *What I **Know**, What I **Want** to Know, What I **Learned*** (KWL) charts.

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8

Tips for Teachers: Processing

- Teach critical reading skills—skimming and scanning skills.
- Teach critical thinking skills—comparing and contrasting.
- See Appendices L and M, pp. 102–103.

Assessing Processing

In the context of classroom activities or an inquiry activity, the teacher provides opportunities for students to:

- complete and hand in graphic organizers (e.g., compare/ contrast, cause/effect, commonalities/discrepancies, problems/issues)
- write/talk about which graphic organizer(s) was/were most appropriate for their inquiry
- write/talk about the process
- evaluate Internet sites for accuracy, objectivity, currency, authority and content, using a rubric, an evaluation checklist or other tool
- write/talk about the process of making meaning from information
- write/talk about which resources are most useful for a deeper understanding of their topic and why
- examine their information sources and the order in which they used them
- write/talk about how they are creating new ideas by linking new knowledge to other knowledge or their own personal ideas
- write/talk about graphs, charts and illustrations and how effectively these present information in an easily understood format
- write/talk about how their understanding of the topic has changed/developed since the start of the inquiry
- write/talk about what new questions, problems, issues and ideas have emerged.

Thinking about Processing

In the Processing phase, students select and record information pertinent to their topic; information that will answer the students' questions or fit into their subtopics. The time invested in the Planning phase is apparent, since students will find it easier to establish their focus (e.g., modify, adapt, extend, refine their topic) and to select pertinent information. Students need to learn how to record only the most important information. Electronic resources or

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the photocopy machine can actually be a detriment to the inquiry process, since it becomes so easy to copy everything. Some students are in the habit of copying text verbatim, so it is often useful to have students spend some time interacting with materials without writing anything down—browsing materials, skimming potential resources and talking about what they have found. This often helps students to concentrate on finding and recording pertinent information.

Students, at all grades, need help in summarizing and learning to take notes. Provide a format for inexperienced inquirers and suggest formats for more experienced inquirers.

Gauge the feelings

At first, students feel optimistic and confident as they tackle their collected data. They become increasingly interested in their topic as they discover new information and make new connections.

Sample Activity for Processing

Teach students note-taking skills and strategies using different graphic organizers (e.g., 3 x 5 cards, software, compare/contrast charts).
Teach students how to identify the important information by practising Read and Recall (no pencils/pens or paper).

Reflecting on the Process during the Processing Phase

Teach students to ask questions such as:

- From which format do I most easily gather information?
- How do I organize and sort my information?
- What was most useful in helping me determine my focus?
- What skill did I learn that will be most useful to me in later studies?

See also Appendices L and M, pp. 102–103.

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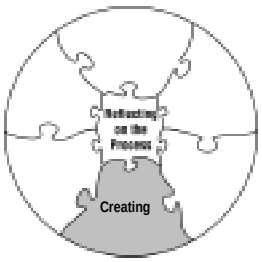
9

Chapter 9: How Do I Teach Phase 4—Creating?



Skills and Strategies	• Organize information • Create a product • Think about the audience • Revise and edit • Review and revise the plan for inquiry

Key learnings

Students will learn to:

- revise/edit to make their creation clear, concise, consistent and appropriate for the audience
- work with others to enhance the creative product
- recognize the strengths and limitations of any creative process
- complete a final creation that incorporates information and suggestions from others and highlights new understandings
- recognize that a creative endeavour requires multiple versions before it is ready for sharing
- recognize the emergence of new questions, issues and ideas during the creation process
- evaluate creating strategies and offer suggestions for improvement next time
- acknowledge the feelings that accompany this phase.

Building student skills for Creating

Students will be more successful in inquiry when teachers provide, in the context of classroom activities, opportunities for students to:

- work with peers to edit their work (e.g., using a checklist)
- revise, rethink and reorganize creative products
- reflect on the creating phase—what works well and what they would like to do with more time and different software
- make generalizations and establish relationships among concepts
- combine and synthesize information from various sources
- synthesize a unique and personal way to produce a variety of creative products
- produce a variety of creations, including reports, maps, artistic renderings, speeches and displays
(see Appendix N, p. 104).

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Teaching Creating

During and in the context of an inquiry activity, the teacher provides students with opportunities to:

- complete a draft creation for their inquiry that incorporates information and highlights new understandings
- complete a final creation, incorporating suggestions from others.

Assessing Creating

In the context of classroom activities or an inquiry activity, the teacher provides students with opportunities to:

- hand in an outline, storyboard or first draft/attempt of the final creation
- write/talk about the strengths and weaknesses of their first draft
- write/talk about what they learned from having others look at and respond to their first draft
- write/talk about what things would further enhance the creation and why
- hand in further drafts as necessary.

Tips for Teachers: Creating

- Limit the use of time and technology for "glitz."
- Use technology to do what would be impossible otherwise.
- See Appendix N, p. 104.

Thinking about Creating

In this phase of the inquiry process, students organize and synthesize their information and ideas in a unique and personal way. They develop or revise a thesis and formulate alternative answers, solutions and conclusions. Facilitating student discussions before writing can help them express their ideas in their own words. Students categorize information according to various frameworks, developed by themselves or provided for them, such as time/order or cause and effect. Students look for inconsistencies or deficiencies in their information and locate other information to rectify such problems.

In this phase, students create a product—oral, visual, written, kinesthetic or multimedia. All products need revision (and instruction if the format used is new to the student).

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9

Gauge the feelings

Students will feel excited, interested and pressured to complete their product at this phase. They have ownership in their product, feel they have expertise in their topic and take any peer or teacher editing very personally.

Sample Activity for Creating

Teach students two or three ways of creating products (e.g., storyboarding, presentation software, multimedia software).

Reflecting on the Process during the Creating Phase

Teach students to ask questions such as:

- Why am I satisfied with my creation?
- How well does my creation address my focus?
- What other items can I consider to include or exclude from my creation?

