INFORMATION TECHNOLOGY 8 TO 10

Integrated Resource Package 1996

Province of
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Education

IRP 035

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Implementation of Information Technology K to 7, 8 to 10, and 11 and 12 will begin in September 1996, with full implementation in September 1997. The K to 12 Education Plan requires the integration of Information Technology K to 7 and 8 to 10 with other curricular areas. Information Technology 11 and 12 is a stand-alone course.

This Integrated Resource Package (IRP) provides some of the basic information that teachers will require to implement the curriculum. The information contained in this IRP is also available through the Internet. Contact the Ministry of Education's home page: http://www.educ.gov.bc.ca/

THE INTRODUCTION

The Introduction provides general information about Information Technology 8 to 10, including special features and requirements. It also provides a rationale for the subject—why information technology is taught in BC schools—and an explanation of the curriculum organizers.

THE INFORMATION TECHNOLOGY 8 TO 10 CURRICULUM

The provincially prescribed curriculum for Information Technology 8 to 10 is structured in terms of *curriculum organizers*. The main body of this IRP consists of four columns of information for each organizer. These columns describe:

- provincially prescribed learning outcome statements for Information Technology 8 to 10
- suggested instructional strategies for achieving the outcomes
- suggested assessment strategies for determining how well students are achieving the outcomes
- provincially recommended learning resources

Prescribed Learning Outcomes

Learning outcome statements are content standards for the provincial education system. Learning outcomes set out the knowledge, enduring ideas, issues, concepts, skills, and attitudes for each subject. They are statements of what students are expected to know and be able to do in each grade. Learning outcomes are clearly stated and expressed in measurable terms. All learning outcomes complete this stem: "It is expected that students will. . . . " Outcome statements have been written to enable teachers to use their experience and professional judgment when planning and evaluating. The outcomes are benchmarks that will permit the use of criterion-referenced performance standards. It is expected that actual student performance will vary. Evaluation, reporting, and student placement with respect to these outcomes depends on the professional judgment of teachers, guided by provincial policy.

Suggested Instructional Strategies

Instruction involves the use of techniques, activities, and methods that can be employed to meet diverse student needs and to deliver the prescribed curriculum. Teachers are free to adapt the suggested instructional strategies or substitute others that will enable their students to achieve the prescribed outcomes. These strategies have been developed by specialist and generalist teachers to assist their colleagues; they are suggestions only.

Suggested Assessment Strategies

The assessment strategies suggest a variety of ways to gather information about student performance. Some assessment strategies relate to specific activities; others are general. These strategies have been developed by specialist and generalist teachers to assist their colleagues; they are suggestions only.

Provincially Recommended Learning Resources

Provincially recommended learning resources are materials that have been reviewed and evaluated by British Columbia teachers in collaboration with the Ministry of Education according to a stringent set of criteria. They are typically materials suitable for student use, but they may also include information primarily intended for teachers. Teachers and school districts are encouraged to select those resources that they find most relevant and useful for their students, and to supplement these with locally approved materials and resources to meet specific local needs. The *recommended* resources listed in the main body of this IRP are those that have a comprehensive coverage of significant portions of the curriculum, or those that provide a unique support to a specific segment of the curriculum. Appendix B contains a complete listing of provincially recommended learning resources to support this curriculum.

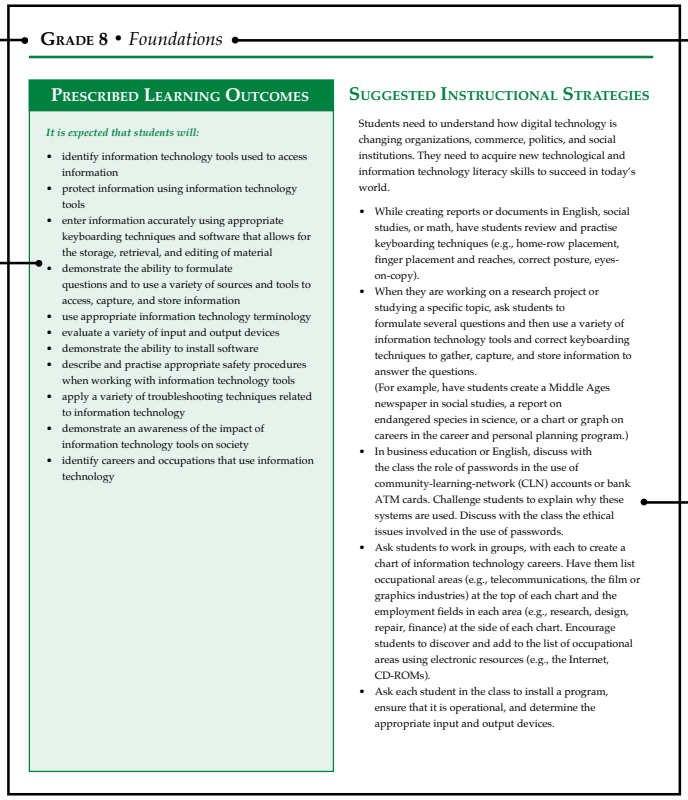
THE APPENDICES

A series of appendices provides additional information about the curriculum and further support for the teacher.

- ***Appendix A*** contains a listing of the prescribed learning outcomes for the curriculum, arranged by curriculum organizer and by grade.
- ***Appendix B*** contains a comprehensive listing of the provincially recommended learning resources for this curriculum. As new resources are evaluated, this appendix will be updated.
- ***Appendix C*** outlines the cross-curricular reviews used to ensure that concerns such as equity, access, and the inclusion of specific topics are addressed by all components of the IRP.
- ***Appendix D*** contains assistance for teachers related to provincial evaluation and reporting policy. Curriculum outcomes have been used as the source for sample criterion-referenced evaluations.
- ***Appendix E*** acknowledges the many people and organizations that have been involved in the development of this IRP.
- ***Appendix F*** contains a glossary of terms specific to the Information Technology 8 to 10 curriculum.
- ***Appendix G*** contains a planning guide and suggestions on how to integrate Information Technology 8 to 10 into a classroom setting.

Grade

Curriculum Organizer



Prescribed Learning Outcomes

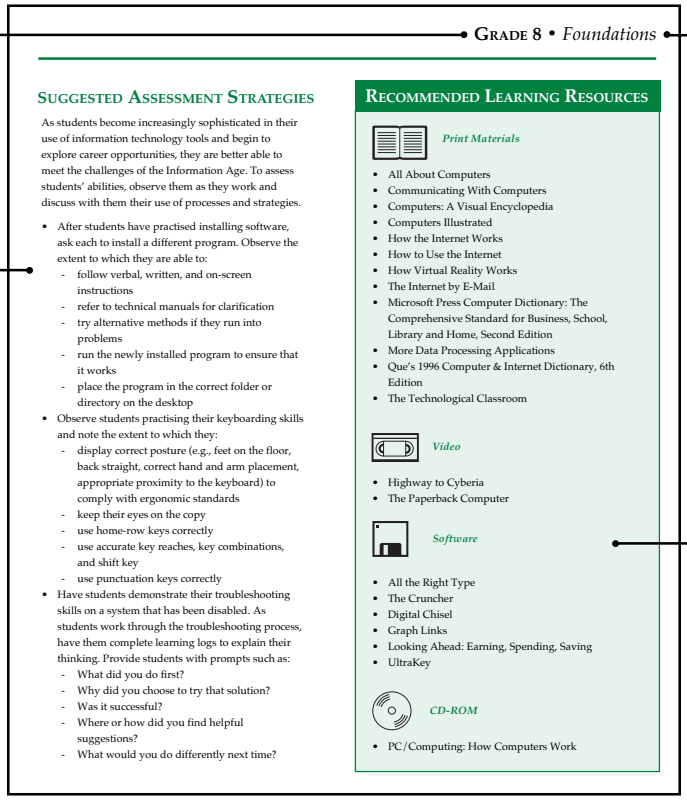
The Prescribed Learning Outcomes column of this IRP lists the specific learning outcomes for each curriculum organizer or sub-organizer. These aid the teacher in day-to-day planning.

Suggested Instructional Strategies

The Suggested Instructional Strategies column of this IRP suggests a variety of instructional approaches that include group work, problem solving, and the use of technology. Teachers should consider these as examples that they might modify to suit the developmental levels of their students.

Grade

Curriculum Organizer



Suggested Assessment Strategies

The Suggested Assessment Strategies offer a wide range of different assessment approaches useful in evaluating the Prescribed Learning Outcomes. Teachers should consider these as examples they might modify to suit their own needs and the instructional goals.

Recommended Learning Resources

The Recommended Learning Resources component of this IRP is a compilation of provincially recommended resources that support the Prescribed Learning Outcomes. A complete list including a short description of the resource, its media type, and distributor is included in Appendix B of this IRP.

The development of this Information Technology 8 to 10 Integrated Resource Package (IRP) has been guided by the principles of learning. These are:

- Learning requires the active participation of the student.
- People learn in a variety of ways and at different rates.
- Learning is both an individual and a group process.

Rationale

To participate and make informed decisions in today's world, a global citizen requires technological and information literacy skills that include the ability to gather, process, and manipulate data. These skills are now as essential as traditional numeracy and literacy.

British Columbia is becoming a highly computer-literate and "wired" society with a large percentage of businesses and households connected to the information highway. Information technology and the information highway are also providing new opportunities for learning. Now a student in a remote or rural area in BC can have the same access to resources as a student in a large urban centre.

Information technology is also quickly changing the way we work. Traditional jobs, such as those in the banking industry, are disappearing while new areas of economic activity, such as multimedia production, are growing rapidly. As well, how and where we work continues to evolve as technology impacts on the workplace.

Our era is marked by constant and rapid change. In the time it has taken to develop this curriculum, technology has already made significant advances; by the time the curriculum reaches the classroom, much of what is now considered state-of-the-art will be obsolete.

As well as the rapid development of new technologies that gather, organize, and share information, familiar technologies like television, telephone, and computers are evolving and being expanded by digitized information, causing a convergence of technologies.

The challenge for students and teachers is to develop an understanding of the fundamentals of information literacy and the tools required to prepare for, and participate in, an evolving information-based society. Students need to have a firm grounding in information technology for their careers, for lifelong learning, and for recreation. The Information Technology K to 12 curriculum provides students with the analytical, interpersonal, and technical skills they require to be active participants in an exciting and dynamic world.

Preparing for the Workplace

Today, new and exciting careers are being pioneered by those with the knowledge and skills to use information technology creatively, with whole industries emerging around the information technology revolution.

To meet career challenges, students must be self-reliant as well as good communicators and problem solvers. They require interpersonal, academic, and technical skills, and must demonstrate an ability to work independently and as part of a team. They also need to develop an ethical approach to the use of information. Employers in British Columbia are looking for workers who are adaptable, are committed to lifelong

learning, and show strong leadership qualities. This curriculum builds these skills while ensuring that students acquire a sound knowledge of information technology.

Preparing the Citizen

To be responsible members of society, students must be aware of the ever-growing impacts of information technology. They need to reflect critically on information technology's role in society and consider its positive and negative effects. The information technology curriculum fosters the development of skills and attitudes that increase students' abilities to address the social and ethical issues of technological advancements.

Relevant to Everyone

The Information Technology K to 12 curriculum is designed to provide learning opportunities for all students. The instructional and assessment strategies described in this IRP encourage students to apply the skills and knowledge they gain to solve real-life problems. As students study information technology, they develop research and communication skills and learn how to evaluate their work.

Preparing for Further Education

The skills and knowledge covered by this curriculum will provide students with the level of information literacy they need to succeed in postsecondary education.

Aim and Approach of the Curriculum

The aim of the Information Technology K to 12 curriculum is to help students develop information literacy and the lifelong learning patterns they need to live and work effectively in an information-rich technological society. To achieve this, the curriculum provides a framework for students to learn how to solve problems using information technology.

Reporting on Information Technology

As in all subject areas at the Kindergarten to grade 10 level and courses at the grade 11 and grade 12 level, teachers must use the prescribed learning outcomes as the basis for reporting to parents on student performance in information technology.

Information technology is an integrated area of study from Kindergarten to grade 10, so teachers of these grades do not need to report on it as a separate subject. However, teachers should include written comments specific to information technology when reporting on other subject areas. In grades 11 and 12, reporting follows the normal procedures for senior-level courses.

Evolving Information Technology

In this IRP, *information technology tools* refers to the tools and resources in common use at the time this document was prepared. It is expected that as new tools and resources are developed they will be used and taught in the schools to reinforce the concepts in this curriculum.

If teachers use resources such as local area networks (LAN)s, wide area networks (WAN)s, the World Wide Web, or the Internet, they will need to have them authorized (according to district and provincial policies) before using them in the classroom.

Information technology tools and resources include computers, multimedia, and related technologies used for local or global communications. The chart on the following page lists some specific tools.

Information Technology Tools

Category of Tool	Examples
Hardware Devices	• faxes, voice/fax/data modems • electronic day books • video recorders, tape-recorders • MIDI hardware • liquid crystal display panels • digital scanners, laser printers • digital cameras
Software and Computer Accessories	• computer-assisted-instruction (CAI software) • simulations • CD-ROMs • laserdiscs • office and multimedia productivity tools • World Wide Web browsers • hypertext authoring tools • programming languages • multimedia software and tools
Communications Environments	• Macintosh, OS/2, Windows, Unix, DOS • World Wide Web • Gopher, Veronica, Archie, file transfer protocol (FTP) sites • Wide Area Information Servers (WAIS) • Internet service providers • local area network • wide area network • infrared communications • video conferencing

The following chart provides an overview of Information Technology K to 12.

Overview

▼ Grades K to 3 Students become aware that information technology is all around them. They become aware of its role in their lives and explore familiar information technology tools. Using these tools, students enhance group interaction and communication, and develop confidence in handling information. Activities are based on classroom themes and their own experiences and interests.	***In grades K to 3, students:*** • identify information technology tools that are useful in their daily lives • use information technology tools independently and in groups • demonstrate an awareness that information can be collected, organized, and presented in a variety of ways • consistently apply suitable and safe use of information technology tools
▼ Grades 4 to 7 Students gain an understanding of the personal, community, and global consequences of information technology tools and develop a concern for their responsible use. They begin to appreciate the impact information technology has on individuals and society. Students become more proficient at accessing, gathering, organizing, and presenting information by using information technology tools to create solutions to relevant problems.	***In grades 4 to 7, students:*** • use a variety of information technology tools, applications, and production processes • apply problem-solving skills to meet an information need • practise using a variety of information technology tools • demonstrate a willingness to manage resources and information • demonstrate an awareness of the protocols and ethics involved in the use of information technology
▼ Grades 8 to 10 Students become more sophisticated in their use of information technology tools. They develop stronger information literacy skills and continue to learn about various careers that use and apply information. They consider the cultural, ethical, and legal implications of information technology.	***In grades 8 to 10, students:*** • use a variety of information technology tools to access information • apply information technology to all walks of life, including education and recreation, and to future careers • identify and describe various information technology tools related to careers • demonstrate an understanding of ethics and acceptable use of information when accessing and processing information • develop simple programs for the computer • demonstrate an understanding of safe ergonomic strategies for the use of information technology • apply information technology tools in research
▼ Grades 11 and 12 Students use sophisticated information technology tools to increase and refine their skills, knowledge, and abilities to solve complex and varied problems. Students prepare for postsecondary and career opportunities through relevant and meaningful experiences within their school and community.	***In grades 11 and 12, students:*** • demonstrate an understanding of the integration and use of information technology tools in the workplace • use information technology tools to increase productivity and to enhance communications • demonstrate an ability to draw conclusions about the impact of multimedia communications on society • demonstrate a mastery of media to convey or enhance their own messages • demonstrate an awareness of the power of networked communities • demonstrate an understanding of the networking problems that are common to their own LANs and their community's WANs • identify the potential of the Internet in their daily lives • analyse information received from the Internet • use the Internet as a tool for their own communication requirements

Curriculum Organizers

The prescribed learning outcomes for Information Technology 8 to 10 are grouped into the following three curriculum organizers:

- Foundations
- Process
- Presentation

These organizers provide an organizational framework for the knowledge, skills, and attitudes contained in the learning outcomes. Because of the dynamic nature of classroom learning, no single organizer should be used in isolation, or as a basis for a lesson or unit of instruction.

