Information Studies

Kindergarten to Grade 12

Curriculum for Schools and School
Library Information Centres

1999

Contents

Preface

Since 1929, the Ontario School Library Association has taken an active role in encouraging a love of reading and in implementing a program of information skills for all students in Ontario.

In 1982, OSLA worked closely with the Ministry of Education to create the curriculum document, *Partners in Action: the School Library Resource Centre in the School Curriculum.* When it became apparent that information technology was transforming the learning environment, OSLA advocated for and participated in the writing of *Information Literacy and Equitable Access*, a Ministry of Education and Training document, released in draft form in 1995.

In 1996, OSLA recognized the need for a comprehensive curriculum to ensure that all students have a solid foundation in Information Studies in Ontario. The Information Literacy Task Force was created to research the information knowledge and skills needed by today's students.

In 1997, the Information Studies Writing Team was struck and drafts of *Information Studies, Kindergarten to Grade 12, 1998* were released in January and May 1998 for field testing and revision across the province.

This first edition of *Information Studies, Kindergarten to Grade 12, 1998,* though not commissioned by the Ontario Ministry of Education and Training, aligns with the Ontario Curriculum documents released to date.

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Introduction

The Importance of Information Studies

Our students live in a new era known as the Information Age. The focus on information and technology has profoundly affected the nature of society and the world of work. More information is accessible to all people in our society, and more businesses are seeking employees who are proficient in information retrieval, analysis, and communication, in conjunction with highly developed technological skills.

It is therefore vital for education in Ontario to develop comprehensive information literacy skills.

Futurists predict that within ten years almost half of the workforce will be employed in information-based occupations - gathering, processing, retrieving and analyzing information. To be successful in this information economy, students must prepare themselves with the knowledge and skills they will need in tomorrow's world of work. The illiterate of the year 2000, according to Alvin Toffler, will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn. Our students need to be information literate, lifelong learners. (Koechlin and Zwaan, *Teaching Tools for the Information Age*).
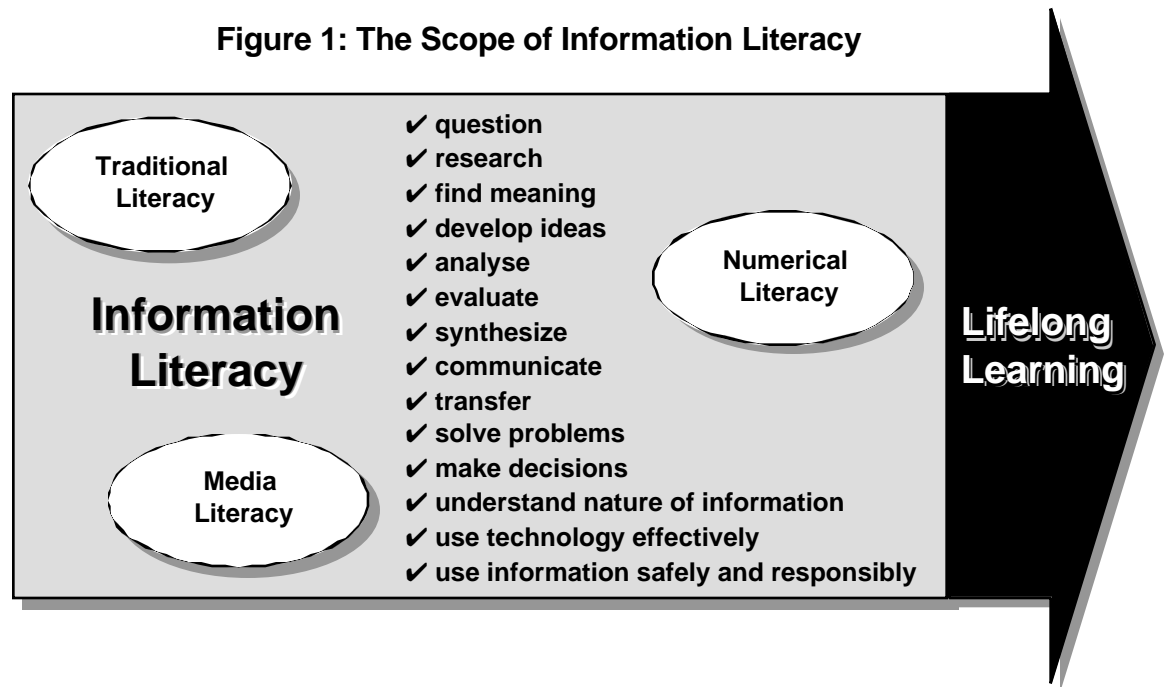
Information literacy is defined as "the ability to acquire, critically evaluate, select, use, create and communicate information in ways which lead to knowledge and wisdom" (*Information Literacy and Equitable Access (ILEA)*: Draft Document, Ministry of Education and Training, 1995). Information literacy is the key to helping students use learning throughout their lives as a way to solve problems, act ethically, plan for the future and prepare for change. According to the Association of Teacher-Librarians in Canada (ATLC), students, to become lifelong learners, must be able to:

- recognize the need for information to solve problems and develop ideas;
- pose important questions;
- use a variety of information gathering strategies and research processes;
- locate relevant and appropriate information;
- access information for quality, authority, accuracy and authenticity;
- use the practical and conceptual tools of information technology;
- understand form and format of information, location and access methods, including how information is situated and produced
- format and publish in text and multimedia, adapting to emerging technologies

As Figure 1 demonstrates, information literacy encompasses "all other forms of literacy -- traditional literacy (the ability to read and write) and media literacy (the ability to critically evaluate and create media, such as television, advertising, news stories and movies) and numerical literacy (the ability to understand and solve problems with data and numbers)." (*ILEA*)

All students should have "equal opportunities to participate and succeed in tomorrow's world. Educators must ensure they have access to information technology, information skills instruction and a wide range of information. Equitable access is fundamental to achieving the goals and expectations of our education system." (*ILEA*)

Figure 1: The Scope of Information Literacy

Information Literacy

- Traditional Literacy
- Numerical Literacy
- Media Literacy

✔ question
✔ research
✔ find meaning
✔ develop ideas
✔ analyse
✔ evaluate
✔ synthesize
✔ communicate
✔ transfer
✔ solve problems
✔ make decisions
✔ understand nature of information
✔ use technology effectively
✔ use information safely and responsibly

Lifelong Learning

Purpose of *Information Studies: Kindergarten to Grade 12, 1998*

The purpose of *Information Studies: Kindergarten to Grade 12, 1998* is to support, develop and integrate cross-curricular information expectations, both stated and implied, of the elementary and secondary Ontario Curriculum. This document provides a comprehensive program of information literacy for all grades such as that provided by school library information centres. This document recognizes the need for and importance of:

- formal and informal programs that encourage the transfer of information literacy skills and knowledge to real-life situations;

- an information problem-solving process, as well as specific information application skills;

- a research process that develops higher-order critical and creative thinking skills;

- expertise in the use of the tools and applications of the Information Age, from traditional print to digital information technologies;

- the development of student independence in using information for lifelong learning;

- the use of information-based decision-making and decision-making to enhance life at school, at work, and at home;

- the collaborative role of parents, teachers, and teacher-librarians in promoting independent thinking and information problem-solving;

- the development of safe, ethical and responsible practices in acquiring, using, and communicating information;

- the integration of a wide range of activities and resources to provide a lifetime of reading and learning.

New Features of *Information Studies: Kindergarten to Grade 12, 1998*

This document specifically addresses the changes in and challenges of the information explosion. Nowhere is this more evident than in the evolution of school library programs. (See Figure 2).

For the past twenty-five years the library program has been continually evolving. Before the 1980's, the popular term in use was library skills. Students received instruction in using libraries and print-based reference materials, and the gathering, organizing of information, in

rigidly timetabled weekly periods in the school library. In the 1980's, the emphasis changed to resource-based learning and collaborative program planning between teachers and teacher-librarians. Information skills were meaningfully integrated into curriculum but the resources, although now encompassing print and visual materials, were still primarily housed in building-level collections.

The electronic revolution began for schools in the late 1980's with access to personal computers -- often networked within buildings. In the early 1990's, on-line access to sources beyond the school began the information explosion thus underlining the critical need for students to not only physically access these sources, but to develop intellectual access skills -- critical thinking and information literacy skills.

Figure 2. The Evolution of School Library Programs in Ontario

	Before the 70's	The 70's -- 80's	The 90's and Beyond
Curriculum	Library-Based Curriculum of Isolated Skills Instruction	School-Wide Curriculum of Integrated Content/Skills Units	Real Life Curriculum of Core Information Studies
Assessment	Isolated Opportunities to Assess Library Skills	Wider Opportunities to Partner the Evaluation of Resource-Based Activities with Individual Teachers	Full Opportunities to Report on Student Achievement in Information Knowledge and Skills Across the Curriculum
Resources	Books Periodicals Vertical Files	Basic Computer Applications Audio -Visual	Internet Online Databases
Facilities	Library	Library Resource Centre	Library Information Centre
Support Services	Isolated Models of Support Mostly in Larger Boards	Linked Models of Support Between Adjacent Boards	Shared Models of Support Among Local, Provincial and National Organizations
Technologies	Print	Media Microform	Digital Networks Multimedia
Community	Isolated Models of Community Involvement and Volunteerism	Local Partnerships of Specific Involvement and Funding	Network of Parent, Community, Provincial, National and Global Partnerships
Leadership	Librarian	Teacher-Librarian	Teacher-Librarian / Information Coordinator

As a result of the evolution of the school library program, the Information Studies curriculum in this document differs from previous library information skills curricula in several important ways.

It provides learning experiences that:

- acknowledge the exponential growth of information as a result of digital storage, retrieval, communication and transfer;

- emphasize the importance of information knowledge and skills within the context of resource-based learning in integrated school library programs;

- emphasize research activities to support writing, reading, reasoning and communicating;

To strengthen planning, implementation and evaluation, the information studies curriculum is carefully constructed to:

- generate consistent overall expectations for all grades directly from the metaskills used to assess student achievement;

- organize grade-by-grade overall expectations directly from the overall expectations and metaskills;

- coordinate with the information knowledge and skills implicit in the achievement levels throughout Ontario curriculum documents;

- can be used to track student achievement in individual subjects and in the learning skills section of the Ontario Report Card;

- can be integrated into individual subject disciplines or delivered as an interdisciplinary course in Information Studies.

Role of Parents

Studies show that students perform better in school if their parents are involved in their education. Therefore, parents have an important role to play in supporting their child's learning. By reading the curriculum, parents can find out what their children are learning in each grade and why they are learning it. This awareness enables parents to discuss their children's work with them, to communicate with teachers, and to ask relevant questions about their child's progress. Knowledge of the expectations in the various grades will also help parents to interpret their child's report card and to work with the teacher to improve the student's learning. For this reason, parents are urged to read through the expectations for all grades rather than just the particular grade their child is in.

Participating in parent conferences, working on school councils, and encouraging children to complete homework are some of many ways parents can support their child's education.

Information Studies: Kindergarten to Grade 12, 1998 provides specific ways in which parents can support student learning. The information problem-solving process mirrors the life-long learning process. Parents can encourage their child to seek information before making decisions, and to reflect on decisions made. Parents can model information-based problem-solving and decision-making by sharing with their child the sources they use to reach their conclusions. They can look for opportunities to involve their child in decisions being made in the household, such as buying a new vehicle, which require gathering, using and analyzing information.

Parents can promote contact between home and school by visiting the School Library Information Centre, participating in Literacy Celebrations, Book Fairs, and Family Reading events, and supporting their child's recreational reading. Many school library information centres offer extended hours after school and into the evening to encourage parents and their children to enjoy the materials, to work together on information-based projects, and to provide access to world-wide information sources and multi-media technologies which

children may not have access to at home. Parents can encourage the use of the public library, museums, historical societies and other information sources within their communities.

Role of Teachers and Teacher-Librarians

Teachers and students have complementary responsibilities. Teachers are responsible for developing appropriate instructional strategies. They need to address different student needs and bring enthusiasm and a variety of teaching approaches to the classroom to ensure sound learning for every student. Teachers know the individual strengths and needs of each student and are the experts in the curriculum for the grade level they teach.

The role of the teacher-librarian is a vital one for overall student achievement. Research studies (Clyde, 1996; Lance, 1994, Haycock, 1995, Krashen, 1992, Haycock 1992, Woolls 1990) indicate that the development of student competence in information skills is most effective when integrated with classroom instruction through cooperative program planning and team teaching by the teacher-librarian and the classroom teacher as two equal partners.

Teacher-librarians are information specialists who work collaboratively with classroom teachers in planning, teaching, and evaluating students. Because of the knowledge explosion, it is impossible to learn all there is to know in any one discipline. All knowledge is interrelated and learning can be more efficient and effective through a process that recognizes these interrelationships. As cross-grade, cross-curricular information coordinators, teacher-librarians can assist teachers to plan and implement interdisciplinary curriculum and help students see the connections among subjects. They select a broad base of learning resources to support classroom programs and the range of student learning needs and styles. Recognizing that library collections are becoming a balance of in-house and on-line sources, teacher-librarians focus on acquiring and using information technology tools and skills to support student learning. They often provide network management and technology training to colleagues. The ultimate goal is that the technology becomes transparent and seamless in the learning process for students and teachers.

With their unique combination of professional skills – educator and information professional - teacher-librarians perform the role of the information intermediary – bridging the gap between the needs of students growing up in an information society, and the abilities of students to access and use the information they need.

Role of Students

With regard to their learning, students also have responsibilities that increase as they advance through elementary and secondary school. Students who make the effort required and who are able to apply themselves will soon learn that there is a direct relationship between achievement and hard work, and will be motivated to work as a result.

There will be some students, however, who will find it more difficult to take responsibility for their learning because of special challenges, which may include lack of support and other difficulties in the home or environment in which they are growing up. For these students, the attention, patience, and encouragement of teachers can be extremely important factors for success. However, regardless of their circumstances, taking responsibility for their learning and progress is an important part of education for all students.

Curriculum Expectations and Achievement Levels

Information Studies: Kindergarten to Grade 12, 1998 has two elements: expectations and achievement levels. The expectations identified for each grade, describe the knowledge and the skills that students are expected to develop and to demonstrate across all subject areas, in their class work, on tests, and in various other activities on which their achievement is assessed.

Teachers and teacher-librarians will use their professional judgment in deciding which instructional methods will best foster the development of the skills and knowledge necessary in the research process and the application of information technology. They will build their information literacy program based on the needs of students, the resources available, and the recognition that good teaching should build positive attitudes toward the role of information in a knowledge-based society. High achievement is the goal for all students. Teachers, teacher-librarians, students and parents are expected to work together to help students to meet the expectations specified.

The achievement levels are brief descriptions of four possible levels of student achievement. These descriptions, which are used along with more traditional indicators like letter grades and percentage marks are among a number of tools that teachers will use to assess students' learning. The four achievement levels for the Information Studies Curriculum focus on four "metaskills", that is, the significant, comprehensive and unifying skills behind all specific, subject-based expectations: understanding of concepts/reasoning, organizing, communicating, and applying. When teachers use the achievement levels in reporting to parents and speaking with students, they can discuss what is required of students to achieve the expectations for a given grade.

The provincial standard identifies the level of achievement at which parents and teachers can be confident students are well prepared for work at the next grade. Level 1 identifies achievement that falls much below the provincial standard. Level 2 identifies achievement that approaches but is not yet at the provincial standard specified for the grade. Level 3 describes achievement that is at the standard for the grade; and level 4, achievement that surpasses the standard. For example, a student who is currently able to conduct grade appropriate research only with constant assistance from the teacher would be described as achieving at level 1 in research and information problem-solving. A reasonable goal for that student in this category would be to attain level 2 or 3 by improving the ability to work independently.

Strands in the *Information Studies: Kindergarten to Grade 12, 1998*

The program in all grades and subject areas is designed to develop information problem-solving and decision-making skills, which include accessing, analyzing, applying, creating and communicating information. Students will explore a variety of resources including print and electronic sources, visual media, and community resources. The expectations will lead to information literate students who are confident and competent in applying their information processing skills to their personal lives, in further education, and to the world of work.

The information studies expectations are organized into three strands which focus on process, applied skills and contextual knowledge. The three strands are:

◆ **Inquiry and Research** ◆ **Information Technologies** ◆ **Information and Society**

Figures 3, 4 and 5 identify the overall expectations of each strand arranged by the four metaskills:

◆ **Understanding of Concepts/Reasoning** ◆ **Organizing** ◆ **Communicating** ◆ **Applying**.

Figure 3. STRAND 1: INQUIRY AND RESEARCH - Overall Expectations Arranged by Metaskill

Stages of Inquiry and Research	CONCEPTS / REASONING	ORGANIZING	COMMUNICATING	APPLYING
Preparing For Research	– define information needs using a variety of strategies	– identify varied ways of organizing information	– explore information using a variety of group activities	– relate prior knowledge to information tasks
Accessing Resources	– select information appropriate to needs using a variety of strategies	– gather information from resources using internal organizers and conventions of texts	– collaborate with others to share findings and ideas	– locate a variety of appropriate resources from a variety of sources
Processing Information	– analyse and evaluate information using a variety of strategies	– sort information using a variety of organizers and formats	– test ideas to adjust research and problem solving strategies	– synthesize findings and formulate conclusions
Transferring Learning	– reflect on and evaluate research product and process	– revise product appropriate to purpose, audience and format	– present research findings in a variety of forms for a variety of audiences	– transfer information skills and knowledge to solve problems and make decisions

Figure 4. STRAND 2: INFORMATION TECHNOLOGIES - Overall Expectations Arranged by Metaskill

CONCEPTS / REASONING	ORGANIZING	COMMUNICATING	APPLYING
– use information technology to define needs, select information, analyse and evaluate information, and reflect on and evaluate research	– use information technology to classify, gather and sort information, and revise product	– use information technology to explore information, collaborate with others, test ideas and present findings	– use information technology to relate prior knowledge, locate information, synthesize findings, formulate conclusions and transfer knowledge and skills

Figure 5. STRAND 3: INFORMATION AND SOCIETY - Overall Expectations Arranged by Metaskill

CONCEPTS / REASONING	ORGANIZING	COMMUNICATING	APPLYING
– analyse and evaluate the nature and importance of information in personal life and society	– demonstrate an understanding of varied ways of organizing, processing and storing information	– demonstrate an understanding of varied ways of creating and communicating information	– transfer information skills and knowledge to enrich personal life and contribute to society

Information Technology and Equitable Access

Learning programs must provide students with a wide range of information, access to information technology and information skills training. This is important for all students, and crucial to the success of those who, because of background or economic circumstances, do not have access to information technologies in their homes.

Equity of access to information instruction and technologies in schools will help to overcome economic barriers to achievement. It will also help educators reduce other barriers that prevent some students from both imagining and realizing their potentials. Information technologies can:

- provide new learning opportunities to geographically isolated communities and individuals. For instance, emerging telecommunications technologies make it possible to transcend physical, political, economic and cultural boundaries.

- enhance instruction in French and other languages. Information technologies will make it possible, through the sharing of resources, for Francophone students, native students and those students for whom English is a second language to have greater access to information, learning materials, instruction and support.

- expand racial and ethnocultural perspectives. By bringing new worlds of information to schools, information technologies and information skills training will give students of all races and cultural backgrounds improved access to information and knowledge about their cultures and the opportunity to develop greater confidence in their cultural and racial identities.

- enable students to work and express ideas in an environment relatively free of gender stereotyping and other biases. In comparison with other forms of communication, electronic networks have the greatest potential for allowing students to interact regardless, for instance, of gender or exceptionality. They also allow students with any impediments to social interaction to interact with others in ways that build confidence.

- provide new opportunities for students with special needs and abilities. Most information technologies can be modified to meet the special needs of students with special hearing, visual, motor and learning needs.

Information technologies have the potential to provide physical access to a broad range of information, but it is the equity of access to Information Studies curriculum that will produce information literate students prepared to live and work in the 21st century.

Independent Reading in the School Library Program

In an information age, literacy demands not only the ability to read and write, but also the ability to process information and communicate effectively. Research suggests that reading proficiency increases with the amount of time spent reading voluntarily. The initial invitation to read may be provided within the home or by a Kindergarten teacher reading to students.

A primary goal of the school library program is to create life-long readers.

It is crucial that teacher-librarians work with teachers, parents, the public library and other community institutions offering literacy programs to find ways to instill the joy of reading while helping students build the reading habit.

To become life-long readers, students must have:

- access to current, quality, high interest, and extensive collections of books and other print materials in their school libraries, classrooms and public libraries;
- contact with adults who read regularly and widely and who serve as positive role models;
- teacher-librarians and teachers who demonstrate their enthusiasm for reading by reading aloud and providing special reading programs;
- time during the school day dedicated to reading for pleasure, information and exploration;
- opportunities specifically designed to engage young people in reading;
- schools that create an environment where independent reading is valued, promoted, and encouraged;
- opportunities that involve parents and other family and community members in reading.

The Kindergarten Program and the School Library

Children's early learning experiences have a profound effect on their development; and children arrive at school with different backgrounds and experiences and at different stages of development. Regular visits to the school library are part of the foundation for life-long literacy skills and habits. Often, before the children are formally enrolled in Kindergarten programs, teacher-librarians invite families to the school library on a weekly basis to engage in storyreading and storytelling, and to begin borrowing exciting, quality literature materials.

Students in Kindergarten begin to understand that the school library is a source of authoritative information when they have questions, and that information can be found in many formats. Students begin to access interactive digital media such as CD-ROM storybooks. They can participate in interesting telecommunication projects. If there is a public library nearby, visits can be arranged so that students begin to build awareness of the vast network of cultural and informational resources available to them.

The library program is an ideal way to support the content and teaching / learning approaches of the Kindergarten program. (See Appendix B, p. 106). The three strands of *Information Studies: Kindergarten to Grade 12, 1998* provide excellent opportunities for:

- structuring the integration of learning through real-life situations and activities;
- providing rich language-oriented activities and resources that motivate children to listen and respond, and to prepare for reading and writing;
- foster opportunities to learn through inquiry and research (e.g., observing, listening, experimenting and drawing conclusions).

Above all, the school library offers opportunities for play, where children are receptive to learning within a environment of safety and delight.