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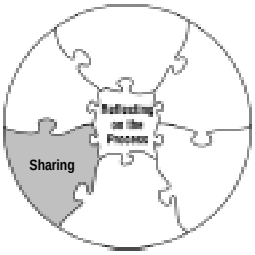
10

Chapter 10: How Do I Teach Phase 5—Sharing?



Skills and Strategies	• Communicate with the audience • Present new understandings • Demonstrate appropriate audience behaviour

Key learnings

Students will learn to:

- share new understandings with an appropriate audience
- focus on the particular needs of the audience
- participate as audience members and reflect on what engages them about a particular sharing experience
- reflect on the successes and challenges of their sharing experiences and write/talk about what they have learned
- evaluate sharing strategies and offer suggestions for improvement next time
- acknowledge the feelings that accompany this phase.

Building student skills for Sharing

Students will be more successful in inquiry when teachers provide, in the context of classroom activities, opportunities for students to:

- learn presentation skills
- share new understandings in a variety of ways with an appropriate audience
- share new understandings with larger and more diverse audiences
- develop positive feedback and questioning techniques
- support others in their sharing by participating as audience members.

Teaching Sharing

During and in the context of an inquiry-based learning activity, the teacher provides students with opportunities to:

- think about the needs of the audience
- prepare for the sharing by completing presentation notes and practising the sharing in front of a test audience (see Appendices O and P, pp. 105–106)
- practise using audiovisual or electronic materials appropriate to the sharing
- offer constructive suggestions to others as they prepare their sharing experience.

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Tips for Teachers: Sharing

- For oral presentations, provide tips on effective public speaking.
- For presentations using technology, book equipment well in advance and allow sufficient time to address glitches.
- Teach audience appreciation to your class.
- Be supportive of student products.
- Allow sufficient time for sharing.
- Review *Researching and Making Presentations*: *Grades 5 to 12* for ideas.
- See Appendices O and P, pp. 105–106.

Assessing Sharing

In the context of classroom activities or an inquiry activity, the teacher provides students with opportunities to:

- write/talk about their reasons for sharing their new knowledge in a particular way
- write/talk about the ways they focused on the needs of their particular audience
- write/talk about what went well with their sharing and what things they need to improve
- write/talk about the experiences of being in an audience—what things they responded positively and negatively to and why.

Thinking about Sharing

Students present the inquiry product in a way that is meaningful for a particular audience. There should be an opportunity for the students to consider the role of the audience members in enhancing the sharing experience. The audience, preferably a wider audience than just the teacher, is best identified in the Planning phase so that the sharing mode is shaped as early as possible. For young or inexperienced researchers, small-group sharing is often more successful and more time-efficient than requiring each student to share with the whole class or school assembly.

Gauge the feelings

Students feel proud of their work and are both anxious and eager to share it. They may be nervous and are highly sensitive to criticism, and they may respond negatively if they feel that others do not recognize their efforts.

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Sample Activity for Sharing

The teacher provides students with an assessment checklist that enables them to determine if they are prepared for their presentation.

Checklist: Am I prepared?

- ❑ I like my topic and am an expert in this area.
- ❑ I know when I will be presenting.
- ❑ I have timed my presentation.
- ❑ I have checked out any equipment that I need to use.
- ❑ I have an alternative plan in case the technology is not reliable.
- ❑ I have anticipated questions from my audience.
- ❑ I have practised answering questions.
- ❑ I have considered and added all possible sources of information.
- ❑ I have interesting, clear and easy-to-read visuals.
- ❑ I have prepared handouts.
- ❑ I have considered how to involve my audience.
- ❑ I have an effective conclusion.
- ❑ I show respect for the ideas of others.
- ❑ I have practised my oral presentation.
- ❑ I have practised making eye contact.

Reflecting on the Process during the Sharing Phase

Teach students to ask questions such as:

- What would I do differently in my next presentation?
- What strategies did I use to get myself ready for the presentation?
- What strategies did I use to get and maintain my audience's attention that I can use again?

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11

Chapter 11: How Do I Teach Phase 6—Evaluating?

Skills and Strategies	• Evaluate the product • Evaluate the inquiry process and inquiry plan • Review and revise personal inquiry model • Transfer learning to new situations/beyond school

Key learnings

Students will learn to:

- understand the evaluation criteria for the inquiry
- evaluate their own inquiry process, using established criteria
- provide constructive feedback to their peers, using established criteria
- reflect on similarities/differences between this inquiry and other inquiries in the past
- reflect on learning styles and how they influence the inquiry process
- reflect on the successes and challenges of their experiences, and write/talk about what they have learned
- acknowledge the feelings that accompany this phase.

Building student skills for Evaluating

Students will be more successful in inquiry when teachers provide, in the context of classroom activities, opportunities for students to:

- reflect on their KWL (What I Know, What I Want to Know, What I Learned) charts and talk/write about the inquiry process and products
- read their personal journals and reflect on them
- write/draw syntheses of their activities
- use a rubric and checklist to evaluate their products and processes (Alberta Learning, 2003).

Teaching Evaluating

During and in the context of an inquiry activity, the teacher provides students with opportunities to:

- go back to the original brainstorming of ideas, questions and issues to examine the development of a focus
- examine how they paced themselves during the inquiry process by completing a flow chart

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- evaluate the success of their inquiry process (see Appendices Q and R, pp. 107–108)
- reflect on their interactions with others (e.g., peers, teachers, teacher-librarian, parents) and on how these interactions influenced new understandings and the inquiry process
- use the evaluation criteria developed in the Planning phase to edit their own work as well as the work of others in the class.

Tips for Teachers: Evaluating

- Stick to predetermined evaluation criteria and processes.
- Evaluate the final product as part of the whole process.
- Use a separate rubric as an assessment instrument.
- Involve students in assessment.
- Consider assessment tools such as the *Classroom Assessment Tool Kit for the Information and Communication Technology (ICT) Program of Studies*.
- See Appendices Q and R, pp. 107–108.

Assessing Evaluating

In the context of classroom activities or an inquiry activity, the teacher can:

- assess the final creation based on criteria established in the Planning phase
- assess students' knowledge outcomes based on a test, rubric or some other performance/application activity
- assess students' skill and attitude outcomes based on a test, rubric or some performance/application activity
- assess students' ability to evaluate their peers' work, based on the criteria set in the Planning phase
- have students write/talk about their inquiry process for this activity and about how they modified their original plan
- have students write/talk about their final creation and evaluate it in relation to their previous work and the work of others.