Foundations

Foundations provides students with the fundamental knowledge, skills, and attitudes needed for a lifetime of using information technology. Issues of ergonomics, ethics, and the safe use of tools are included, as are connections to larger social issues such as security of information, copyright, and personal freedom. The prescribed learning outcomes emphasize:

- acquiring skills for using information technology tools
- developing the knowledge and skills to formulate questions and to access information from a variety of sources
- exploring careers and occupations related to information technology
- developing suitable attitudes and practices about safety and ergonomics in the use of information technology tools
- developing an understanding of the ethical use of information technology tools
- developing a positive attitude toward using information technology as a tool for lifelong learning
- integrating and applying these skills across all areas of learning

Process

Process allows students to select, organize, and modify information to solve problems. Students develop skills in selecting appropriate information technology tools, and they learn to use these tools to access and structure information to analyse problems, synthesize ideas, and justify opinions or values. Students also gain an understanding of time, resource, and project management. The learning outcomes emphasize:

- awareness of multiple solutions for a problem
- evaluating and selecting information based on specific requirements
- personal relevance of problems involving technology
- developing information literacy by accessing, evaluating, synthesizing, making inferences, validating, and creating information using appropriate information technology tools
- understanding the ethical use of information

Presentation

Presentation provides students with an understanding of how to communicate ideas effectively using a variety of information media. In addition to learning the principles of effective communication, students develop skills in integrating text, graphics, and audio to communicate to a specific audience. The prescribed learning outcomes emphasize:

- developing an understanding of digitized media

- applying the principles of communication and design to develop an effective presentation
- using a variety of information technology tools to synthesize the presentation of ideas and information
- thinking critically to determine and develop the most effective media for presenting ideas and information to an audience

Suggested Instructional Strategies

The suggested instructional strategies in this IRP include techniques, ideas, and methods that illustrate a variety of approaches to the prescribed curriculum for a diverse population of students. Teachers determine the best instructional methods for their students, the best way to group students for particular studies, and the best way to present material to make it relevant and interesting.

Each set of instructional strategies in this IRP consists of a context statement followed by several suggested instructional strategies.

Context Statements

The context statement links the prescribed learning outcomes with instruction. It states why these learning outcomes are important for the student's development and suggests ways to integrate the learning outcomes into various subject areas.

Strategies

The suggested instructional strategies may be undertaken by individual students, partners, or small groups. Emphasis is given to the following:

- *Strategies that foster the integration of ideas and skills with other curriculum areas.* Information Technology K to 10 is not designed to be a stand-alone curriculum area. At this level, knowledge, skills, and attitudes associated with information technology must be approached within the context of other subject areas.
- *Strategies that recognize and support the progressive development of knowledge, skills, and attitudes.* Learning outcomes and instructional strategies have been designed to recognize the cumulative nature of skill development.
- *Strategies that recognize a variety of learning styles.* Students find the interactive nature of working with information technology tools exciting and challenging. They have opportunities to create, organize, and present information in ways that are unique to their learning and interests.
- *Strategies that develop research, critical-thinking, and problem-solving skills*. To make informed and responsible choices about the appropriate use of technology, students need to listen, view, and read critically. Using information technology tools, students learn to gather, evaluate, synthesize, and present information from a variety of sources, and apply their knowledge using problem-solving strategies.

Problem-Solving Models

Models that describe problem-solving processes should be developed with students so they understand the recurring nature of solving real-world problems (as part of a problem is solved, new problems arise and some steps in the process recur). The following diagrams present a variety of approaches to applied problem solving that can be used in information technology. They are intended to provide teachers with ideas. They are not intended as prescribed models.

A Simple Linear Model

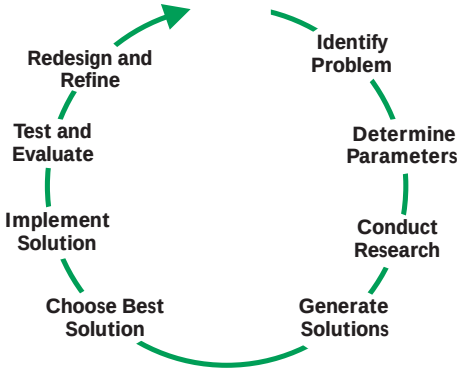
Some models suggest that problem solving is a set of clearly defined and prescribed steps. This is rarely the case.

Designing, Troubleshooting, and Social Impact Models

Some specialized problems are approached in unique ways

Designing

Designing is a problem-solving method used to develop solutions leading to the creation of articles, systems, or environments.



Troubleshooting

Troubleshooting is a method of solving problems used to isolate and diagnose a malfunction

- Identify purpose of system (inputs and outputs)
- Identify purpose of subsystems (inputs and outputs)
- Test subsystems
- Identify cause and implement solution
- Test solution

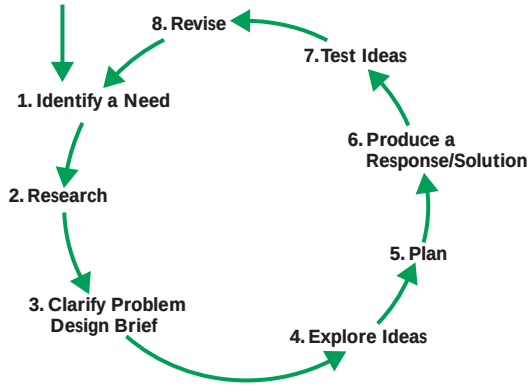
Social Impact

This is a method of solving problems used to appraise the social, environmental, and ethical implications of technological decisions

- Identify consequences and effects
- Develop a value system through critical thinking
- Judge benefits and disadvantages of technological applications
- Make ethical decisions

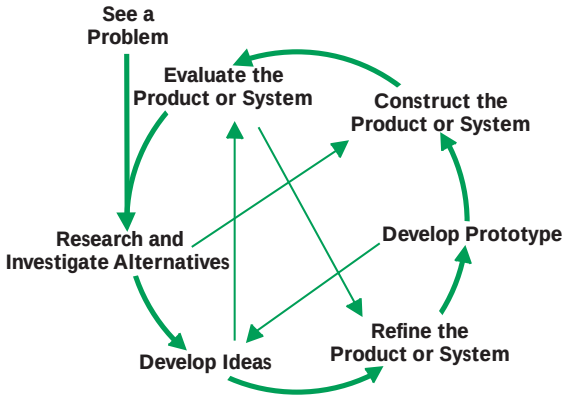
Action Model

Some models suggest a continuous flow of activity, from problem identification to the development of a refined product.



Interactive Model

Interactive models illustrate the complexity of a process, where at any time you might move to any point in the process in order to figure something out.



Integration of Cross-Curricular Interests

Throughout the curriculum development and revision process, the advice of experts has been invited to ensure that relevance, equity, and accessibility issues are addressed in all IRPs.

Prescribed learning outcomes, suggested instructional strategies, and suggested assessment strategies components of all curricula have been integrated with respect to the following:

- Applied Focus
- Career Development
- Multiculturalism and Anti-Racism
- English as a Second Language (ESL)
- Special Needs
- Aboriginal Studies
- Gender Equity
- Information Technology
- Media Education
- Science-Technology-Society
- Environment and Sustainability

See Appendix C: Cross-Curricular Interests for more information.

CONSIDERATIONS IN INFORMATION TECHNOLOGY EDUCATION

When selecting and developing learning activities, consideration must be given to health and safety, students with special needs, and gender equity. Thoughtful planning will help the teacher ensure that instruction and assessment safely meet the needs of all students.

Health and Safety

It is the responsibility of the teacher to ensure that students are aware of the potential health and safety hazards in the use of information technology tools. Consideration should also be given to correct ergonomics and related issues such as wrist, eye, and back fatigue.

Teachers must address the following questions before, during, and after an activity:

- Have students been given specific instruction about how to operate information technology tools?
- Are the tools and equipment in good repair and suitably arranged?
- Has consideration been given to the correct height of chairs, keyboards, and monitors?
- Are students being properly supervised?
- Do the facilities provide adequate lighting and ventilation for the activity?

Students with Special Needs

Students with special educational needs may require resources that are different from those needed by most students.

- Students with special needs may need special directions and more time to practise with equipment, perhaps with the help of a peer.
- Issues of safety in the computer lab, difficulty reading manuals, and special adaptations of computer equipment must be addressed before some students can realistically participate.
- Adaptations may be required to enable students with special needs to successfully meet the prescribed learning outcomes.

For students who have Individual Education Plans (IEPs), adaptations and modifications should be documented on the students' IEPs and considered in the development of the Student Learning Plan. This information may also become important if adjudications for special considerations on examinations are sought at the senior grades.

Regular reporting with letter grades is appropriate for students who are expected to achieve the prescribed learning outcomes. When students are not expected to achieve the prescribed learning outcomes, individual goals should be set and recorded in the IEP. Reporting for students with these modified outcomes should be in the form of structured written comments.

Gender Equity

The education system is committed to helping all students succeed. Teaching, assessment materials, learning activities, and classroom environments should place value on the experiences and contributions of all people from all cultures. Teachers should consider the diversity of learning styles, gender bias in learning resources, and unintentional gender bias when teaching. The following instructional strategies are suggested to help teachers deliver a gender-sensitive Information Technology K to 12 curriculum.

- Think about ways to feature women who make extensive use of information technology in their careers (e.g., guest speakers, subjects of study).
- Design instruction to acknowledge differences in experiences and interests between girls and boys.
- Demonstrate the relevance of information technology to careers and to daily life in ways that appeal to particular students in the class or school.
- Explore not only the practical applications of information technology but also the human elements, such as the ways ideas have changed throughout history, and the social and ethical implications of information technology.
- Provide practical learning opportunities designed specifically to help girls develop confidence and interest in information technology and non-traditional roles.
- Emphasize that information technology is used by people with various interests and responsibilities.

Adaptations for Students with Special Needs	
The following are examples of adaptations that may assist students to achieve success.	
Presentation	• Extensions should be made for those students with special gifts or talents. • Provide students with advance organizers of key information technology concepts. • Demonstrate or model new concepts. • Use bilingual peers or volunteers to help ESL students. • Use e-mail to communicate with peers or students in similar circumstances.
Assistance	• Have peers or volunteers help students with special needs. • Have community-based resources suggest alternative hardware adaptations and software modifications. • Have teacher assistants work with individuals and small groups of students with special needs. • Work with consultants and support teachers to develop appropriate problem-solving activities and strategies for students with special needs. • Suit vocabulary to student's level, and use process diagrams and flow charts.
Environment	• Use preferential seating in lab situations. • Change the student's classroom seat. • Make use of co-operative grouping or pairing. • Provide appropriate equipment (e.g., speech recognition software).
Materials and Equipment	• Use techniques to make the organization of activities more explicit (e.g., colour code the steps used to solve a problem). • Use manipulatives or large-print charts. • Use large print on activity sheets. • Use opaque overlays on text pages to reduce the quantity of visible print. • Highlight key points on activity sheets. • Use translated material for information such as instructions on how to use information technology tools. • Have available software that defaults to a larger font size. • Use hardware that can be adapted to students with special needs where appropriate.
Extension and Practice	• Require the completion of only a small amount of work at any given time. • Simplify the way questions are worded to match students' levels of understanding. • Provide functional, practical opportunities for students to practise skills.
Assessment	• Allow students to demonstrate their understanding of information technology concepts in a variety of ways (e.g., murals, displays, models, puzzles, oral and video presentations). • Modify assessment tools to match student needs. For example, oral tests, open-book tests, and tests with no time limit may allow students to better demonstrate their learning than traditional tests. • Set achievable goals. • Use computer programs that provide opportunities for practice and recording results.

Suggested Assessment Strategies

Teachers determine the best assessment methods for their students. The assessment strategies in this document describe a variety of ideas and methods for gathering evidence of student performance. The assessment strategies for a particular organizer always include specific examples of assessment strategies. Some strategies relate to particular activities, while others are general and could apply to any activity. These specific strategies may be introduced by a *context statement* that explains how students at this age can demonstrate their learning, what teachers can look for, and how this information can be used to adapt further instruction.

About the Provincial Learning Assessment Program

The Provincial Learning Assessment Program gathers information on students' performance throughout the province. Results from these assessments are used in the development and revision of curricula and provide information about teaching and learning in BC. Where appropriate, knowledge gained from these assessments has influenced the assessment strategies suggested in this IRP.

About Assessment in General

Assessment is the systematic process of gathering information about students' learning in order to describe what they know, are able to do, and are working toward. From the evidence and information collected in assessments, teachers describe each student's learning and performance. They use this information to provide students with ongoing feedback, plan further instructional and learning activities, set subsequent learning goals, and determine areas requiring diagnostic teaching and intervention. Teachers base their evaluation of a student's performance on the information collected through assessment. They use their insight, knowledge about learning, and experience with students, along with the specific criteria they establish, to make judgments about student performance.

Teachers determine: the purpose, aspects, or attributes of learning on which to focus the assessment; when to collect the evidence; and the assessment methods, tools, or techniques most appropriate to use. Assessment focusses on the critical or significant aspects of the learning to be demonstrated by the student. Students benefit when they clearly understand the learning goals and learning expectations.

The assessment of student performance is based on a wide variety of methods and tools, ranging from portfolio assessment to pencil-and-paper tests. Appendix D includes a more detailed discussion of assessment and evaluation.

Provincial Reference Sets

The provincial reference sets can also help teachers assess the skills that students acquire across curricular areas. These are:

- *Evaluating Reading Across Curriculum* (RB 0034)
- *Evaluating Writing Across Curriculum* (RB 0020 & RB 0021)
- *Evaluating Problem Solving Across Curriculum* (RB 0053)
- *Evaluating Group Communication Skills Across Curriculum* (RB 0051)
- *Evaluating Mathematical Development Across Curriculum* (RB 0052)

A series of assessment handbooks developed to provide guidance for teachers as they explore and expand their assessment repertoires is also available.

- *Performance Assessment* (XX0246)
- *Portfolio Assessment* (XX0247)
- *Student-Centred Conferencing* (XX0248)
- *Student Self-Assessment* (XX0249)

Learning Resources

The Ministry of Education promotes the establishment of a resource-rich learning environment through the evaluation of educationally appropriate materials intended for use by teachers and students. The media formats include, but are not limited to, materials in print, video, and software, as well as combinations of these formats. Resources that support provincial curricula are identified through an evaluation process that is carried out by practicing teachers. It is expected that teachers will select resources from those that meet the provincial criteria and that suit their particular pedagogical needs and audiences. Teachers who wish to use non-provincially recommended resources to meet specific local needs must have these resources evaluated through a local district approval process.

The use of learning resources involves the teacher as a facilitator of learning. However, students may be expected to have some choice in materials for specific purposes such as independent reading or research. Teachers are expected to use a variety of resources to support learning outcomes at any particular level. A multimedia approach is encouraged.

Some selected resources have been identified to support cross-curricular integration. The ministry also considers special needs audiences in the evaluation and annotation of learning resources. As well, special-format versions of some selected resources (braille and taped-book formats) are available.

Learning resources for use in British Columbia schools fall into one of two categories: *provincially recommended materials* or *locally evaluated materials.*

All learning resources used in schools must have *recommended* designation or be approved through district evaluation and approval policies.

Provincially Recommended Materials

Materials evaluated through the provincial evaluation process and approved through Minister's Order are categorized as *recommended materials*. These resources are listed in the *Catalogue of Learning Resources.*

Locally Evaluated Materials

Learning resources may be approved for use according to district policies, which provide for local evaluation and selection procedures.

A Note on Authorized Materials

Authorized status will no longer exist as new learning resources are evaluated and selected for all new provincial curricula and courses. Those existing authorized resources that meet the needs of new curricula and courses are given *recommended* status.