Planning Student Programs

As Haycock has summarized, " The development of student competence in research and study skills is most effective when integrated with classroom instruction through cooperative program planning and team teaching by two equal teaching partners –the classroom teacher and the teacher-librarian." (*What Works: Research About Teaching and Learning Through the School's Library Resource Centre,* Rockland, 1992.) Teacher-librarians and teachers work collaboratively to plan, teach and assess cross-curricular learning experiences that develop information literacy skills. (See Appendix B). These skills enable students to solve problems, make decisions and create new knowledge for a lifetime. Skills taught in isolation are rarely transferred by students to new situations; therefore, programs must be designed to integrate these skills in authentic and meaningful experiences. For example, information technology

should be seamlessly incorporated in tasks that integrate higher order thinking skills with the tools of today's information society.
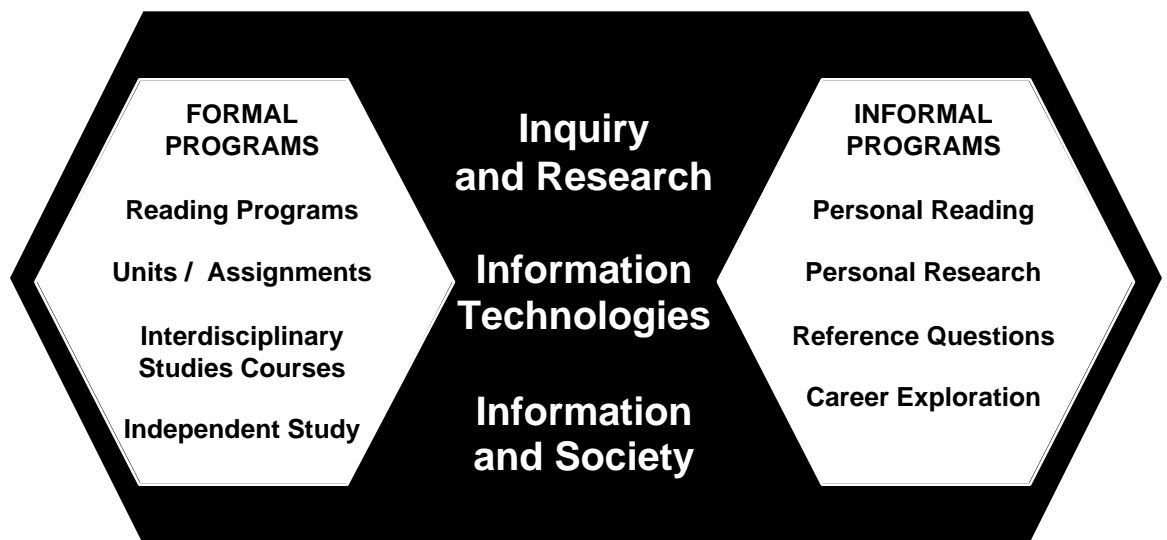
The library program continues to stress the fostering of a love and understanding of literature to

> lead to a love of reading, which is among the most valuable resources students can take with them into adult life… Important as they are, reading for information and reading for learning are not the only activities that should be emphasized as students develop their reading skills. A well-balanced reading program will provide students with many opportunities to read for pleasure, for self-discovery, and for self-enrichment. (*The Ontario Curriculum, Grades 1-8: Language*, 27)

In planning programs, school library information centres are expected to meet the needs of all students, including exceptional students, ESL students and adult learners. This means ensuring that appropriate resources are selected, necessary modifications of curriculum are made, and suitable facilities and equipment are available and maintained.

Figure 6 shows how teacher-librarians, in partnership with teachers, students, and parents, use the information studies curriculum to provide both formal and informal opportunities for learning and teaching across the curriculum

Figure 6. Planning Student Programs in the Library Information centre

FORMAL PROGRAMS

Reading Programs

Units / Assignments

Interdisciplinary Studies Courses

Independent Study

Inquiry and Research

Information Technologies

Information and Society

INFORMAL PROGRAMS

Personal Reading

Personal Research

Reference Questions

Career Exploration

Achievement Levels

Effective school library programs have a positive affect on student achievement: in information processing and information use in all content areas; on reading motivation and achievement; and on the quality of teaching and learning experiences throughout the school.

Figure 7 identifies four areas of achievement (the metaskills) in Information Studies – understanding of concepts / reasoning, organizing, communicating and applying – at four levels of performance. These achievement levels are generically designed to partner in the assessment of information skills and knowledge in all subject areas in both elementary and secondary grades.

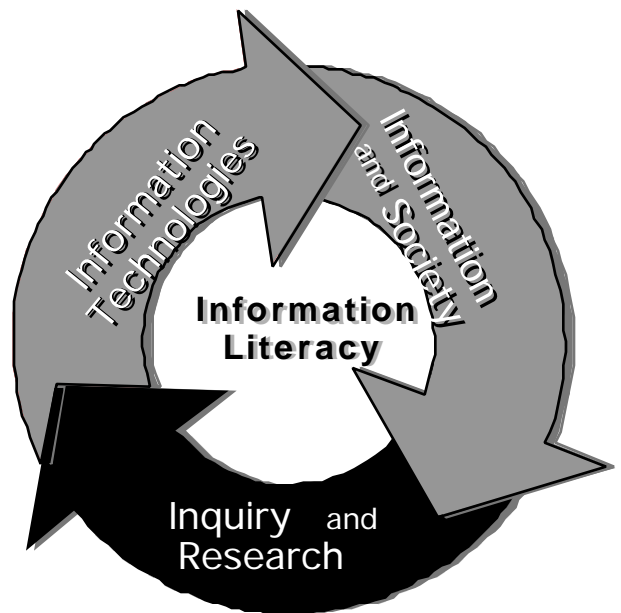## Figure 7. Achievement Levels: *Information Studies, Kindergarten to 12*

Knowledge / Skills	Level 1	Level 2	Level 3	Level 4
Understanding of Concepts / Reasoning	**The student:**			
	– demonstrates understanding of few of required concepts	– demonstrates understanding of some of required concepts	– demonstrates understanding of most of required concepts	– demonstrates understanding of all of required concepts
	– rarely interprets and synthesizes information accurately and effectively	– sometimes interprets and synthesizes information accurately and effectively	– usually interprets and synthesizes information accurately and effectively	– consistently interprets and synthesizes information accurately and effectively
Organizing	**The student:**			
	– rarely organizes information logically and effectively	– sometimes organizes information logically and effectively	– usually organizes information logically and effectively	– consistently organizes information logically and effectively
	– uses / recognizes a few ways to organize information	– uses / recognizes some ways to organize information	– uses / recognizes a wide range of ways to organize information	– uses / recognizes an extensive range of ways to organize information
Communicating	**The student:**			
	– rarely communicates with clarity, precision and relevance	– sometimes communicates with clarity, precision and relevance	– usually communicates with clarity, precision and relevance	– consistently communicates with clarity, precision and relevance
	– rarely uses information strategies and technologies appropriately and effectively	– sometimes uses information strategies and technologies appropriately and effectively	– usually uses information strategies and technologies appropriately and effectively	– consistently uses information strategies and technologies appropriately and effectively

Applying	The student:			
	– rarely applies information skills and knowledge in a variety of contexts	– sometimes applies information skills and knowledge in a variety of contexts	– usually applies information skills and knowledge in a variety of contexts	– consistently applies information skills and knowledge in a variety of contexts
	– rarely transfers information skills and knowledge to solve problems in new or familiar situations	– sometimes transfers information skills and knowledge to solve problems in new or familiar situations	– usually transfers information skills and knowledge to solve problems in new or familiar situations	– consistently transfers information skills and knowledge to solve problems in new or

Inquiry and Research

Inquiry and Research is the process component of *Information Studies: Kindergarten to Grade 12*. It complements the applied technological skills of **Information Technologies** and the knowledge context of **Information and Society.**

Inquiry and Research

Students need the fundamental skills and knowledge of inquiry and research to be information literate. Information literacy is a prerequisite for success in all subjects of the curriculum, for preparation for work and further education, and for lifelong learning.

The purpose of inquiry and research is to encourage high levels of critical thinking so that processes and resources are appropriate, conclusions are based on supporting evidence and problems are solved and decisions made that will extend learning for a lifetime.

All subjects require attention to the expectations of this strand. However, research demonstrates that students benefit most when they engage in systematic study of the process of research and in varied, continuous and well-planned opportunities to extend their information skills.

The resource-based learning programs offered by the integrating partnership between teacher and teacher-librarian ground research and information problem solving in a continuum of information skills and knowledge. This continuum can be described as the development of the metaskills of understanding of concepts/reasoning, organizing, communicating and applying through the process of preparing for research, accessing of information, processing of information and transferring learning.

The Importance of an Inquiry and Research Model for Problem-Solving and Decision-Making

There are comprehensive studies on the importance of research as a complex process that depends on and fosters higher-order knowledge and skills. Recent work by Kuhlthau, Eisenberg/Berkowitz, Irving, and Pitts/Stripling provides interesting international models (See Appendix A).

Several research-inquiry models have been in use in Ontario Schools over the years. Teacher-librarians have found that students learn best when schools adopt a consistent inquiry and research model across all grades and disciplines within a consistent information studies curriculum from grade to grade.

The Ontario School Library Association believes strongly that such a model should be central to all curricular documents. The OSLA has studied the wide range of literature and research in the field of information science and information studies, and has identified four stages which are common to all models:

- Preparing for Research (e.g., defining question)
- Accessing Resources (e.g., locating information)
- Processing Information (e.g., evaluating information)
- Transferring Learning (e.g. presenting information)

Figure 8 outlines how these four stages synthesize various models and provide congruence with the diverse Ontario Curriculum documents.

Figure 8. A Comparison of Inquiry / Research Process Models

Information Studies K - Gr.12	Cognitive Skills Model	Social Science Independent Study	English Writing Process	Mathematical Problem Solving	Tech Design Process	Scientific Method	Inquiry Process
Stage 1 Preparing for Research **Stage 2** Accessing Resources **Stage 3** Processing Information **Stage 4** Transferring Learning	1. Focus what is the question 2. Organize plan possibilities and sources 3. Locate 4. Record 5. Evaluate and Assess 6. Synthesize and Conclude 7. Apply 8. Communicate	1. Focus 2. Gather Information locate sources 3. Record write a thesis statement 4. Use extract information 5. Organize synthesize and present 6. Evaluate for Effectiveness communicate	1. Decide on topic focus ideas 2. Brainstorm group data outline 3. Write Introduction, organize information, rough draft 4. Revise edit, proof, add/delete, conclusion 5. Final Copy publish 6. Communicate evaluate	1. Understand the problem 2. Make a Plan 3. Carry out the plan 4. Look back over the work done 5. Communicate the solution	1. Develop a focus 2. Develop a framework 3. Choose the best solution 4. Implement a plan 5. Reflect on the process and product	1. Decide on the problem 2. Write hypothesis 3. Design and conduct experiment 4. Observe relationships 5. Formulate conclusions 6. Apply results 7. Present information	1. Exploring 2. Inquiring 3. Predicting possibilities 4. Planning and collecting 5. Deciding 6. Communicating 7. Evaluating 8. Applying

To assist in the assessment of student achievement, Figure 3 (p. 9) organizes the overall expectations of inquiry and research according to the four metaskills.

To help design and implement inquiry-based and research-based activities, Figure 9 reorganizes these overall expectations as steps in the research process itself, from identifying the task and beginning to find resources to the higher level thinking skills such as synthesizing findings, formulating conclusion and transferring skills and knowledge to new situations. The research process is often depicted as a linear progression but the circularity of the diagram shows how the development of information skills and knowledge is as recursive as information itself.

Figure 10 recasts this inquiry and research process in a simpler diagram.

Figure 11 represents a scope and sequence of the knowledge and skills of *Inquiry and Research* to help track student progress as a continuum for Kindergarten to Grade 12. Such progress is made possible when teachers and teacher-librarians work together to collect demonstrations of authentic performances grade to grade.

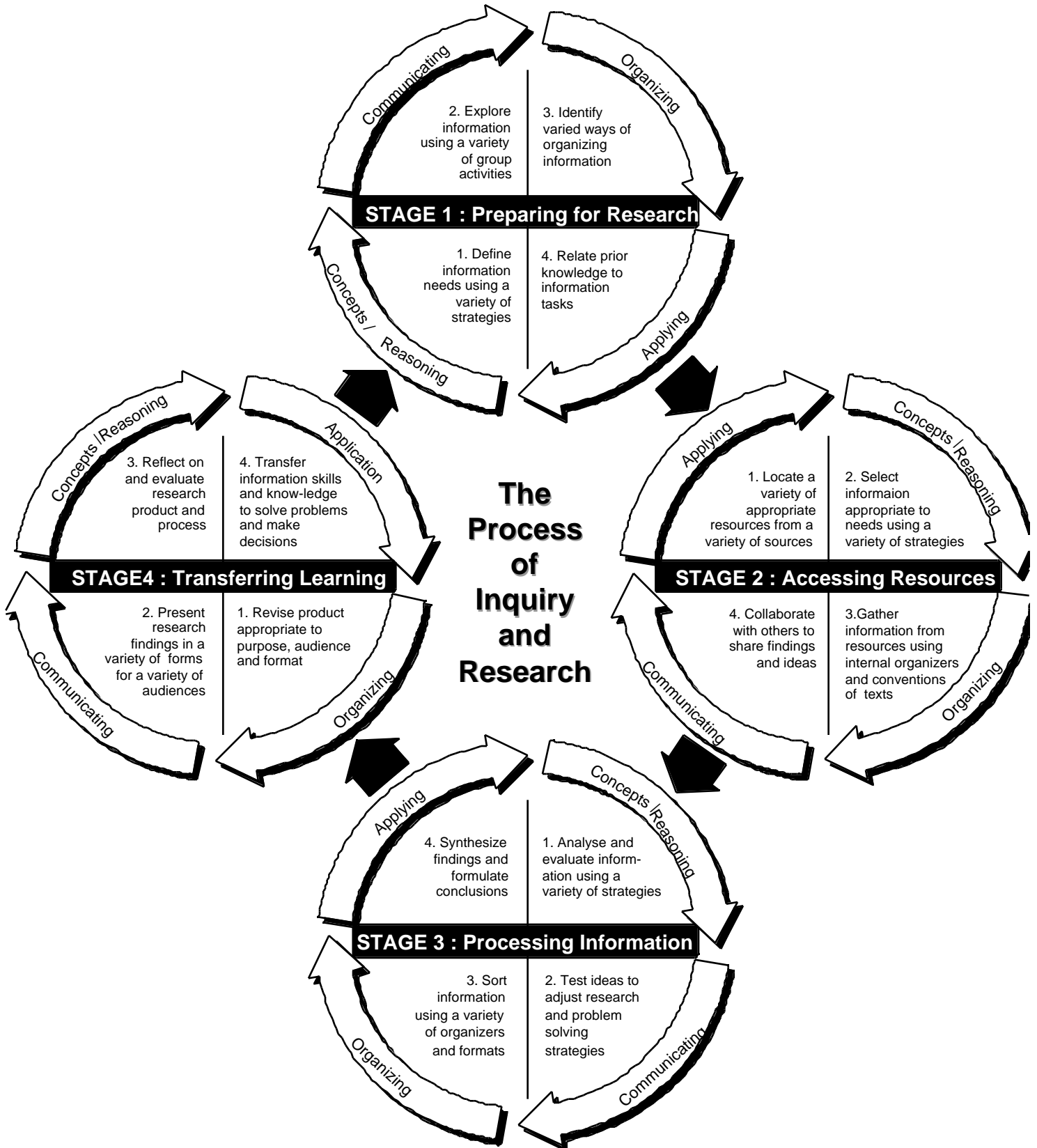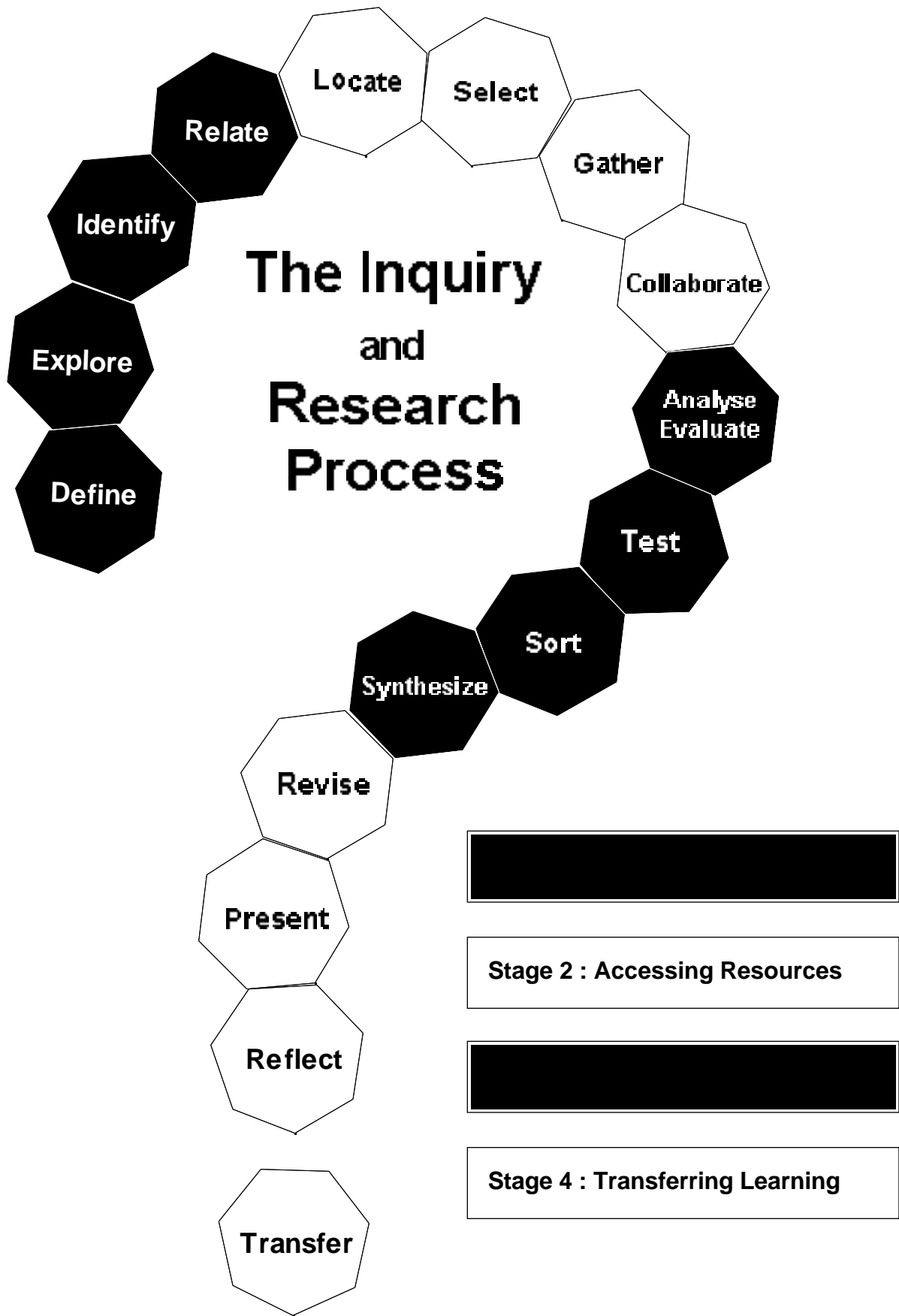**Figure 9. The Process of Inquiry and Research: Model 1**

Communicating

2. Explore information using a variety of group activities

Organizing

3. Identify varied ways of organizing information

STAGE 1 : Preparing for Research

1. Define information needs using a variety of strategies

4. Relate prior knowledge to information tasks

Concepts / Reasoning

Applying

Concepts /Reasoning

3. Reflect on and evaluate research product and process

Application

4. Transfer information skills and know-ledge to solve problems and make decisions

STAGE4 : Transferring Learning

2. Present research findings in a variety of forms for a variety of audiences

1. Revise product appropriate to purpose, audience and format

Communicating

Organizing

The Process of Inquiry and Research

Applying

1. Locate a variety of appropriate resources from a variety of sources

Concepts /Reasoning

2. Select informaion appropriate to needs using a variety of strategies

STAGE 2 : Accessing Resources

4. Collaborate with others to share findings and ideas

3.Gather information from resources using internal organizers and conventions of texts

Communicating

Organizing

Applying

4. Synthesize findings and formulate conclusions

Concepts /Reasoning

1. Analyse and evaluate inform- ation using a variety of strategies

STAGE 3 : Processing Information

3. Sort information using a variety of organizers and formats

2. Test ideas to adjust research and problem solving strategies

Organizing

Communicating

Figure 10. The Inquiry and Research Process: Model 2

The Inquiry and Research Process

Locate
Select
Relate
Gather
Identify
Collaborate
Explore
Analyse Evaluate
Define
Test
Sort
Synthesize
Revise
Present
Reflect
Transfer

Stage 2 : Accessing Resources

Stage 4 : Transferring Learning

Inquiry and Research: Kindergarten

Overall Expectations

By the end of Kindergarten, students will:
• define needs, select information, make sense of information and respond to findings;
• identify, gather and sort information and observations;
• explore information, and collaborate with others, test ideas and share findings;
• relate prior knowledge, locate information, make observations, and adapt to new learning.

Expectations in Specific Areas

Reasoning

By the end of Kindergarten, students will:

– ask questions and express feelings about answers found
– begin to distinguish between real and imaginary stories and depictions
– begin to make predictions about stories and information
– make a simple plan to get information and carry out its steps
– investigate and describe familiar cultural, geographical and recreational features of their neighbourhood

Organizing

By the end of Kindergarten, students will:

– identify some features of books and other written materials
– begin to describe the library layout and routines
– sort and classify objects by characteristic and category
– identify parts of things, such as parts of the body, and describe their separate function

Communicating

By the end of Kindergarten, students will:

– ask questions within a group about people, places and things they are curious about
– share feelings and ideas about information-based experiences in a variety of verbal and non-verbal ways
– use a variety of print and physical materials to communicate information and ideas
– choose products for portfolio collections in consultation with peers and teachers

Applying

By the end of Kindergarten, students will:

– express wonder and curiosity about the world of information around them
– identify new thoughts and feelings arising from information-based activities
– make appropriate observations about information results and findings

Inquiry and Research: Grade 1

Overall Expectations

By the end of Grade 1, students will:

- prepare for research:
    - define information needs using a variety of strategies
    - explore information using a variety of group activities
    - identify varied ways of organizing information
    - relate prior knowledge to information tasks;
- access resources:
    - locate a variety of appropriate resources from a variety of sources
    - select information appropriate to needs using a variety of strategies
    - gather information from resources using internal organizers and conventions of texts
    - collaborate with others to share findings and ideas;
- process information:
    - analyse and evaluate information using a variety of strategies
    - test ideas to adjust research and problem solving strategies
    - sort information using a variety of organizers and formats
    - synthesize findings and formulate conclusions;
- transfer learning:
    - revise product appropriate to purpose, audience and format
    - present research findings in a variety of forms for a variety of audiences
    - reflect on and evaluate product and process
    - transfer new information skills and knowledge to solve problems and make decisions.