Assessing the process may take the form of students creating a flow chart of their personal inquiry process. Another alternative is having students prepare a written or oral summary of what they have learned about the process, or what new understandings they have gained through the process. Having students write a letter to

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their parents can be a very effective way of having students identify and assess their own learning. Students who are mentored in metacognitive awareness show growth in both content knowledge and search strategies.

Thinking about Evaluating

In the Evaluating phase, the emphasis is on involving the students in assessing the process as well as the product of the research. The emphasis may be on assessing the students' understanding of the process or it may be on assessing the content. Evaluation need not be summative and need not emphasize the final product. If most of the emphasis is on the final product, students may simply become more skillful at plagiarizing (McGregor, 1995).

The inquiry process is active learning that plays a critical role in developing information-literate learners. Student achievement in information literacy may be assessed using the eight information literacy outcomes outlined in the glossary (see pp. 109–110). Indicators of these information literacy outcomes are provided in *Achieving Information Literacy: Standards for School Library Programs in Canada* (Asselin, Branch & Oberg, 2003).

Gauge the feelings

Students feel relieved, either satisfied or dissatisfied, and want to reflect on their learnings about their feelings and their topic.

Sample Activity for the Evaluating Phase

Teach students the basics of a flow chart and how it assists in evaluating process and product. Have students draw a flow chart of their inquiry process. Encourage students to depict the flow chart in a way that best describes their real experiences. The chart can be designed on 11 x 17 paper. Provide time for students to compare and contrast their flow charts. Reflecting and learning from the process is the key for learning how to do inquiries.

Reflecting on the Process during the Evaluating Phase

Teach students to ask questions such as:

- What was the highlight of this assignment? Why?
- What did I learn that I can transfer to other tasks?

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12

Chapter 12: Thinking Ahead

Implementing a process approach to inquiry often involves changes in classroom teaching and in the way our schools are organized for teaching and learning.

Teachers who are familiar with process models know that time and other pressures sometimes militate against implementing the model fully, and they know that sometimes aspects that are critical to the success of the process model are ignored. For example, one study of the *Focus on Research* model revealed that the implementation was hampered by limited understanding of the model, particularly in relation to the critical importance of reviewing the process with students (Holland, 1994).

Some of the common challenges experienced by teachers implementing a process approach to inquiry are cognitive overload, affective overload and time demands.

Reducing cognitive overload

The process approach to inquiry can easily result in cognitive overload for students (and for their teachers!). Reduce cognitive overload by:

- ensuring that students have a good background in the content area of the inquiry. An inquiry activity is usually more successful if it involves extending and applying familiar understandings, rather than addressing new understandings. Certainly, inquiry should provide opportunities for students to develop new understandings, but the level and sophistication of those new understandings will be enhanced if students begin with a broad background in the content area related to the inquiry.
- keeping to a minimum the number of new process skills that are involved in the inquiry. The inquiry phases of Retrieving, Processing and Creating involve a multiplicity of skills and strategies. Teach no more than one new skill in each of these phases of an inquiry project.

Tips for Teachers
In one inquiry project, students might be taught how to refine a database search by combining searches (using Boolean logic), how to use a retrieval chart to organize and collect information, and how to design an informational poster.

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- reducing the number of new skills and strategies to be taught. Teachers will then have the time to provide the instruction and support essential for student success.

Tips for Teachers

Teach some of the skills and strategies that will be needed for an inquiry project in the classroom. Teach students how to:

- use a database to find items by a particular author or to find information on a topic by using a single keyword
- answer a fact-based question or to find an article to bring to class for discussion.

Teach these skills on several occasions before students are taught how to combine searches as part of an inquiry project. Students might also develop and use a retrieval chart to help them process information from a familiar textbook, in preparation for using the same note-taking format to process information from many unfamiliar sources.

- reducing the range of choices that students are given for creating and sharing their new knowledge. If students are to be given choices of formats for processing, creating and/or sharing information, it is a good idea to have them choose from a range of familiar formats. If a new format is to be taught, it is usually better to expect all students to become proficient with the new format before offering it as a choice.

Reducing affective overload

The process approach to inquiry emphasizes affective as well as cognitive aspects. The affective domain involves elements of pleasure, engagement, motivation, imagination, participation in community and acknowledgement of other voices. These elements provide the energy that keeps young people engaged in inquiry-based learning activities. Alienation from learning and from schooling often results from lack of recognition by the teacher of these elements.

The affective domain involves negative feelings as well as positive feelings. The process of learning something new, especially when that new learning challenges old understandings, is often accompanied by feelings of confusion, frustration and sometimes anger. Students need to be helped to recognize that the waves of

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optimism and frustration that accompany complex learning are natural (Kuhlthau, 1993). During inquiry projects that use problem-based approaches, emotional problems may increase since some students become anxious when facing problems that have no right answer, especially when the process of problem solving has only limited structure, and when multiple perspectives have to be taken into account (Schroeder & Zarinnia, 2001).

Students need to be aware of and have coping strategies to address the affective challenges of inquiry-based learning as well as such common phenomena as library anxiety and information overload. They need to recognize that all feelings, both positive and negative, are normal parts of inquiry learning. They need to understand them and to regulate them. Students who understand that their feelings are not unique but shared by others are less likely to be overwhelmed. The Reflecting on the Process component of the Inquiry Model gives many opportunities for helping students to acknowledge and understand the affective aspects of learning.

Time demands

The process approach to inquiry means a shift in the way we think about and use class time. More time is needed in the early phases of the process for exploration, for building content knowledge and for developing a personal interpretation or focus. This is time well invested in developing students' interest in and commitment to the topic being researched.