Curriculum

Information Technology 8 to 10

PRESCRIBED LEARNING OUTCOMES

It is expected that students will:

- identify information technology tools used to access information
- protect information using information technology tools
- enter information accurately using appropriate keyboarding techniques and software that allows for the storage, retrieval, and editing of material
- demonstrate the ability to formulate questions and to use a variety of sources and tools to access, capture, and store information
- use appropriate information technology terminology
- evaluate a variety of input and output devices
- demonstrate the ability to install software
- describe and practise appropriate safety procedures when working with information technology tools
- apply a variety of troubleshooting techniques related to information technology
- demonstrate an awareness of the impact of information technology tools on society
- identify careers and occupations that use information technology

SUGGESTED INSTRUCTIONAL STRATEGIES

Students need to understand how digital technology is changing organizations, commerce, politics, and social institutions. They need to acquire new technological and information technology literacy skills to succeed in today's world.

- While creating reports or documents in English, social studies, or math, have students review and practise keyboarding techniques (e.g., home-row placement, finger placement and reaches, correct posture, eyes-on-copy).
- When they are working on a research project or studying a specific topic, ask students to formulate several questions and then use a variety of information technology tools and correct keyboarding techniques to gather, capture, and store information to answer the questions. (For example, have students create a Middle Ages newspaper in social studies, a report on endangered species in science, or a chart or graph on careers in the career and personal planning program.)
- In business education or English, discuss with the class the role of passwords in the use of community-learning-network (CLN) accounts or bank ATM cards. Challenge students to explain why these systems are used. Discuss with the class the ethical issues involved in the use of passwords.
- Ask students to work in groups, with each to create a chart of information technology careers. Have them list occupational areas (e.g., telecommunications, the film or graphics industries) at the top of each chart and the employment fields in each area (e.g., research, design, repair, finance) at the side of each chart. Encourage students to discover and add to the list of occupational areas using electronic resources (e.g., the Internet, CD-ROMs).
- Ask each student in the class to install a program, ensure that it is operational, and determine the appropriate input and output devices.

SUGGESTED ASSESSMENT STRATEGIES

As students become increasingly sophisticated in their use of information technology tools and begin to explore career opportunities, they are better able to meet the challenges of the Information Age. To assess students' abilities, observe them as they work and discuss with them their use of processes and strategies.

- After students have practised installing software, ask each to install a different program. Observe the extent to which they are able to:
  - follow verbal, written, and on-screen instructions
  - refer to technical manuals for clarification
  - try alternative methods if they run into problems
  - run the newly installed program to ensure that it works
  - place the program in the correct folder or directory on the desktop
- Observe students practising their keyboarding skills and note the extent to which they:
  - display correct posture (e.g., feet on the floor, back straight, correct hand and arm placement, appropriate proximity to the keyboard) to comply with ergonomic standards
  - keep their eyes on the copy
  - use home-row keys correctly
  - use accurate key reaches, key combinations, and shift key
  - use punctuation keys correctly
- Have students demonstrate their troubleshooting skills on a system that has been disabled. As students work through the troubleshooting process, have them complete learning logs to explain their thinking. Provide students with prompts such as:
  - What did you do first?
  - Why did you choose to try that solution?
  - Was it successful?
  - Where or how did you find helpful suggestions?
  - What would you do differently next time?

RECOMMENDED LEARNING RESOURCES

Print Materials

- All About Computers
- Communicating With Computers
- Computers: A Visual Encyclopedia
- Computers Illustrated
- How the Internet Works
- How to Use THE INTERNET
- How Virtual Reality Works
- The Internet by E-Mail
- Microsoft Press Computer Dictionary: The Comprehensive Standard for Business, School, Library and Home, Second Edition
- More Data Processing Applications
- Que's 1996 Computer & Internet Dictionary, 6th Edition
- The Technological Classroom

Video

- Highway to Cyberia
- The Paperback Computer

Software

- All the Right Type
- The Cruncher
- Digital Chisel
- Graph Links
- Looking Ahead: Earning, Spending, Saving
- UltraKey

CD-ROM

- PC/Computing: How Computers Work

PRESCRIBED LEARNING OUTCOMES

It is expected that students will:

- apply management skills to complete a project
- use a variety of information technology tools to help them solve problems
- apply predetermined search criteria to locate, retrieve, and evaluate information
- create electronic text documents
- evaluate information retrieved electronically for authenticity, bias, and timeliness
- synthesize information from a variety of electronic sources for their presentations

SUGGESTED INSTRUCTIONAL STRATEGIES

Students need to use problem-solving techniques and project-management skills to access and evaluate information and organize it into forms that give it meaning. They should become aware that they can use these skills both inside and outside the school environment.

- Have students, working in teams, retrieve electronic information about current social or political issues, report on how this information was retrieved, and evaluate it for timeliness, bias, and authenticity.
- Ask students to prepare individual research projects in science or social studies using information technology tools (e.g., computers, video cameras, tape-recorders) to research, record, and present their projects. Then invite students to create electronic text documents that they can share by e-mail. Research projects could include:
  - *social studies:* tracing and recording the development of a specific current event; researching changing immigration patterns
  - *science:* preparing a report on an endangered species in Canada

SUGGESTED ASSESSMENT STRATEGIES

Students can demonstrate an ability to manage projects effectively by first clarifying the purpose of each project and then developing a realistic timeline and a list of the tasks required to accomplish the purpose. Assess students' knowledge and skills by inviting them to discuss their plans and by observing them as they work.

- Observe students as they use various information technology tools to search for and retrieve data. Note the extent to which they are able to:
  - focus a search from a general heading to a specific topic
  - use keywords to define parameters for the search
  - use "AND/OR" commands to streamline their search
- Before beginning a group project, have each group of students create a plan including a list of tasks to be done, individual responsibilities, materials needed, and a timeline. To assess students' abilities to manage projects effectively, confer with them about their plans. Note the extent to which:
  - tasks have been assigned fairly
  - relevant goals and subgoals have been set
  - goals and subgoals have been effectively prioritized
  - all necessary materials have been included
  - the timeline is manageable and realistic

  Confer with students throughout their projects and note the extent to which their plans are being applied effectively and revisions to the plans are being made as required.
- Have each student access and retrieve information pertaining to a specific topic from a variety of on-line sources (e.g., e-mail, the Internet, a CD-ROM encyclopedia, newspapers). Ask each student to prepare an annotated bibliography and to analyse the information sources with respect to authenticity, bias, and timeliness. Note the extent to which students consider:
  - the reliability of the information source
  - the author's viewpoint
  - the publication date

RECOMMENDED LEARNING RESOURCES

Print Materials

- Communicating With Computers
- Computers Illustrated
- How the Internet Works
- How to Use THE INTERNET
- The Internet by E-Mail
- Microsoft Press Computer Dictionary: The Comprehensive Standard for Business, School, Library and Home, Second Edition
- More Data Processing Applications

Video

- How To Make Great Videos-With Just a Camcorder
- Virtual Reality

Software

- All the Right Type
- The Cruncher
- Digital Chisel
- Graph Links
- HyperStudio
- Looking Ahead: Earning, Spending, Saving
- UltraKey

CD-ROM

- How Multimedia Computers Work
- The Multimedia Workshop

PRESCRIBED LEARNING OUTCOMES

It is expected that students will:

- identify and consider ethical and legal issues when presenting information
- use a variety of software to present messages
- demonstrate the ability to arrange information in different forms to create new meaning
- analyse the effects of information technology on presentations
- describe the effect of multimedia presentations on intended audiences

SUGGESTED INSTRUCTIONAL STRATEGIES

Students need to communicate using a combination of information technology resources and tools. A knowledge of the associated ethical and legal issues is important when using these resources and tools. Students must be able to prepare and present information in a variety of forms as well as analyse the effects of their presentations on intended audiences.

- Have groups of students each choose a multimedia package (in any subject area) from the school's resource centre and analyse its impact on its intended audience. Then ask each group to make a multimedia presentation to the class in which they evaluate how well the package they analysed used technology for its stated purpose. Challenge the groups to suggest ways in which the packages they analysed could be improved.
- Invite students, working in pairs, to review advertisements from a variety of sources (e.g., the World Wide Web, on-line magazines, television, electronic bulletin boards, a freenet) and analyse the impact of each advertisement on its intended audience.
- In art, English, physical education, or home economics, have students work in small groups to create multimedia presentations (e.g., promoting the school; on recycling, multiculturalism, antiracism, human rights, or conservation). Ask them to reorganize the same information to convey a different message (e.g., for another audience).
- As science, home economics, or physical education activities, have students use the Internet or periodical indices on CD-ROM to access articles on the latest scientific discoveries. Encourage them to use information technology tools to download the information, summarize it, and produce a bibliography. This information could then be shared using an on-line source.

SUGGESTED ASSESSMENT STRATEGIES

Students synthesize their knowledge and skills as they work with a variety of software, organize information for new purposes, and become aware of the effects of multimedia presentations. Record the extent to which they show increasing sophistication in their use of information technology tools to convey ideas in anecdotal note form. Ask probing questions related to the appropriate use of particular information technology tools to determine students' level of understanding.

- Have students assess each other's presentations (e.g., greeting cards, posters, pamphlets, research papers) for the effective use of a variety of software to present messages clearly and powerfully. To ensure that their feedback is constructive, provide a framework for their responses by supplying them with questions such as the following:
  - Was the greeting card (poster, pamphlet, research paper) effective and its message clear?
  - Was the most appropriate software chosen?
  - Were a variety of applications used to communicate the message?
  - Were the features of the application(s) used to emphasize meaning?

  Note that students can share and assess their work both with classmates and with other students whom they contact electronically.
- Ask each student to collect data and use software to generate a graph representing the information. To assess the student's ability to present synthesized information, look for evidence that:
  - an appropriate graph (a bar graph, pictograph, pie graph, line graph) was chosen to present the information clearly
  - all the relevant information was included
  - the axes were labelled appropriately
  - a legend was incorporated
  - program features (e.g., shadow, tilt, 3-D) were used for emphasis

RECOMMENDED LEARNING RESOURCES

Print Materials

- Communicating With Computers

Video

- Highway to Cyberia
- Virtual Reality

Software

- All the Right Type
- The Cruncher
- Digital Chisel
- Graph Links
- HyperStudio
- Looking Ahead: Earning, Spending, Saving
- UltraKey

CD-ROM

- How Multimedia Computers Work

PRESCRIBED LEARNING OUTCOMES

It is expected that students will:

- enter information accurately using appropriate keyboarding techniques and software that allows for the storage, retrieval, and editing of material
- demonstrate the ability to install software on stand-alone computers
- evaluate different software and defend their use in solving problems
- demonstrate the ability to use the Internet to access, capture, and store information
- demonstrate an understanding of the ethical use of information
- demonstrate an understanding of programming, using a variety of information technology tools
- demonstrate an awareness of ergonomic and health issues related to the use of information technology tools
- identify careers related to the field of information technology

SUGGESTED INSTRUCTIONAL STRATEGIES

Rapid developments in information technology are now bringing more and more information into the home electronically. Students require skills that allow them to evaluate and select from a variety of options offered by information technology. As well, they need to understand the educational, career, and recreational opportunities created by information technology.

- To demonstrate their understanding of programming, have students program a variety of technology tools (e.g., a program on a VCR; a constant into a calculator; a short hypertext presentation in, for example, math, social studies, or art).
- For a science, a social studies, or an English project, ask students to use the Internet to access a primary information source (e.g., the author of information) and a secondary source (e.g., a document created by an author) and follow the proper procedures for crediting sources of information.
- In English, social studies, or science, have students work individually to complete assignments that include graphs, charts, spreadsheets, and text using different applications. In groups, ask students to compare the software they used.
- Ask students to work in groups to select a large company (e.g., a national bank, BC Hydro, BC Ferries, IBM, Northern Telecom) and develop a list of occupations found within that company. Challenge students to rank the occupations according to the complexity and frequency of use of the information technology tools required in each occupation.
- To practise and reinforce keyboarding and data-entry techniques using a variety of software, ask each student to create a document that includes text and graphics or data display (e.g., bar, pie, or line graphs; charts; spreadsheets; tables). Encourage students to use suitable ergonomic practices.
- Ask each student to install and critique a program.

SUGGESTED ASSESSMENT STRATEGIES

Students broaden their knowledge of the use of information technology tools by investigating legal and ethical issues related to information management. As they have frequent opportunities to use a variety of software and information technology tools, they gain confidence in choosing appropriate tools for specific purposes.

- With students, develop criteria to assess keyboarding skills, the use of the numeric keypad, and safe, healthy practices related to computer use. Have students use the checklist of criteria as a peer-assessment tool. The criteria might include:
  - the consistent use of home-row keys
  - correct key reaches
  - the appropriate use of the shift key
  - correct posture (feet on the floor, back straight, correct hand and arm placement, appropriate proximity to the keyboard)
  - eyes on copy
- While researching topics from a variety of subject areas, have students access information using the Internet. Using criteria developed by the class, ask students to work with partners to assess each others' skills. The criteria might include:
  - observes copyright restrictions when accessing and using information
  - accesses required information easily
  - captures and downloads data successfully
  - stores information to a disk or hard drive efficiently
- Have students create a checklist to use when designing an ergonomically well-designed workplace. To check on the extent to which students can apply their knowledge, ask each to choose from a list of locations (e.g., a bank, a retail outlet, an office) and design an ergonomically correct workplace.
- Have students work in pairs and use a checklist to assess the socially responsible use of information technology in their daily routines. The checklist items might include:
  - uses passwords appropriately
  - respects the privacy of others' work
  - seeks proper permission, if required, when accessing information

RECOMMENDED LEARNING RESOURCES

Print Materials

- All About Computers
- Computers: A Visual Encyclopedia
- Computers Illustrated
- Desktop Publishing: Design Basics and Applications
- How the Internet Works
- How to Use THE INTERNET
- How Virtual Reality Works
- The Internet by E-Mail
- Microsoft Press Computer Dictionary: The Comprehensive Standard for Business, School, Library and Home, Second Edition
- More Data Processing Applications
- Que's 1996 Computer & Internet Dictionary, 6th Edition
- The Technological Classroom

Video

- Computer Integrated Manufacturing
- Highway to Cyberia
- The Paperback Computer

Software

- All the Right Type
- The Cruncher
- Digital Chisel
- UltraKey

CD-ROM

- PC/Computing: How Computers Work

PRESCRIBED LEARNING OUTCOMES

It is expected that students will:

- demonstrate the use of a variety of software and appropriate information technology tools to solve problems
- demonstrate the ability to use a variety of software to access, capture, and store information from the Internet
- evaluate the suitability of information for use in specific contexts
- analyse electronically organized information for authenticity, bias, timeliness, and usefulness

SUGGESTED INSTRUCTIONAL STRATEGIES

Students need to be able to analyse and evaluate information for bias. They must also be able to determine the most effective tools for gathering information that is relevant to their educational, career, and recreational needs.

- In English, encourage students to investigate an international current-affairs issue that has been the focus of an editorial in a local or provincial newspaper. Suggest that students:
  - use the Internet to access editorial opinions on the topic in newspapers in other countries, including English-language newspapers in non-English-speaking countries
  - use information technology tools to capture, store, and modify the information obtained
  - compare foreign viewpoints with Canadian editorial opinions
  - find and record examples of bias (e.g., related to gender, culture, or politics) and identify the reasoning used to support the biassed arguments
  - use information technology tools to prepare a chart that lists bias statements and explains why they have been identified as such
- In social studies, have students use information technology tools to research the impact of the Industrial Revolution on the lives of people in the late 1700s. Then encourage students to use the same tools (e.g., the Internet, periodical indices on CD-ROMs) to investigate the impact of information technology on today's society. Have them capture, store, and modify the information. Challenge them to use information technology to present the information to the class (e.g., by creating a graphic representation comparing the two time periods).