Expectations in Specific Areas

Reasoning

By the end of Grade 1, students will:

- use brainstorming to explore thoughts and feelings
- role play questions and answers
- use question starter words
- distinguish between questions and statements-predict content from the cover of a book
- begin to understand keywords
- find information from illustrative works-predict story sequence and revise/confirm predictions
- retell a simple story in proper sequence and recall information in it accurately
- distinguish between real-life and media depictions
- complete simple self-evaluation charts
- comment on the ease and difficulty of a task

By the end of Grade 1, students will:

- identify parts of fictional texts such as table of contents and chapters
- describe library layout and routines
- complete information tasks within structured time
- use information from different parts of a book
- read pictures for information
- understand what an author and a title are
- write simple notes
- draw pictures for storybooks
- organize information on concrete graphs and pictographs
- explain sorting method used
- participate in student –teacher conferencing
- begin to understand the difference between rough copy and finished product

Organizing

Communicating

By the end of Grade 1, students will:

- create group lists of previous knowledge about a particular topic or topics
- take turns speaking in a group, sharing ideas
- present research question to group, answering questions for clarifications
- express feelings and ideas about information-based experiences in a variety of verbal and non-verbal ways
- recount personal experiences seeking information
- make predictions about information and stories
- report findings pictorially
- create simple dramatic presentations

Applying

By the end of Grade 1, students will:

- create charts that distinguish what they know and what they need to know
- identify pattern books and simple poetry texts
- be familiar with some sections of the library
- be familiar with the public library
- organize information into pictographs
- create story maps
- express their thoughts and feelings about stories and informational texts
- complete pictorial self-evaluation
- talk about new learning
- make judgments and draw conclusions to solve problems

Inquiry and Research: Grade 2

Overall Expectations

By the end of Grade 2, students will:

- prepare for research:
    - define information needs using a variety of strategies
    - explore information using a variety of group activities
    - identify varied ways of organizing information
    - relate prior knowledge to information tasks;
- access resources:
    - locate a variety of appropriate resources from a variety of sources
    - select information appropriate to needs using a variety of strategies
    - gather information from resources using internal organizers and conventions of texts
    - collaborate with others to share findings and ideas;
- process information:
    - analyse and evaluate information using a variety of strategies
    - test ideas to adjust research and problem solving strategies
    - sort information using a variety of organizers and formats
    - synthesize findings and formulate conclusions;
- transfer learning:
    - revise product appropriate to purpose, audience and format
    - present research findings in a variety of forms for a variety of audiences
    - reflect on and evaluate product and process
    - transfer new information skills and knowledge to solve problems and make decisions.

Expectations in Specific Areas

Reasoning

By the end of Grade 2, students will:

- articulate questions
- experiment with concrete objects
- cluster ideas
- collaborate with teacher to plan research-begin to use illustrated dictionaries and encyclopedias
- select pictures and found objects for information-identify advertisements
- restate information in a short non-fiction text in their own words
- retell a story in proper sequence and identify the main idea and characters
- make conclusions based on completed research
- participate in peer conferences

Organizing

By the end of Grade 2, students will:

- identify different forms of information such as story books, informational texts and environmental print

- identify major Dewey Decimal categories
- use a table of contents, index and chapter headings
- look for key words in simple interactive software
- identify information from basic parts of a graph
- begin to create timelines
- make jot notes
- prepare storyboards
- create a research folder
- record sources
- use graphic organizers
- make corrections to products
- practise performances

Communicating

By the end of Grade 2, students will:

- ask questions for clarification
- work in small groups effectively, taking responsibility for personal contributions

- complete simple response journals
- participate in choral responses
- create simple research reports
- restate information in own words
- construct and label simple graphs

Applying

By the end of Grade 2, students will:

- create lists of focus words
- use previously written journal entries
- identify storybooks and interactive software
- begin to understand the organization and range of the school library
- browse library shelves to locate information
- express their thoughts and feelings about ideas in stories and informational texts
- identify connections to everyday life
- make judgments and draw conclusions to solve problems

Inquiry and Research: Grade 3

Overall Expectations

By the end of Grade 3, students will:

- prepare for research:
    - define information needs using a variety of strategies
    - explore information using a variety of group activities
    - identify varied ways of organizing information
    - relate prior knowledge to information tasks;
- access resources:
    - locate a variety of appropriate resources from a variety of sources
    - select information appropriate to needs using a variety of strategies
    - gather information from resources using internal organizers and conventions of texts
    - collaborate with others to share findings and ideas;
- process information:
    - analyse and evaluate information using a variety of strategies
    - test ideas to adjust research and problem solving strategies
    - sort information using a variety of organizers and formats
    - synthesize findings and formulate conclusions;
- transfer learning:
    - revise product appropriate to purpose, audience and format
    - present research findings in a variety of forms for a variety of audiences
    - reflect on and evaluate product and process
    - transfer new information skills and knowledge to solve problems and make decisions.

Expectations in Specific Areas

Reasoning
By the end of Grade 3, students will:

- ask questions to clarify meaning and encourage responses
- narrow and broaden focus
- outline necessary resources and plan steps to obtain them
- select information from a range of print and electronic resources
- explore bookmarked Internet sites
- use picture files and globes
- distinguish between fact and fiction
- identify and restate main ideas in a piece of writing and cite supporting details
- interpret data from graphs-reflect on opportunities for further developments
- complete tracking sheets

- begin to identify catalogue record elements
- explore reference information on CD-ROMs and in simple encyclopedias
- use the elements of charts, diagrams and graphs to collect information
- enter simple search words
- use the features of thesauri to collect information
- use titles and subheadings
- enter data into simple databases and spreadsheets
- use source sheets to record
- organize data into charts and diagrams using several criteria
- use peer-conferencing to revise work
- begin to practise self-editing and proofreading

Organizing
By the end of Grade 3, students will:

- identify the parts of non-fiction texts such as indexes

Communicating
By the end of Grade 3, students will:

- get feedback from teachers and peers
- participate in class discussions

- contribute to group databases
- participate in small group discussions, including peer and teacher conferences
- illustrate text appropriately with a range of visual materials
- explain copyright and plagiarism and report findings without plagiarizing form and ideas of others

Applying

By the end of Grade 3, students will:

- recall past experiences with information resources
- begin to make inferences when reading
- locate chapter books and children's reference books
- begin to use catalogues to locate materials by call number
- browse bookmarked sites on the Internet
- create a variety of charts to collect and organize data according to given criteria
- begin to develop their own opinions by considering ideas from various materials
- identify connecting ideas
- prepare a list of further information problems to solve
- make judgments and draw conclusions to solve problems

Inquiry and Research: Grade 4

Overall Expectations

By the end of Grade 4, students will:

- prepare for research:
    - define information needs using a variety of strategies
    - explore information using a variety of group activities
    - identify varied ways of organizing information
    - relate prior knowledge to information tasks;
- access resources:
    - locate a variety of appropriate resources from a variety of sources
    - select information appropriate to needs using a variety of strategies
    - gather information from resources using internal organizers and conventions of texts
    - collaborate with others to share findings and ideas;
- process information:
    - analyse and evaluate information using a variety of strategies
    - test ideas to adjust research and problem solving strategies
    - sort information using a variety of organizers and formats
    - synthesize findings and formulate conclusions;
- transfer learning:
    - revise product appropriate to purpose, audience and format
    - present research findings in a variety of forms for a variety of audiences
    - reflect on and evaluate product and process
    - transfer new information skills and knowledge to solve problems and make decisions.
    -

Expectations in Specific Areas

Reasoning

By the end of Grade 4, students will:

- formulate questions to guide research
- create mind maps, subject webs prior to search
- get an overview of a topic or problem from a variety of reference resources
- begin to reread, skim, and scan to select appropriate information
- conduct interviews and surveys
- begin to bookmark Internet sites relevant to research-identify story elements
- identify bias in information
- distinguish between fact and opinion
- -start to complete learning logs and response journals
- identify how data was collected

Organizing

By the end of Grade 4, students will:

- use library terminology

- understand organization of atlases
- identify Dewey Decimal sub-categories
- recognize the purposes of different parts of a graph
- use index in multi-volume works
- explore specific Web sites on the Internet
- use conventional symbols, titles and labels when displaying data
- make notes on such organizers as index cards
- prepare outlines
- identify key points
- use research folder to organize a variety of information
- routinely edit work, with feedback from teachers and peers
- choose an appropriate title for research

Communicating

By the end of Grade 4, students will:

- stay on topic in group discussions

- begin to participate in telecommunications projects
- share findings in electronic format, e.g. keypals, conferencing and databases
- review research strategies in peer and teacher conferencing
- create simple spreadsheets and tables
- create dramatizations

Applying

By the end of Grade 4, students will:

- use an encyclopedia to provide overview of topic
- clarify meaning with a dictionary
- search catalogue by author, title, subject
- locate novels, biographies and myths
- browse subject directories on the Internet
- compare findings with predictions
- identify their own point of view in research
- relate ideas in materials to personal knowledge and experience
- make judgments and draw conclusions to solve problems

Inquiry and Research: Grade 5

Overall Expectations

By the end of Grade 5, students will:

- prepare for research:
    - define information needs using a variety of strategies
    - explore information using a variety of group activities
    - identify varied ways of organizing information
    - relate prior knowledge to information tasks;
- access resources:
    - locate a variety of appropriate resources from a variety of sources
    - select information appropriate to needs using a variety of strategies
    - gather information from resources using internal organizers and conventions of texts
    - collaborate with others to share findings and ideas;
- process information:
    - analyse and evaluate information using a variety of strategies
    - test ideas to adjust research and problem solving strategies
    - sort information using a variety of organizers and formats
    - synthesize findings and formulate conclusions;
- transfer learning:
    - revise product appropriate to purpose, audience and format
    - present research findings in a variety of forms for a variety of audiences
    - reflect on and evaluate product and process
    - transfer new information skills and knowledge to solve problems and make decisions.

Expectations in Specific Areas

Reasoning

By the end of Grade 5, students will:

- structure search strategies within set timelines
- build a knowledge base from a variety of resources
- distinguish different kinds and purposes of questions
- develop a research focus-select novels, short stories, biographies
- bookmark and use Internet sites relevant to research
- select information from a variety of electronic reference materials
- identify main ideas and supporting details
- examine currency of data
- evaluate definitions
- discuss patterns in data
- complete self-evaluation on product and process, identifying strengths and weaknesses
- analyse how data was collected and discuss the reasonableness of results

Organizing

By the end of Grade 5, students will:

- identify the features of a variety of media
- understand role of bibliographic conventions
- determine time required to complete tasks
- begin to use footnotes and bibliographic citations found in resources to locate other information
- begin to use simple bibliographic conventions
- prepare simple flow charts with timelines
- create simple databases and spreadsheets and output data in a variety of ways
- understand the needs of the audience and the purpose of the product
- recognize the need for deadlines and meet them

Communicating

By the end of Grade 5, students will:

- use appropriate strategies to organize group projects
- prepare subject webs to connect similar ideas
- create preliminary outline based on initial findings and test clarity with group
- create timelines and multi-media presentations
- use authentic performance strategies to present research

Applying

By the end of Grade 5, students will:

- prepare a list of potential kinds of resources, prior to beginning search
- locate periodicals, texts and editorials
- independently search automated catalogues
- begin to search the Internet using keywords in single search engines
- use matrixes to sort facts and similarities, and to evaluate and classify data
- discover relationships between resources
- relate research findings to personal knowledge and experience
- make judgments and draw conclusions to solve problems

Inquiry and Research: Grade 6

Overall Expectations

By the end of Grade 6, students will:

- prepare for research:
    - define information needs using a variety of strategies
    - explore information using a variety of group activities
    - identify varied ways of organizing information
    - relate prior knowledge to information tasks;
- access resources:
    - locate a variety of appropriate resources from a variety of sources
    - select information appropriate to needs using a variety of strategies
    - gather information from resources using internal organizers and conventions of texts
    - collaborate with others to share findings and ideas;
- process information:
    - analyse and evaluate information using a variety of strategies
    - test ideas to adjust research and problem solving strategies
    - sort information using a variety of organizers and formats
    - synthesize findings and formulate conclusions;
- transfer learning:
    - revise product appropriate to purpose, audience and format
    - present research findings in a variety of forms for a variety of audiences
    - reflect on and evaluate product and process
    - transfer new information skills and knowledge to solve problems and make decisions.

Expectations in Specific Areas

Reasoning

By the end of Grade 6, students will:

- structure search strategies and timelines
- develop research plans with statement of purpose
- begin to manage thoughts and feelings arising from research process-select periodicals
- select national and international atlases
- compare formats of print and electronic reference materials to facilitate selection of information
- deconstruct media works
- identify agreement and disagreement among sources
- distinguish between primary and secondary sources
- identify point of view
- -independently complete self-evaluation on all research and information problem solving
- demonstrate an understanding of probability in making appropriate conclusions and appropriate decisions

Organizing

By the end of Grade 6, students will:

- explore various subject directories on CD-ROMs
- describe how information on specific Web sites is structured
- prepare key words, descriptors and concepts appropriate to intended research, e.g. dictionary definitions; specialized terms in math and science
- use simple bibliographic conventions
- use headings and captions
- design surveys, organize data into self-selected categories and ranges, and record data on spreadsheets
- compare information selected and interpreted with information needs and adjust research strategies if necessary
- eliminate irrelevant information

Communicating

By the end of Grade 6, students will:

- listen to, acknowledge and consider differing opinions in group work
- work in teams to develop project outlines
- formulate hypothesis and test validity with peers and teacher
- evaluate the advantages and disadvantages of various presentation formats
- experiment with a variety of displays of the same data

Applying

By the end of Grade 6, students will:

- browse the appropriate sections of the library to expand approaches to a topic
- locate and read a wide range of resources
- begin to search the Internet using features of single search engines
- retrieve information from databases
- create tree diagrams to analyse parts, and to order or rank information
- make analogies to connect ideas in a variety of formats
- analyse data to make inferences and arguments
- relate research findings to career possibilities and applications in the workplace
- make judgments and draw conclusions from research to solve problems

Inquiry and Research: Grade 7

Overall Expectations

By the end of Grade 7, students will:

- prepare for research:
    - define information needs using a variety of strategies
    - explore information using a variety of group activities
    - identify varied ways of organizing information
    - relate prior knowledge to information tasks;
- access resources:
    - locate a variety of appropriate resources from a variety of sources
    - select information appropriate to needs using a variety of strategies
    - gather information from resources using internal organizers and conventions of texts
    - collaborate with others to share findings and ideas;
- process information:
    - analyse and evaluate information using a variety of strategies
    - test ideas to adjust research and problem solving strategies
    - sort information using a variety of organizers and formats
    - synthesize findings and formulate conclusions;
- transfer learning:
    - revise product appropriate to purpose, audience and format
    - present research findings in a variety of forms for a variety of audiences
    - reflect on and evaluate product and process
    - transfer new information skills and knowledge to solve problems and make decisions.

Expectations in Specific Areas

Reasoning

By the end of Grade 7, students will:

- begin to use planners
- formulate questions that would synthesize various sources of information and points of view
- learn to prepare questions in advance of research
- select a variety of periodicals
- select information from relevant field study
- understand plagiarism and copyright
- examine the authority, validity and reliability of print and online resources
- begin to identify criteria used to evaluate information
- begin to articulate the stages of the research process
- judge if a problem has been identified and solved
- identify bias in data collection methods

Organizing

By the end of Grade 7, students will:

- explain the purpose of catalogue record elements
- distinguish between general and subject specific reference materials
- describe how different formats record information
- begin to use simple print or online indexes to periodicals
- identify conventional symbols, titles and labels that organize data
- create prefaces and tables of contents
- use basic surveys
- use simple bibliographic conventions
- sort data on tally charts and stem-and-leaf charts
- edit product for coherence
- verify the adequacy of information selected

Communicating

By the end of Grade 7, students will:

- use role play strategies to explore ideas during research process
- develop subject webs to expand connections among similar ideas
- use detailed outlines in peer and teacher conferencing to check progress and test clarity of ideas
- use appropriate transitions in presenting research
- display data and information in a variety of formats, with and without the use of technology

Applying

By the end of Grade 7, students will:

- use see references and cross references to expand approaches to a topic
- independently use the public library to locate information
- search the Internet using a variety of features in single search engines
- develop generalizations
- generalize findings into useful conclusions
- make inferences and convincing arguments based on data analysis
- begin to recast a product in a new format for a range of purposes and audiences
- make judgments and draw conclusions to solve problems

Inquiry and Research: Grade 8

Overall Expectations

By the end of Grade 8, students will:

- prepare for research:
    - define information needs using a variety of strategies
    - explore information using a variety of group activities
    - identify varied ways of organizing information
    - relate prior knowledge to information tasks;
- access resources:
    - locate a variety of appropriate resources from a variety of sources
    - select information appropriate to needs using a variety of strategies
    - gather information from resources using internal organizers and conventions of texts
    - collaborate with others to share findings and ideas;
- process information:
    - analyse and evaluate information using a variety of strategies
    - test ideas to adjust research and problem solving strategies
    - sort information using a variety of organizers and formats
    - synthesize findings and formulate conclusions;
- transfer learning:
    - revise product appropriate to purpose, audience and format
    - present research findings in a variety of forms for a variety of audiences
    - reflect on and evaluate product and process
    - transfer new information skills and knowledge to solve problems and make decisions.

Expectations in Specific Areas

Reasoning

By the end of Grade 8, students will:

- recognize elements of potentially successful research questions
- ask higher-order questions
- select CD ROM databases
- select biographical resources
- compare and verify statements from two or more sources
- examine assumptions and bias in information
- identify criteria used to evaluate information
- articulate the stages of the research process
- assess bias in data collection methods
- examine assumptions in product and process

Organizing

By the end of Grade 8, students will:

- describe the features and conventions of a variety of reference materials

- use bibliographies and suggested readings in reference materials to investigate further sources
- use simple print or online indexes to periodicals
- create paraphrases
- use legends
- use matrices to record variables for decision making
- sort collected information, using general and sample data
- edit product for unity
- verify the accuracy of examples and quotations from primary sources
- check product for bias

Communicating

By the end of Grade 8, students will:

- use simulation strategies to explore ideas during research process
- participate in an electronic conference to share and contribute ideas

- use paraphrase in peer and teacher conferencing to check progress and test clarity of ideas
- maintain an appropriate tone in presenting research through diction and detail
- manipulate and present data using spreadsheets
- begin to use presentation software to present research

Applying

By the end of Grade 8, students will:

- use previous research folder to generate ideas and approaches
- compare predicted and experimental results
- begin to use community resources and organizations for information
- begin to search the Internet using a range of strategies available in a variety of single search engines
- identify cause and effect relationships in information
- determine trends and patterns in information
- make inferences and convincing arguments based on data analysis
- recast a product in a new format for a range of purposes and audiences
- make judgments and draw conclusions to solve problems

Inquiry and Research: Grade 9

Overall Expectations

By the end of Grade 9, students will:

- prepare for research:
    - define information needs using a variety of strategies
    - explore information using a variety of group activities
    - identify varied ways of organizing information
    - relate prior knowledge to information tasks;
- access resources:
    - locate a variety of appropriate resources from a variety of sources
    - select information appropriate to needs using a variety of strategies
    - gather information from resources using internal organizers and conventions of texts
    - collaborate with others to share findings and ideas;
- process information:
    - analyse and evaluate information using a variety of strategies
    - test ideas to adjust research and problem solving strategies
    - sort information using a variety of organizers and formats
    - synthesize findings and formulate conclusions;
- transfer learning:
    - revise product appropriate to purpose, audience and format
    - present research findings in a variety of forms for a variety of audiences
    - reflect on and evaluate product and process
    - transfer new information skills and knowledge to solve problems and make decisions.

Expectations in Specific Areas

Reasoning

By the end of Grade 9, students will:

- begin to prioritize questions for significance, relevance and practicality
- use planners independently
- manage thoughts and feeling arising from research
- select a variety of online databases
- select handbooks, almanacs and directories
- compare comprehensiveness of sources
- analyse bias and suggest alternative sources
- design criteria to evaluate information
- begin to understand general principles of good research
- begin to use journal to track product and process, including emotional and intellectual responses

Organizing

By the end of Grade 9, students will:

- describe how periodicals are indexed in print or electronic form
- use varied dictionary entries to determine connotation, etymology and idiom
- gather human resource information from directories, electronic yellow pages and email
- begin to create advanced databases and spreadsheets and output information in a variety of ways
- chart concept formation
- begin to use advanced bibliographic conventions
- edit product for emphasis
- verify the logic of argument
- begin to follow a standard format for a variety of formats

Communicating

By the end of Grade 9, students will:

- conduct formal interview strategies to explore ideas during research process
- complete delegated group work

- use summaries in peer and teacher conferencing to check progress and test clarity of ideas
- integrate varied forms of and approaches to information in presentations

Applying

By the end of Grade 9, students will:

- use visual organizers such as mind maps
- maintain a log of thoughts and feelings as a response to learning
- use community resources and organizations for information
- search the Internet using a range of strategies available in a variety of single search engines
- make connections between sources to provide overview
- regroup and organize data to make connections
- analyse conflicting information
- make judgments and draw conclusions to solve problems

Inquiry and Research: Grade 10

Overall Expectations

By the end of Grade 10, students will:

- prepare for research:
    - define information needs using a variety of strategies
    - explore information using a variety of group activities
    - identify varied ways of organizing information
    - relate prior knowledge to information tasks;
- access resources:
    - locate a variety of appropriate resources from a variety of sources
    - select information appropriate to needs using a variety of strategies
    - gather information from resources using internal organizers and conventions of texts
    - collaborate with others to share findings and ideas;
- process information:
    - analyse and evaluate information using a variety of strategies
    - test ideas to adjust research and problem solving strategies
    - sort information using a variety of organizers and formats
    - synthesize findings and formulate conclusions;
- transfer learning:
    - revise product appropriate to purpose, audience and format
    - present research findings in a variety of forms for a variety of audiences
    - reflect on and evaluate product and process
    - transfer new information skills and knowledge to solve problems and make decisions.

Expectations in Specific Areas

Reasoning

By the end of Grade 10, students will:

- prioritize questions for significance, relevance and practicality
- form questions into focus and reflect on continual appropriateness of focus
- select specialized atlases, such as historical and cultural atlases
- select appropriate census material
- analyse inaccuracy and ambiguity in information and their effect on argument
- evaluate the clarity of language to support ideas
- judge if conclusion follows the argument
- understand general principles of good research

use journal to track product and process, including emotional and intellectual responses

Organizing

By the end of Grade 10, students will:

- compare the organizational structures of similar reference materials
- interpret statistical information in varied media such as handbooks, yearbooks, almanacs and reports
- use advanced print or online indexes to periodicals
- create advanced databases and spreadsheets and output information in a variety of ways
- create summaries
- use advanced bibliographic conventions
- revise introduction and conclusion to provide context
- verify accuracy of facts and quotations from secondary sources
- follow a standard format for a variety of products

Communicating

By the end of Grade 10, students will:

- use informal debate strategies to explore ideas during research process

- use informal meeting strategies to share ideas during research
- use flow charts in peer and teacher conferencing to check progress and test clarity of ideas
- use presentation software to present research

Applying

By the end of Grade 10, students will:

- use published print and electronic bibliographies to start search
- begin to use special libraries, local and virtual, for information
- begin to search the Internet using a range of strategies available in a variety of meta search engines
- discover relationships in information
- make personal meaning from the information analysed
- make judgments and draw conclusions to solve problems

Inquiry and Research: Grade 11

Overall Expectations

By the end of Grade 11, students will:

- prepare for research:
    - define information needs using a variety of strategies
    - explore information using a variety of group activities
    - identify varied ways of organizing information
    - relate prior knowledge to information tasks;
- access resources:
    - locate a variety of appropriate resources from a variety of sources
    - select information appropriate to needs using a variety of strategies
    - gather information from resources using internal organizers and conventions of texts
    - collaborate with others to share findings and ideas;
- process information:
    - analyse and evaluate information using a variety of strategies
    - test ideas to adjust research and problem solving strategies
    - sort information using a variety of organizers and formats
    - synthesize findings and formulate conclusions;
- transfer learning:
    - revise product appropriate to purpose, audience and format
    - present research findings in a variety of forms for a variety of audiences
    - reflect on and evaluate product and process
    - transfer new information skills and knowledge to solve problems and make decisions.