Even very young researchers in Grades 1 and 2, given the opportunity for lengthy and rich exploration of a topic, can develop a clear understanding of the inquiry process and can produce unique and original final products. For example, one group of young researchers, investigating Insect Life, spent almost half of their research time in this early exploration phase, reading and talking about insects, hearing stories and singing songs about insects, watching videos about insects and going on a "bug walk" in the schoolyard. They were immersed in their topic, in ways that engaged both the affective and cognitive domains. Their interest and commitment to finding out about insects was deep enough to sustain them when they faced the challenges of finding answers to the questions that they had generated (Steeves, 1994).

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12

Older students generally demonstrate more interest in their research topics if they have solid background knowledge in the topic area and if they can see the purpose of the research and its connection to their other school work (Garland,1995).

Tips for Teachers
Remember that this exploration time can happen during the teaching of other units. Give students the time they need to find a focus for their inquiry and it is much more likely that they will be successful.

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13

Chapter 13: Professional Growth

Research foundations of inquiry-based learning

In order for students to have rewarding experiences through inquiry-based learning activities, teachers need to provide instructional guidance that is affective as well as cognitive throughout the process. Teachers need to have an understanding of how learners experience the inquiry process and of how learning through investigation can be facilitated.

The Inquiry Model presented in this guide is a theory-based process model, grounded in research from the disciplines of education and library and information studies. From education, comes learning theory, and from library and information studies, information-seeking behaviour theory. For example, from education research comes:

- the knowledge that learners vary in the level of abstraction that they can handle, depending on their cognitive development and their prior knowledge and experience
- the constructivist concept of learners actively building or constructing their knowledge in a social context and from experiences
- the knowledge that learners experience changes in feelings as well as changes in thoughts as they learn.

From library and information studies comes the knowledge that inquirers:

- progress through levels of question specificity, from vague notions of information need, to clearly defined needs or questions
- are more successful in the search process if they have a realistic understanding of the information system and of the information problem.

The process approach to inquiry emphasizes thinking about information and using information within a problem-solving perspective. The process approach does not discard the knowledge from earlier approaches, such as the knowledge of tools, sources and search strategies, but it does emphasize that this knowledge is to be developed within a learning context (real world) that:

- engages the learner
- includes metacognition
- fosters critical and creative thinking.

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The process approach to inquiry goes beyond the locating of information to the interpreting of information, beyond the answering of a specific question to the seeking of evidence to shape a topic, solve a problem or support an argument. It considers the process of a search for information as well as the product of the search. It calls for an awareness:

- of the complexity of learning from information
- that learning from information is not a routine or standardized task
- that it involves the affective as well as the cognitive domain.

Teachers need to reflect on the growing body of research related to inquiry learning, in order to improve instructional practice on an ongoing basis. Without a deep understanding of the process approach to inquiry, traditional practices, some of which push learners to "get to work" too early and prevent them from developing a personal perspective and motivation for learning through inquiry, are likely to continue.

Constructivist learning theory

In the past two decades, process-based models of information literacy instruction have been developed in many parts of the world, including Canada, the United Kingdom, the United States and Australia. However, the effective implementation of such models depends on teachers understanding:

- that students vary in the level of abstraction that they can handle
- that students are active learners building or constructing their understandings as they use information
- that students are experiencing changes in feelings as well as changes in thoughts as they use information
- that students need time to reflect on their learnings and processes to complete the learning cycle.

This approach to inquiry learning is based on constructivist learning theory. Constructivist learning theory supports a view of inquiry-based learning as an opportunity for students to experience learning through inquiry and problem solving, characterized by exploration and risk taking, by curiosity and motivation, by engagement in critical and creative thinking, and by connections with real-life situations and real audiences (AASL, 1999; Bush, 1998; Harada, 1998; Schroeder & Zarinnia, 2001).

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Metacognition

Inquiry-based learning involves a cyclic process, with some steps being revisited from time to time as a result of new insights. For example, Reflecting on the Process is a critical element in helping students to understand inquiry as a learning process and to develop their metacognitive abilities—both "thinking about thinking" and "thinking about feelings." Metacognition encompasses all the thinking that we do to evaluate our own mental processes and to plan for appropriate use of these processes in order to meet the demands of the situation. Metacognitive knowledge includes knowledge of person, task and strategy; that is,

- knowledge of one's capacity to learn
- knowledge about the nature of what is to be learned
- knowledge about the actions that one can take to aid one's thinking (Flavell, 1979).

Research on metacognition began in the 1920s, but it was not until the 1990s that researchers began investigating methods of helping students to develop their abilities to think about, evaluate and monitor their feelings. Thinking about feelings, or "emotional literacy" (Toben, 1997), or "emotional intelligence," can be defined as:

> The ability to perceive, access, and generate emotions so as to assist thought, to understand emotions and emotional knowledge, and to reflectively regulate emotions so as to promote emotional and intellectual growth (Salovey & Sluyter, 1997, p. 5).

Young students, in their first few years in school, for example, are less likely to have developed these metacognitive and emotional intelligence skills, but they can be helped to do so, within the limits of their intellectual and emotional maturation. Older students also need to be helped to understand their feelings as well as their thinking as they work through the information literacy process. McGregor (1994) found that even bright high school students in their 11th year of school needed assistance in learning to think about their thinking, while Loerke (1992) pointed out that graduate students may be unaware that feelings of confusion and frustration are a natural part of the inquiry process.

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Tips for Teachers: Metacognition
Students' personal growth and motivation to learn are enhanced when teachers:

- pose questions about thinking and feeling, and allow students to reflect upon their learning progress
- honour diverse learning styles and perspectives
- model the inquiry process out loud on a consistent basis
- explicitly call the students' attention to the Inquiry Model and to the particular phase at which they are working
- set timelines
- review the inquiry process through class discussions, journal writing and ongoing and retrospective analyses of the data generated throughout the inquiry process.

Leaders in inquiry-based learning

The Inquiry Model is based on more than 30 years of research from around the world. Some of the key researchers in the area of inquiry-based learning are featured here, each with a brief biographical note and several citations of his or her work.

Carol C. Kuhlthau
Dr. Kuhlthau is a professor in the School of Communication, Information and Library Studies at Rutgers, the State University of New Jersey, and is the Director of the Center for International Scholarship in School Libraries (CISSL). She is internationally recognized for her research on the information search process and is a frequent keynote speaker on the inquiry process and information literacy.