SUGGESTED ASSESSMENT STRATEGIES

As students expand their repertoire of information sources, they evaluate information carefully for its authenticity, bias, and timeliness. To assess students' abilities to store, locate, and retrieve information, examine their work and talk with them about the processes and strategies they have used.

- Provide students with a specific task or problem to solve using information technology tools. While students are working, note the extent to which they:
  - brainstorm a list of possible information technology tools
  - choose the appropriate tools and resources
  - explain their choices
  - use the tools and resources successfully
  - determine the effectiveness of their solutions
- Have students set up portfolios (in hardcopy or electronic form) to store selected assignments for which they have used computer software. Examine their portfolios and look for evidence that they:
  - used a variety of applications (e.g., text, graphics, video, hypertext)
  - produced a variety of types of documents (e.g., graphs, spreadsheets, databases, text)
  - integrated a variety of types of documents in their work
  - used information technology skills in a variety of subject areas
- Conference informally with individual students about the information each has collected on a controversial issue. To assess students' abilties to analyse the data critically, note the extent to which they are able to:
  - recognize the authors' viewpoints or bias
  - recognize and gather alternative viewpoints
  - consider the publication dates of information (for relevancy)

RECOMMENDED LEARNING RESOURCES

Print Materials

- Computers Illustrated
- Desktop Publishing: Design Basics and Applications
- How the Internet Works
- How to Use THE INTERNET
- The Internet by E-Mail
- Microsoft Press Computer Dictionary: The Comprehensive Standard for Business, School, Library and Home, Second Edition
- More Data Processing Applications

Video

- Computer Integrated Manufacturing
- How To Make Great Videos-With Just a Camcorder
- Virtual Reality

Software

- All the Right Type
- The Cruncher
- Digital Chisel
- HyperStudio
- UltraKey

CD-ROM

- How Multimedia Computers Work
- The Multimedia Workshop

PRESCRIBED LEARNING OUTCOMES

It is expected that students will:

- select, use, and evaluate a variety of information technology tools for making presentations
- apply the principles of effective communication and good design when using information technology tools
- consider ethical and legal issues when presenting information
- analyse the impact of multimedia documents on the intended audiences
- develop an awareness that all media can be digitized for electronic presentation

SUGGESTED INSTRUCTIONAL STRATEGIES

Students should be able to use a variety of information technology tools to make effective presentations. They need to be aware that media can be digitized and manipulated to present views that influence others. Students should also understand the legal and ethical implications associated with using information technology in their daily lives.

- Discuss with the class the legal and ethical issues arising from the use of electronic resources accessed through information technology (e.g., using legally obtained software, providing bibliographic references, respecting copyright). Frame the discussion by posing questions such as:
  - Is it important to know who originally created the information?
  - Is the use of pirated software a concern?
- Challenge students to investigate the digitization of media by gathering information from the Internet, CD-ROMs, and other electronic sources. Have them answer questions such as:
  - What media can be digitized?
  - What are the benefits of and drawbacks to digitizing media?
  - What are the social, cultural, and environmental implications of digitization?
- Suggest that students select and invite a guest speaker from the community to discuss the principles involved when designing effective and attractive multimedia documents. Have them consider the social or environmental implications of design. Then ask each student to produce a home page incorporating the principles of design.
- Have students use a software presentation package to enhance a project in social studies, English, science, physical education, or home economics, with the emphasis on the level of detail included, originality, and aesthetics.
- Ask students to produce, edit, and add sound to a video that relates to a particular subject area (e.g., an exercise video for physical education, a video on a local current event for social studies).

SUGGESTED ASSESSMENT STRATEGIES

When they have the opportunity to explore information technology tools, plan presentations, and analyse their work, students can demonstrate their knowledge of information technology tools and their understanding of the legal and ethical considerations associated with their use.

- While students are planning presentations, confer with them about the ethical and legal implications of working with information. Note the extent to which they:
  - cite sources related to their ideas, text, and graphic images
  - choose information appropriate to their audiences
  - are sensitive to issues related to culture, gender, and ability
  - understand the controversial or sensitive nature of information
- With students, develop a list of criteria for the peer assessment of presentations that incorporate information technology tools. The criteria might include:
  - appropriate choice of information tools (e.g., tape-recorders, video cameras, computers)
  - effective use of a variety of tools
  - use of correct terminology
  - application of design principles to create an effective presentation
- With the class, develop a questionnaire to assess the impact of a multimedia document on an audience. Present a multimedia document to an audience of students or parents and ask them to complete the questionnaire. Have students compile, report, examine, and analyse the data. To guide their analysis, use prompts such as:
  - Was the intended message the same as what the audience received?
  - How appropriate was the document for the intended audience?
  - What parts of the document had the greatest impact on the audience?
  - To what extent do you think the presentation will have a long-term effect on the audience?
  - How will you use this information in designing future presentations?

RECOMMENDED LEARNING RESOURCES

Print Materials

- Desktop Publishing: Design Basics and Applications

Video

- Highway to Cyberia
- Virtual Reality

Software

- All the Right Type
- The Cruncher
- Digital Chisel
- HyperStudio
- UltraKey

CD-ROM

- How Multimedia Computers Work

PRESCRIBED LEARNING OUTCOMES

It is expected that students will:

- practise and reinforce their keyboarding skills
- demonstrate the ability to formulate questions and to use a variety of sources and tools to access, capture, and store information
- demonstrate the ability to program information technology tools
- use programming effectively to create products or systems
- practise handling Internet information in an ethical way
- demonstrate an awareness of the impact of electronic resources on education, careers, and recreation
- evaluate the impact of information technology tools on the workplace, on individuals, and on society
- compare the use of information technology in different job settings within the community
- demonstrate competence in using basic information technology tools

SUGGESTED INSTRUCTIONAL STRATEGIES

Information technology is increasingly affecting our daily lives, changing the way we live, work, and play. Students need to be able to understand and apply various information technology tools to access and communicate information in their personal and work lives.

- Have students demonstrate their abilities to use appropriate data-entry and keyboarding skills in a variety of curriculum areas by using information technology tools to produce research documents involving text, print, and original graphics.
- Ask each student to use electronic resources in the school library or career centre (e.g., Bridges, Choices, Job Factory, Chronicle Careers) to research and develop a report on three careers that involve the extensive use of information technology. Then have them present their reports using video or multimedia.
- Invite groups of students to each locate someone in the community who uses information technology tools as an important part of his or her job. Have each group conduct an e-mail, a telephone, or a personal interview to develop a profile of the information technology skills required to do the job. Encourage groups to record the responses they obtain on forms or to produce a document based on the responses.
- Suggest that students use an Internet browser to capture and save research information for projects, such as:
  - *social studies:* Find information on the climatic regions of Canada.
  - *science:* Locate a web page that leads to topics on the production of electricity.
  - *English:* Visit a web page devoted to Shakespeare.
  - *business education:* Find information on the latest consumer craze in the teen market.
- Have students work in teams to develop criteria for purchasing an information technology tool (e.g., a computer, software, a fax machine). Suggest that they evaluate available products based on these criteria.

SUGGESTED ASSESSMENT STRATEGIES

Students can become aware of the implications of information management for their own lives by examining the impact of information technology tools on individuals, the workplace, and society. Assess students' abilities to make these connections as they discuss their thinking.

- Have students work with partners to use a variety of browsers (e.g., Fetch, Gopher, and web browsers) to locate and retrieve electronic information. Note the extent to which they are able to:
  - enter Internet addresses accurately
  - effectively use tools to search file transfer protocol (FTP) sites for information
  - use appropriate keywords to define the parameters of their searches
  - use "bookmarks" or "hotlists" to mark relevant sources
  - create folders to receive downloaded information
- As students use video or digital cameras to capture and store data related to a project, observe the extent to which they are able to:
  - efficiently use the functions and special features of the equipment
  - successfully capture images on videotape or video cards and transfer digitized data to various software
  - choose appropriate sources for data collection
- After students interview community members who use information technology tools in their jobs, have them reflect on what they learned by answering questions such as:
  - How have societal demands influenced change in information technology?
  - How have advances in information technology affected the workplace?
  - How have information technology tools affected individual productivity?
- Have each student code and document a simple program using an appropriate programming language. Note the extent to which:
  - instructions are logically sequenced
  - correct syntax, grammar, and style are used
  - the program is free of logic error
  - the program runs successfully

RECOMMENDED LEARNING RESOURCES

Print Materials

- All About Computers
- Computers: A Visual Encyclopedia
- Computers Illustrated
- Desktop Publishing: Design Basics and Applications
- How Multimedia Works
- How the Internet Works
- How to Use THE INTERNET
- How Virtual Reality Works
- The Internet by E-Mail
- Microsoft Press Computer Dictionary: The Comprehensive Standard for Business, School, Library and Home, Second Edition
- More Data Processing Applications
- Que's 1996 Computer & Internet Dictionary, 6th Edition
- The Technological Classroom

Video

- Computer Integrated Manufacturing
- Highway to Cyberia
- Inventing the Future
- The Paperback Computer
- The Thinking Machine

Software

- All the Right Type
- The Cruncher
- Digital Chisel

CD-ROM

- PC/Computing: How Computers Work

PRESCRIBED LEARNING OUTCOMES

It is expected that students will:

- solve problems using information technology tools and resources
- use information technology tools to gather and organize information and produce documents
- evaluate the suitability of information technology tools for solving problems related to specific tasks
- demonstrate the ability to install software that can be shared within a network
- develop guidelines for evaluating and using information in an ethical way
- develop criteria to evaluate information for bias

SUGGESTED INSTRUCTIONAL STRATEGIES

Students need to use information effectively to solve problems. Information technology either helps students solve problems or brings a new dimension to the problem-solving process. Because so much information is produced today, students need to know how to sort and screen information effectively.

- Ask students to solve problems related to hardware, software, or information by using on-line sources (e.g., the Internet, local bulletin boards, e-mail). For example:
  - *CAD lab:* Find the specifications for installing electric wiring in a building.
  - *automotive shop:* Locate on-line information on the availability of parts.
  - *computer lab:* Locate information on protecting the lab from the latest virus.
  - *drama:* Find out what productions are being shown in New York (or any other large city).
  - *art:* Find information about exhibits related to a specific painter or period.
  - *home economics:* Research to develop a list of products grown in BC.
- Suggest that large groups of students register with a local bulletin board system (BBS) or with a service provider and then demonstrate that they are able to sign on and navigate the system.
- In English, after studying a novel about privacy of information, have students use information technology tools (e.g., the Internet, e-mail) to investigate the impact of information technology on personal or corporate privacy. Have them use information technology tools to present reports.

SUGGESTED ASSESSMENT STRATEGIES

Students become more sophisticated in their abilities to select and use appropriate information technology tools for gathering and organizing information and producing documents in a variety of subject areas. They also further their experience with networked systems by installing software. Assessment activities can help students clarify and communicate their understanding of the processes and strategies they are using.

- After students have practised installing software to be shared over a network, present them with a new program to install. Observe students as they work and consider:
  - Are they able to follow on-screen prompts?
  - How often do they refer to instructions or the technical manual for clarification?
  - To what extent are they able to try alternative methods if they run into problems?
  - Do they run the newly installed program to ensure that it works and can be accessed by all workstations attached to the network?
  - Is the program installed and saved in the correct folder or directory?
- While working on a research project (e.g., investigating the impact of technology on privacy, Canadian unity, environmental toxicology), have each student use information technology tools to gather and organize data and produce a document. Collect students' work and look for evidence that they:
  - used a variety of information technology tools
  - accessed several information technology sources
  - chose appropriate software to produce an effective document
  - logically organized the information
  - effectively integrated text, graphics, charts, illustrations, and sound in the final document

RECOMMENDED LEARNING RESOURCES

Print Materials

- Becoming a Computer Animator
- Computers Illustrated
- Desktop Publishing: Design Basics and Applications
- How Multimedia Works
- How the Internet Works
- How to Use THE INTERNET
- The Internet by E-Mail
- Microsoft Press Computer Dictionary: The Comprehensive Standard for Business, School, Library and Home, Second Edition
- More Data Processing Applications

Video

- Computer Integrated Manufacturing
- Virtual Reality

Software

- All the Right Type
- The Cruncher
- Digital Chisel
- HyperStudio

CD-ROM

- How Multimedia Computers Work
- The Multimedia Workshop

PRESCRIBED LEARNING OUTCOMES

It is expected that students will:

- create multimedia documents using a variety of electronic sources
- demonstrate the ability to use special effects in multimedia presentations to influence a message
- apply ethical and legal principles when presenting information
- evaluate the effectiveness of the component parts of multimedia presentations
- demonstrate the ability to manage the process of creating multimedia presentations

SUGGESTED INSTRUCTIONAL STRATEGIES

Being able to inform or influence people through the manipulation of data using information technology is a powerful tool. The ability to manage this process requires a high degree of information literacy as well as technical skills. The skills associated with this process help students become independent and successful learners, when working either individually or in groups.

- To develop an understanding of how multimedia elements (e.g., visuals, sound, text, colour) influence a message, and to apply their learning, ask each student to modify a television advertisement to convey a different message (e.g., "smoking is dangerous to your health" as opposed to "smoking is a healthy activity") or to appeal to a different segment of the community.
- Have teams of students create scenarios that demonstrate their understanding of legal and ethical issues (e.g., copyright infringement) as they relate to the presentation of information and the use of information technology. Then ask the teams to present their scenarios to the rest of the class using information technology tools.
- Challenge students, working in groups, to produce and manage short presentations to elementary students on topics that are relevant to them (e.g., an introduction to the programs and courses at the high school) using presentation software. Encourage each of the groups to create a plan, assign tasks, and develop timelines.
- Invite each student to identify a meaningful social, cultural, or environmental issue (e.g., related to immigration, First Nations' land claims, national unity) and then use electronic technology (e.g., e-mail, the telephone, a fax machine) to set up an interview with someone in the community involved in or knowledgeable about the issue. Ask students to tape-record or videotape their interviews and present them as television or radio news reports.

SUGGESTED ASSESSMENT STRATEGIES

As students work in groups to establish plans, tasks, and timelines and evaluate the components of presentations, they demonstrate their knowledge and level of sophistication in using multimedia techniques to add emphasis to their ideas.

- Ask each student to create a multimedia presentation that delivers a message (e.g., a product advertisement, a campaign pamphlet). Examine students' finished products and note the extent to which they:
  - used a variety of electronic resources
  - tailored the presentations to specific audiences
  - effectively integrated text, graphics, and sound
  - used special effects for emphasis
- After students watch a multimedia presentation, have them first work in small groups and then as a whole class to develop an assessment instrument. Invite them to watch the multimedia presentation again, using the assessment instrument. Note the extent to which they are able to:
  - single out specific aspects of the presentation for evaluation
  - consider the response of the audience
  - explain how a certain aspect of the presentation had an impact on the audience or influenced the message
- Before they develop a group presentation, have students create a plan including a list of tasks, materials needed, individual responsibilities, and a timeline. Confer with them about their plan and note the extent to which:
  - tasks have been assigned fairly
  - relevant goals and subgoals have been set
  - goals and subgoals are effectively prioritized
  - all necessary materials have been included
  - the timeline is manageable and realistic

RECOMMENDED LEARNING RESOURCES

Print Materials

- Desktop Publishing: Design Basics and Applications

Video

- Highway to Cyberia
- Virtual Reality

Software

- All the Right Type
- The Cruncher
- Digital Chisel
- HyperStudio

CD-ROM

- How Multimedia Computers Work

APPENDICES

Information Technology 8 to 10

APPENDIX A

Prescribed Learning Outcomes

FOUNDATIONS

Foundations provides students with the fundamental knowledge, skills, and attitudes to use information technology tools in all areas of learning.