Expectations in Specific Areas

Reasoning

By the end of Grade 11, students will:

- critique own questions as essential and non essential
- form questions into thesis and reflect on continual appropriateness of thesis
- select specialized atlases, such as regional and economic atlases
- select bibliographies
- analyse the validity of hypothesis of a resource by examining its primary and secondary sources
- construct logic statements to test the validity of argument
- recognize personal learning styles and their impact on research and problem solving
- set goals for improvement in next research activity

Organizing

By the end of Grade 11, students will:

- describe different classification systems

- use specialized indexes such as literary, legal, bibliographic, biographic and business indexes
- create abstracts
- use outlining and flowchart software to organize data
- use advanced surveys
- re-examine currency of research and modify product in light of new findings

Communicating

By the end of Grade 11, students will:

- use formal debate strategies to explore ideas during research process
- use formal meeting strategies to share ideas during research
- use abstracts in peer and teacher conferencing to check progress
- publish information in virtual formats, such as Web pages

Applying

By the end of Grade 11, students will:

- examine published hypotheses for similarities and differences with own hypothesis
- use special libraries, local and virtual, for information
- search the Internet using a range of strategies available in a variety of meta search engines
- begin to extend insights and opinions from findings
- relate research findings to global perspectives
- make judgments and draw conclusions to solve problems
- suggest areas for further research

Inquiry and Research: Grade 12

Overall Expectations

By the end of Grade 12, students will:

- prepare for research:
    - define information needs using a variety of strategies
    - explore information using a variety of group activities
    - identify varied ways of organizing information
    - relate prior knowledge to information tasks;
- access resources:
    - locate a variety of appropriate resources from a variety of sources
    - select information appropriate to needs using a variety of strategies
    - gather information from resources using internal organizers and conventions of texts
    - collaborate with others to share findings and ideas;
- process information:
    - analyse and evaluate information using a variety of strategies
    - test ideas to adjust research and problem solving strategies
    - sort information using a variety of organizers and formats
    - synthesize findings and formulate conclusions;
- transfer learning:
    - revise product appropriate to purpose, audience and format
    - present research findings in a variety of forms for a variety of audiences
    - reflect on and evaluate product and process
    - transfer new information skills and knowledge to solve problems and make decisions.

Expectations in Specific Areas

Reasoning

By the end of Grade 12, students will:

- recognize the importance of taking time to internalize questions and findings at all stages of the process
- select archival material and government documents
- select journals and abstracts
- deconstruct an argument to determine original principles
- analyse both inductive and deductive arguments and evaluate the logic of their conclusions
- recognize and integrate the learning styles of others in research and problem solving
- foresee consequences and implications of personal research

Organizing

By the end of Grade 12, students will:

- identify how resources are classified within different classification systems
- visit a variety of physical and virtual libraries and describe their features
- use specialized indexes such as newspaper, journal, and trade indexes to prepare for post-secondary employment and education
- create précis
- create relational databases and output information in a variety of ways
- distinguish between MLA and APA bibliographic conventions
- use conventions of editing and revising print, media and electronic texts such as proofreader's marks and director's cues

Communicating

By the end of Grade 12, students will:

- use a variety of seminar strategies to explore ideas during research process
- conduct an electronic conference to collect ideas from a wide variety of student and expert participants
- use précis in peer and teacher conferencing to check progress
- extend presentations to a variety of communities for authentic performance

Applying

By the end of Grade 12, students will:

- identify the strengths and weaknesses in knowledge and experience prior to task
- use controlled vocabulary for subject searching
- locate archival and government documents
- use free text searching of online resources
- extend insights and opinions from findings
- make judgments and draw conclusions to solve problems
- transfer conclusion reached in one context to another context, e.g., from the arts to the sciences.

Figure 11. Scope and Sequence: Inquiry and Research - Kindergarten

	CONCEPTS / REASONING	ORGANIZING	COMMUNICATING	APPLYING
G R A D E	– **define needs, select information, make sense of information and respond to findings**	– **identify, gather and sort information and observations**	– **explore information, and collaborate with others, test ideas and share findings**	– **relate prior knowledge, locate information, make observations, and adapt to new learning**
K i n d e r g a r t e n	– ask questions and express feelings about answers found – begin to distinguish between real and imaginary stories and depictions – begin to make predictions about stories and information – make a simple plan to get information and carry out its steps – investigate and describe familiar cultural, geographical and recreational features of their neighbourhood	– identify some features of books and other written materials – begin to describe the library layout and routines – sort and classify objects by characteristic and category – identify parts of things, such as parts of the body, and describe their separate function	– ask questions within a group about people, places and things they are curious about – share feelings and ideas about information-based experiences in a variety of verbal and non-verbal ways – use a variety of print and physical materials to communicate information and ideas – choose products for portfolio collections in consultation with peers and teachers	– express wonder and curiosity about the world of information around them – identify new thoughts and feelings arising from information-based activities – make appropriate observations about information results and findings

Figure 11. Scope and Sequence: Inquiry and Research - Grades 1 to 6

	CONCEPTS / REASONING			
G R A D E	**PREPARING** – **define information needs using a variety of strategies**	**ACCESSING** – **select information appropriate to needs using a variety of strategies**	**PROCESSING** – **analyse and evaluate information using a variety of strategies**	**TRANSFERRING** – **reflect on and evaluate research product and process**
1	– use brainstorming to explore thoughts and feelings – role play questions and answers – use question starter words – distinguish between	– predict content from the cover of a book – begin to understand keywords – find information from illustrative works	– predict story sequence and revise/confirm predictions – retell a simple story in proper sequence and recall information in it accurately – distinguish between real-life and media depictions	– complete simple self-evaluation charts – comment on the ease and difficulty of a task
2	– articulate questions – experiment with concrete objects – cluster ideas – collaborate with teacher to plan research	– begin to use illustrated dictionaries and encyclopedias – select pictures and found objects for information	– identify advertisements – restate information in a short non-fiction text in their own words – retell a story in proper sequence and identify the main idea and characters	– make conclusions based on completed research – participate in peer conferences
3	– ask questions to clarify meaning and encourage responses – narrow and broaden focus – outline necessary resources and plan steps to obtain them	– select information from a range of print and electronic resources – explore bookmarked Internet sites – use picture files and globes	– distinguish between fact and fiction – identify and restate main ideas in a piece of writing and cite supporting details – interpret data from graphs	– reflect on opportunities for further developments – complete tracking sheets
4	– formulate questions to guide research – create mind maps, subject webs prior to search – get an overview of a topic or problem from a variety of reference resources	– begin to reread, skim, and scan to select appropriate information – conduct interviews and surveys – begin to bookmark Internet sites relevant to research	– identify story elements – identify bias in information – distinguish between fact and opinion	– start to complete learning logs and response journals – identify how data was collected
5	– structure search strategies within set timelines – build a knowledge base from a variety of resources – distinguish different kinds and purposes of questions – develop a research focus	– select novels, short stories, biographies – bookmark and use Internet sites relevant to research – select information from a variety of electronic reference materials	– identify main ideas and supporting details – examine currency of data – evaluate definitions – discuss patterns in data	– complete self-evaluation on product and process, identifying strengths and weaknesses – analyse how data was collected and discuss the reasonableness of results
6	– structure search strategies and timelines – develop research plans with statement of purpose – begin to manage thoughts and feelings arising from research process	– select periodicals – select national and international atlases – compare formats of print and electronic reference materials to facilitate selection of information	– deconstruct media works – identify agreement and dis-agreement among sources – distinguish between primary and secondary sources	– independently complete self-evaluation on all research and information problem solving – demonstrate an understand-ing of probability in making appropriate conclusions

Figure 11. Scope and Sequence: Inquiry and Research - Grades 1 to 6

	ORGANIZING			
G R A D E	**PREPARING** – **identify varied ways of organizing information**	**ACCESSING** – **gather information from resources using internal organizers and conventions of texts**	**PROCESSING** – **sort information using a variety of organizers and formats**	**TRANSFERRING** – **revise product appropriate to purpose, audience and format**
1	– identify parts of fictional texts such as table of contents and chapters – describe library layout and routines – complete information tasks within structured time	– use information from different parts of a book – read pictures for information – understand what an author and a title are	– write simple notes – draw pictures for storybooks – organize information on concrete graphs and pictographs – explain sorting method	– participate in student –teacher conferencing – begin to understand the difference between rough copy and finished product
2	– identify different forms of information such as story books, informational texts and environmental print – identify major Dewey Decimal categories	– use a table of contents, index and chapter headings – look for key words in simple interactive software – identify information from basic parts of a graph	– begin to create timelines – make jot notes – prepare storyboards – create a research folder – record sources – use graphic organizers	– make corrections to products – practise performances
3	– identify the parts of non-fiction texts such as indexes – begin to identify catalogue record elements – explore reference information on CD-ROMs and in simple	– use the elements of charts, diagrams and graphs to collect information – enter simple search words – use the features of thesauri to collect information	– use titles and subheadings – enter data into simple databases and spreadsheets – use source sheets to record – organize data into charts and diagrams using several criteria	– use peer-conferencing to revise work – begin to practise self-editing and proofreading
4	– use library terminology – understand organization of atlases – identify Dewey Decimal sub-categories – recognize the purposes of different parts of a graph	– use index in multi-volume works – explore specific Web sites on the Internet – use conventional symbols, titles and labels when displaying data	– make notes on such organizers as index cards – prepare outlines – identify key points – use research folder to organize a variety of information	– routinely edit work, with feedback from teachers and peers – choose an appropriate title for research
5	– identify the features of a variety of media – understand role of bibliographic conventions – determine time required to complete tasks	– begin to use footnotes and bibliographic citations found in resources to locate other information	– begin to use simple bibliographic conventions – prepare simple flow charts with timelines – create simple databases and spreadsheets and output data in a variety of ways	– understand the needs of the audience and the purpose of the product – recognize the need for deadlines and meet them
6	– explore various subject directories on CD-ROMs – describe how information on specific Web sites is structured	– prepare key words, descriptors and concepts appropriate to intended research, e.g. dictionary definitions; specialized terms in math and science	– use simple bibliographic conventions – use headings and captions – design surveys, organize data into self-selected categories and ranges, and record data on spreadsheets	– compare information selected and interpreted with information needs and adjust research strategies if necessary – eliminate irrelevant information

Figure 11. Scope and Sequence: Inquiry and Research - Grades 1 to 6

	COMMUNICATING			
G R A D E	**PREPARING** – **explore information using a variety of group activities**	**ACCESSING** – **collaborate with others to share findings and ideas**	**PROCESSING** – **test ideas to adjust research and problem solving strategies**	**TRANSFERRING** – **present research findings in a variety of forms for a variety of audiences**
1	– create group lists of previous knowledge about a particular topic or topics – take turns speaking in a group, sharing ideas	– present research question to group, answering questions for clarifications – express feelings and ideas about information-based experiences in a variety of verbal and non-verbal ways	– recount personal experiences seeking information – make predictions about information and stories	– report findings pictorially – create simple dramatic presentations
2	– ask questions for clarification	– work in small groups effectively, taking responsibility for personal contributions	– complete simple response journals – participate in choral responses	– create simple research reports – restate information in own words – construct and label simple graphs
3	– get feedback from teachers and peers – participate in class discussions	– contribute to group databases	– participate in small group discussions, including peer and teacher conferences	– illustrate text appropriately with a range of visual materials – explain copyright and plagiarism and report findings without plagiarizing form and ideas of others
4	– stay on topic in group discussions – begin to participate in telecommunications projects	– share findings in electronic format, e.g. keypals, conferencing and databases	– review research strategies in peer and teacher conferencing	– create simple spreadsheets and tables – create dramatizations
5	– use appropriate strategies to organize group projects	– prepare subject webs to connect similar ideas	– create preliminary outline based on initial findings and test clarity with group	– create timelines and multi-media presentations – use authentic performance strategies to present research
6	– listen to, acknowledge and consider differing opinions in group work	– work in teams to develop project outlines	– formulate hypothesis and test validity with peers and teacher	– evaluate the advantages and disadvantages of various presentation formats – experiment with a variety of displays of the same data

Figure 11. Scope and Sequence: Inquiry and Research - Grades 1 to 6

	APPLYING			
G R A D E	**PREPARING** – **relate prior knowledge to information tasks**	**ACCESSING** – **locate a variety of appropriate resources from a variety of sources**	**PROCESSING** – **synthesize findings and formulate conclusions**	**TRANSFERRING** – **transfer information skills and knowledge to solve problems and make decisions**
1	– create charts that distinguish what they know and what they need to know	– identify pattern books and simple poetry texts – be familiar with some sections of the library – be familiar with the public library	– organize information into pictographs – create story maps – express their thoughts and feelings about stories and informational texts	– complete pictorial self-evaluation – talk about new learning – make judgments and draw conclusions to solve problems
2	– create lists of focus words – use previously written journal entries	– identify storybooks and interactive software – begin to understand the organization and range of the school library – browse library shelves to locate information	– express their thoughts and feelings about ideas in stories and informational texts	– identify connections to everyday life – make judgments and draw conclusions to solve problems
3	– recall past experiences with information resources – begin to make inferences when reading	– locate chapter books and children's reference books – begin to use catalogues to locate materials by call number – browse bookmarked sites on the Internet	– create a variety of charts to collect and organize data according to given criteria – begin to develop their own opinions by considering ideas from various materials – identify connecting ideas	– prepare a list of further information problems to solve – make judgments and draw conclusions to solve problems
4	– use an encyclopedia to provide overview of topic – clarify meaning with a dictionary	– search catalogue by author, title, subject – locate novels, biographies and myths – browse subject directories on the Internet	– compare findings with predictions – identify their own point of view in research	– relate ideas in materials to personal knowledge and experience – make judgments and draw conclusions to solve problems
5	– prepare a list of potential kinds of resources, prior to beginning search	– locate periodicals, texts and editorials – independently search automated catalogues – begin to search the Internet using keywords in single search engines	– use matrixes to sort facts and similarities, and to evaluate and classify data – discover relationships between resources	– relate research findings to personal knowledge and experience – make judgments and draw conclusions to solve problems
6	– browse the appropriate sections of the library to expand approaches to a topic	– locate and read a wide range of resources – begin to search the Internet using features of single search engines – retrieve information from databases	– create tree diagrams to analyse parts, and to order or rank information – make analogies to connect ideas in a variety of formats – analyse data to make infer-ences and arguments	– relate research findings to career possibilities and applications in the workplace – make judgments and draw conclusions from research to solve problems

Figure 11. Scope and Sequence: Inquiry and Research - Grades 7 to 12

	CONCEPTS / REASONING			
G R A D E	**PREPARING** – **define information needs using a variety of strategies**	**ACCESSING** – **select information appropriate to needs using a variety of strategies**	**PROCESSING** – **analyse and evaluate information using a variety of strategies**	**TRANSFERRING** – **reflect on and evaluate research product and process**
7	– begin to use planners – formulate questions that would synthesize various sources of information and points of view – learn to prepare questions in advance of research	– select a variety of periodicals – select information from relevant field study	– understand plagiarism and copyright – examine the authority, validity and reliability of print and online resources – begin to identify criteria used to evaluate information	– begin to articulate the stages of the research process – judge if a problem has been identified and solved – identify bias in data collection methods
8	– recognize elements of potentially successful research questions – ask higher-order questions	– select CD ROM databases – select biographical resources	– compare and verify statements from two or more sources – examine assumptions and bias in information – identify criteria used to evaluate information	– articulate the stages of the research process – assess bias in data collection methods – examine assumptions in product and process
9	– begin to prioritize questions for significance, relevance and practicality – use planners independently – manage thoughts and feeling arising from research	– select a variety of online databases – select handbooks, almanacs and directories	– compare comprehensiveness of sources – analyse bias and suggest alternative sources – design criteria to evaluate information	– begin to understand general principles of good research – begin to use journal to track product and process, including emotional and intellectual responses
10	– prioritize questions for significance, relevance and practicality – form questions into focus and reflect on continual appropriateness of focus	– select specialized atlases, such as historical and cultural atlases – select appropriate census material	– analyse inaccuracy and ambiguity in information and their effect on argument – evaluate the clarity of language to support ideas – judge if conclusion follows the argument	– understand general principles of good research – use journal to track product and process, including emotional and intellectual responses
11	– critique own questions as essential and non essential – form questions into thesis and reflect on continual appropriateness of thesis	– select specialized atlases, such as regional and economic atlases – select bibliographies	– analyse the validity of hypothesis of a resource by examining its primary and secondary sources – construct logic statements to test the validity of argument	– recognize personal learning styles and their impact on research and problem solving – set goals for improvement in next research activity
12	– recognize the importance of taking time to internalize questions and findings at all stages of the process	– select archival material and government documents – select journals and abstracts	– deconstruct an argument to determine original principles – analyse both inductive and deductive arguments and evaluate the logic of their conclusions	– recognize and integrate the learning styles of others in research and problem solving – foresee consequences and implications of personal research

Figure 11. Scope and Sequence: Inquiry and Research - Grades 7 to 12

|	ORGANIZING			
G R A D E	**PREPARING** – **identify varied ways of organizing information**	**ACCESSING** – **gather information from resources using internal organizers and conventions of texts**	**PROCESSING** – **sort information using a variety of organizers and formats**	**TRANSFERRING** – **revise product appropriate to purpose, audience and format**
7	– explain the purpose of catalogue record elements – distinguish between general and subject specific reference materials – describe how different formats record information	– begin to use simple print or online indexes to periodicals – identify conventional symbols, titles and labels that organize data	– create prefaces and tables of contents – use basic surveys – use simple bibliographic conventions – sort data on tally charts and stem-and-leaf charts	– edit product for coherence – verify the adequacy of information selected
8	– describe the features and conventions of a variety of reference materials	– use bibliographies and suggested readings in reference materials to investigate further sources – use simple print or online indexes to periodicals	– create paraphrases – use legends – use matrices to record variables for decision making – sort collected information, using general and sample data	– edit product for unity – verify the accuracy of examples and quotations from primary sources – check product for bias
9	– describe how periodicals are indexed in print or electronic form	– use varied dictionary entries to determine connotation, etymology and idiom – gather human resource information from directories, electronic yellow pages and email	– begin to create advanced databases and spreadsheets and output information in a variety of ways – chart concept formation – begin to use advanced bibliographic conventions	– edit product for emphasis – verify the logic of argument – begin to follow a standard format for a variety of formats
10	– compare the organizational structures of similar reference materials	– interpret statistical information in varied media such as handbooks, yearbooks, almanacs and reports – use advanced print or online indexes to periodicals	– create advanced databases and spreadsheets and output information in a variety of ways – create summaries – use advanced bibliographic conventions	– revise introduction and con-clusion to provide context – verify accuracy of facts and quotations from secondary sources – follow a standard format for a variety of products
11	– describe different classification systems	– use specialized indexes such as literary, legal, bibliographic, biographic and business indexes	– create abstracts – use outlining and flowchart software to organize data – use advanced surveys	– re-examine currency of research and modify product in light of new findings
12	– identify how resources are classified within different classification systems – visit a variety of physical and virtual libraries and describe their features	– use specialized indexes such as newspaper, journal, and trade indexes to prepare for post-secondary employment and education	– create précis – create relational databases and output information in a variety of ways – distinguish between MLA and APA bibliographic conventions	– use conventions of editing and revising print, media and electronic texts such as proofreader's marks and director's cues

Figure 11. Scope and Sequence: Inquiry and Research - Grades 7 to 12

	COMMUNICATING			
G R A D E	**PREPARING** – **explore information using a variety of group activities**	**ACCESSING** – **collaborate with others to share findings and ideas**	**PROCESSING** – **test ideas to adjust research and problem solving strategies**	**TRANSFERRING** – **present research findings in a variety of forms for a variety of audiences**
7	– use role play strategies to explore ideas during research process	– develop subject webs to expand connections among similar ideas	– use detailed outlines in peer and teacher conferencing to check progress and test clarity of ideas	– use appropriate transitions in presenting research – display data and information in a variety of formats, with and without the use of technology
8	– use simulation strategies to explore ideas during research process	– participate in an electronic conference to share and contribute ideas	– use paraphrase in peer and teacher conferencing to check progress and test clarity of ideas	– maintain an appropriate tone in presenting research through diction and detail – manipulate and present data using spreadsheets – begin to use presentation software to present research
9	– conduct formal interview strategies to explore ideas during research process	– complete delegated group work	– use summaries in peer and teacher conferencing to check progress and test clarity of ideas	– integrate varied forms of and approaches to information in presentations
10	– use informal debate strategies to explore ideas during research process	– use informal meeting strategies to share ideas during research	– use flow charts in peer and teacher conferencing to check progress and test clarity of ideas	– use presentation software to present research
11	– use formal debate strategies to explore ideas during research process	– use formal meeting strategies to share ideas during research	– use abstracts in peer and teacher conferencing to check progress	– publish information in virtual formats, such as Web pages
12	– use a variety of seminar strategies to explore ideas during research process	– conduct an electronic conference to collect ideas from a wide variety of student and expert participants	– use précis in peer and teacher conferencing to check progress	– extend presentations to a variety of communities for authentic performance

Figure 10. Scope and Sequence: Inquiry and Research - Grades 7 to 12

	APPLYING			
G R A D E	**PREPARING** – **relate prior knowledge to information tasks**	**ACCESSING** – **locate a variety of appropriate resources from a variety of sources**	**PROCESSING** – **synthesize findings and formulate conclusions**	**TRANSFERRING** – **transfer information skills and knowledge to solve problems and make decisions**
7	– use see references and cross references to expand approaches to a topic	– independently use the public library to locate information – search the Internet using a variety of features in single search engines	– develop generalizations – generalize findings into useful conclusions – make inferences and convincing arguments based on data analysis	– begin to recast a product in a new format for a range of purposes and audiences – make judgments and draw conclusions to solve problems
8	– use previous research folder to generate ideas and approaches – compare predicted and experimental results	– begin to use community resources and organizations for information – begin to search the Internet using a range of strategies available in a variety of single search engines	– identify cause and effect relationships in information – determine trends and patterns in information – make inferences and convincing arguments based on data analysis	– recast a product in a new format for a range of purposes and audiences – make judgments and draw conclusions to solve problems
9	– use visual organizers such as mind maps – maintain a log of thoughts and feelings as a response to learning	– use community resources and organizations for information – search the Internet using a range of strategies available in a variety of single search engines	– make connections between sources to provide overview – regroup and organize data to make connections – analyse conflicting information	– make judgments and draw conclusions to solve problems
10	– use published print and electronic bibliographies to start search	– begin to use special libraries, local and virtual, for information – begin to search the Internet using a range of strategies available in a variety of meta search engines	– discover relationships in information – make personal meaning from the information analysed	– make judgments and draw conclusions to solve problems
11	– examine published hypotheses for similarities and differences with own hypothesis	– use special libraries, local and virtual, for information – search the Internet using a range of strategies available in a variety of meta search engines	– begin to extend insights and opinions from findings – relate research findings to global perspectives	– make judgments and draw conclusions to solve problems – suggest areas for further research
12	– identify the strengths and weaknesses in knowledge and experience prior to task	– use controlled vocabulary for subject searching – locate archival and government documents – use free text searching of online resources	– extend insights and opinions from findings	– make judgments and draw conclusions to solve problems – transfer conclusion reached in one context to another context, e.g., from the arts to the sciences

Information Technologies
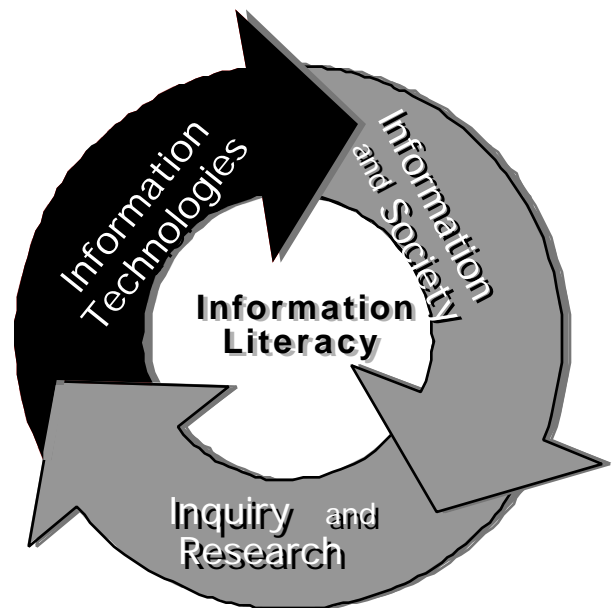
Information Technologies is the applied skills component of *Information Studies: Kindergarten to Grade 12*. It complements the process of **Inquiry and Research** and the knowledge context of **Information and Society**.