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Ross Todd
Dr. Todd is an associate professor in the School of Communication, Information and Library Studies at Rutgers, the State University of New Jersey, and is the Director of Research at the Center for International Scholarship in School Libraries (CISSL). His work in Australia and the United States focuses on information literacy and learning in digital environments. He has also done extensive research on adolescent information seeking and use.

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Vi Harada
Dr. Harada is an associate professor in the Department of Information and Computer Sciences, University of Hawaii at Manoa.

Harada, V. H. (1998). Building a professional community for student learning. *Knowledge Quest*, 26(3), 22–26.

Joy McGregor
Dr. McGregor is a Senior Lecturer in Teacher Librarianship and Director, Centre for Studies in Teacher Librarianship, School of Information Studies, at Charles Sturt University in Wagga Wagga, New South Wales, Australia.

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Julie Tallman
Dr. Tallman is a professor in the Department of Instructional Technology at the University of Georgia.

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Appendices

A. Perceptual Preference Inventory 91

B. Learning Styles: Teaching Strategies 92

C. What Worked: Effective Teaching Strategies 93

D. How I Learn Best 94

E. Know Your Own Strengths Inventory 95

F. How I Like to Learn 96

G. Know Myself Inventory 97

H. Inquiry Research Project: Questions to Be Answered 98

I. Overall Plan for Inquiry-based Learning Activity 99

J. Scoring Criteria for Presentation 100

K. Determining the Reliability and Relevance of Resources 101

L. Refocus 102

M. Clarify and Refocus 103

N. Product Forms 104

O. Planning the Presentation 105

P. Presentation Planner 106

Q. Reflecting on My Inquiry Project 107

R. Reflecting on the Inquiry and Presentation 108

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Perceptual Preference Inventory

Kinesthetic Learner	Visual Learner	Auditory Learner
• likes doing things with hands • points finger when reading • looks confined in the classroom • responds physically when listening to a story • often drops things, squiggles in the desk or takes frequent jaunts • likes to set up equipment • touches to get attention • stands closer to the person he is talking to than most people do • responds to physical touch • feels everything • rubs hands along wall while in lunch line or walking down hallway • puts hands on door frame, touches desks while moving down the aisle • is well coordinated—good at sports • frequently uses fists • likes to write on the blackboard • takes extensive notes during lectures	• chooses a book for its pictures or illustrations • likes orderly, attractive, neat surroundings • sees details—errors on board or typing, missing buttons, scruffy shoes • remembers where objects are located, what is seen • organizes by size, colour or other visual clues • would rather read than be read to • doodles or draws with great detail • likes to assist with displays, bulletin boards • pictures have good balance • finds phonics difficult unless a picture accompanies sound • has difficulty with verbal directions • watches speaker's face intently • rarely talks in class • responds in as few words as possible	• tends to chatter or make other noises • likes phonics—spoken language is easier than written • tells jokes, uses humour • good storyteller • tends to talk to self aloud • knows all the words to songs, slogans, jingles • can easily memorize • poor handwriting, history of reversals • requires oral interpretation of charts, maps, diagrams • says material to self in order to learn it • likes to discuss what needs to be done • transmits messages accurately • likes rhythmic activities

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Appendix B

Learning Styles: Teaching Strategies

The following strategies accommodate specified learning styles and can be used in various combinations in any particular lesson to suit the different ways in which students learn.

Kinesthetic Style

Strategies which accommodate kinesthetic learners include:

- using classroom demonstrations
- using experiential learning, simulation activities, field trips
- painting, drawing, creating models, slides, videotapes, puppets, dioramas
- clapping or tapping out numbers, syllables, etc.
- lab work
- teaching students to take notes
- show and tell
- acting, mime, charades, dancing, rhythmic movement
- using games, puzzles, manipulatives
- using sandpaper or felt letters, writing in sand or clay, using three-dimensional letters and numbers.

Visual Style

Strategies which accommodate visual learners include using:

- artifacts, objects, models
- slides, transparencies, illustrations, graphics, demonstrations
- abacuses, colour-coding systems, rulers and number lines, visual symbols for sound
- maps, charts, graphs, pictures, diagrams
- microscopes
- dictionaries
- matching games, configuration clues
- visual clues on the chalkboard for all verbal directions
- visualization techniques (visualize spelling words)
- coloured markers, pens or chalk on the overhead or blackboard.

Auditory Style

Strategies which accommodate auditory learners include:

- direct instruction, lecturing
- having learners verbalize tasks
- using tape recorders; for example, having students listen to a tape while they read
- reading to students, paraphrasing
- providing listening centres
- allowing learners to think out loud and spell audibly
- using records, tapes and films
- employing music, rhythm, melody
- saying syllables orally, integrating music, using choral speech, rhyming games, debating, radio plays and discussions
- giving verbal as well as written directions.

Learning Styles—Teaching Strategies: From *Teaching for student differences (Programming for students with special needs*, Book 1) (p. 4), by Alberta Education, 1995, Edmonton, AB: Alberta Education.

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What Worked: Effective Teaching Strategies

Subject: _____

Inquiry Activity: _____ Grade: _____
Team Members: _____ Date: _____

1. What Worked

- Highlights:
- What was most successful for students?

2. What Has to Change

- Low Points:
- What would you not do again?

3. What Could Improve

- How would you change this activity for the next time?

4. Unexpected Learnings

- What did you learn that was surprising?
- What learnings do you want to follow up?

5. Collaboration

- What strategies worked best for team teaching?
- How did you solve problems as a team?

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Date: _____

Name: _____

How I Learn Best

Tools that help me learn

- What writing tool works best for me (type of pen, pencil, colour of ink)? _____
- What kind of paper helps me keep organized (wide-ruled, unlined, wide margins, pre-punched)? _____
- What colour paper do I find the easiest to read? _____
- What binder system works for me? _____
- What other supplies help me keep organized; e.g., white-out, post-it notes, ruler? _____

  _____
- What calculator works best for me; e.g., size, features? _____
- What spell checker works best for me? _____
- What is my favourite dictionary? _____
- What other reference books help me learn? _____
- What computer programs are helpful to my learning? _____

In the classroom

- What seat in the classroom works best for me? _____
- What do I read best from?