It is expected that students will:

Grade 8	Grade 9	Grade 10
• identify information technology tools used to access information • protect information using information technology tools • enter information accurately using appropriate keyboarding techniques and software that allows for the storage, retrieval, and editing of material • demonstrate the ability to formulate questions and to use a variety of sources and tools to access, capture, and store information • use appropriate information technology terminology • evaluate a variety of input and output devices • demonstrate the ability to install software • describe and practise appropriate safety procedures when working with information technology tools • apply a variety of trouble-shooting techniques related to information technology • demonstrate an awareness of the impact of information technology tools on society • identify careers and occupations that use information technology	• enter information accurately using appropriate keyboarding techniques and software that allows for the storage, retrieval, and editing of material • demonstrate the ability to install software on stand-alone computers • evaluate different software and defend their use in solving problems • demonstrate the ability to use the Internet to access, capture, and store information • demonstrate an understanding of the ethical use of information • demonstrate an understanding of programming, using a variety of information technology tools • demonstrate an awareness of ergonomic and health issues related to the use of information technology tools • identify careers related to the field of information technology	• practise and reinforce their keyboarding skills • demonstrate the ability to formulate questions and to use a variety of sources and tools to access, capture, and store information • demonstrate the ability to program information technology tools • use programming effectively to create products or systems • practise handling Internet information in an ethical way • demonstrate an awareness of the impact of electronic resources on education, careers, and recreation • evaluate the impact of information technology tools on the workplace, on individuals, and on society • compare the use of information technology in different job settings within the community • demonstrate competence in using basic information technology tools

PROCESS

Process allows students to select, organize, and modify information to solve problems.

It is expected that students will:

Grade 8	Grade 9	Grade 10
• apply management skills to complete a project • use a variety of information technology tools to help them solve problems • apply predetermined search criteria to locate, retrieve, and evaluate information • create electronic text documents • evaluate information retrieved electronically for authenticity, bias, and timeliness • synthesize information from a variety of electronic sources for their presentations	• demonstrate the use of a variety of software and appropriate information technology tools to solve problems • demonstrate the ability to use a variety of software to access, capture, and store information from the Internet • evaluate the suitability of information for use in specific contexts • analyse electronically organized information for authenticity, bias, timeliness, and usefulness	• solve problems using information technology tools and resources • use information technology tools to gather and organize information and produce documents • evaluate the suitability of information technology tools for solving problems related to specific tasks • demonstrate the ability to install software that can be shared within a network • develop guidelines for evaluating and using information in an ethical way • develop criteria to evaluate information for bias

PRESENTATION

Presentation provides students with an understanding of how to effectively use information technology tools to communicate ideas and information using a variety of media.

It is expected that students will:

Grade 8	Grade 9	Grade 10
• identify and consider ethical and legal issues when presenting information • use a variety of software to present messages • demonstrate the ability to arrange information in different forms to create new meaning • analyse the effects of information technology on presentations • describe the effect of multimedia presentations on intended audiences	• select, use, and evaluate a variety of information technology tools for making presentations • apply the principles of effective communication and good design when using information technology tools • consider ethical and legal issues when presenting information • analyse the impact of multimedia documents on the intended audiences • develop an awareness that all media can be digitized for electronic presentation	• create multimedia documents using a variety of electronic sources • demonstrate the ability to use special effects in multimedia presentations to influence a message • apply ethical and legal principles when presenting information • evaluate the effectiveness of the component parts of multimedia presentations • demonstrate the ability to manage the process of creating multimedia presentations

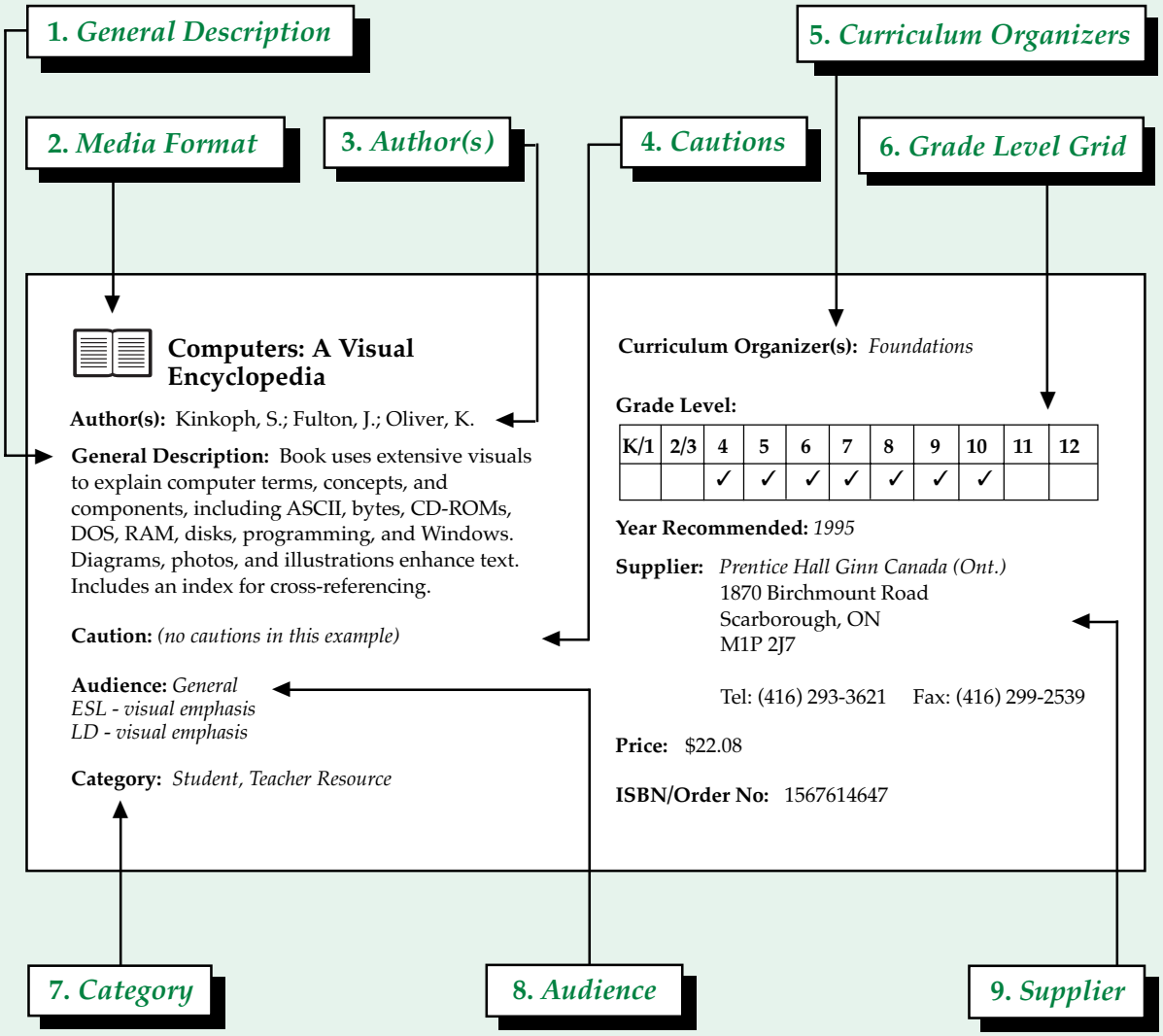
Appendix B

Learning Resources

WHAT IS APPENDIX B?

Appendix B is a comprehensive list of the *recommended* learning resources for Information Technology 8 to 10. The titles are listed alphabetically and each resource is annotated. In addition, Appendix B contains information on selecting learning resources for the classroom.

What information does an annotation provide?



1. ***General Description:*** This section provides an overview of the resource.

2. ***Media Format:*** This part is represented by an icon next to the title. Possible icons include:


Audio Cassette


CD-ROM


Film


Games/Manipulatives


Laserdisc, Videodisc


Multimedia


Music CD


Print Materials


Record


Slides


Software


Video

3. ***Author(s):*** Author or editor information is provided where it might be of use to the teacher.

4. ***Cautions:*** This category is used to alert teachers about potentially sensitive issues.

5. ***Curriculum Organizers:*** This category helps teachers make links between the resource and the curriculum.

6. ***Grade Level Grid:*** This category indicates the suitable age range for the resource.

7. ***Category:*** This section indicates whether it is a student and teacher resource, teacher resource, or professional reference.

8. ***Audience:*** This category indicates the suitability of the resource for different types of students. Possible student audiences include the following:
   - general
   - English as a second language (ESL)
   - *Students who are:*
     - gifted
     - blind or have visual impairments
     - deaf or hard of hearing
   - *Students with:*
     - severe behavioural disorders
     - dependent handicaps
     - physical disabilities
     - autism
     - learning disabilities (LD)
     - mild intellectual disabilities (ID-mild)
     - moderate to severe/profound disabilities (ID-moderate to severe/profound)

9. ***Supplier:*** The name and address of the supplier are included in this category. Prices shown here are approximate and subject to change. Prices should be verified with the supplier.

What about the videos?

The ministry attempts to obtain rights for most *recommended* videos. Negotiations for the most recently recommended videos may not be complete. For these titles, the original distributor is listed in this document, instead of British Columbia Learning Connection Inc. Rights for new listings take effect the year implementation begins. Please check with British Columbia Learning Connection Inc. before ordering new videos.

SELECTING LEARNING RESOURCES FOR THE CLASSROOM

Selecting a learning resource means choosing locally appropriate materials from the list of recommended resources or other lists of evaluated resources. The process of selection involves many of the same considerations as the process of evaluation, though not to the same level of detail. Content, instructional design, technical design, and social considerations may be included in the decision-making process, along with a number of other criteria.

The selection of learning resources should be an ongoing process to ensure a constant flow of new materials into the classroom. It is most effective as an exercise in group decision making, co-ordinated at the school, district, and ministry levels. To function efficiently and realize the maximum benefit from finite resources, the process should operate in conjunction with an overall district and school learning resource implementation plan.

Teachers may choose to use provincially recommended resources to support provincial or locally developed curricula; choose resources that are not on the ministry's list; or choose to develop their own resources. Resources that are not on the provincially recommended list must be evaluated through a local, board-approved process.

CRITERIA FOR SELECTION

There are a number of factors to consider when selecting learning resources.

Content

The foremost consideration for selection is the curriculum to be taught. Prospective resources must adequately support the particular learning objectives that the teacher wants to address. Resources on the ministry's *recommended* list are not matched directly to learning outcomes, but they are linked to the appropriate curriculum organizers. It is the responsibility of the teacher to determine whether a resource will effectively support any given learning outcomes within a curriculum organizer. This can only be done by examining descriptive information regarding that resource; acquiring additional information about the material from the supplier, published reviews, or colleagues; and by examining the resource first-hand.

Instructional Design

When selecting learning resources, teachers must keep in mind the individual learning styles and abilities of their students, as well as anticipate the students they may have in the future. Resources have been recommended to support a variety of special audiences, including gifted, learning disabled, mildly intellectually disabled, and ESL students. The suitability of a resource for any of these audiences has been noted in the resource annotation. The instructional design of a resource includes the organization and presentation techniques; the methods used to introduce, develop, and summarize concepts; and the vocabulary level. The suitability of all of these should be considered for the intended audience.

Teachers should also consider their own teaching styles and select resources that will complement them. The list of *recommended* resources contains materials that range from prescriptive or self-contained resources, to open-ended resources that require considerable teacher preparation. There are *recommended* materials for teachers with varying levels of experience with a particular subject, as well as those that strongly support particular teaching styles.

Technology Considerations

Teachers are encouraged to embrace a variety of educational technologies in their classrooms. To do so, they will need to ensure the availability of the necessary equipment and familiarize themselves with its operation. If the equipment is not currently available, then the need must be incorporated into the school or district technology plan.

Social Considerations

All resources on the ministry's *recommended* list have been thoroughly screened for social concerns from a provincial perspective. However, teachers must consider the appropriateness of any resource from the perspective of the local community.

Media

When selecting resources, teachers should consider the advantages of various media. Some topics may be best taught using a specific medium. For example, video may be the most appropriate medium when teaching a particular, observable skill, since it provides a visual model that can be played over and over or viewed in slow motion for detailed analysis. Video can also bring otherwise unavailable experiences into the classroom and reveal "unseen worlds" to students. Software may be particularly useful when students are expected to develop critical-thinking skills through the manipulation of a simulation, or where safety or repetition is a factor. Print resources or CD-ROM can best be used to provide extensive background information on a given topic. Once again, teachers must consider the needs of their individual students, some of whom may learn better from the use of one medium than another.

Funding

As part of the selection process, teachers should determine how much money is available to spend on learning resources. This requires an awareness of school and district policies, and procedures for learning resource funding. Teachers will need to know how funding is allocated in their district and how much is available for their needs. Learning resource selection should be viewed as an ongoing process that requires a determination of needs, as well as long-term planning to co-ordinate individual goals and local priorities.

Existing Materials

Prior to selecting and purchasing new learning resources, an inventory of those resources that are already available should be established through consultation with the school and district resource centres. In some districts, this can be facilitated through the use of district and school resource management and tracking systems. Such systems usually involve a computer database program (and possibly bar-coding) to help keep track of a multitude of titles. If such a system is put on-line, then teachers can check the availability of a particular resource via a computer.

SELECTION TOOLS

The Ministry of Education has developed a variety of tools to assist teachers with the selection of learning resources.

These include:

- Integrated Resource Packages (IRPs) that contain curriculum information, teaching and assessment strategies, and *recommended* learning resources
- learning resource information via annotation sets, resource databases on disks, and, in the future, on-line access
- sets of the most recently recommended learning resources (provided each year to a number of host districts throughout the province to allow teachers to examine the materials first-hand at regional displays)
- sample sets of provincially recommended resources (available on loan to districts on request)

A MODEL SELECTION PROCESS

The following series of steps is one way a school resource committee might go about selecting learning resources:

1. Identify a resource co-ordinator (for example, a teacher-librarian).
2. Establish a learning resources committee made up of department heads or lead teachers.
3. Develop a school vision and approach to resource-based learning.
4. Identify existing learning resource and library materials, personnel, and infrastructure.
5. Identify the strengths and weaknesses of existing systems.
6. Examine the district Learning Resources Implementation Plan.
7. Identify resource priorities.
8. Apply criteria such as those found in *Selection and Challenge* to shortlist potential resources.
9. Examine shortlisted resources first-hand at a regional display or at a publishers' display, or borrow a set from the Learning Resources Branch.
10. Make recommendations for purchase.

FURTHER INFORMATION

For further information on evaluation and selection processes, catalogues, annotation sets, or resource databases, please contact the Learning Resources Branch at 387-5331 or by fax at 387-1527.

All About Computers

Author(s): *Atelsek, Jean*

General Description: Book introduces the various parts of a computer. Topics cover what is in a computer, memory, storage, I/O devices, DOS, Windows, and some basics of programming. Colourful visuals help explain concepts. Includes activities and an answer key.

Audience: *General*

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Foundations*

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
				✓	✓	✓	✓	✓		

Year Recommended: *1995*

Supplier: *Copp Clark Ltd.*
2775 Matheson Boulevard East
Mississauga, ON
L4W 4P7

Tel: (905) 238-6074 Fax: (905) 238-6075

Price: $22.95

ISBN/Order No: 1562761668

All the Right Type

Author(s): *Beaucamp, Ernest*

General Description: Multilevel software program for either Macintosh or MS-DOS uses drills and activities to teach proper keyboarding technique and help build skill and accuracy. Includes a word processor function and automatic record keeping for the teacher, as well as a user's guide with installation instructions and teaching strategies.

System requirements for Macintosh: Macintosh Plus or later; 512 K RAM; System 4.1 or later; high density disk drive. System requirements for MS-DOS: IBM PC compatible; 256 K RAM; double-sided disk drive; CGA card optional; DOS 2.0 or later (DOS 3.2 or later for 3.5" disks).