Information Technologies

Students need to develop the skills and knowledge of information technologies to harness the power, effectiveness, efficiency and excitement of learning in the information age. In fact, technological literacy is such a vital component of information literacy, that its neglect could seriously effect future academic success and career opportunity.

Information technology is a term used to include a wide range of technologies – print, digital and visual media -- for storing, retrieving, sending and transferring information. The term is also used to describe the study or application of systems (especially computers, digital electronics, telecommunication, automated catalogues, etc.) Information technology is a significant enterprise in schools for neither the technological message nor medium is neutral: both moveable type and digital byte are extensions of feeling, thinking, seeing and understanding.

Today's environment requires all teachers to provide varied, continuous and well-planned technological opportunities to extend students' information skills (See Figure 12). Learning programs must provide students with a wide range of information, access to information technology and information skills training. This is important for all students, and crucial to the success of those who, because of background or economic circumstances, do not have access to information technologies in their homes. Equity of access to information instruction and technologies in schools will improve learning for all students, including those with special needs. It will also help educators reduce other barriers that prevent some students from both imagining and realizing their potential.
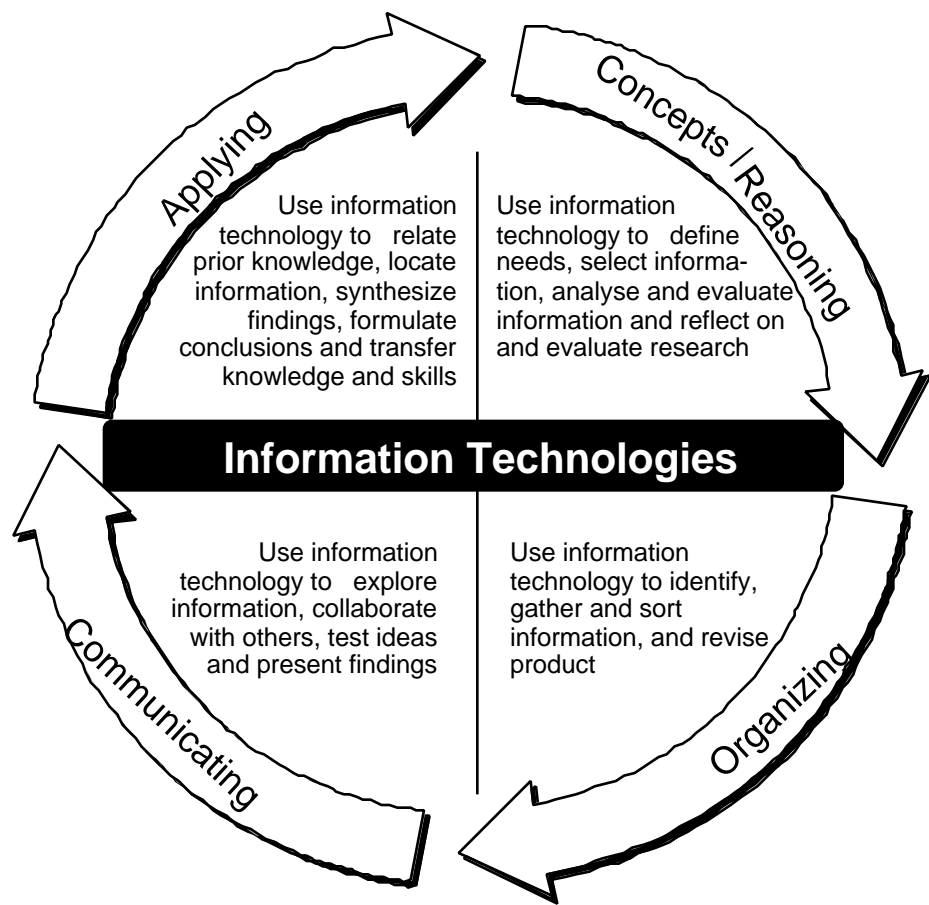

Figure 12: Information Technologies

Schools need to place information technology in appropriate contexts to integrate the tools, personalize the experience and extend its transfer to other areas of life and learning.

The school library, for instance, provides a complete range of information technology programs within the context of a wide range of resources - print and electronic, book and tape, film and CD-ROM, file and Web. Library resources are organized to be found and principles of equitable and effective access reward the retrieval skills used in searching both automated catalogues and the Internet. When placed within the context of the program of *Inquiry and Research* and *Information and Society*, information technology can enrich learning and its transfer.

Figure 13 represents a scope and sequence of the knowledge and skills of Information Technologies to track student progress as a continuum for Kindergarten to Grade 12. Such progress is made possible when teachers and teacher-librarians work together to collect demonstrations of authentic performances grade to grade.

Information Technologies: Kindergarten

Overall Expectations

By the end of Grade 1, students will:

- use information technology to define needs, select information, make sense of information and respond to findings;
- use information technology to identify, gather and sort information and observations;
- use information technology to explore information, and collaborate with others, test ideas and share findings;
- use information technology to relate prior knowledge, locate information, make observations, and adapt to new learning.

Expectations in Specific Areas

Reasoning

By the end of Kindergarten, students will:

- respond to information from a variety of media verbally and non-verbally

Organizing

By the end of Kindergarten, students will:

- use patterning software applications to structure information

Communicating

By the end of Kindergarten, students will:

- use a variety of software tools and techniques to make products and presentations
- work with others in using technology

Applying

By the end of Kindergarten, students will:

- use a variety of familiar technologies appropriately

Information Technologies: Grade 1

Overall Expectations

By the end of Grade 1, students will:

- use information technology to define needs, select information, analyse information, and reflect on research;

- use information technology to identify, gather and sort information, and revise product;

- use information technology to explore information, collaborate with others, test ideas and present findings;

- use information technology to relate prior knowledge, locate information, synthesize findings, formulate conclusions and transfer knowledge and skills.

Expectations in Specific Areas

Reasoning

By the end of Grade 1, students will:

- select audio, video and CD resources appropriate to need
- restate information from audio and video recordings
- develop group/class chart categorizing information needs and the technology and media products to meet them
- explain why selected information is important

Organizing

By the end of Grade 1, students will:

- use pictorial and alphabetical prompts on CD-ROMs to understand the organization of information
- enter text in a word processor
- begin to use drawing tools to record information
- develop basic telephone skills such as answering and taking a message

Communicating

By the end of Grade 1, students will:

- develop active listening and viewing skills such as recording video information on a class chart
- create a story on a computer template
- create a pictograph to share gathered information

- explore basic computer drawing tools such as paintbrush

Applying

By the end of Grade 1, students will:

- search for information by keyword and subject on OPAC
- use available automated systems to exchange library materials
- use cassette or CD to listen to a story or gather information
- operate a tape recorder to share collected information
- use draw applications to create simple pictures
- practice safe and responsible use of information technologies

Information Technologies: Grade 2

Overall Expectations

By the end of Grade 2, students will:

- use information technology to define needs, select information, analyse information, and reflect on research ;

- use information technology to identify, gather and sort information, and revise product;

- use information technology to explore information, collaborate with others, test ideas and present findings;

- use information technology to relate prior knowledge, locate information, synthesize findings, formulate conclusions and transfer knowledge and skills.

Expectations in Specific Areas

Reasoning

By the end of Grade 2, students will:

- select a variety of audio, video and CD resources appropriate to need
- restate pertinent information from audio and video recordings
- explore CD-ROMs to introduce a topic

Organizing

By the end of Grade 2, students will:

- use menus on CD-ROMs to understand the organization of information
- begin to develop word processor skills such as cut, copy and paste
- use drawing tools and simple databases to sort and record information
- explain how information was collected

Communicating

By the end of Grade 2, students will:

- create a presentation using simple drawing publication software
- develop basic computer drawing tools such as fill tools
- explore use of word processing tools such as font size, style and colour to enhance text presentations
- develop telephone skills through role play
- comply with an acceptable use policy

Applying

By the end of Grade 2, students will:

- use basic organizational tools such as alphabetical indexes and hypertext to retrieve information on CD-ROMs
- search for information by keywords, subject, author and title on OPAC
- use computer files to share collected information
- use television and VCR to retrieve information

Information Technologies: Grade 3

Overall Expectations

By the end of Grade 3, students will:

- use information technology to define needs, select information, analyse information, and reflect on research;

- use information technology to identify, gather and sort information, and revise product;

- use information technology to explore information, collaborate with others, test ideas and present findings;

- use information technology to relate prior knowledge, locate information, synthesize findings, formulate conclusions and transfer knowledge and skills.

Expectations in Specific Areas

Reasoning

By the end of Grade 3, students will:

- identify different media works such as television programs and CD-ROMs and describe the purpose of each
- identify communication technology tools and describe the function of each such as television, computer, telephone
- describe how electronic resources enhance reading, viewing and listening for information and pleasure

Organizing

By the end of Grade 3, students will:

- develop word processor skills such as cut, copy and paste
- investigate how different formats are organized such as photos, collage and newspapers
- use camcorder and camera to collect data
- use audio and video tape to record information
- use story board organizer to plan projects

Communicating

By the end of Grade 3, students will:

- create a simple media work such as picture book, advertisement or a video production and adhere to principles of copyright

- share information using appropriate presentation technologies such as overhead projector and VCR
- conduct interviews or surveys following a prepared script in small groups using telephone, fax, or Email (penpals)

Applying

By the end of Grade 3, students will:

- locate and retrieve appropriate resources such as online catalogues, reference CD-ROMs and audio/visual resources
- use preselected bookmarks to access Web pages
- identify basic techniques in media production such as camera angle, music, and colour
- begin to synthesize results lists from searches on CD-ROMs

Information Technologies: Grade 4

Overall Expectations

By the end of Grade 4, students will:

- use information technology to define needs, select information, analyse information, and reflect on research;

- use information technology to identify, gather and sort information, and revise product;

- use information technology to explore information, collaborate with others, test ideas and present findings;

- use information technology to relate prior knowledge, locate information, synthesize findings, formulate conclusions and transfer knowledge and skills.

Expectations in Specific Areas

Reasoning

By the end of Grade 4, students will:

- explore topic to be investigated using a variety of media such as video, and CD-ROMs
- analyse story elements in audio, video and electronic presentation

Organizing

By the end of Grade 4, students will:

- recognize structural elements used to create media works and understand their function
- use electronic template to record information from telephone interview and surveys
- use prepared database or spread sheet to enter and edit data

Communicating

By the end of Grade 4, students will:

- participate in electronic communication
- create a simple slide show using a prepared template from a digital presentation tool
- develop word processing/drawing skills to edit and write/create research
- publish electronically a product for sharing information

Applying

By the end of Grade 4, students will:

- locate and retrieve appropriate resources such as bookmarked Web sites and subject directories
- operate a tape recorder and still camera to collect data
- synthesize results lists from searches on CD-ROMs
- use graphic applications to illustrate information
- use word processor to load, edit and save information

Information Technologies: Grade 5

Overall Expectations

By the end of Grade 5, students will:

- use information technology to define needs, select information, analyse information, and reflect on research;

- use information technology to identify, gather and sort information, and revise product;

- use information technology to explore information, collaborate with others, test ideas and present findings;

- use information technology to relate prior knowledge, locate information, synthesize findings, formulate conclusions and transfer knowledge and skills.

Expectations in Specific Areas

Reasoning

By the end of Grade 5, students will:

- examine media works such as television commercial or documentary film to identify creator's purpose and strategies to achieve it
- explore topic to be investigated using a variety of media such as videos and television shows

Organizing

By the end of Grade 5, students will:

- use video and computer applications to organize, sort and visually display data and draw conclusions
- print selected text, pictures or maps from appropriate electronic resources to collect information and meet information need
- organize and display data using line graphs, bar graphs, pictographs and circle graphs

Communicating

By the end of Grade 5, students will:

- participate in electronic communication for peer editing
- use online collaborative tools to develop team projects
- prepare simple multimedia works to present research
- develop presentation software skills such as creating stacks for a slide show

- publish electronically a product for sharing information

Applying

By the end of Grade 5, students will:

- use multiple keywords to search OPAC and CD-ROMs
- begin to search Internet by keywords in single search engines
- use database or spreadsheet to compare and contrast resources
- obtain data by phone, letter and online
- use graphic applications to illustrate information
- add drawn, scanned, or digital pictures to documents

Information Technologies: Grade 6

Overall Expectations

By the end of Grade 6, students will:

• use information technology to define needs, select information, analyse information, and reflect on research;

• use information technology to identify, gather and sort information, and revise product;

• use information technology to explore information, collaborate with others, test ideas and present findings;

• use information technology to relate prior knowledge, locate information, synthesize findings, formulate conclusions and transfer knowledge and skills.

Expectations in Specific Areas

Reasoning

By the end of Grade 6, students will:

– investigate common technology tools and identify types of tasks for which they can be used
– justify the choice of presentation technology and how it meets information needs
– analyse and evaluate data using appropriate software tools such as outlining and graphic organizers

Organizing

By the end of Grade 6, students will:

– combine data, design spreadsheets and make charts and graphs to record and display information
– use organization tools such as timelines, knowledge trees, hypertext links, legends and indexes to record and organize information
– create storyboard organizer to plan video and electronic slide presentation

Communicating

By the end of Grade 6, students will:

– integrate text, graphics and sound in presentations
– use Email and web pages to share information
– contribute information to a class web page

– prepare a display using different technologies such as scanners, digital cameras and camcorders
– describe the purpose of netiquette and follow its protocols

Applying

By the end of Grade 6, students will:

– begin to search the Internet using Boolean operators in single search engines
– use applications to display data in a variety of ways to determine most effective mode of presentation
– integrate multimedia tools such as importing sound/graphics
– use appropriate information technology hardware such as fax, VCR, camcorder, digital camera and computer

Information Technologies: Grade 7

Overall Expectations

By the end of Grade 7, students will:

- use information technology to define needs, select information, analyse information, and reflect on research;

- use information technology to identify, gather and sort information, and revise product;

- use information technology to explore information, collaborate with others, test ideas and present findings;

- use information technology to relate prior knowledge, locate information, synthesize findings, formulate conclusions and transfer knowledge and skills.

Expectations in Specific Areas

Reasoning

By the end of Grade 7, students will:

- examine media works for usefulness, validity and effectiveness identifying perspective, bias, inclusiveness, stereotyping, intent, credibility
- analyse a specific problem and select and use appropriate tools to solve it in a variety of technological formats
- assess the value and usability of a variety of electronic resources such as CD-ROMs, for class and personal use

Organizing

By the end of Grade 7, students will:

- deconstruct media products such as video and CD-ROM for structural design and techniques
- use appropriate technology such as VCR and camcorders to collect, revise and edit products for presentation
- use stationary organizers (templates) to organize data
- use slide show software to edit and organize information for presentation

Communicating

By the end of Grade 7, students will:

- import digital pictures for a presentation
- express data in a variety of graphs, pie charts, histograms

- present electronic slide show and video of research for target audience for a specific purpose
- publish a report, newsletter or pamphlet using word processing and desktop publishing software

Applying

By the end of Grade 7, students will:

- search the Internet using keywords and Boolean operators in single search engines
- develop skills integrating multimedia tools
- use appropriate information technology hardware such as fax, VCR, camcorder, camera (digital) and computer
- use a variety of electronic reference tools, online and on CD-ROM, to investigate a topic

Information Technologies: Grade 8

Overall Expectations

By the end of Grade 8, students will:

- use information technology to define needs, select information, analyse information, and reflect on research;

- use information technology to identify, gather and sort information, and revise product;

- use information technology to explore information, collaborate with others, test ideas and present findings;

- use information technology to relate prior knowledge, locate information, synthesize findings, formulate conclusions and transfer knowledge and skills.

Expectations in Specific Areas

Reasoning

By the end of Grade 8, students will:

- analyse and deconstruct for usefulness media products such as web sites for techniques, structure, design
- compare and contrast information on electronic tools
- assess the value and usability of a variety of electronic resources such as CD-ROMs, for teacher/student use

Organizing

By the end of Grade 8, students will:

- develop design and construction skills to prepare multimedia presentation
- use advanced database strategies to record and sort information
- use a notepad to select, save and print excerpts from a resource

Communicating

By the end of Grade 8, students will:

- demonstrate a step by step evaluation of a media work or computer application
- design a web page to report findings with citations for other sources used
- create an effective digital video presentation
- model an organizational tool on Email or Intranet for others

Applying

By the end of Grade 8, students will:

- begin to search the Internet using a range of strategies relevant to a variety of single search engines
- use software in more than one subject area to do research
- use a variety of electronic reference and telecommunication tools to build a knowledge base on a topic
- demonstrate to younger students how to use bookmarked web sites for specific projects

Information Technologies: Grade 9

Overall Expectations

By the end of Grade 1, students will:

- use information technology to define needs, select information, analyse information, and reflect on research;

- use information technology to identify, gather and sort information, and revise product;

- use information technology to explore information, collaborate with others, test ideas and present findings;

- use information technology to relate prior knowledge, locate information, synthesize findings, formulate conclusions and transfer knowledge and skills.

Expectations in Specific Areas

Reasoning

By the end of Grade 9, students will:

- distinguish between primary, secondary and tertiary materials on electronic sources
- assess the value and usability of various types of electronic resources

Organizing

By the end of Grade 9, students will:

- create graphs and organizers using appropriate technology tools such as graphs and tables
- use graphic tools to organize subtopics and keywords
- use acknowledged format for citing electronic sources
- record and output information from advanced databases and spreadsheets in a variety of ways

Communicating

By the end of Grade 9, students will:

- integrate information from a variety of print and electronic sources including digital photos, scanned images, and notepad information for presentations
- teach others to use a specific electronic tool for research
- use Email to ask questions of experts

Applying

By the end of Grade 9, students will:

- search the Internet using a range of strategies relevant to a variety of single search engines
- use a variety of telecommunication tools to locate and retrieve information from such community sources as public and university libraries
- bookmark appropriate web sites for teacher and students in a specific grade for a specific topic

Information Technologies: Grade 10

Overall Expectations

By the end of Grade 10, students will:

- use information technology to define needs, select information, analyse information, and reflect on research;

- use information technology to identify, gather and sort information, and revise product;

- use information technology to explore information, collaborate with others, test ideas and present findings;

- use information technology to relate prior knowledge, locate information, synthesize findings, formulate conclusions and transfer knowledge and skills.

Expectations in Specific Areas

Reasoning

By the end of Grade 10, students will:

- access help manuals, menus and online experts
- analyse a variety of electronic information sources
- make predications based on manipulation of data by combining database and spreadsheet information

Organizing

By the end of Grade 10, students will:

- use graphic tools to create a research plan
- download and manage files from online sites
- create complex graphic organizers
- create research documents which include word processing charts, graphs and tables
- manage bookmark files in simple hierarchies

Communicating

By the end of Grade 10, students will:

- use advance features of word processing and telecommunication to communicate knowledge
- define and articulate appropriate terminology terms
- summarize data from databases and spreadsheets in presentations

- publish results of research on electronic web pages to receive electronic feedback

Applying

By the end of Grade 10, students will:

- begin to search the Internet using a range of strategies relevant to a variety of meta search engines
- use a variety of telecommunication tools to locate and retrieve information from such community sources as police, museums, galleries and social services
- use flow chart and webbing software to synthesize findings and formulate conclusions

Information Technologies: Grade 11

Overall Expectations

By the end of Grade 11, students will:

- use information technology to define needs, select information, analyse information, and reflect on research;

- use information technology to identify, gather and sort information, and revise product;

- use information technology to explore information, collaborate with others, test ideas and present findings;

- use information technology to relate prior knowledge, locate information, synthesize findings, formulate conclusions and transfer knowledge and skills.

Expectations in Specific Areas

Reasoning

By the end of Grade 11, students will:

- evaluate electronic resources for validity, authority, relevance and accuracy
- identify and articulate protocols and responsibilities for use of information from electronic resources
- establish criteria for evaluating a web page

By the end of Grade 11, students will:

- search the Internet using a range of strategies relevant to a variety of meta search engines
- use flow chart and webbing software to solve problems and make decisions
- locate and retrieve information from a variety of primary sources such as business and government

Organizing

By the end of Grade 11, students will:

- perform personal file and directory management
- create relational databases to manage data and apply resources
- manage bookmark files in complex hierarchies
- create a web page to organize links to other sources of information

Communicating

By the end of Grade 11, students will:

- incorporate information from preselected and moderated discussion newsgroups
- post on the intranet findings re the value and usability of web sites for teacher and/or student use
- independently teach others how to use a specific electronic tool for research

Applying

Information Technologies: Grade 12

Overall Expectations

By the end of Grade 12, students will:

- use information technology to define needs, select information, analyse information, and reflect on research;

- use information technology to identify, gather and sort information, and revise product;

- use information technology to explore information, collaborate with others, test ideas and present findings;

- use information technology to relate prior knowledge, locate information, synthesize findings, formulate conclusions and transfer knowledge and skills.