  ___ chalkboard ___ overhead ___ projector ___ chart paper ___ my own copy
- Does the colour of ink (or chalk) make a difference? _____
- Does the type of print (e.g., printed, handwritten or typed) make a difference?_____
- Does the size and spacing of print make a difference? _____

How I Learn Best: Adapted from *Make school work for you: A resource for junior and senior high students who want to be more successful learners* (p. 85), by Learning Disabilities Association of Alberta and Alberta Learning, 2001, Edmonton, AB: Alberta Learning.

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Date: _____

Name: _____

Know Your Own Strengths Inventory

A. List four successful experiences you have had in the last 12 months:

- _____
- _____
- _____
- _____

B. List four everyday things you do well:

- _____
- _____
- _____
- _____

C. List two things you could teach someone else:

- _____
- _____

D. List 10 positive words to describe yourself:

- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____

E. List two things that really matter to you:

- _____
- _____

F. List two things you can do for yourself that will always make you feel good:

- _____
- _____

G. List two people who you can count on for help and support:

- _____
- _____

Know Your Own Strengths Inventory: From *Make school work for you: A resource for junior and senior high students who want to be more successful learners* (p. 84), by Learning Disabilities Association of Alberta and Alberta Learning, 2001, Edmonton, AB: Alberta Learning.

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Appendix F

How I Like to Learn

Rank in order from 1 to 12 which directions work best for me to learn:

_____ teacher explains aloud

_____ teacher writes directions on the board

_____ teacher does example on the board

_____ teacher asks another student to demonstrate

_____ teacher asks all students to try a sample at their desks

_____ I read the directions while the teacher reads them

_____ I read the directions on my own

_____ teacher shows me at my desk

_____ another student explains a second time and answers my questions

_____ I watch what another student does

_____ I try it on my own and then check with the teacher

_____ I try it on my own and then compare with another student

How I Like to Learn: Adapted from *Make school work for you: A resource for junior and senior high students who want to be more successful learners* (p. 85), by Learning Disabilities Association of Alberta and Alberta Learning, 2001, Edmonton, AB: Alberta Learning.

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Know Myself Inventory

1. I complete tasks when _____

2. My mind wanders when _____

3. I get tired and bored when _____

4. When I have a hard time paying attention I _____

5. I find classes interesting when _____

6. School is exciting when _____

My Strengths:	Areas in Need of Improvement:

Know Myself Inventory: From *Teaching thinking, enhancing learning: A resource book for schools, ECS to grade 12* (p. 95), by Alberta Education, 1990, Edmonton, AB: Alberta Education.

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Inquiry Research Project: Questions to Be Answered

1. Is this a group or an individual project? If a group project, how are responsibilities assigned?

2. Timelines: Research Plan Due: _____ First Research Due: _____
   Refocus Due: _____ Presentation Date: _____

3. What is the purpose of the research?

4. What do I (we) already know about the topic?

5. What do I (we) need to learn about the topic?

6. What are good sources of information?

7. What questions need to be answered?

8. How should the topic be focused initially?

9. What do I (we) expect to learn from this research?

10. Does this topic relate to my community? How?

11. How should the topic be clarified?

12. How may the topic be refocused?

13. What are the assessment criteria during the research/at the end of the project?

Inquiry Research Project—Questions to Be Answered: Adapted from *Researching and making presentations: Grades 5 to 12* [CD–ROM] (Section: Superpro/Focus), by Alberta Learning, 2001, Edmonton, AB: Alberta Learning.

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Overall Plan for Inquiry-based Learning Activity

<table>
<tr><td>Before Activity

What I know:

How I know:

What else I need to know:

Why I want to know:</td><td>What skills will I use:
•

•</td><td>After Activity

What did I learn:

How well did I achieve my goal:</td></tr>
<tr><td>Goal of Activity

Subgoals:

Date due:</td><td>• What resources do I need:

• What procedures or steps do I follow:

• What might go wrong:</td><td>What changes did I have to make to meet my goals:

For next time:

Where else can I use these strategies:</td></tr>
<tr><td>Ideas and feelings to put on the back burner:</td><td></td><td></td></tr>
</table>

Overall Plan for Inquiry-based Learning Activity: Adapted from *Teaching thinking, enhancing learning: A resource book for schools, ECS to grade 12* (p. 96), by Alberta Education, 1990, Edmonton, AB: Alberta Education.

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Appendix J

Scoring Criteria for Presentation

(Grades 11 and 12)

When marking the **Presentation**, consider the:

- effectiveness of language and speaking style
- degree of interest created for the audience
- quality of the student's preparation for the presentation
- quality of the conclusion.

To earn a 5

The student:

- speaks precisely and skillfully, and uses language, tone, pacing, eye contact, and gestures persuasively and emphatically
- successfully involves the audience through an imaginative method of presenting ideas, details, and/or visuals
- is fully prepared, so the presentation is effective
- concludes effectively, creating the desired effect.

To earn a 4

The student:

- speaks clearly and fluently, and uses language, tone, pacing, eye contact, and gestures purposefully
- generally involves the audience through a frequently inventive method of presenting ideas, details, and/or visuals
- is competently prepared, so the presentation is made with confidence
- concludes effectively.

To earn a 3

The student:

- speaks clearly, though perhaps with hesitations, and uses language, tone, eye contact, and gestures to communicate meaningfully
- sometimes involves the audience through an occasionally original method of presenting ideas, details, and/or visuals
- is adequately prepared, so the presentation establishes a basic view
- concludes adequately.

To earn a 2

The student:

- speaks hesitantly, and may use some language or pace that is ineffective for the purpose
- rarely involves the audience due to a frequently unimaginative method of presenting ideas, details, and/or visuals
- falters due to flaws in preparation
- concludes unclearly.