Audience: *General*
ESL - keyboarding tutorials
LD - keyboarding tutorials

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Foundations*
Presentation
Process

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
		✓	✓	✓	✓	✓	✓	✓		

Year Recommended: *1995*

Supplier: *Didatech Software*
#200 - 4250 Dawson Street
Burnaby, BC
V5C 4B1

Tel: (604) 299-4435 Fax: (604) 299-2428

Price: Macintosh: $89.00
IBM: $67.00

ISBN/Order No: Macintosh: 1-55030-144-6
IBM (3.5"): 1-55030143-8

Becoming a Computer Animator

Author(s): *Morrison, Mike*

General Description: Illustrated book presents an in-depth examination of computer animation technology (virtual reality, 3-D, morphing), history, tools, applications, and careers. Includes instruction for techniques using particular software. Accompanying CD-ROM features over 20 working demo versions of animation software for both Macintosh and IBM computers.

System requirements for Macintosh: 68000 processor or later; 8 Mb RAM; System 7 or later. System requirements for Windows: 386 or later; 4 Mb RAM; Windows 3.1 or later; VGA graphics.

Audience: *General*
ESL - graphical interface available
Gifted - open-ended, may take to higher levels

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Process*

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
								✓		

Year Recommended: *1995*

Supplier: *Prentice Hall Ginn Canada (Ont.)*
1870 Birchmount Road
Scarborough, ON
M1P 2J7

Tel: (416) 293-3621 Fax: (416) 299-2539

Price: $36.17

ISBN/Order No: 0672304635

Communicating With Computers

Author(s): *Martin, Dave*

General Description: Student book and teacher's resource book provide a general computer literacy overview for Apple and MS-DOS computers. Students develop skills in word processing, graphics, data management, and spreadsheet programs through numerous activities. Teacher's resource provides specific instructional strategies.

Audience: *General*

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Foundations*
Presentation
Process

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
				✓	✓	✓				

Year Recommended: *1995*

Supplier: *D. C. Heath Canada Ltd. (Ont.)*
3rd Floor, 200 Adelaide Street West
Toronto, ON
M5H 1W7

Tel: (416) 977-1345 Fax: (416) 977-3135

Price: Student Edition: $14.95
Teacher's Resource Book: $14.95

ISBN/Order No: Student Edition: 0-669-95500-0
Teacher's Resource Book: 0-669-95501-9

Computer Integrated Manufacturing

General Description: Seventeen-minute video introduces trends in modern manufacturing using the computer. Discusses advantages of computer integrated manufacturing, as well as problems, general business management, product and process planning, control systems, factory automation, and information resource communications.

Audience: *General*

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Foundations*
Process

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
							✓	✓		

Year Recommended: *1995*

Supplier: *McIntyre Media Ltd.*
6845 Rexwood Road, Unit 2
Mississauga, ON
L4L 1S5

Tel: (905) 678-9866 Fax: (905) 678-2403

Price: (not available)

ISBN/Order No: (not available)

Computers: A Visual Encyclopedia

Author(s): *Kinkoph, S.; Fulton, J.; Oliver, K.*

General Description: Book uses extensive visuals to explain computer terms, concepts, and components, including ASCII, bytes, CD-ROMs, DOS, RAM, disks, programming, and Windows. Diagrams, photos, and illustrations enhance text. Includes an index for cross-referencing.

Audience: *General*
ESL - visual emphasis
LD - visual emphasis

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Foundations*

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
		✓	✓	✓	✓	✓	✓	✓		

Year Recommended: *1995*

Supplier: *Prentice Hall Ginn Canada (Ont.)*
1870 Birchmount Road
Scarborough, ON
M1P 2J7

Tel: (416) 293-3621 Fax: (416) 299-2539

Price: $22.08

ISBN/Order No: 1567614647

Computers Illustrated

Author(s): *Gertler, Nat*

General Description: Book presents a visual guide to the workings and components of a computer system, including its multimedia aspects. Chapters explore what a computer is, how the various parts work, and what the computer is capable of doing. Includes a detailed glossary.

Audience: *General*

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Foundations*
Process

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
				✓	✓	✓	✓	✓		

Year Recommended: *1995*

Supplier: *Prentice Hall Ginn Canada (Ont.)*
1870 Birchmount Road
Scarborough, ON
M1P 2J7

Tel: (416) 293-3621 Fax: (416) 299-2539

Price: $21.41

ISBN/Order No: 1565296761

The Cruncher

General Description: Macintosh spreadsheet program facilitates mathematical problem solving through spreadsheet application, animated tutorials, projects, colour charts and graphs, and an on-line notebook. A comprehensive teacher's guide is included. Software emphasizes presentations that include charts, sounds, and animations. Text-to-speech capability is provided.

System requirements: Macintosh Classic or later; System 7.0 with 2 Mb RAM; 8 Mb free disk space; printer highly recommended. Windows version has not been evaluated.

Audience: *General*

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Foundations*
Presentation
Process

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
		✓	✓	✓	✓	✓	✓	✓		

Year Recommended: *1995*

Supplier: *Davidson & Associates, Inc.*
P.O. Box 2961
Torrance, California
90509

Tel: 1-800-545-7677 Fax: (310) 793-0601

Price: (not available)

ISBN/Order No: (not available)

Desktop Publishing: Design Basics and Applications

Author(s): *Porozny, George*

General Description: Book introduces desktop publishing with an emphasis on the various hardware and software components. Chapters cover planning, formatting, graphic design, and artwork. Ten projects allow students to apply skills developed earlier.

Audience: *General*

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Foundations*
Presentation
Process

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
							✓	✓		

Year Recommended: *1995*

Supplier: *Copp Clark Ltd.*
2775 Matheson Boulevard East
Mississauga, ON
L4W 4P7

Tel: (905) 238-6074 Fax: (905) 238-6075

Price: $23.96

ISBN/Order No: 07730-5218-6

Digital Chisel

General Description: Macintosh software package for preparing multimedia presentations consists of a detailed reference manual, CD, and installation disks. The HyperCard-type program allows students to incorporate text, pictures, movies, sound, animation, and hypermedia in projects. The CD features a multimedia library of 14 topics.

System requirements: Macintosh LC; 4 Mb RAM; System 6.0.7.

Audience: *General*

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Foundations*
Presentation
Process

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
			✓	✓	✓	✓	✓	✓	✓	✓

Year Recommended: *1995*

Supplier: *Pierian Spring Software*
Suite 570, 5200 S.W. Macadam Avenue
Portland, Oregon
97201

Tel: (503) 222-2044 Fax: (503) 222-0771

Price: Single Copy: $119.95
Site Licence: $995.00

ISBN/Order No: Single Copy: CHIZ 000 B1Z
Site Licence: CHIZ 000R1.2

Graph Links

General Description: Macintosh graphing program allows students to use data to set up a spreadsheet and generate pictographs, line graphs, bar graphs, and circle graphs. Tutorial explanations and examples help clarify concepts. Includes a teacher's guide with detailed instructions. American symbols used.

System requirements: System 6.0.7 or later; 4 Mb RAM.

Audience: *General*

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Foundations*
Presentation
Process

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
	✓	✓	✓	✓	✓	✓				

Year Recommended: *1995*

Supplier: *Harcourt Brace and Company Canada Ltd.*
55 Horner Avenue
Toronto, ON
M8Z 4X6

Tel: (416) 255-4491 Fax: (416) 255-5456

Price: $149.99

ISBN/Order No: (not available)

Highway to Cyberia

General Description: Forty-seven-minute video, narrated by David Suzuki, examines the use of computers as a communications tool for people all over the world. Profiles video games and movies on demand, home shopping and banking, telepresence, 3-D animation and graphics, and the Internet. The social implications of these developing trends are questioned in a thoughtful and provocative manner.

Audience: *General*

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Foundations*
Presentation

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
						✓	✓	✓	✓	

Year Recommended: *1995*

Supplier: *CBC Educational Sales*
P.O. Box 500, Station A
Toronto, ON
M5W 1E6

Tel: (416) 205-6384 Fax: (416) 205-3482

Price: (not available)

ISBN/Order No: (not available)

How Multimedia Computers Work

General Description: Award-winning CD-ROM features tours through the inner workings and components of a multimedia computer. It uses detailed 3-D animation with accompanying narration, music, and sound effects. Includes a glossary of computer terms, answers to common questions, and tips.

System requirements: MPC CD-ROM; IBM compatible; double-speed CD-ROM drive; SVGA colour monitor; 4 Mb RAM; SoundBlaster-compatible sound card.

Audience: *General*

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Presentation*
Process

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
		✓	✓	✓	✓	✓	✓	✓		

Year Recommended: *1995*

Supplier: *Addison-Wesley Publishers Limited*
26 Prince Andrew Place
P.O. Box 580
Don Mills, ON
M3C 2T8

Tel: (416) 447-5101 Fax: (416) 443-0948

Price: $49.99

ISBN/Order No: 0-7911-1569-0

How Multimedia Works

Author(s): *Holsinger, Erik*

General Description: Book provides an overview of multimedia computing. Topics include software and hardware systems, graphics, digital video, digital audio, CD-ROMs, and laserdiscs. Numerous illustrations help explain concepts.

Audience: *General*

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Foundations*
Process

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
								✓	✓	

Year Recommended: *1995*

Supplier: *Copp Clark Ltd.*
2775 Matheson Boulevard East
Mississauga, ON
L4W 4P7

Tel: (905) 238-6074 Fax: (905) 238-6075

Price: $34.95

ISBN/Order No: 1562762087

How the Internet Works

Author(s): *Eddings, Joshua*

General Description: Book provides an overview of, and some important particulars on, the Internet. The topics include a description and explanation of the Internet, Telnet, downloading files, e-mail, security issues, and future trends. Step-by-step instructions and attractive visuals help to explain concepts.

Audience: *General*

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Foundations*
Process

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
					✓	✓	✓	✓	✓	

Year Recommended: *1995*

Supplier: *Copp Clark Ltd.*
2775 Matheson Boulevard East
Mississauga, ON
L4W 4P7

Tel: (905) 238-6074 Fax: (905) 238-6075

Price: $49.95

ISBN/Order No: 1-56276-249-4

How To Make Great Videos - With Just a Camcorder

General Description: Twenty-five-minute video instructs students in the basic techniques of video production using a camcorder. Also covers how to create a finished program. The issue of saving energy is used as an example topic for a video.

Audience: *General*

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Process*

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
		✓	✓	✓	✓	✓	✓			

Year Recommended: *1995*

Supplier: *McIntyre Media Ltd.*
6845 Rexwood Road, Unit 2
Mississauga, ON
L4L 1S5

Tel: (905) 678-9866 Fax: (905) 678-2403

Price: (not available)

ISBN/Order No: (not available)

How to Use THE INTERNET

Author(s): *Butler, Mark*

General Description: Book provides an overview of, and some important particulars on, what the Internet is, how to access and use the Internet, and Internet-related software. Topics cover e-mail, electronic mailing lists, news groups, transferring files, and browsing. Step-by-step instructions and attractive visuals help to explain concepts. Some specifics about certain software or protocol may vary depending on the carrier.

Audience: *General*

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Foundations*
Process

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
					✓	✓	✓	✓		

Year Recommended: *1995*

Supplier: *Copp Clark Ltd.*
2775 Matheson Boulevard East
Mississauga, ON
L4W 4P7

Tel: (905) 238-6074 Fax: (905) 238-6075

Price: (not available)

ISBN/Order No: 1-56276-222-2

How Virtual Reality Works

Author(s): *Eddings, Joshua*

General Description: Book provides an overview of the computer technology known as virtual reality. Topics include operation of the senses, hardware and software, history, professional applications, recreational use, and future trends. Numerous illustrations help explain concepts.

Audience: *General*

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Foundations*

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
					✓	✓	✓	✓	✓	✓

Year Recommended: *1995*

Supplier: *Copp Clark Ltd.*
2775 Matheson Boulevard East
Mississauga, ON
L4W 4P7

Tel: (905) 238-6074 Fax: (905) 238-6075

Price: $34.95

ISBN/Order No: 1562762303

HyperStudio

Author(s): *O'Keefe, Michael; Wagner, Roger*

General Description: Software package for Macintosh or Apple IIgs allows students to create multimedia presentations with text, pictures, laserdiscs, sound, and drawing. The program works with QuickTime or Hypermedia. Includes an on-line tutorial and a book on how to use HyperLogo to control HyperStudio. HyperCard experience an asset.

System requirements for Macintosh: 2 Mb RAM with System 6.0.8, 4 Mb RAM with System 7; Macintosh Plus or later; colour monitor recommended. System requirements for Apple IIgs: 1 Mb RAM; 3.5" disk drive. Windows version has not been evaluated.

Audience: *General*

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Presentation*
Process

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
		✓	✓	✓	✓	✓	✓	✓	✓	✓

Year Recommended: *1995*

Supplier: *Roger Wagner Publishing Inc.*
1050 Pioneer Way
El Cajon, California
92020

Tel: 1-800-421-6526 Fax: (619) 442-0525

Price: $120.00

ISBN/Order No: 0-927796-41-D/MRW-023

The Internet by E-Mail

Author(s): *Shirky, Clay*

General Description: Book is an introductory guide to the Internet, with a focus on text-based, non-graphical e-mail applications. Topics cover the basics in sending and receiving mail, subscribing to on-line publications, mailing lists, newsgroups, file retrieval, on-line access sites, Archie, and government services.

Audience: *General*

Category: *Professional Reference*

Curriculum Organizer(s): *Foundations*
Process

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
						✓	✓	✓	✓	✓

Year Recommended: *1995*

Supplier: *Copp Clark Ltd.*
2775 Matheson Boulevard East
Mississauga, ON
L4W 4P7

Tel: (905) 238-6074 Fax: (905) 238-6075

Price: $23.16

ISBN/Order No: 1-5627-6240-0

Inventing the Future

General Description: Fifty-minute video documents the commercial and scientific development of computers from World War II to the *Apollo II* moon landing. Illustrates the stages of development from vacuum tubes to transistors and integrated circuits.

Audience: *General*

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Foundations*

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
								✓		

Year Recommended: *1993*

Supplier: *B.C. Learning Connection Inc.*
c/o Learning Resources Branch (Customer Service)
878 Viewfield Road
Victoria, BC
V9A 4V1

Tel: (604) 387-5331 Fax: (604) 387-1527

Price: $22.00

ISBN/Order No: IMA011

Looking Ahead: Earning, Spending, Saving

General Description: Macintosh software program allows students to make simulated financial planning decisions for independent living. Students choose a career, determine take-home pay, track expenses, and update their bank balance accordingly. Includes a teacher's guide with instructions, worksheets, and assessment. American terms and spellings.

System requirements: System 6.0.7; 2 Mb RAM.

Audience: *General*

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Foundations*
Presentation
Process

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
			✓	✓	✓	✓				

Year Recommended: *1995*

Supplier: *Harcourt Brace and Company Canada Ltd.*
55 Horner Avenue
Toronto, ON
M8Z 4X6

Tel: (416) 255-4491 Fax: (416) 255-5456

Price: $104.55

ISBN/Order No: (not available)

Microsoft Press Computer Dictionary: The Comprehensive Standard for Business, School, Library and Home, Second Edition

Author(s): *Woodcock, Joanne*

General Description: Reference book has over 5000 alphabetized, generic definitions accompanied by illustrations. It includes pronunciation guides and cross references. Five appendices cover common character sets and numeric equivalents.

Audience: *General*

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Foundations*
Process

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
						✓	✓	✓	✓	

Year Recommended: *1995*

Supplier: *Gage Educational Publishing Co. (Scarborough)*
164 Commander Boulevard
Scarborough, ON
M1S 3C7

Tel: (416) 293-8141 Fax: (416) 293-9009

Price: (not available)

ISBN/Order No: 55615-5972

More Data Processing Applications

Author(s): *Dvorchik, Sheila; Wasylenki, Lesley*

General Description: Simulation-based textbook deals generically with application software. Presents case studies from the business world that require the use of software and problem-solving approaches. Topics include word processing, data management, spreadsheets, project management, research skills, desktop publishing, and communications technology. Includes activities and a teacher's resource book.