Expectations in Specific Areas

Reasoning

By the end of Grade 12, students will:

- perform complex calculation on databases and spreadsheets to answer information needs
- prepare web pages with connecting links to demonstrate how criteria for evaluating subject web sites are used
- identify and analyze the appropriate technology resources for research and problem solving considering validity, authority, relevance and accuracy

Organizing

By the end of Grade 12, students will:

- use a variety of computer applications to manipulate data to test and support theses and hypotheses
- use organization tools such as timelines, knowledge trees, hypertext links, legends and indexes to record and organize information

- participate in video conferencing to explore a topic and share information online
- participate in online discussion groups to find information
- transfer data from a database such as FileMaker to web page to share research findings in database format

Applying

By the end of Grade 12, students will:

- use free text searching of online resources
- use controlled vocabulary for subject searching
- locate and retrieve information from a variety of global resources such as United Nations and World Bank

Communicating

By the end of Grade 12, students will:

Figure 13. Scope and Sequence: Information Technologies - Kindergarten

	CONCEPTS / REASONING	ORGANIZING	COMMUNICATING	APPLYING
G R A D E	– **use information technology to define needs, select information, make sense of information and respond to findings**	– **use information technology to identify, gather and sort information and observations**	– **use information technology to explore information, and collaborate with others, test ideas and share findings**	– **use information technology to relate prior knowledge, locate information, make observations, and adapt to new learning**
K i n d e r g a r t e n	– respond to information from a variety of media verbally and non-verbally	– use patterning software applications to structure information	– use a variety of software tools and techniques to make products and presentations – work with others in using technology	– use a variety of familiar technologies appropriately

Figure 13. Scope and Sequence: Information Technologies - Grades 1 to 6

GRADE	CONCEPTS / REASONING	ORGANIZING
	– **use information technology to define needs, select information, analyse information, and reflect on research**	– **use information technology to identify, gather and sort information, and revise product**
1	– select audio, video and CD resources appropriate to need – restate information from audio and video recordings – develop group/class chart categorizing information needs and the technology and media products to meet them – explain why selected information is important	– use pictorial and alphabetical prompts on CD-ROMs to understand the organization of information – enter text in a word processor – begin to use drawing tools to record information
2	– select a variety of audio, video and CD resources appropriate to need – restate pertinent information from audio and video recordings – explore CD-ROMs to introduce a topic	– use menus on CD-ROMs to understand the organization of information – begin to develop word processor skills such as cut, copy and paste – use drawing tools and simple databases to sort and record information – explain how information was collected
3	– identify different media works such as television programs and CD-ROMs and describe the purpose of each – identify communication technology tools and describe the function of each such as television, computer, telephone – describe how electronic resources enhance reading, viewing and listening for information and pleasure	– develop word processor skills such as cut, copy and paste – investigate how different formats are organized such as photos, collage and newspapers – use camcorder and camera to collect data – use audio and video tape to record information – use story board organizer to plan projects
4	– explore topic to be investigated using a variety of media such as video, and CD-ROMs – analyse story elements in audio, video and electronic presentation	– recognize structural elements used to create media works and understand their function – use electronic template to record information from telephone interview and surveys – use prepared database or spread sheet to enter and edit data
5	– examine media works such as television commercial or documentary film to identify creator's purpose and strategies to achieve it – explore topic to be investigated using a variety of media such as videos and television shows	– use video and computer applications to organize, sort and visually display data and draw conclusions – print selected text, pictures or maps from appropriate electronic resources to collect information and meet information need – organize and display data using line graphs, bar graphs, pictographs and circle graphs
6	– investigate common technology tools and identify types of tasks for which they can be used – justify the choice of presentation technology and how it meets information needs – analyse and evaluate data using appropriate software tools such as outlining and graphic organizers	– combine data, design spreadsheets and make charts and graphs to record and display information – use organization tools such as timelines, knowledge trees, hypertext links, legends and indexes to record and organize information – create storyboard organizer to plan video and electronic slide presentation

Figure 13. Scope and Sequence: Information Technologies - Grades 1 to 6

	COMMUNICATING	APPLYING
G R A D E	– **use information technology to explore information, collaborate with others, test ideas and present findings**	– **use information technology to relate prior knowledge, locate information, synthesize findings, formulate conclusions and transfer knowledge and skills**
1	– develop active listening and viewing skills such as recording video information on a class chart – create a story on a computer template – create a pictograph to share gathered information – explore basic computer drawing tools such as paintbrush – develop basic telephone skills such as answering and taking a message	– search for information by keyword and subject on OPAC – use available automated systems to exchange library materials – use cassette or CD to listen to a story or gather information – operate a tape recorder to share collected information – use draw applications to create simple pictures – practice safe and responsible use of information technologies
2	– create a presentation using simple drawing publication software – develop basic computer drawing tools such as fill tools – explore use of word processing tools such as font size, style and colour to enhance text presentations – develop telephone skills through role play – comply with an acceptable use policy	– use basic organizational tools such as alphabetical indexes and hypertext to retrieve information on CD-ROMs – search for information by keywords, subject, author and title on OPAC – use computer files to share collected information – use television and VCR to retrieve information
3	– create a simple media work such as picture book, advertisement or a video production and adhere to principles of copyright – share information using appropriate presentation technologies such as overhead projector and VCR – conduct interviews or surveys following a prepared script in small groups using telephone, fax, or Email (penpals)	– locate and retrieve appropriate resources such as online catalogues, reference CD-ROMs and audio/visual resources – use preselected bookmarks to access Web pages – identify basic techniques in media production such as camera angle, music, and colour – begin to synthesize results lists from searches on CD-ROMs
4	– participate in electronic communication – create a simple slide show using a prepared template from a digital presentation tool – develop word processing/drawing skills to edit and write/create research – publish electronically a product for sharing information	– locate and retrieve appropriate resources such as bookmarked Web sites and subject directories – operate a tape recorder and still camera to collect data – synthesize results lists from searches on CD-ROMs – use graphic applications to illustrate information – use word processor to load, edit and save information
5	– participate in electronic communication for peer editing – use online collaborative tools to develop team projects – prepare simple multimedia works to present research – develop presentation software skills such as creating stacks for a slide show – publish electronically a product for sharing information	– use multiple keywords to search OPAC and CD-ROMs – begin to search Internet by keywords in single search engines – use database or spreadsheet to compare and contrast resources – obtain data by phone, letter and online – use graphic applications to illustrate information – add drawn, scanned, or digital pictures to documents

| 6 | – integrate text, graphics and sound in presentations
 – use Email and web pages to share information
 – contribute information to a class web page
 – prepare a display using different technologies such as scanners, digital cameras and camcorders
 – describe the purpose of netiquette and follow its protocols | – begin to search the Internet using Boolean operators in single search engines
 – use applications to display data in a variety of ways to determine most effective mode of presentation
 – integrate multimedia tools such as importing sound/graphics
 – use appropriate information technology hardware such as fax, VCR, camcorder, digital camera and computer |

# Figure 13. Scope and Sequence: Information Technologies - Grades 7 to 12

GRADE	CONCEPTS / REASONING	ORGANIZING
	– **use information technology to define needs, select information, analyse information, and reflect on research**	– **use information technology to identify, gather and sort information, and revise product**
7	– examine media works for usefulness, validity and effectiveness identifying perspective, bias, inclusiveness, stereotyping, intent, credibility – analyse a specific problem and select and use appropriate tools to solve it in a variety of technological formats – assess the value and usability of a variety of electronic resources such as CD-ROMs, for class and personal use	– deconstruct media products such as video and CD-ROM for structural design and techniques – use appropriate technology such as VCR and camcorders to collect, revise and edit products for presentation – use stationary organizers (templates) to organize data – use slide show software to edit and organize information for presentation
8	– analyse and deconstruct for usefulness media products such as web sites for techniques, structure, design – compare and contrast information on electronic tools – assess the value and usability of a variety of electronic resources such as CD-ROMs, for teacher/student use	– develop design and construction skills to prepare multimedia presentation – use advanced database strategies to record and sort information – use a notepad to select, save and print excerpts from a resource
9	– distinguish between primary, secondary and tertiary materials on electronic sources – assess the value and usability of various types of electronic resources	– create graphs and organizers using appropriate technology tools such as graphs and tables – use graphic tools to organize subtopics and keywords – use acknowledged format for citing electronic sources – record and output information from advanced databases and spreadsheets in a variety of ways
10	– access help manuals, menus and online experts – analyse a variety of electronic information sources – make predications based on manipulation of data by combining database and spreadsheet information	– use graphic tools to create a research plan – download and manage files from online sites – create complex graphic organizers – create research documents which include word processing charts, graphs and tables – manage bookmark files in simple hierarchies
11	– evaluate electronic resources for validity, authority, relevance and accuracy – identify and articulate protocols and responsibilities for use of information from electronic resources – establish criteria for evaluating a web page	– perform personal file and directory management – create relational databases to manage data and apply resources – manage bookmark files in complex hierarchies – create a web page to organize links to other sources of information
12	– perform complex calculation on databases and spreadsheets to answer information needs – prepare web pages with connecting links to demonstrate how criteria for evaluating subject web sites are used – identify and analyze the appropriate technology resources for research and problem solving considering validity, authority, relevance and accuracy	– use a variety of computer applications to manipulate data to test and support theses and hypotheses – use organization tools such as timelines, knowledge trees, hypertext links, legends and indexes to record and organize information

Figure 13. Scope and Sequence: Information Technologies - Grades 7 to 12

GRADE	COMMUNICATING	APPLYING
	– **use information technology to explore information, collaborate with others, test ideas and present findings**	– **use information technology to relate prior knowledge, locate information, synthesize findings, formulate conclusions and transfer knowledge and skills**
7	– import digital pictures for a presentation – express data in a variety of graphs, pie charts, histograms – present electronic slide show and video of research for target audience for a specific purpose – publish a report, newsletter or pamphlet using word processing and desktop publishing software	– search the Internet using keywords and Boolean operators in single search engines – develop skills integrating multimedia tools – use appropriate information technology hardware such as fax, VCR, camcorder, camera (digital) and computer – use a variety of electronic reference tools, online and on CD-ROM, to investigate a topic
8	– demonstrate a step by step evaluation of a media work or computer application – design a web page to report findings with citations for other sources used – create an effective digital video presentation – model an organizational tool on Email or Intranet for others	– begin to search the Internet using a range of strategies relevant to a variety of single search engines – use software in more than one subject area to do research – use a variety of electronic reference and telecommunication tools to build a knowledge base on a topic – demonstrate to younger students how to use bookmarked web sites for specific projects
9	– integrate information from a variety of print and electronic sources including digital photos, scanned images, and notepad information for presentations – teach others to use a specific electronic tool for research – use Email to ask questions of experts	– search the Internet using a range of strategies relevant to a variety of single search engines – use a variety of telecommunication tools to locate and retrieve information from such community sources as public and university libraries – bookmark appropriate web sites for teacher and students in a specific grade for a specific topic
10	– use advance features of word processing and telecommunication to communicate knowledge – define and articulate appropriate terminology terms – summarize data from databases and spreadsheets in presentations – publish results of research on electronic web pages to receive electronic feedback	– begin to search the Internet using a range of strategies relevant to a variety of meta search engines – use a variety of telecommunication tools to locate and retrieve information from such community sources as police, museums, galleries and social services – use flow chart and webbing software to synthesize findings and formulate conclusions
11	– incorporate information from preselected and moderated discussion newsgroups – post on the intranet findings re the value and usability of web sites for teacher and/or student use – independently teach others how to use a specific electronic tool for research	– search the Internet using a range of strategies relevant to a variety of meta search engines – use flow chart and webbing software to solve problems and make decisions – locate and retrieve information from a variety of primary sources such as business and government
12	– participate in video conferencing to explore a topic and share information online – participate in online discussion groups to find information – transfer data from a database such as FileMaker to web page to share research findings in database format	– use free text searching of online resources – use controlled vocabulary for subject searching – locate and retrieve information from a variety of global resources such as United Nations and World Bank

Information and Society
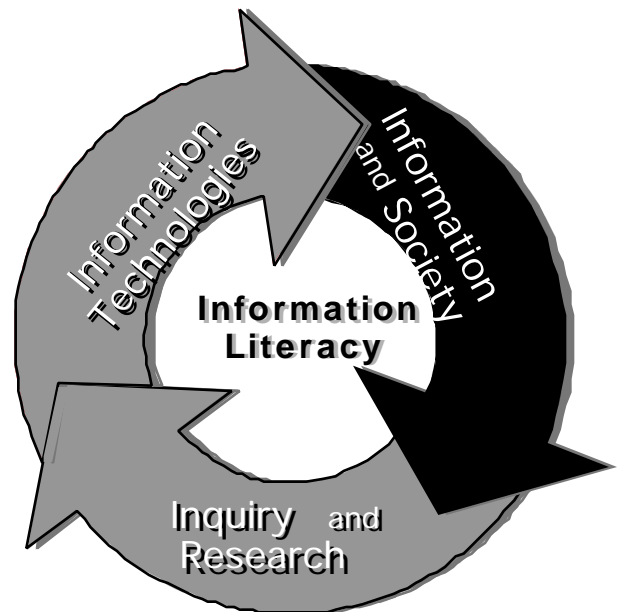
Information and Society is the knowledge
context of *Information Studies: Kindergarten to
Grade 12*. It complements the process of
Inquiry and Research and the applied skills
found in **Information Technologies.**

Information and Society

Students need to understand the importance and features of information in the Information Age. They need to identify how information is organized, created and communicated. They need to develop enjoyment in exploring information of all kinds. Reading a wide range of Canadian and international literature is a vital part of a literacy program and extends the narrow definition of information as merely data, facts or figures. Above all, students need the skills and knowledge to use information deeply and wisely to gain lasting personal satisfaction and to contribute to their society.

It is time to study information as a subject by itself in its own context. To study information as a subject requires analysis and evaluation of its role in every aspect of human life – from banking to education, from local government to global trends. Since information is socially constructed, it is not neutral in either purpose or result. Students need to be socially responsible in their use of information and keenly aware of the safety, security and ethical issues surrounding it.

Students need to learn about learning. How does the brain work, learn and perceive? What are stages by which both individuals and societies develop the skills of information literacy? How do we become not just an information society but a learning society. In a fast-changing world where particular data might quickly lose their currency, it is the metacognitive skills and knowledge which are the foundation of independent learning for life. Such a challenge requires all teachers to provide varied, continuous and well-planned opportunities to extend students' information skills.
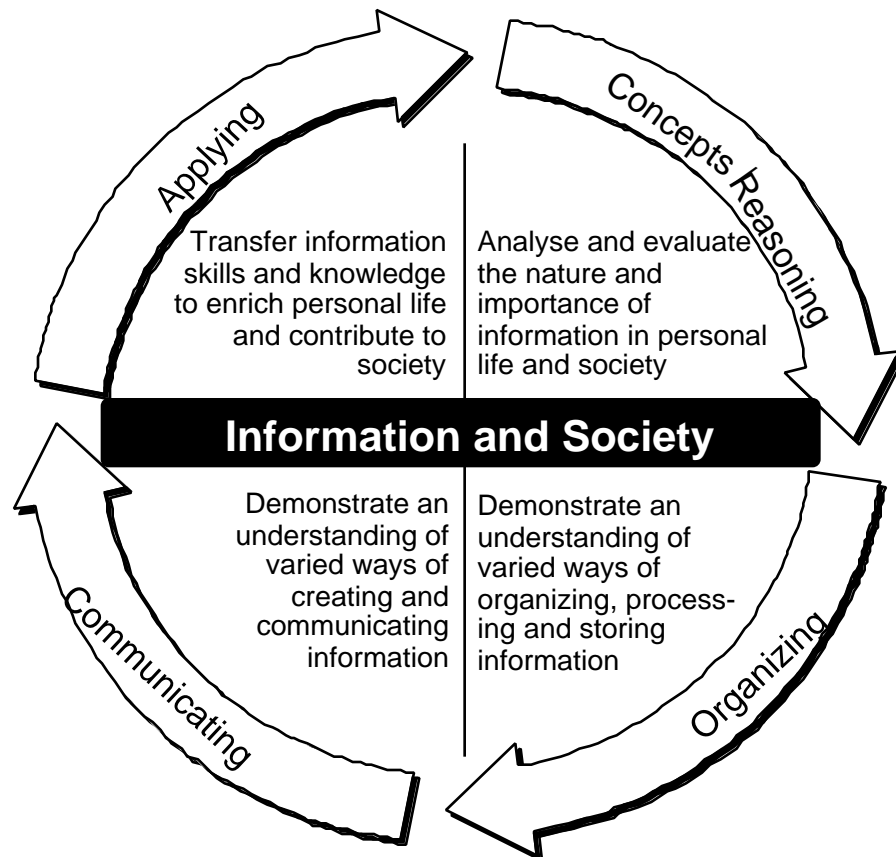
Figure 14. Information and Society

To do this, schools need to place the study of information at the heart of learning. This can be accomplished in two ways.

First, the expectations of *Information and Society* can be integrated into subject-based opportunities, themes, and projects. In fact, the expectations of this strand (See Figure 14) are particularly effective in suggesting ideas for group and independent study activities across the curriculum in all grades.

Secondly, separate courses such as interdisciplinary studies at the secondary level can incorporate *Information and Society* in a comprehensive treatment. Both approaches require strong resource-based learning partnerships between teachers and teacher-librarians

Figure 15 represents a scope and sequence of the knowledge and skills of Information and Society to track student progress as a continuum for Kindergarten to Grade 12. Such progress is made possible when teachers and teacher-librarians work together to collect demonstrations of authentic performances grade to grade.

Information and Society: Kindergarten

Overall Expectations

By the end of Kindergarten, students will:

- demonstrate an understanding of the nature and role of information
- demonstrate an understanding of how information is organized
- demonstrate an understanding of ways of creating and communicating information
- transfer information knowledge and skills to enrich personal life and contribute to society

Expectations in Specific Areas

Reasoning

By the end of Kindergarten, students will:

- identify safe and unsafe ways of obtaining information
- identify familiar information-based and technological items and describe their use
- recognize special places where information is found and describe their function
- identify people in the community who provide information and describe what they do

Organizing

By the end of Kindergarten, students will:

- identify patterns, cycles and events in daily life and describe how such patterns provide information
- identify elements and variations of textual and visual information

Communicating

By the end of Kindergarten, students will:

- take turns in classroom activities and explain why turns allow for the sharing of information
- describe features of art forms from a variety of cultures and what they tell us about those cultures
- demonstrate an understanding of the information-based purposes of rules and routines in different contexts

Applying

By the end of Kindergarten, students will:

- identify favourite texts and retell the stories in their own words
- identify and discuss their own interests and preferences
- connect their own experiences to those of characters in fiction and non-fiction
- use a variety of simple strategies to solve social problems
- use familiar materials to express information in new ways

Information and Society: Grade 1

Overall Expectations

By the end of Grade 1, students will:

- analyse and evaluate the nature and importance of information in personal life and society;
- demonstrate an understanding of varied ways of organizing and storing information;
- demonstrate an understanding of varied ways of creating and communicating information;
- transfer information skills and knowledge to enrich personal life and contribute to society.

Expectations in Specific Areas

Reasoning

By the end of Grade 1, students will:

- define what information is in everyday life
- identify the qualities of good information such as accuracy and use
-

Organizing

By the end of Grade 1, students will:

- recognize the meaning of signs and symbols in everyday life
- identify ways information is organized at home and school

Communicating

By the end of Grade 1, students will:

- identify the variety of ways to communicate information
- describe how stories and books communicate information

Applying

By the end of Grade 1, students will:

- discover the work of authors and illustrators in simple fiction and non-fiction texts for pleasure and understanding
- write, listen and present information to express thoughts and feelings
- connect stories to personal experiences

Information and Society: Grade 2

Overall Expectations

By the end of Grade 2, students will:

- analyse and evaluate the nature and importance of information in personal life and society;
- demonstrate an understanding of varied ways of organizing and storing information;
- demonstrate an understanding of varied ways of creating and communicating information;
- transfer information skills and knowledge to enrich personal life and contribute to society.

Expectations in Specific Areas

Reasoning

By the end of Grade 2, students will:

- identify ways that books and computers in record and provide textual and visual information
- describe the variety of purposes for selecting reading materials

Organizing

By the end of Grade 2, students will:

- summarize the reasons for organizing and storing information
- explain how dictionaries and encyclopedias are organized
- describe different forms of fiction texts such as storybooks and chapter books
- begin to use the Dewey Decimal system, simple indexes and catalogues

Communicating

By the end of Grade 2, students will:

- identify ways picture books are created to communicate information
- identify ways animated media are created to communicate information

By the end of Grade 2, students will:

- read simple pattern books, chart stories and non-fiction texts for pleasure and understanding
- create dramatic presentations to express thoughts and feelings

Applying

Information and Society: Grade 3

Overall Expectations

By the end of Grade 3, students will:

- analyse and evaluate the nature and importance of information in personal life and society;
- demonstrate an understanding of varied ways of organizing and storing information;
- demonstrate an understanding of varied ways of creating and communicating information;
- transfer information skills and knowledge to enrich personal life and contribute to society.

Expectations in Specific Areas

Reasoning

By the end of Grade 3, students will:

- recognize the importance of school and public libraries
- begin to develop criteria for selecting reading materials
- express and support opinions about personal reading

By the end of Grade 3, students will:

- read chapter books and non-fiction texts for pleasure and understanding
- prepare letters, stories and poems and simple media works to express thoughts and feelings

Organizing

By the end of Grade 3, students will:

- classify ways information is organized at home and school
- explain how thesauri are organized
- describe different forms of non-fiction texts such as instructional manuals, recipes, consumer packaging
- recognize library layout to locate materials

Communicating

By the end of Grade 3, students will:

- describe ways information is communicated at home and school
- identify how everyday products such as labels and packaging are created to communicate information
- describe the concept and importance of intellectual property, including basic copyright and plagiarism

Applying

Information and Society: Grade 4

Overall Expectations

By the end of Grade 4, students will:

- analyse and evaluate the nature and importance of information in personal life and society;
- demonstrate an understanding of varied ways of organizing and storing information;
- demonstrate an understanding of varied ways of creating and communicating information;
- transfer information skills and knowledge to enrich personal life and contribute to society.

Expectations in Specific Areas

Reasoning

By the end of Grade 4, students will:

- analyse the differences between information produced by oral and written cultures
- develop criteria for selecting reading materials
- identify bias in selected information
- follow acceptable use policies for specific tasks

Organizing

By the end of Grade 4, students will:

- classify the methods of organizing and storing information such as alphabetical order, subject approach and type of media
- describe major Dewey Decimal categories
- compare fiction and non-fiction texts to classify their features

Communicating

By the end of Grade 4, students will:

- describe the history of writing systems such as alphabets, hieroglyphics, codes and petroglyphs
- identify how text books are created to communicate information

Applying

By the end of Grade 4, students will:

- connect stories to personal and others' experiences
- produce a brief oral report and simple multi-media presentation to express thoughts and feelings
- begin to identify and apply effective study practices

Information and Society: Grade 5

Overall Expectations

By the end of Grade 5, students will:

- define, analyse and evaluate the nature and importance of information in personal life and society;
- demonstrate an understanding of varied ways of organizing and storing information;
- demonstrate an understanding of varied ways of creating and communicating information;
- transfer information skills and knowledge to enrich personal life and contribute to society.

Expectations in Specific Areas

Reasoning

By the end of Grade 5, students will:

- compare the impact of a variety of media on different cultures and communities
- recognize generic features in fiction and non-fiction and explain preferences
- demonstrate an understanding of the purpose and importance of an acceptable use policy

Organizing

By the end of Grade 5, students will:

- describe the origins of organizational systems
- keep a log of reading, viewing and listening experiences
- compare different forms of digital texts such as CD-ROM and the Internet

Communicating

By the end of Grade 5, students will:

- describe the history of the transmission of information such as trade routes, pony express and postal systems
- identify how commercials are created to communicate information

Applying

By the end of Grade 5, students will:

- connect information to personal and community issues and perspectives
- develop the pleasure and habit of reading a variety of inclusive fiction and non-fiction
- work collaboratively to produce a simple web page

Information and Society: Grade 6

Overall Expectations

By the end of Grade 6, students will:

- analyse and evaluate the nature and importance of information in personal life and society;
- demonstrate an understanding of varied ways of organizing and storing information;
- demonstrate an understanding of varied ways of creating and communicating information;
- transfer information skills and knowledge to enrich personal life and contribute to society.