To earn a 1

The student:

- speaks unclearly, so that listeners strain to understand, and uses ineffective language and pace
- demonstrates no attempt to involve the audience
- is generally unprepared
- draws no conclusion.

To earn an INS

The student:

- makes no attempt to present.

Scoring Criteria for Presentation: Adapted from *English 20, teacher manual: Classroom assessment materials* (p. 22), by Alberta Education, 1997, Edmonton, AB: Alberta Education.

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Determining the Reliability and Relevance of Resources

(Grades 11 and 12)

Reliability

When collecting information, consider these questions to help you determine the reliability of the resources.

Purpose

- What is the primary purpose of the information: to inform, to entertain, to persuade, to sell?

Accuracy

- What do you know about the author? What do you know about the publisher?
- Have you researched more than two resources to check for accuracy?

Timeliness

- What is the copyright date?
- Is the resource an original or is it an updated copy? If an update, has all the information been updated?
- If the information is on a web site, what is the date of the latest revision? How many visitations have been made?

Scope

- How much information did you find? Is there sufficient information to fulfill your purpose?
- Is the range of the material too broad or too narrow?
- What components of the topic are included?
- Does the supporting evidence enhance the information?
- Is the material too shallow or in too much depth?

Background of Resource

- Is the material supported by reliable sources?
- If on a web site, is it a reputable and educational web site?

Viewpoint of Author or Publisher

- What method of presentation is used?
- Is the information objective? Subjective?
- Has the author included personal opinions or biases?

Relevance

Consider these questions to help determine the relevance of the information.

- Does the material serve the topic? Which part?
- Does the information answer the questions?
- Does the information lead to new questions?
- Of what use is the cross-referenced material?
- If the information is biographical, where does it fit?
- Is the material suitable for the target audience?

Determining the Reliability and Relevance of Resources: From *Researching and making presentations: Grades 5 to 12* [CD–ROM] (Section: Superpro/Evaluate), by Alberta Learning, 2001, Edmonton, AB: Alberta Learning.

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Appendix L

Refocus
(Grades 9 and 10)

After you have collected your information and before you prepare your final presentation, answer these questions.

- Is there enough information to complete the project?
- Does the information answer the questions asked?
- What generalizations can be formed by integrating the new information with prior knowledge?
- What conclusions can be drawn that are appropriate to the findings, reflect own understandings and are relevant to the topic, purpose and situation?
- In what ways does this research meet the context of the assignment?
- Will the research and the findings meet the needs of the audience?

Other questions to be considered before completing the assignment.

- What new questions have been added?
- What questions have emerged from the research that need to be answered?
- How does the research refocus the assignment?
- What other information needs to be added?
- What is the best source for this information?
- How does the research alter the presentation?
- How should the appropriateness and significance of the research findings be determined?
- How can this information best be used for an effective presentation?
- Does the proposed presentation form still work for this topic?
- If a group project, are individual roles and responsibilities for the final presentation clear and appropriate?

For future assignments.

- Which research strategies have been effective?
- How would I better use time and divide the labour (if a group project)?
- What strategies would improve future inquiry or research?

Refocus: From *Researching and making presentations: Grades 5 to 12* [CD–ROM] (Section: Pro/Create), by Alberta Learning, 2001, Edmonton, AB: Alberta Learning.

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Clarify and Refocus
(Grades 11 and 12)

After you have collected your information and before you prepare your final presentation, answer these questions.

- Is there enough information to complete the project?
- Does the information answer the posed questions?
- Is the information appropriate to the purpose of the assignment?
- What generalizations can be formed by integrating new information with prior knowledge?
- What new ideas have you developed from integrating new information with prior knowledge?
- Is the information documented accurately and completely?
- What conclusions can be drawn that are appropriate to the findings, reflect own understandings and are relevant to the topic, purpose and situation?
- In what ways does this research meet the context of the assignment?
- Will the research and the findings meet the needs of the audience?

Other questions to be considered before completing the assignment.

- What new questions have been added?
- What other questions need to be asked?
- How does the research refocus the assignment?
- What other information needs to be added?
- What is the best source for this information?
- How does the research alter the presentation?
- Does the proposed presentation form still work for this topic?
- If a group project, are individual roles and responsibilities for the final presentation clear and appropriate?
- How should the appropriateness and significance of the research findings be determined?
- How can this information best be used for an effective presentation?

For future assignments.

- Which research strategies have been effective?
- How would I better use time and divide the labour (if a group project)?
- What strategies would improve future inquiry or research?

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Appendix N

Product Forms

ORAL

- cassette
- chant
- choral reading
- choral speech
- choric drama
- debate
- dialogue
- discussion
- intercom message
- interview
- lecture
- lesson teaching
- monologue
- oral imitations
- panel discussion
- reader's theatre
- report
- song
- speech
- story theatre
- storytelling
- survey

VISUAL

- advertisement
- artifacts
- blueprint
- book jacket
- bulletin board
- cartoon
- charts
- collage
- computer graphics
- diagram
- display
- film
- filmstrip
- flow chart
- folding screen
- graffiti
- logo
- mind map or web
- mini-gallery
- mural
- overhead
- painting
- photocopy
- photoessay
- photographs
- poster
- print
- program
- project cube
- rebus
- record cover
- rubbings
- scroll
- slides
- spreadsheet
- storyboard
- tableau
- tables
- time capsule
- timeline
- transparency
- visual journal
- wordless book

WRITTEN

- acrostic
- advertisement
- autobiography
- bibliography
- biography
- book review
- brochure
- case study
- celebrity cards
- codes
- computer program
- criticism
- crossword puzzle
- definitions
- editorial
- epitaphs
- fact file
- instructions
- invitations
- itinerary
- journal/diary
- letter
- list
- logbook
- manual
- menus
- message
- newspaper
- outline
- palindromes
- pamphlet
- puns
- quotation collage
- recipe
- record book
- report
- requests
- résumé
- review
- schedule
- script
- slogans
- song
- story
- summary
- telegrams
- textbook
- tongue twisters
- travelogue
- want ads
- worksheet

KINESTHETIC

- collection
- costume
- creative movement
- dance
- demonstration
- diorama
- dramatization
- experiment
- flip-book
- game
- impersonation
- mini-centre
- mobile
- model
- museum
- pantomime
- playmaking
- prototype
- puppetry
- puzzle
- scrapbook
- sculpture
- stitchery
- terrarium
- treasure hunt
- vivarium
- weaving

Product Forms: From *Teaching thinking, enhancing learning: A resource book for schools, ECS to grade 12* (p. 70), by Alberta Education, 1990, Edmonton, AB: Alberta Education.