Audience: *General*

Category: *Teacher Resource*

Curriculum Organizer(s): *Foundations*
Process

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
						✓	✓	✓		

Year Recommended: *1995*

Supplier: *Copp Clark Ltd.*
2775 Matheson Boulevard East
Mississauga, ON
L4W 4P7

Tel: (905) 238-6074 Fax: (905) 238-6075

Price: Student Edition: $29.95
Teacher's Manual: $49.95

ISBN/Order No: Student Edition: 0-7730-5095-7
Teacher's Manual: 0-7730-5111-2

The Multimedia Workshop

General Description: Presentation software for Macintosh and Windows teaches students the elements of designing printed documents and video presentations. It features text, clip art, photos, QuickTime movies, sounds, and music. Standard format files also can be imported. Includes comprehensive print support with suggested projects.

System requirements for Macintosh: LC series or later; System 7.0 or later; 4 Mb RAM for 256 colours; 8 Mb RAM for thousands of colours; 3 Mb free disk space. System requirements for Windows: Windows 3.1 or later; 4 Mb RAM; Super VGA 256 - colour only; 25 MHz 486 or faster; CD-ROM drive (double-speed recommended); hard drive and mouse; audio accessory necessary for optimum audio output, but not required;

Audience: *General*
Gifted - completely open-ended
LD - allows non-readers to express ideas or concepts

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Process*

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
		✓	✓	✓	✓	✓	✓	✓		

Year Recommended: *1995*

Supplier: *Davidson & Associates, Inc.*
P.O. Box 2961
Torrance, California
90509

Tel: 1-800-545-7677 Fax: (310) 793-0601

Price: Macintosh: $129.95
Windows: $129.95

ISBN/Order No: Macintosh: 0-7849-0351-4
Windows: 0-7849-0541-X

The Paperback Computer

General Description: Fifty-minute British historical documentary provides an in-depth perspective on the development of the computer and how this once threatening and forbidding machine has become a small, friendly, affordable tool.

Audience: *General*
Gifted - could be used for historical enrichment

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Foundations*

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
						✓	✓	✓	✓	

Year Recommended: *1995*

Supplier: *International Tele-Film Enterprises Ltd.*
Suite #301, 5090 Explorer Drive
Mississauga, ON
L4W 4T9

Tel: (905) 629-3133 Fax: (905) 629-1211

Price: (not available)

ISBN/Order No: (not available)

PC/Computing: How Computers Work

Author(s): *White, Ron*

General Description: Illustrated book provides comprehensive overview of the inner workings and components of a PC. Topics include boot-up process, microchips, data storage, I/O devices, networks, and printers. Accompanying CD-ROM features 3-D animated tours, video interviews, and computing tips in a comic format.

System requirements: 386DX/33; 4 Mb RAM; Windows 3.1; MS-DOS 5.0; MSCDEX 2.2.1; double-speed CD-ROM drive.

Audience: *General*

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Foundations*

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
						✓	✓	✓		

Year Recommended: *1995*

Supplier: *Copp Clark Ltd.*
2775 Matheson Boulevard East
Mississauga, ON
L4W 4P7

Tel: (905) 238-6074 Fax: (905) 238-6075

Price: $49.95

ISBN/Order No: 1562762508

Que's 1996 Computer & Internet Dictionary, 6th Edition

Author(s): *Pfaffenberger, Bryan*

General Description: Comprehensive, pocket-sized, softcover dictionary contains more than 3500 definitions of computer, multimedia, and Internet terminology. Includes occasional small graphics and index tabs.

Audience: *General*
Gifted - high vocabulary; in-depth explanations of technology terms

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Foundations*

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
				✓	✓	✓	✓	✓	✓	✓

Year Recommended: *1995*

Supplier: *Prentice Hall Ginn Canada (Ont.)*
1870 Birchmount Road
Scarborough, ON
M1P 2J7

Tel: (416) 293-3621 Fax: (416) 299-2539

Price: $14.04

ISBN/Order No: 0-7897-0356-4

The Technological Classroom

Author(s): *Henderson, Dale; Heide, Ann*

General Description: Book provides teachers with an informative foundation for incorporating technology in the classroom. It deals with student progress, discussing technology with parents, integrated learning activities, and making decisions about the costs related to the inclusion of technology.

Audience: *General*
Special Needs - chapter devoted to strategies for inclusion

Category: *Professional Reference*

Curriculum Organizer(s): *Foundations*

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
✓	✓	✓	✓	✓	✓	✓	✓	✓		

Year Recommended: *1995*

Supplier: *Irwin Publishing*
1800 Steeles Avenue West
Concord, ON
L4K 2P3

Tel: (905) 660-0611 Fax: (905) 660-0676

Price: $29.95

ISBN/Order No: 7725-21417

The Thinking Machine

General Description: Fifty-minute British historical documentary provides an in-depth perspective on the development of the computer. It focusses on the computer as a "thinking machine" and how mankind has attempted to make it into a tool that acts and thinks like a human.

Audience: *General*
Gifted - could be used for historical enrichment

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Foundations*

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
								✓		

Year Recommended: *1995*

Supplier: *International Tele-Film Enterprises Ltd.*
Suite #301, 5090 Explorer Drive
Mississauga, ON
L4W 4T9

Tel: (905) 629-3133 Fax: (905) 629-1211

Price: (not available)

ISBN/Order No: (not available)

UltraKey

General Description: Introductory Macintosh keyboarding software program features instruction, skill-building exercises, and timed tests. The Enhancer software allows teachers to input test material. Includes a teacher's guide, technical help, and student's guide.

System requirements: System 7 recommended; 2 Mb RAM; 1.2 Mb free disk space; 4 Mb RAM; MacinTalk or PlainTalk speech extensions required for text-to-speech; colour monitor recommended. Apple II and MS-DOS versions have not been evaluated.

Audience: *General*
ESL - tutorial
LD - tutorial

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Foundations*
Presentation
Process

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
		✓	✓	✓	✓	✓	✓			

Year Recommended: *1995*

Supplier: *Media Duplication*
275 Steelcase Road East
Markham, ON
L3R 1G3

Tel: (905) 940-5115

Price: UltraKey: $495.00
UntraKey Enhancer: $195.00

ISBN/Order No: UltraKey: 67654-13003
UntraKey Enhancer: 0921849060

Virtual Reality

General Description: Thirteen-minute video outlines the origins of virtual reality in military flight simulators and subsequent applications including NASA simulators, architecture, medical techniques, and games.

Audience: *General*

Category: *Student, Teacher Resource*

Curriculum Organizer(s): *Presentation*
Process

Grade Level:

K/1	2/3	4	5	6	7	8	9	10	11	12
		✓	✓	✓	✓	✓	✓	✓	✓	✓

Year Recommended: *1995*

Supplier: *Canadian Learning Company Inc.*
63 Mack Avenue
Scarborough, ON
M1L 1M5

Tel: (416) 691-9094 Fax: (416) 691-8833

Price: (not available)

ISBN/Order No: (not available)

Appendix C

Cross-Curricular Interests

The three principles of learning stated in the introduction of this Integrated Resource Package (IRP) support the foundation of The Kindergarten to Grade 12 Education Plan. They have guided all aspects of the development of this document, including the curriculum outcomes, instructional strategies, assessment strategies, and learning resource evaluations.

In addition to these three principles, the Ministry of Education wants to ensure that education in British Columbia is relevant, equitable, and accessible to all learners. In order to meet the needs of all learners, the development of each component of this document has been guided by a series of cross-curricular reviews. This appendix outlines the key aspects of each of these reviews. The information here is intended to guide the users of this document as they engage in school and classroom organization and instructional planning and practice.

The areas of cross-curricular interest are:

- Applied Focus in Curriculum
- Career Development
- English as a Second Language (ESL)
- Environment and Sustainability
- Aboriginal Studies
- Gender Equity
- Information Technology
- Media Education
- Multiculturalism and Anti-Racism
- Science-Technology-Society
- Special Needs

APPLIED FOCUS IN CURRICULUM

An applied focus combines the following components in curriculum development, consistent with the nature of each subject area:

Learning Outcomes—expressed as observable, measurable, and reportable abilities or skills

Employability Skills—inclusion of outcomes or strategies that promote skills that will enable students to be successful in the workplace (e.g., literacy, numeracy, critical and creative thinking, problem solving, technology, and information management)

Contextual Learning—an emphasis on learning by doing; the use of abstract ideas and concepts, including theories, laws, principles, formulae, rules, or proofs in a practical context (e.g., home, workplace, community)

Interpersonal Skills—inclusion of strategies that promote co-operative activities and teamwork

Career Development—inclusion of appropriate connections to careers, occupations, entrepreneurship, or the workplace

An applied focus in all subjects and courses promotes the use of practical applications to demonstrate theoretical knowledge. Using real-world and workplace problems and situations as a context for the application of theory makes school more relevant to students' needs and goals. An applied focus strengthens the link between what students need to know to function effectively in the workplace or in postsecondary education and what they learn in Kindergarten through Grade 12.

Some examples of an applied focus in different subjects are:

English Language Arts—increasing emphasis on language used in everyday situations and in the workplace, such as for job interviews, memo and letter writing, word processing, and technical communication (including the ability to interpret technical reports, manuals, tables, charts, and graphics)

Mathematics—more emphasis on skills needed in the workplace, including knowledge of probability and statistics, logic, measurement theory, and problem solving

Science—more practical applications and hands-on experience of science, such as reducing energy waste in school or at home, caring for a plant or animal in the classroom, using computers to produce tables and graphs and for spreadsheets

Business Education—more emphasis on real-world applications such as preparing résumés and personal portfolios, participating in groups to solve business communication problems, using computer software to keep records, and using technology to create and print marketing material

Visual Arts—applying visual arts skills to real-world design, problem solving, and communications; exploring career applications of visual arts skills; experimenting with a variety of new technologies to create images; and a new emphasis on creating and understanding images of social significance to the community

This summary is derived from *The Kindergarten to Grade 12 Education Plan* (September 1994), and curriculum documents from British Columbia and other jurisdictions.

CAREER DEVELOPMENT

Career development is an ongoing process through which learners integrate their personal, family, school, work, and community experiences to facilitate career and lifestyle choices.

Students develop:

- an open attitude toward a variety of occupations and types of work
- an understanding of the relationship between work and leisure, work and the family, and work and one's interests and abilities
- an understanding of the role of technology in the workplace and in daily life
- an understanding of the relationship between work and learning
- an understanding of the changes taking place in the economy, society, and the job market
- an ability to construct learning plans and reflect on the importance of lifelong learning
- an ability to prepare for multiple roles throughout life

The main emphases of career development are career awareness, career exploration, career preparation, career planning, and career work experience.

In the Primary Years

Career awareness promotes an open attitude toward a variety of career roles and types of work. Topics include:

- the role of work and leisure
- relationships among work, the family, one's personal interests, and one's abilities

A variety of careers can be highlighted through the use of in-class learning activities focussing on the students themselves and on a range of role models, including non-traditional role models.

In Grades 4 to 8

The emphasis on self-awareness and career awareness is continued. Topics include:

- interests, aptitudes, and possible future goals
- technology in the workplace and in our daily lives
- social, family, and economic changes
- future education options
- career clusters (careers that are related to one another)
- lifestyles
- external influences on decision making

Games, role-playing, drama, and appropriate community volunteer experience can be used to help students actively explore the world of work. Field experiences in which students observe and interview workers in their occupational environments may also be appropriate. These learning activities will facilitate the development of interpersonal communications and group problem-solving skills needed in the workplace and in other life situations.

In Grades 9 and 10

The emphasis is on providing students with opportunities to prepare for and make appropriate and realistic decisions. In developing their student learning plans, they will relate self-awareness to their goals and aspirations. They will also learn many basic skills and attitudes that are required for an effective transition into adulthood. This will assist in preparing them to be responsible and self-directed throughout their lives. Topics include:

- entrepreneurial education
- employability skills (e.g., how to find and keep a job)
- the importance of lifelong education and career planning
- involvement in the community
- the many different roles that an individual can play throughout life
- the dynamics of the working world (e.g., unions, unemployment, supply and demand, Pacific Rim, free trade)

The examination of personal interests and skills through a variety of career exploration opportunities (e.g., job shadowing) is emphasized at this level. Group discussion and individual consultation can be used to help students examine and confirm their personal values and beliefs.

In Grades 11 and 12

Career development in these grades is focussed more specifically on issues related to the world of work. These include:

- dynamics of the changing work force and changing influences on the job market (e.g., developing technology and economic trends)
- job-keeping and advancement skills (interpersonal skills needed in the workplace, employment standards)
- occupational health issues and accessing health support services
- funding for further education
- alternative learning strategies and environments for different life stages
- mandatory work experience (minimum 30 hours)

Work Experience

Work experience provides students with opportunities to participate in a variety of workplace situations to help prepare them for the transition to a work environment. Work experience also provides students with opportunities to:

- connect what they learn in school with the skills and knowledge needed in the workplace and society in general
- experience both theoretical and applied learning, which is part of a broad liberal education
- explore career directions identified in their Student Learning Plans

Descriptions of career development are drawn from the Ministry of Education's *Career Developer's Handbook, Guidelines for the Kindergarten to Grade 12 Education Plan, Implementation Resource, Part 1*, and the *Career and Personal Planning IRP*, April 1995.

ENGLISH AS A SECOND LANGUAGE (ESL)

ESL assistance is provided to students whose use of English is sufficiently different from standard English to prevent them from reaching their potential. Many students learning English speak it quite fluently and seem to be proficient. School, however, demands a more sophisticated version of English, both in reading and writing. Thus even fluent speakers might require ESL to provide them with an appropriate language experience that is unavailable outside the classroom. ESL is a transitional service rather than a subject. Students are in the process of learning the language of instruction and, in many cases, the content matter of subjects appropriate to their grade level. Thus ESL does not have a specific curriculum. The provincial curriculum is the basis of much of the instruction and is used to teach English as well as individual subject areas. It is the methodology, the focus, and the level of engagement with the curriculum that differentiates ESL services from other school activities.

Students in ESL

Nearly 10% of the British Columbia school population is designated as ESL students. These students come from a diversity of backgrounds. Most are recent immigrants to British Columbia. Some are Canadian-born but have not had the opportunity to learn English before entering the primary grades. The majority of ESL students have a well-developed language system and have had similar schooling to that of British Columbia-educated students. A small number, because of previous experiences, are in need of basic support such as literacy training, academic upgrading, and trauma counselling.

Teachers may have ESL students at any level in their classes. Many ESL students are placed in subject-area classes primarily for the purpose of contact with English-speaking peers and experience with the subject and language. Other ESL students are wholly integrated into subject areas. A successful integration takes place when the student has reached a level of English proficiency and background knowledge in a subject to be successful with a minimum of extra support.

Optimum Learning Environment

The guiding principle for ESL support is the provision of a learning environment where the language and concepts can be understood by the students.

Good practices to enhance the learning of students include:

- using real objects and simple language at the beginning level
- taking into consideration other cultural backgrounds and learning styles at any level
- providing adapted (language-reduced) learning materials
- respecting a student's "silent period" when expression does not reflect the level of comprehension
- allowing students to practise and internalize information before giving detailed answers
- differentiating between form and content in student writing
- keeping in mind the level of demand placed on students

This summary is drawn from *Supporting Learners of English: Information for School and District Administrators*, RB0032, 1993, and *ESL Policy Discussion Paper (Draft)*, Social Equity Branch, December 1994.

ENVIRONMENT AND SUSTAINABILITY

Environmental education is defined as a way of understanding human relationships with the environment. It involves:

- students learning about their connections to the natural environment through all subjects
- students having direct experiences in the environment, both natural and human-built
- students making decisions about and acting for the environment

The term *sustainability* helps to describe societies that "promote diversity and do not compromise the natural world for any species in the future."

Value of Integrating Environment and Sustainability Themes

Integrating these themes into the curriculum helps students develop a responsible attitude toward caring for the earth. Studies that integrate environment and sustainability themes provide students with opportunities to identify their beliefs and opinions, reflect on a range of views, and ultimately make informed and responsible choices.