Expectations in Specific Areas

Reasoning

By the end of Grade 6, students will:

- evaluate the significance of information in different cultures
- recognize the reading, viewing and listening preferences of self and others

Organizing

By the end of Grade 6, students will:

- read about and describe the life and work of individuals who contributed to the organization of print information
- classify the general types and structures of Web sites for information

Communicating

By the end of Grade 6, students will:

- describe the history of communication such as Morse code and radio, television and computers
- identify how audio media are created to communicate information
- describe the concept and importance of appropriate online behaviour, including basic netiquette

Applying

By the end of Grade 6, students will:

- begin to develop a yearly reading plan for personal and academic interest
- follow an acceptable use policy and explain its rational for safe and responsible use of information
- identify and apply effective study practices

Information and Society: Grade 7

Overall Expectations

By the end of Grade 7, students will:

- analyse and evaluate the nature and importance of information in personal life and society;
- demonstrate an understanding of varied ways of organizing and storing information;
- demonstrate an understanding of varied ways of creating and communicating information;
- transfer information skills and knowledge to enrich personal life and contribute to society.

Expectations in Specific Areas

Reasoning

By the end of Grade 7, students will:

- analyse features of our information-based society
- analyse the ways people learn to read, write, speak and view information
- appraise the perspectives, opinions and biases of varied writers and producers
- begin to explain the importance of literacy

Organizing

By the end of Grade 7, students will:

- read about and describe the life and work of individuals who contributed to the organization of digital information
- describe how reference materials such as atlases and directories are organized

Communicating

By the end of Grade 7, students will:

- explain the history of printing including manuscript, type, fax, photocopy, and scanner
- identify how newspapers and periodicals are created to communicate information
- begin to provide literacy assistance to other students
- use information skills and reading experiences to resolve personal issues
- develop a yearly reading plan for personal and academic interest

Applying

By the end of Grade 7, students will:

- begin to provide literacy assistance to other students
- use information skills and reading experiences to resolve personal issues
- develop a yearly reading plan for personal and academic interest

Information and Society: Grade 8

Overall Expectations

By the end of Grade 8, students will:

- analyse and evaluate the nature and importance of information in personal life and society;
- demonstrate an understanding of varied ways of organizing and storing information;
- demonstrate an understanding of varied ways of creating and communicating information;
- transfer information skills and knowledge to enrich personal life and contribute to society.

Expectations in Specific Areas

Reasoning

By the end of Grade 8, students will:

- describe information anxiety and overload in contemporary society
- analyse the role of information in the workplace
- read and evaluate biographies of pioneers of information
- analyse features and examples of ethical and unethical uses of information and information technology

Organizing

By the end of Grade 8, students will:

- describe the features and methods of genealogy and create a family tree
- visit a variety of physical and virtual libraries and describe their organization

Communicating

By the end of Grade 8, students will:

- compare ways that information is created and communicated in a variety of formats
- explain the principles and practice of confidentiality and privacy in communicating information
- recognize the complexity of copyright in print and digital formats

Applying

By the end of Grade 8, students will:

- self-regulate perceptions that affect information response
- use information skills and reading experiences to resolve issues at school
- connect literature and media to personal experiences and those of others

Information and Society: Grade 9

Overall Expectations

By the end of Grade 1, students will:

- analyse and evaluate the nature and importance of information in personal life and society;
- demonstrate an understanding of varied ways of organizing and storing information;
- demonstrate an understanding of varied ways of creating and communicating information;
- transfer information skills and knowledge to enrich personal life and contribute to society.

Expectations in Specific Areas

Reasoning

By the end of Grade 9, students will:

- compare methods for using information to solve problems
- identify the role of information in society in such fields as literacy
- analyse the impact of information technology on such areas as education and health
- identify the different kinds of bias in information

Organizing

By the end of Grade 9, students will:

- classify types of generic fiction and identify significant authors and titles in each genre
- describe methods of indexing materials in print or electronic form

Communicating

By the end of Grade 9, students will:

- describe the evolution of communication of information and predict future trends
- illustrate ways of controlling information such as filtering and censorship

Applying

By the end of Grade 9, students will:

- compare ways of using linear and lateral thinking to process information
- link learning from various disciplines
- use information skills and reading experiences to resolve issues at home
- begin to identify and apply advanced study practices

Information and Society: Grade 10

Overall Expectations

By the end of Grade 10, students will:

- analyse and evaluate the nature and importance of information in personal life and society;
- demonstrate an understanding of varied ways of organizing and storing information;
- demonstrate an understanding of varied ways of creating and communicating information;
- transfer information skills and knowledge to enrich personal life and contribute to society.

Expectations in Specific Areas

Reasoning

By the end of Grade 10, students will:

- identify the role of information in society in such fields as criminology
- analyse the impact of information technology on such areas as environment and global development
- recognize the importance of reading a variety of fictional texts in understanding various cultures

Organizing

By the end of Grade 10, students will:

- begin to describe the organizational functions of the brain
- explain how business materials such as manuals and reports are organized

Communicating

By the end of Grade 10, students will:

- describe the impact of new technologies on communication such as the Internet, conferences, chat and email
- identify ways of determining the ownership of intellectual property

Applying

By the end of Grade 10, students will:

- use such theories as multiple intelligences to determine personal approaches to information
- describe the legal consequences of interfering with on-line communication
- use information skills and reading experiences to investigate career choices

Information and Society: Grade 11

Overall Expectations

By the end of Grade 11, students will:

- analyse and evaluate the nature and importance of information in personal life and society;
- demonstrate an understanding of varied ways of organizing and storing information;
- demonstrate an understanding of varied ways of creating and communicating information;
- transfer information skills and knowledge to enrich personal life and contribute to society.

Expectations in Specific Areas

Reasoning

By the end of Grade 11, students will:

- identify the role of information in society in such fields as medicine and genetic engineering
- analyse the impact of information technology on such areas as Canadian and world cultures
- recognize the importance of reading classical fictional texts in understanding various cultures

By the end of Grade 11, students will:

- develop products and solutions by linking learning from various disciplines
- report how groups negotiate to reach consensus and make decisions
- use information skills and reading experiences to resolve issues in the community

Organizing

By the end of Grade 11, students will:

- describe how the brain processes information
- explain how web pages and search engines are constructed and organized

Communicating

By the end of Grade 11, students will:

- identify the features of propaganda and explain how it has been used throughout history
- explain ways of making information secure such as encryption
- classify ways of determining the intellectual ownership of information

Applying

Information and Society: Grade 12

Overall Expectations

By the end of Grade 12, students will:

- analyse and evaluate the nature and importance of information in personal life and society;
- demonstrate an understanding of varied ways of organizing and storing information;
- demonstrate an understanding of varied ways of creating and communicating information;
- transfer information skills and knowledge to enrich personal life and contribute to society.

Expectations in Specific Areas

Reasoning

By the end of Grade 12, students will:

- identify the role of information in society in such fields as artificial intelligence and cybernetics
- analyse the impact of information technology on such areas as economy and politics
- evaluate the effectiveness of distance learning
- identify the features of information theory

Organizing

By the end of Grade 12, students will:

- describe the history of libraries, museums and other institutions that organize and store information
- identify the features of expert systems

Communicating

By the end of Grade 12, students will:

- analyse the use of propaganda and the control of communication in contemporary society
- identify legal and ethical issues related to intellectual property
- describe ways that businesses, professions and trades communicate information

Applying

By the end of Grade 12, students will:

- provide literacy assistance within community
- test research methods in independent study projects
- express views to a variety of governmental and organizational agencies
- use information skills and reading experiences to investigate global issues
- identify and apply advanced study practices

Figure 12. Scope and Sequence : Information and Society : Kindergarten

	UNDERSTANDING OF CONCEPTS / REASONING	ORGANIZING	COMMUNICATING	APPLYING
G R A D E	– **demonstrate an understanding of the nature and role of information**	– **demonstrate an understanding of how information is organized**	– **demonstrate an understanding of ways of creating and communicating information**	– **transfer information knowledge and skills to enrich personal life and contribute to society**
K i n d e r g a r t e n	– identify safe and unsafe ways of obtaining information – identify familiar information-based and technological items and describe their use – recognize special places where information is found and describe their function – identify people in the community who provide information and describe what they do	– identify patterns, cycles and events in daily life and describe how such patterns provide information – identify elements and variations of textual and visual information	– take turns in classroom activities and explain why turns allow for the sharing of information – describe features of art forms from a variety of cultures and what they tell us about those cultures – demonstrate an understanding of the information-based purposes of rules and routines in different contexts	– identify favourite texts and retell the stories in their own words – identify and discuss their own interests and preferences – connect their own experiences to those of characters in fiction and non-fiction – use a variety of simple strategies to solve social problems – use familiar materials to express information in new ways

Figure 12. Scope and Sequence: Information and Society - Grades 1 to 6

GRADE	CONCEPTS / REASONING	ORGANIZING
	– **define, analyse and evaluate the nature and importance of information in personal life and society**	– **demonstrate an understanding of varied ways of organizing and storing information**
1	– define what information is in everyday life – identify the qualities of good information such as accuracy and use	– recognize the meaning of signs and symbols in everyday life – identify ways information is organized at home and school
2	– identify ways that books and computers in record and provide textual and visual information – describe the variety of purposes for selecting reading materials	– summarize the reasons for organizing and storing information – explain how dictionaries and encyclopedias are organized – describe different forms of fiction texts such as storybooks and chapter books – begin to use the Dewey Decimal system, simple indexes and catalogues
3	– recognize the importance of school and public libraries – begin to develop criteria for selecting reading materials – express and support opinions about personal reading	– classify ways information is organized at home and school – explain how thesauri are organized – describe different forms of non-fiction texts such as instructional manuals, recipes, consumer packaging – recognize library layout to locate materials
4	– analyse the differences between information produced by oral and written cultures – develop criteria for selecting reading materials – identify bias in selected information – follow acceptable use policies for specific tasks	– classify the methods of organizing and storing information such as alphabetical order, subject approach and type of media – describe major Dewey Decimal categories – compare fiction and non-fiction texts to classify their features
5	– compare the impact of a variety of media on different cultures and communities – recognize generic features in fiction and non-fiction and explain preferences – demonstrate an understanding of the purpose and importance of an acceptable use policy	– describe the origins of organizational systems – keep a log of reading, viewing and listening experiences – compare different forms of digital texts such as CD-ROM and the Internet
6	– evaluate the significance of information in different cultures – recognize the reading, viewing and listening preferences of self and others	– read about and describe the life and work of individuals who contributed to the organization of print information – classify the general types and structures of Web sites for information

Figure 12. Scope and Sequence: Information and Society - Grades 1 to 6

GRADE	COMMUNICATING – **demonstrate an understanding of varied ways of creating and communicating information**	APPLYING – **transfer information skills and knowledge to enrich personal life and contribute to society**
1	– identify the variety of ways to communicate information – describe how stories and books communicate information	– discover the work of authors and illustrators in simple fiction and non-fiction texts for pleasure and understanding – write, listen and present information to express thoughts and feelings – connect stories to personal experiences
2	– identify ways picture books are created to communicate information – identify ways animated media are created to communicate information	– read simple pattern books, chart stories and non-fiction texts for pleasure and understanding – create dramatic presentations to express thoughts and feelings
3	– describe ways information is communicated at home and school – identify how everyday products such as labels and packaging are created to communicate information – describe the concept and importance of intellectual property, including basic copyright and plagiarism	– read chapter books and non-fiction texts for pleasure and understanding – prepare letters, stories and poems and simple media works to express thoughts and feelings
4	– describe the history of writing systems such as alphabets, hieroglyphics, codes and petroglyphs – identify how text books are created to communicate information	– connect stories to personal and others' experiences – produce a brief oral report and simple multi-media presentation to express thoughts and feelings – begin to identify and apply effective study practices
5	– describe the history of the transmission of information such as trade routes, pony express and postal systems – identify how commercials are created to communicate information	– connect information to personal and community issues and perspectives – develop the pleasure and habit of reading a variety of inclusive fiction and non-fiction – work collaboratively to produce a simple web page
6	– describe the history of communication such as Morse code and radio, television and computers – identify how audio media are created to communicate information – describe the concept and importance of appropriate online behaviour, including basic netiquette	– begin to develop a yearly reading plan for personal and academic interest – follow an acceptable use policy and explain its rational for safe and responsible use of information – identify and apply effective study practices

Figure 12. Scope and Sequence: Information and Society - Grades 7 to 12

GRADE	CONCEPTS / REASONING	ORGANIZING
	– **analyse and evaluate the nature and importance of information in personal life and society**	– **demonstrate and understanding of varied ways of organizing and storing information**
7	– analyse features of our information-based society – analyse the ways people learn to read, write, speak and view information – appraise the perspectives, opinions and biases of varied writers and producers – begin to explain the importance of literacy	– read about and describe the life and work of individuals who contributed to the organization of digital information – describe how reference materials such as atlases and directories are organized
8	– describe information anxiety and overload in contemporary society – analyse the role of information in the workplace – read and evaluate biographies of pioneers of information – analyse features and examples of ethical and unethical uses of information and information technology	– describe the features and methods of genealogy and create a family tree – visit a variety of physical and virtual libraries and describe their organization
9	– compare methods for using information to solve problems – identify the role of information in society in such fields as literacy – analyse the impact of information technology on such areas as education and health – identify the different kinds of bias in information	– classify types of generic fiction and identify significant authors and titles in each genre – describe methods of indexing materials in print or electronic form
10	– identify the role of information in society in such fields as criminology – analyse the impact of information technology on such areas as environment and global development – recognize the importance of reading a variety of fictional texts in understanding various cultures	– begin to describe the organizational functions of the brain – explain how business materials such as manuals and reports are organized
11	– identify the role of information in society in such fields as medicine and genetic engineering – analyse the impact of information technology on such areas as Canadian and world cultures – recognize the importance of reading classical fictional texts in understanding various cultures	– describe how the brain processes information – explain how web pages and search engines are constructed and organized
12	– identify the role of information in society in such fields as artificial intelligence and cybernetics – analyse the impact of information technology on such areas as economy and politics – evaluate the effectiveness of distance learning – identify the features of information theory	– describe the history of libraries, museums and other institutions that organize and store information – identify the features of expert systems

Figure 12. Scope and Sequence: Information and Society - Grades 7 to 12

GRADE	COMMUNICATING – **demonstrate an understanding of varied ways of creating and communicating information**	APPLYING – **transfer information skills and knowledge to enrich personal life and contribute to society**
7	– explain the history of printing including manuscript, type, fax, photocopy, and scanner – identify how newspapers and periodicals are created to communicate information	– begin to provide literacy assistance to other students – use information skills and reading experiences to resolve personal issues – develop a yearly reading plan for personal and academic interest
8	– compare ways that information is created and communicated in a variety of formats – explain the principles and practice of confidentiality and privacy in communicating information – recognize the complexity of copyright in print and digital formats	– self-regulate perceptions that affect information response – use information skills and reading experiences to resolve issues at school – connect literature and media to personal experiences and those of others
9	– describe the evolution of communication of information and predict future trends – illustrate ways of controlling information such as filtering and censorship	– compare ways of using linear and lateral thinking to process information – link learning from various disciplines – use information skills and reading experiences to resolve issues at home – begin to identify and apply advanced study practices
10	– describe the impact of new technologies on communication such as the Internet, conferences, chat and email – identify ways of determining the ownership of intellectual property	– use such theories as multiple intelligences to determine personal approaches to information – describe the legal consequences of interfering with on-line communication – use information skills and reading experiences to investigate career choices
11	– identify the features of propaganda and explain how it has been used throughout history – explain ways of making information secure such as encryption – classify ways of determining the intellectual ownership of information	– develop products and solutions by linking learning from various disciplines – report how groups negotiate to reach consensus and make decisions – use information skills and reading experiences to resolve issues in the community
12	– analyse the use of propaganda and the control of communication in contemporary society – identify legal and ethical issues related to intellectual property – describe ways that businesses, professions and trades communicate information	– provide literacy assistance within community – test research methods in independent study projects – express views to a variety of governmental and organizational agencies – use information skills and reading experiences to investigate global issues – identify and apply advanced study practices

Explanatory Notes

The following definitions of terms are intended to help teachers and parents use this document. References to definitions in relevant documents from The Ontario Curriculum are in italics. ATLC is an abbreviation for The Association of Teacher-Librarianship in Canada.

Achievement Levels. Brief description of four different degrees of achievement of the provincial curriculum expectations for any given grade. Level 3, which is the "provincial standard", identifies a high level of achievement of the provincial expectations. Parents of students achieving at level 3 in a particular grade can be confident that their children will be prepared for work at the next grade. Level 1 identifies achievement that falls much below the provincial standard. Level 2 identifies achievement that approaches the standard. Level 4 identifies achievement that surpasses the standard. (*Science and Technology*)

Catalogue. A list of library materials contained in a collection, a library or group of libraries, arranged according to some definite plan (e.g., Dewey Decimal Classification)

Concrete Materials. Objects that students handle and use in constructing their own understanding of mathematical concepts and skills and in illustrating that understanding. Some examples are base ten blocks, centicubes, construction kits, dice, games, geoboards, geometric solids, hundreds charts, measuring tapes, Miras, number lines, pattern blocks, spinners, and tiles. Also call manipulatives. (*Mathematics*)

Conventions. Accepted practices or rules in the use of language. In the case of written or printed materials, some conventions help convey meaning (e.g., punctuation, typefaces, capital letters) and other conventions aid in the presentation of content (e.g., table of contents, headings, footnotes, charts, captions, lists, pictures, index). (*Language*)

Creative Thinking. The generation of ideas which force or facilitate connections that challenge assumptions and lead to more elaborate ideas.(*Demystifying Thinking: A Practical Handbook for Teachers*, Prentice Hall, Scarborough: 1995)

Critical Thinking. Some aspects of thinking critically in reading are: examining opinions; questioning ideas; interpreting information; identifying values and issues; detecting bias; detecting implied as well as explicit meanings. (*Language*)

Critical Thinking Skills. Some aspects of thinking critically in writing are: questioning, hypothesizing, interpreting, inferring, analyzing, comparing, contrasting, evaluating, predicting, reasoning, distinguishing between alternatives, making and supporting judgments, synthesizing, elaborating on ideas, identifying values and issues, detecting bias, detecting implied as well as explicit meanings. (*Language*)

Data. See **Information.**

Dewey Decimal System. The classification system by Melvil Dewey, first published in 1876, which divides knowledge into ten main classes, with further subdivisions, accompanied by decimal notation.

Expectations. The knowledge and skills that students are expected to develop and to demonstrate in their class work, on tests, and in various other activities on which their achievement is assessed. The new Ontario Curriculum for Language identifies expectations for each grade from Grade 1 to Grade 8. (*Language*)

Expert system. A computer system that is designed and programmed to imitate the patterns, procedures and decisions that experts in a particular field might make.

Forms of fiction. Particular kinds of works of literature that describe imaginary events and people; for example, story, short story, adventure story, detective

story, myth, legend, folk tale, cumulative tale, lyric poem, dramatic poem, ballad, novel, mystery novel, historical novel, science fiction novel, soliloquy, play, script, story book, picture book, pattern books, chapter book. (*Language*)

Forms of non-fiction. Particular kinds of works of literature, as well as other written materials, that are not fiction; for example, history book, geography text, article, report, essay, theatre or concert program, book review, editorial, newspaper or magazine article, television or radio script, letter (personal, business), invitation, e-mail message, manual, public sign, label, biography, autobiography, monologue, resume, personal journal, diary, brochure, reference book, encyclopedia, multi-media text, database, World Wide Web page, CD-ROM dictionary, interactive software. (*Language*)

Forms of Oral Communication. Examples are: greeting, conversation, question, statement, exclamation, instructions, directions, poem, rhyme, song, story, anecdote, announcement, news broadcast, interview, oral presentation, speech, recitation, debate, report, role-play, drama. (*Language*)

Graphs. A representation of data in a pictorial form. Some types of graphs are: **Histogram.** A type of bar graph in which each bar represents a range of values, and the data are continuous. **Pictograph.** A graph that illustrates data using pictures and symbols. (*Mathematics*)

Information. A kind or items of knowledge found in or gathered from such various sources as observation, persons, books, media or electronic sources. The term carries no specific reference to the extent, character or soundness of that knowledge. Information may be termed **data** when it is organized for analysis or used as a basis for a decision. Data may also be used to refer strictly to numerical information in a form suitable for processing by a computer. Information becomes **knowledge** when it is invested with meaning through study, investigation, analysis, observation and experience, possibly to become a body of ideas which are considered grounded on truth.

Knowledge suggests a range of information leading to a theoretical or practical understanding. Knowledge leads to **wisdom** with experience; wisdom suggests the application of knowledge with good judgment and foresight.

Information literacy. The ability to recognize the need for information to solve problems and develop ideas; pose important questions; use a variety of information gathering strategies; locate relevant and appropriate information; access information for quality; authority, accuracy and authenticity. Includes the abilities to use the practical and conceptual tools of information technology, to understand form, format, location and access methods, how information is situated and produced, research processes, and to format and publish in textual and multimedia formats and to adapt to emerging technologies. (ATLC)

Information Technology. A term used to include a wide range of technologies -- print, digital and visual media -- for storing, retrieving, sending and transferring of information. The term is also used to describe the study or application of systems (especially computers, digital electronics, telecommunication, or automated catalogue etc.). See also Media Works; Print and Electronic Resources; Technology.

Knowledge. See **Information.**

Listening and speaking skills. Examples are: determining the purpose of listening; paying attention to the speaker or performer; following directions and instructions; recalling ideas accurately; responding appropriately to thoughts expressed; judging when it is appropriate to speak or ask questions; allowing others a turn to speak; speaking clearly and coherently; asking questions to clarify meaning or to obtain more information; responding with consideration for other's feelings; using and interpreting facial expressions, gestures, and body language appropriately. (*Language*)

Mathematical Communication. The use of mathematical language by students to:
respond to and describe the world around them; communicate their attitudes about and interests in mathematics; reflect and shape their understandings of and skills in mathematics. Students communicate by talking, drawing, pictures, diagrams, writing journals, charting, dramatizing, building with concrete materials, and using symbolic language, (e.g., 2, < =). (*Mathematics*)

Media Works: Forms of communication that include written or spoken words, sound, and/or pictures, such as brochures, posters, magazines, newspapers, documentary films, videos, advertisements, cartoons, commercials, news reports, nature programs, and travelogues. Audio elements include speech, music, background sounds, sound effects, volume, silence, narration, pace, and sequence of sounds. Compositional elements include form (structure), theme, setting, atmosphere, and point of view. Visual elements include lighting, colour, images, size and type of lettering, size of images, sequence of images, symbols, graphics, camera angles, logos, speed of presentation, shape of design, credits, details of sponsorship, animation and live-action. (*Language)*

Metacognition. The ability to think about one's own thinking, involving planning before a task, monitoring during a task and evaluating oneself upon completion. (*Demystifying Thinking: A Practical Handbook for Teachers*, Prentice Hall, Scarborough: 1995)

Metaskills. The significant, comprehensive and unifying skills behind and beyond all specific, subject-based expectations. *Information Studies: Kindergarten to Grade 12* organizes learning according to four metaskills: Understanding of Concepts / Reasoning, Organizing, Communicating and Applying). Such organization allows for the rich, consistent and effective assessment of achievement, transfer and change.