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Name: _____

Planning the Presentation
(Grades 4–9)

Topic:

Audience:

Purpose:

Time Allotted:

Introduction:

Who Is Responsible:

•

Order of Presentation:

•

•

•

•

Conclusion:

•

Props/Audio/Visual:

Planning the Presentation: From *Researching and making presentations: Grades 5 to 12* [CD–ROM] (Section: Turbo/Ultraturbo/Present), by Alberta Learning, 2001, Edmonton, AB: Alberta Learning.

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Appendix P

Name: _____

Presentation Planner
(Grades 9–12)

Group Members

Description of Component: Group Member Responsible:

Visuals:

Handouts:

Speaking:

Other:

Timelines: Meeting Dates:

Presentation Dates:

Outline of Presentation:

Presentation Planner: From *Researching and making presentations: Grades 5 to 12* [CD–ROM] (Section: Pro/Superpro/Present), by Alberta Learning, 2001, Edmonton, AB: Alberta Learning.

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Name: _____

Reflecting on My Inquiry Project
(Grades 4–6)

Planning	Yes	No	Comments
1. I understood the topic.			
2. I made up good inquiry questions.			
3. I suggested possible information sources.			
4. I decided how to present my research.			
5. I understood the evaluation criteria.			
6. I developed an inquiry plan.			
Retrieving			
1. I developed an information retrieval plan.			
2. I identified sources of information.			
Processing			
1. I chose information.			
2. I discovered information I did not know before.			
3. I decided on my topic focus.			
Creating			
1. I organized my information.			
2. I created draft projects.			
3. I edited my work.			
Sharing			
1. I presented my research in an effective manner.			
2. I carried out my action plan.			
Evaluating			
1. I learned the following skills that can be used in other activities.			
2. I need to improve in the area of …			
3. I am good at …			

Reflecting on My Inquiry Project: Adapted from *Researching and making presentations: Grades 5 to 12* [CD–ROM] (Section: Turbo/Present), by Alberta Learning, 2001, Edmonton, AB: Alberta Learning.

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Name: _____

Reflecting on the Inquiry and Presentation

(Grades 9–12)

After completing the inquiry and making the presentation, consider these questions.

1. What worked well?

2. What didn't work?

3. What would I do next time?

4. What did the audience tell me?

5. What have I learned about the topic?

6. How could I make better use of my time?

7. What did I like about the other presentations?

8. What did I learn from the other presentations?

9. What inquiry techniques have I learned that will help in the future (focusing the topic, selecting resources, using the information, considering the community, putting together an effective presentation)?

10. What other questions linger?

Reflecting on the Inquiry and Presentation: Adapted from *Researching and making presentations: Grades 5 to 12* [CD–ROM] (Section: Pro/Superpro/Present), by Alberta Learning, 2001, Edmonton, AB: Alberta Learning.

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Glossary

Many other terms are used synonymously or in relationship with inquiry and inquiry-based learning: research, resource-based learning, problem-based learning, project-based learning, authentic learning, active learning and information literacy. The following definitions should help to clarify the meanings of these terms:

Active learning
Active learning (Bonwell & Eison, 1991) involves students creating new knowledge, often working in collaboration with other students. The emphasis is on using higher order thinking skills during active investigation and reflection. Teachers are co-learners and facilitators in the learning process.

Authentic learning
Authentic learning (Newmann, Marks & Gamoran, 1995) involves going beyond active learning to challenge and solve complex problems and construct new meaning that is grounded in real-world experience. Students are challenged to create new knowledge, to answer a question, to develop a solution or to support a position or point of view based on real-world problems.

Information literacy
Information literacy involves the ability to access, evaluate and use information from a variety of resources; to recognize when information is needed; and to know how to learn (American Library Association, 1989).

The national standards document from the Canadian School Library Association and the Association for Teacher-Librarianship in Canada, *Achieving Information Literacy: Standards for School Library Programs in Canada*, identifies eight student information literacy outcomes that will assist students as they prepare themselves with the knowledge and skills they will require for a lifetime of learning (Asselin, Branch & Oberg, 2003):

- Students will demonstrate an appreciation of the creative arts, literature, various media formats and other aesthetic representations, and a value for lifelong learning.
- Students will use information responsibly and ethically for individual and collaborative learning activities.
- Students will use information from diverse perspectives and values with respect.
- Students will use information critically to evaluate the relevance, authenticity, and validity of information and its source.

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- Students will use information strategically to process, organize, and filter information to meet an individual or collaborative learning need.
- Students will consciously use information for making personal and group learning decisions.
- Students will use information expressively to modify, revise, and transform information and to communicate their newly created information with an intended audience.
- Students will demonstrate competence and proficiency in the technical uses of traditional and digital information and media tools.

Problem-based learning
Problem-based learning (Schroeder & Zarinnia, 2000) begins with an open-ended, real-world problem with more than one possible solution. The emphasis is on gaining the content knowledge that is needed to solve the problem. The problem may have as its focus a dilemma to be confronted, a decision to be made, an issue to be resolved, a policy to be debated or a new product or service to be developed.

Project-based learning
Project-based learning begins with the student's own interests and questions. Learning activities are long-term, interdisciplinary and student-centred and are integrated with real-world issues and practices. Students are involved in making decisions about how they will find answers and solve problems.

Research
Research is a process that seeks an answer to a question or a curiosity. It involves close, careful and systematic study and is often used to refer to scholarly or scientific investigation or inquiry.

Resource-based learning
Resource-based learning (Beswick, 1977; Saskatchewan Education, 1987) actively involves students in the meaningful use of a wide range of appropriate print, nonprint, digital and human resources.

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