OPAC (Online Public Access Catalogue). On online catalogue of information and materials organized and classified for electronic access according to recognized standards.

Pattern book. Book for Primary students containing text with predictable language patterns. (*Language*)

Primary data. Information that is collected directly or first-hand. Data from a person-on-the-street survey are primary data. Also called first-hand data or primary-source data. (*Mathematics*)

Primary sources. Artifacts, and oral, print, media, or computer materials that are the earliest or first of a kind. (*Social Studies, Grades 1 to 6; History and Geography, Grades 7 and 8*)

Probability. The extend to which an event is likely to occur, measured by the ratio of the favourable cases to the whole number of cases possible.

Print and Electronic Resources. Materials in print or electronic media, including reference materials; for example, books (fiction, non-fiction), newspapers, magazines, encyclopaedias, reports, television programs, videos, CD-ROMs, computer graphics programs, word processing programs, models for writing (e.g., stories or essays by published writers), style guides, databases, dictionaries, thesauruses, spell-check programs. (*Language*)

Reading strategies. Methods used in reading to determine the meaning of a text. Examples are: rereading, substituting an appropriate familiar word for an unfamiliar one; using root words to determine meaning of unfamiliar words; using previous knowledge to determine meaning; using information from the context to determine meaning; predicting the use of specific words from the context (e.g., in a simple statement, the verb often immediately follows the subject); making inferences; predicting content; confirming or revising predictions; adjusting speed in silent reading according to the purpose of reading or the difficulty of the text; using graphic organizers (e.g. Venn diagrams, story maps), skimming text for information or detail; scanning text to determine purpose of text or type of

material; recording key points and organizing them in a sequence; monitoring comprehension. (*Language*)

Sample. A small, representative group chosen from a population and examined in order to make predictions about the population. Also called sampling. (*Mathematics*)

School library. The instructional centre in the school that coordinates and provides on-site and off-site access to information, resources, services and programs that integrate information literacy, the intellectual access to information, with teachers, to develop independent learners who are effective users of information and ideas and committed to informed decision-making. (ATLC)

School Library Program. The collaboratively planned and taught units of study developed through the shared expertise and equal partnership of classroom teachers and teacher-librarians based on the principles of resource-based learning and designed to achieve the educational goals of the school. (ATLC). The term may also refer to the full range of learning experiences arising out of school library assessment, resources, facilities, support services, technologies, community connections and staff leadership.

Secondary data. Information that is not collected first-hand, for example, data from a government document or a database. Also called second-hand data or secondary-source data. (*Mathematics*)

Secondary Sources. Oral, print, media, and computer materials that are not primary or original.

Simulation. A probability experiment to test the likelihood of an event. For example, tossing a coin is a simulation of whether the next person you meet is a male or a female. (*Mathematics*)

Strands. The major areas of knowledge and skills into which a curriculum is organized (e.g., Inquiry and Research, Information Technologies, and Information and Society)

Support services. School-level ancillary staff, such as library technicians and clerical assistants, as well as central board staff and services such as central media, acquisitions, cataloguing and technical services.

Table. An orderly arrangement of facts set out for easy reference, for example, an arrangement of numerical values in vertical or horizontal columns. (*Mathematics*)

Teacher-librarian. A teacher additionally qualified in the selection, management and utilization of learning resources, who manages the school library and works with other teachers to plan, implement and evaluate resource-based instructional programs.

Technology. The application of knowledge to meet the goals, goods and services desired by people (*Social Studies, Grades 1 to 6; History and Geography, Grades 7 and 8*). See also Information Technology.

Wisdom. See **Information.**

Appendix A - Research-Based Information Problem-Solving Process Models

OSLA Info. Studies K-Gr.12 Canada	Kuhlthau Information Seeking United States	Eisenberg/Berkowitz Information Problem-Solving United States	Irving Information Skills United Kingdom	Stripling / Pitts Research Process United States
STAGE 1 **Preparing for Research** 1. Define 2. Explore 3. Identify 4. Relate	1. Initiation 2. Selection of topic 3. Exploration (investigating information on the general topic 4. Formulation of a focused topic/thesis	1. Task Definition 1.1 Define the problem 1.2 Identify the requirements 2. Information Seeking Strategies 2.1 Determine the range of resources 2.2 Prioritize sources	1. Formulation/analysis of information need 2. Identification/appraisal of likely sources	1. Choose a broad topic 2. Get and overview of the topic 3. Narrow the topic 4. Develop thesis/purpose statement 5. Formulate questions to guide research 6. Plan for research and production
STAGE 2 **Accessing Resources** 5. Locate 6. Select 7. Gather 8. Collaborate	5. Collection (gather information on focused topic)	3. Location and Access 1.1 Locate sources 1.2 Find information within sources	3. Locating individual resources 4. Examining, selecting and rejecting individual resources	7. Find, analyse, evaluate sources
STAGE 3 **Processing Information** 9. Analyse/ Evaluate 10. Test 11. Sort 12. Synthesize		4. Information Use 4.1 Engage - read, view, listen, etc. 4.2 Extract information 5. Synthesis 5.1 Organize 5.2 Create and present	5. Interrogating/using individual resources 6. Recording/storing information 7. Interpretation, analysis, synthesis and evaluation of information	8. Evaluate evidence, take notes, compile bibliography 9. Establish conclusions, organize information into outline
STAGE 4 **Transferring Learning** 13. Revise 14. Present 15. Reflect 16. Transfer	6. Presentation-organizing, outlining, summarizing, writing 7. Assessment - of outcome and process	6. Evaluation 6.1 Judge the product 6.2 Judge the process	8. Shape, presentation and communication of information 9. Evaluation of the assignment	10. Create and present final product 11. Reflection Point - is the paper/product satisfactory?

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Appendix B. Planning for Interdisciplinary Learning
Sample Connections for *The Arts* and *Information Studies*

Grade	*The Ontario Curriculum: The Arts Gr. 1-8* Specific Expectation (unless otherwise stated)	*Information Studies Kindergarten - Gr. 12* Specific Expectation (unless otherwise stated)
1	- describe the subject matter in both their own and others' art work (e.g., *La Orana Maria* by Paul Gauguin and *Kettle of Soup* by Joseph-Charles Franchere, which depict people engaged in everyday activities). *Visual Arts: Critical Thinking*	- find information from illustrative works. *Inquiry and Research: Concepts/Reasoning*
2	- describe the subject matter of a variety of art works from various cultures and periods and in various styles (e.g., *Child and Dog* by Alex Colville and *The Sleeping Gypsy* by Henri Rousseau, which depicts animals). *Visual Arts: Critical Thinking*	- express their thoughts and feelings about ideas in stories and informational text. *Inquiry and Research: Applying*
3	- communicate their thoughts and feelings about the music they hear, using language and a variety of art forms and media (e.g., storytelling, software program for drawing, creative movement). *Music: Critical Thinking*	- create a simple media work such as a picture book, advertisement or a video production with teacher assistance. *Information Technologies: Communicating*
4	- explain the importance of research in producing effective dramatizations. *Dance and Drama: Critical Thinking*	- begin to bookmark Internet sites relevant to research. *Inquiry and Research: Concepts/Reasoning*
5	- provide support for their interpretations of personal experiences and aspects of history which they have presented through drama and dance using various research resources to gather information. *Dance and Drama: Critical Thinking*	- develop a research focus. *Inquiry and Research: Concepts/Reasoning*
6	- create an accompaniment for a story, poem, or drama presentation. *Music: Creative Work*	- integrate multimedia tools such as importing sound/graphics. *Information Technology: Applying*
7	- identify ways in which the visual arts affect various aspects of society and the economy. *Visual Arts: Critical Thinking*	- appraise the perspectives and opinions of varied writers, artists, and producers of creative works. *Information and Society: Concepts/Reasoning*
8	- describe theatrical dance performances and distinguish between the types and styles used (e.g., ballet, modern, jazz, folk, ethnic). *Dance and Drama: Knowledge of Elements*	- compare ways that information is created and communicated in a variety of formats. *Information and Society; Communicating*

Appendix B. Planning for Interdisciplinary Learning
Sample Connections for *French As A Second Language: Core French* and *Information Studies*

Grade	The Ontario Curriculum French As A Second Language : Core French Gr. 4-8 Specific Expectation (unless otherwise stated)	Information Studies Kindergarten - Gr. 12 Specific Expectation (unless otherwise stated)
1		
2		
3		
4	- respond briefly to oral texts. *Oral Communication, Reading and Writing: Oral Communication*	- analyse the difference between information produced by oral and written cultures). *Information and Society: Reasoning*
5	- give an oral presentation of five to ten sentences in length (e.g., description of clothing). *Oral Communication, Reading and Writing: Oral Communication*	- obtain data by telephone, letter and online. *Information Technologies: Applying*
6	- respond to oral texts (e.g. answer questions from a tape). *Oral Communication, Reading and Writing: Oral Communication*	- deconstruct media works, *Inquiry and Research: Concepts/Reasoning*
7	- produce a variety of simple responses, in structured and open-ended situations, to convey understanding of written text in a different form (e.g. design a biography card). *Oral Communication, Reading and Writing: Reading*	- publish a report, newsletter or pamphlet using word processing and desktop publishing software, *Information Technologies: Communicating*
8	- give an oral presentation of more than 20 sentences in length, adjusting speech to suit the audience. *Oral Communication, Reading and Writing: Oral Communication*	- explore biographies of pioneers of information. *Information and Society: Reasoning*

Appendix B. Planning for Interdisciplinary Learning
Sample Connections for *Health and Physical Education* and *Information Studies*

Grade	The Ontario Curriculum: Health and Physical Education Gr. 1-8 Specific Expectation (unless otherwise stated)	Information Studies Kindergarten - Gr. 12 Specific Expectation (unless otherwise stated)
1	- describe exploitative behaviour (e.g., abusive behaviours, bullying, inappropriate touching) and the feelings associated with them. *Healthy Living: Personal Safety & Injury Prevention*	- use brainstorming to explore thoughts and feelings. *Inquiry & Research: Concepts/Reasoning*
2	- identify a balanced diet and apply decision-making skills to create menus for healthy meals. *Healthy Living: Healthy Eating*	- begin to develop word processor skills such as cut, copy, paste. *Information Technologies: Organizing*
3	- identify examples of real and fictional violence (e.g., schoolyard fights, cartoons, movies). *Healthy Living: Personal Safety & Injury Prevention*	- begin to make inferences when reading. *Inquiry & Research: Applying*
4	- apply decision-making and assertiveness skills to make and maintain healthy choices related to tobacco use, and recognize factors that can influence decisions to smoke or to abstain from smoking (e.g., the media, family members, friends, laws). *Healthy Living: Substance Use and Abuse*	- create dramatizations. *Inquiry & Research: Communicating*
5	- demonstrate resistance techniques (e.g. avoidance, walking away) and assertiveness skills (e.g., saying no) to deal with peer pressure in situations pertaining to substance use and abuse. *Healthy Living: Substance Use and Abuse*	- explore topic to be investigated using a variety of visual media such as videos and television programs. *Information Technologies: Reasoning*
6	- describe the short and long term effects of cannabis and other illicit drugs. *Healthy Living: Substance Use and Abuse*	- browse appropriate sections of the library to expand approaches to the topic. *Inquiry and Research: Applying*
7	- identify people and resources that can support someone experiencing harassment. *Healthy Living: Personal Safety and Injury Prevention*	- use information skills to resolve conflicts at school. *Information and Society: Applying*
8	- identify symptoms, methods of transmission, prevention, and high-risk behaviours related to common STD's, HIV, and AIDS. *Healthy Living: Growth and Development*	- use a variety of electronic references and telecommunication tools to build a knowledge base on a topic. *Information Technologies; Applying*

Appendix B. Planning for Interdisciplinary Learning
Sample Connections for *Kindergarten* and *Information Studies*

Areas of Learning	The Ontario Curriculum : Kindergarten Specific Expectation (unless otherwise stated)	Information Studies Kindergarten - Gr. 12 Specific Expectation (unless otherwise stated)
Language	- ask questions, express feelings, and share ideas *Language: Oral Communication*	- ask questions and express feelings about answers found. *Inquiry and Research, Concepts/Reasoning*
Mathematics	- sort and classify objects into sets according to specific characteristics, and describe those characteristics (e.g., colour, size, shape). *Mathematics: Number Sense and Numeration*	- sort and classify objects by characteristic and category. *Inquiry and Research: Organizing*
Science and Technology	- identify familiar technological items and describe their use in daily life (e.g., telephone, videocassette recorder). *Science and Technology: Use of Technology*	- identify familiar information-based and technological items and describe their use. *Information and Society: Concepts/Reasoning*
Personal and Social Development	- demonstrate self-control by following classroom rules and routines in different contexts in the school (e.g., in the classroom, gym, library). *Personal and Social Development: Self-Awareness and Self-Reliance*	- demonstrate an understanding of the information-based purposes of rules and routines in different contexts. *Information and Society: Communicating*
The Arts	- use a variety of tools and materials in creating art works or making representations (e.g., musical instruments, props). *The Arts: Creative Activity*	- use a variety of software tools and techniques to make products and presentations. *Information Technologies: Communication*

Appendix B. Planning for Interdisciplinary Learning
Sample Connections for *Language* and *Information Studies*

Grade	*The Ontario Curriculum: Language Gr. 1-8* Specific Expectation (unless otherwise stated)	*Information Studies Kindergarten - Gr. 12* Specific Expectation (unless otherwise stated)
1	- identify ways in which different kinds of written materials are organized (e.g., stories, pop-up books, reference books). *Reading: Understanding Form and Style*	- identify parts of fictional texts such as table of contents and chapters. *Inquiry and Research: Organizing*
2	- produce short pieces of writing using simple forms (e.g., narratives and poems based on familiar models). *Writing: Overall Expectation*	- identify different forms of information such as storybooks, information texts, brochures, menus and recipes. *Inquiry and Research: Organizing*
3	- create simple media works (e.g., create a series of shots using a still video camera or still camera and then display them for the class). *Oral and Visual Communication: Media Communication Skills*	- create a simple media work such as a picture book, advertisement or video production with teacher assistance. *Information Technologies: Communicating*
4	- communicate ideas and information for a variety of purposes and to specific audiences (e.g., write a brief research report on a class investigation for classmates). *Writing: Overall Expectations*	- explore the history of writing systems such as alphabets, hieroglyphics, codes, and petroglyphs. *Information and Society: Communicating*
5	- identify various types of media works and some of the techniques used in them. *Oral and Visual Communication: Overall Expectations*	- examine media works such as television commercial or documentary film to identify creator's purpose and strategies to achieve it. *Information Technologies: Concepts/Reasoning*
6	- create a variety of media works (e.g., create a video advertisement for a book as a member of an "advertising team"). *Oral and Visual Communication: Media Communication Skills*	- prepare a display using different technologies such as scanners, digital cameras and camcorders. *Information Technologies: Communicating*
7	- describe the function of different elements in magazines and newspapers. *Oral and Visual Communication: Media Communication Skills*	- identify how newspapers and periodicals are created to communicate information. *Information and Society: Communicating*
8	- evaluate the effectiveness of various informational media works (e.g., a website on the Internet, a documentary film, television or radio news programs, news magazines). *Oral and Visual Communication: Media Communication skills*	- demonstrate a step-by-step evaluation of a media work or computer application. *Information Technologies; Communicating*

Appendix B. Planning for Interdisciplinary Learning
Sample Connections for *Mathematics* and *Information Studies*

Grade	The Ontario Curriculum: Mathematics Gr. 1-8 Specific Expectation (unless otherwise stated)	Information Studies Kindergarten - Gr. 12 Specific Expectation (unless otherwise stated)
1	- organize materials on concrete graphs and pictographs using one-to-one correspondence. *Data Management and Probability: Concluding and Reporting*	- organize information on concrete graphs and pictographs. *Inquiry and Research: Organizing*
2	- construct and label simple graphs, bar graphs, and pictographs using one-to-one correspondence. *Data Management and Probability: Concluding and Reporting*	- construct and label simple graphs. *Inquiry and Research: Organizing*
3	- organize data in Venn diagrams and charts using several criteria. *Data Management and Probability: Concluding and Reporting*	- organize information in diagrams and charts using several criteria. *Inquiry and Research: Organizing*
4	- use conventional symbols, titles and labels when displaying data. *Data Management and Probability: Analysing Data*	- use conventional symbols, titles and labels when displaying information. *Inquiry and Research: Organizing*
5	- analyse how data was collected and discuss the reasonableness of the results. *Data Management and Probability: Analysing Data*	- analyse how information was collected and discuss the reasonableness of the results, *Information Technologies: Concepts/Reasoning*
6	- show an understanding of probability in making relevant decisions (e.g., the probability of tossing a head with a coin is not dependent on the previous toss). *Data Management and Probability: Probability*	- demonstrate an understanding of probability in making relevant decisions and appropriate conclusions. *Inquiry and Research: Concepts/Reasoning*
7	- explore with technology to find the best presentation of data. *Data Management and Probability: Probability*	- present electronic slide show and video of research. *Information Technologies: Communicating*
8	- read and report information about data presented on line graphs, comparative bar graphs, pictographs, and circle graphs, and use the information to solve problems *Data Management and Probability: Probability*	- use information skills and reading experiences to resolve issues at school. *Information and Society; Applying*

Appendix B. Planning for Interdisciplinary Learning
Sample Connections for *Science and Technology* and *Information Studies*

Grade	*The Ontario Curriculum: Science and Technology Gr. 1-8* Specific Expectation (unless otherwise stated)	*Information Studies Kindergarten - Gr. 12* Specific Expectation (unless otherwise stated)
1	- use appropriate vocabulary in describing their investigations, explorations, and observations (e.g., use body, legs, wings and feelers in describing an insect). *Life Systems: Characteristics and Needs of Living Things: Developing Skills of Inquiry, Design and Communication*	- use draw applications to create simple pictures. *Information Technologies: Applying*
2	- ask questions about and identify some needs of different animals with which they are familiar, and explore possible answers to these questions and ways of meeting these needs. *Life systems: Growth and Change in Animals: Developing Skills of Inquiry, Design and Communication*	- articulate questions. *Inquiry and Research: Concepts/Reasoning,*
3	- plan investigations to answer some of these questions or solve some of these problems and explain the steps involved. *Matter and Materials: Magnetic and Charged Materials: Developing Skills of Inquiry, Design and Communication*	- outline necessary resources and plan steps to obtain resources. *Inquiry and Research: Concepts/Reasoning*
4	- communicate the procedures and results of investigations for specific purposes and to specific audiences, using oral presentations, written notes and descriptions, drawings, and charts. *Matter and Materials: Materials That Transmit, Reflect, or Absorb Light or Sound: Developing. Skills of Inquiry, Design, and Communication*	- share findings in electronic format, e.g. keypals, conferencing and databases. *Inquiry and Research: Communicating*
5	- compile data gathered through investigation in order to record and present results, using tally charts, tables, and labeled graphs produced by hand or with a computer. *Energy and Control: Conservation of Energy: Developing Skills of Inquiry, Design, and Communication*	- create simple databases and spreadsheets and output data in a variety of ways. *Inquiry and Research: Organizing*
6	- identify through experimentation ways in which chemical energy can be transformed into electrical energy. *Energy and Control: Underlying Concepts: Understanding Basic Concepts*	- make judgments and draw conclusions to solve problems. *Inquiry and Research: Applying*
7	- tell the "story" of a product used every day identifying the need it meets and describing its production, use, and eventual disposal. *Structural Strength and Stability: Relating Science and Technology to the World Outside of the School*	- use a variety of electronic reference and telecommunication tools to investigate a topic. *Information Technologies: Applying*
8	- identify ways in which humans have tried to contain damage caused by water. *Earth and Space Systems: Water Systems: Relating Science and Technology to the World Outside of the School*	- identify cause and effect relationships in information. *Inquiry and Research: Applying*

Appendix B. Planning for Interdisciplinary Learning
Sample Connections for *Social Studies/History and Geography* and *Information Studies*

Grade	The Ontario Curriculum: Social Studies/History and Geography Gr. 1-8 Specific Expectation (unless otherwise stated)	Information Studies Kindergarten - Gr. 12 Specific Expectation (unless otherwise stated)
1	- identify important past and present relationships in their lives (e.g., with family members, friends, pets, teachers). *Heritage and Citizenship: Relationships, Rules and Responsibilities: Understanding Concepts*	- create group lists of previous knowledge about particular topics. *Inquiry and Research: Communicating*
2	- ask simple questions and use a variety of means for obtaining information about communities around the world. *Canada and World Connections: Features of Communities: Developing Research/Inquiry and Communication Skills*	- identify different forms of information such as storybooks, informational texts, brochures, menus and recipes. *Inquiry and Research: Organizing*
3	- communicate information (e.g., concerning the comparison of urban and rural communities), using media works, oral presentations, written notes and descriptions, drawings, tables, charts, maps, and graphs. *Canada & World Connections: Urban & Rural Communities: Developing Inquiry/ Research etc.*	- select information from a range of print, electronic resources. *Information Technologies: Concepts/Reasoning*
4	- identify relationships between Ontario and other provinces and territories in a variety of fields (e.g., art, literature, music, dance, technology). *Canada and World Connections: The provinces and Territories of Canada: Applying Concepts and Skills in Various Contexts*	- use an encyclopedia to provide an overview of the topic. *Inquiry and Research: Applying*
5	- communicate information about early communities, using media works, oral presentations, written notes and descriptions, drawings, tables, charts, maps and graphs. *Heritage and Citizenship: Early Civilizations: Developing Inquiry/Research and Communication Skills*	- create simple databases and spreadsheets and output data in a variety of ways. *Inquiry and Research: Organizing*
6	- use appropriate vocabulary (e.g., technology, culture, immigration, tourism, physical features, export, import, parallels, meridians, Pacific Rim, economics, media) to describe their inquiries and observations. *Canada and World Connections: Canada and Its Trading Partners: Developing Inquiry/Research and Communication Skills*	- prepare keywords, descriptors and concepts appropriate to intended research (e.g. dictionary definitions, specialized terms in math and science). *Inquiry and Research: Organizing*
7	- analyse, synthesize, and evaluate data by applying a decision-making model to an environmental issue. *Geography: The Themes of Geographic Inquiry: Developing Inquiry/Research and Communication Skills*	- make judgments and draw conclusions to solve problems. *Inquiry and Research: Applying*
8	- demonstrate an understanding of factors affecting population distribution (e.g., history, natural environment, technological development). *Geography: Patterns in Human Geography: Understanding Concepts*	- identify cause and effect. *Inquiry and Research: Applying*