The guiding principles that should be interwoven in subjects from Kindergarten to Grade 12 are:

- Direct experience is the basis of human learning.
- Analysis of interactions helps humans make sense of their environment.
- Responsible action is both integral to and a consequence of environmental education.

Some organizing principles are:

- Human survival depends on complex natural and human-built systems.
- Human decisions and actions have environmental consequences.
- Students should be provided with opportunities to develop an aesthetic appreciation of the environment.

The theme study units might include: Consumerism, School Operating Systems, Pollution, or Endangered Species.

This summary is derived from *A Plan for Environmental Education,* Curriculum Branch, October 1995.

ABORIGINAL STUDIES

Aboriginal studies focus on the richness and diversity of Aboriginal cultures and languages. These cultures and languages are examined within their own unique contexts and within historical, contemporary, and future realities. Aboriginal studies are based on a holistic perspective that integrates the past, present, and future. Aboriginal peoples are the original inhabitants of North America and live in sophisticated, organized, and self-sufficient societies. The First Nations constitute a cultural mosaic as rich and diverse as that of Western Europe, including different cultural groups (e.g., Nisga'a, KwaKwaka'Wakw, Nlaka'pamux, Secwepemc, Skomish, Tsimshian). Each is unique and has a reason to be featured in the school system. The First Nations of British Columbia constitute an important part of the historical and contemporary fabric of the province.

Value of Integrating Aboriginal Studies

- First Nations values and beliefs are durable and relevant today.
- There is a need to validate and substantiate First Nations identity.
- First Nations peoples have strong, dynamic, evolving cultures that have adapted to changing world events and trends.
- There is a need to understand similarities and differences among cultures to create tolerance, acceptance, and mutual respect.

- There is a need for informed, reasonable discussion and decision making regarding First Nations issues, based on accurate information (for example, as modern treaties are negotiated by Canada, British Columbia, and First Nations).

In studying First Nations, it is expected that the students will:

- demonstrate an understanding and appreciation for the values, customs, and traditions of First Nations peoples
- demonstrate an understanding of and appreciation for unique First Nations communications systems
- demonstrate a recognition of the importance of the relationship between First Nations peoples and the natural world
- recognize dimensions of First Nations art as a total cultural expression
- give examples of the diversity and functioning of the social, economic, and political systems of First Nations peoples in traditional and contemporary contexts
- describe the evolution of human rights and freedoms as they pertain to First Nations peoples

Some examples of curriculum integration include:

Visual Arts—comparing the artistic styles of two or more First Nations cultures

English Language Arts—analysing portrayals and images of First Nations peoples in various works of literature

Home Economics—identifying forms of food, clothing, and shelter in past and contemporary First Nations cultures

Technology Education—describing the sophistication of traditional First Nations technologies (e.g., bentwood or kerfed boxes, weaving, fishing gear)

Physical Education—participating in and developing an appreciation for First Nations games and dances

This summary is derived from *First Nations Studies: Curriculum Assessment Framework (Primary Through Graduation),* Aboriginal Education Branch, 1992, and *B.C. First Nations Studies 12 Curriculum,* Aboriginal Education Branch, 1994.

GENDER EQUITY

Gender-equitable education involves the inclusion of the experiences, perceptions, and perspectives of girls and women, as well as boys and men, in all aspects of education. It will initially focus on girls in order to redress historical inequities. Generally, the inclusive strategies, which promote the participation of girls, also reach boys who are excluded by more traditional teaching styles and curriculum content.

Principles of Gender Equity in Education

- All students have the right to a learning environment that is gender equitable.
- All education programs and career decisions should be based on a student's interest and ability, regardless of gender.
- Gender equity incorporates a consideration of social class, culture, ethnicity, religion, sexual orientation, and age.
- Gender equity requires sensitivity, determination, commitment, and vigilance over time.
- The foundation of gender equity is co-operation and collaboration among students, educators, education organizations, families, and members of communities.

General Strategies for Gender-Equitable Teaching

- Be committed to learning about and practising equitable teaching.

- Use gender-specific terms to market opportunities—for example, if a technology fair has been designed to appeal to girls, mention girls clearly and specifically. Many girls assume that gender-neutral language in non-traditional fields means boys.
- Modify content, teaching style, and assessment practices to make non-traditional subjects more relevant and interesting for female and male students.
- Highlight the social aspects and usefulness of activities, skills, and knowledge.
- Comments received from female students suggest that they particularly enjoy integrative thinking; understanding context as well as facts; and exploring social, moral, and environmental impacts of decisions.
- When establishing relevance of material, consider the different interests and life experiences that girls and boys may have.
- Choose a variety of instructional strategies such as co-operative and collaborative work in small groups, opportunities for safe risk taking, hands-on work, and opportunities to integrate knowledge and skills (e.g., science and communication).
- Provide specific strategies, special opportunities, and resources to encourage students to excel in areas of study in which they are typically under-represented.
- Design lessons to explore many perspectives and to use different sources of information; refer to female and male experts.
- Manage competitiveness in the classroom, particularly in areas in which male students typically excel.
- Watch for biasses (e.g., in behaviour or learning resources) and teach students strategies to recognize and work to eliminate inequities they observe.
- Be aware of accepted gender-bias practices in physical activity (e.g., in team sport, funding for athletes, and choices in physical education programs).
- Do not assume that all students are heterosexual.
- Share information and build a network of colleagues with a strong commitment to equity.
- Model non-biassed behaviour: use inclusive, parallel, or gender-sensitive language; question and coach male and female students with the same frequency, specificity, and depth; allow quiet students sufficient time to respond to questions.
- Have colleagues familiar with common gender biasses observe your teaching and discuss any potential bias they may observe.
- Be consistent over time.

This summary is derived from the preliminary *Report of the Gender Equity Advisory Committee*, received by the Ministry of Education in February 1994, and from a review of related material.

INFORMATION TECHNOLOGY

Information technology is the use of tools and electronic devices that allow us to create, explore, transform, and express information.

Value of Integrating Information Technology

As Canada moves from an agricultural and industrial economy to the information age, students must develop new knowledge, skills, and attitudes. The information technology curriculum has been developed to be integrated into all new curricula to ensure that students know how to use computers and gain the technological literacy demanded in the workplace.

In learning about information technology, students acquire skills in information analysis and evaluation, word processing,

database analysis, information management, graphics, and multimedia applications. Students also identify ethical and social issues arising from the use of information technology.

With information technology integrated into the curriculum, students will be expected to:

- demonstrate basic skills in handling information technology tools
- demonstrate an understanding of information technology structure and concepts
- relate information technology to personal and social issues
- define a problem and develop strategies for solving it
- apply search criteria to locate or send information
- transfer information from external sources
- evaluate information for authenticity and relevance
- arrange information in different patterns to create new meaning
- modify, revise, and transform information
- apply principles of design affecting appearance of information
- deliver a message to an audience using information technology

The curriculum organizers are:

- ***Foundations***—the basic physical skills, and intellectual and personal understandings required to use information technology, as well as self-directed learning skills and socially responsible attitudes
- ***Process***—allows students to select, organize, and modify information to solve problems
- ***Presentation***—provides students with an understanding of how to communicate ideas effectively using a variety of information technology tools

This information is derived from the *Information Technology K to 12 curriculum.*

MEDIA EDUCATION

Media education is a multidisciplinary and interdisciplinary approach to the study of media. Media education deals with key media concepts and focusses on broad issues such as the history and role of media in different societies and the social, political, economic, and cultural issues related to the media. Instead of addressing the concepts in depth, as one would in media studies, media education deals with most of the central media concepts as they relate to a variety of subjects.

Value of Integrating Media Education

Popular music, television, film, radio, magazines, computer games, and information services—all supplying media messages—are pervasive in the lives of students today. Media education develops students' abilities to think critically and independently about issues that affect them. Media education encourages students to identify and examine the values contained in media messages. It also cultivates the understanding that these messages are produced by others to inform, persuade, and entertain for a variety of purposes. Media education helps students understand the distortions that may result from the use of particular media practices and techniques. All curriculum areas provide learning opportunities for media education. It is not taught as a separate curriculum.

The key themes of media education are:

- media products (purpose, values, representation, codes, conventions, characteristics, production)
- audience interpretation and influence (interpretation, influence of media on audience, influence of audience on media)
- media and society (control, scope)

Examples of curriculum integration include:

English Language Arts—critiquing advertising and examining points of view

Visual Arts—analysing the appeal of an image by age, gender, status, and other characteristics of the target audience

Personal Planning—examining the influence of the media on body concepts and healthy lifestyle choices

Drama—critically viewing professional and amateur theatre productions, dramatic films, and television programs to identify purpose

Social Studies—comparing the depiction of First Nations in the media over time

This summary is derived from *A Cross-Curricular Planning Guide for Media Education,* prepared by the Canadian Association for Media Education for the Curriculum Branch in 1994.

MULTICULTURALISM AND ANTI-RACISM EDUCATION

Multiculturalism Education

Multiculturalism education stresses the promotion of understanding, respect, and acceptance of cultural diversity within our society.

Multiculturalism education involves:

- recognizing that everyone belongs to a cultural group
- accepting and appreciating cultural diversity as a positive feature of our society
- affirming that all ethnocultural groups are equal within our society
- understanding that multicultural education is for all students
- recognizing that similarities across cultures are much greater than differences and that cultural pluralism is a positive aspect in our society
- affirming and enhancing self-esteem through pride in heritage, and providing opportunities for individuals to appreciate the cultural heritages of others
- promoting cross-cultural understanding, citizenship, and racial harmony

Anti-Racism Education

Anti-racism education promotes the elimination of racism through identifying and changing institutional policies and practices as well as identifying individual attitudes and behaviours that contribute to racism.

Anti-racism education involves:

- proposing the need to reflect about one's own attitudes on race and anti-racism
- understanding what causes racism in order to achieve equality
- identifying and addressing racism at both the personal and institutional level
- acknowledging the need to take individual responsibility for eliminating racism
- working toward removing systemic barriers that marginalize groups of people
- providing opportunities for individuals to take action to eliminate all forms of racism, including stereotypes, prejudice, and discrimination

Value of Integrating Multiculturalism and Anti-Racism Education

Multiculturalism and anti-racism education provides learning experiences that promote strength through diversity and social, economic, political, and cultural equity. Multiculturalism and anti-racism education gives students learning experiences that are intended to enhance their social, emotional,

aesthetic, artistic, physical, and intellectual development. It provides learners with the tools of social literacy and skills for effective cross-cultural interaction with diverse cultures. It also recognizes the importance of collaboration between students, parents, educators, and communities working toward social justice in the education system.

The key goals of multiculturalism and anti-racism education are:

- to enhance understanding of and respect for cultural diversity
- to increase creative intercultural communication in a pluralistic society
- to provide equal opportunities for educational achievement by all learners, regardless of culture, national origin, religion, or social class
- to develop self-worth, respect for oneself and others, and social responsibility
- to combat and eliminate stereotyping, prejudice, discrimination, and other forms of racism
- to include the experiences of all students in school curricula

Examples of curriculum integration include:

Fine Arts—identifying ways in which the fine arts portray cultural experiences

Humanities—identifying similarities and differences within cultural groups' lifestyles, histories, values, and beliefs

Mathematics or Science—recognizing that individuals and cultural groups have used both diverse and common methods to compute, to record numerical facts, and to measure

Physical Education—developing an appreciation of games and dances from diverse cultural groups

This summary is derived from *Multicultural and Anti-Racism Education—Planning Guide (Draft)*, developed by the Social Equity Branch in 1994.

SCIENCE-TECHNOLOGY-SOCIETY

Science-Technology-Society (STS) addresses our understanding of inventions and discoveries and of how science and technology affect the well-being of individuals and our global society.

The study of STS includes:

- the contributions of technology to scientific knowledge and vice versa
- the notion that science and technology are expressions of history, culture, and a range of personal factors
- the processes of science and technology such as experimentation, innovation, and invention
- the development of a conscious awareness of ethics, choices, and participation in science and technology

Value of Integrating STS

The aim of STS is to enable learners to investigate, analyse, understand, and experience the dynamic interconnection of science, technology, and human and natural systems.

The study of STS in a variety of subjects gives students opportunities to:

- discover knowledge and develop skills to foster critical and responsive attitudes toward innovation
- apply tools, processes, and strategies for actively challenging emerging issues
- identify and consider the evolution of scientific discovery, technological change, and human understanding over time, in the context of many societal and individual factors
- develop a conscious awareness of personal values, decisions, and responsible actions about science and technology
- explore scientific processes and technological solutions
- contribute to responsible and creative solutions using science and technology

The organizing principles of STS are: Human and Natural Systems, Inventions and Discoveries, Tools and Processes, Society and Change. Each organizer may be developed through a variety of contexts, such as the economy, environment, ethics, social structures, culture, politics, and education. Each context provides a unique perspective for exploring the critical relationships that exist and the challenges we face as individuals and as a global society.

Examples of curriculum integration include:

Visual Arts—recognizing that demands generated by visual artists have led to the development of new technologies and processes (e.g., new permanent pigments, fritted glazes, drawing instruments)

English Language Arts—analysing the recent influence of technologies on listening, speaking, and writing (e.g., CDs, voice mail, computer-generated speech)

Physical Education—studying how technology has affected our understanding of the relationship between activity and well-being

This summary is derived from *Science-Technology-Society—A Conceptual Framework*, Curriculum Branch, 1994.

SPECIAL NEEDS

Students with special needs have disabilities of an intellectual, physical, sensory, emotional, or behavioural nature; or have learning disabilities; or have exceptional gifts or talents.

All students can benefit from an inclusive learning environment that is enriched by the diversity of the people within it. Opportunities for success are enhanced when provincial learning outcomes and resources are developed with regard for a wide range of student needs, learning styles, and modes of expression.

Educators can assist in creating more inclusive learning environments by introducing the following:

- activities that focus on development and mastery of foundational skills (basic literacy)
- a range of co-operative learning activities and experiences in the school and community, including the application of practical, hands-on skills in a variety of settings
- references to specialized learning resources, equipment, and technology
- ways to accommodate special needs (e.g., incorporating adaptations and extensions to content, process, product, pacing, and learning environment; suggesting alternative methodologies or strategies; making references to special services)
- a variety of ways, other than through paper-and-pencil tasks, for students to demonstrate learning (e.g., dramatizing events to demonstrate understanding of a poem, recording observations in science by drawing or by composing and performing a music piece)
- promotion of the capabilities and contributions of children and adults with special needs
- participation in physical activity

All students can work toward achievement of the provincial learning outcomes. Many students with special needs learn what all students are expected to learn. In some cases the student's needs and abilities require that education programs be adapted or modified. A student's program may include regular instruction in some subjects, modified instruction in others, and adapted instruction in still others. Adaptations and modifications are specified in the student's Individual Education Plan (IEP).

Adapted Programs

An adapted program addresses the learning outcomes of the prescribed curriculum but provides adaptations so the student can participate in the program. These adaptations may include alternative formats for resources (e.g., Braille, books-on-tape), instructional strategies (e.g., use of interpreters, visual cues, learning aids), and assessment procedures (e.g., oral exams, additional time). Adaptations may also be made in areas such as skill sequence, pacing, methodology, materials, technology, equipment, services, and setting. Students on adapted programs are assessed using the curriculum standards and can receive full credit.

Modified Programs

A modified program has learning outcomes that are substantially different from the prescribed curriculum and specifically selected to meet the student's special needs. For example, a Grade 5 student in language arts may be working on recognizing common signs and using the telephone, or a secondary student could be mapping the key features of the main street between school and home. A student on a modified program is assessed in relation to the goals and objectives established in the student's IEP.

Ministry Resources for Teachers of Students with Special Needs

The following publications are currently available from the Learning Resources Branch or are under development and will be available soon:

The Universal Playground: A Planning Guide (Ministry of Education, 1991, FCG 129)

Hard of Hearing and Deaf Students—A Resource Guide to Support Classroom Teachers (Ministry of Education, 1994, RB0033)

Special Education Services—A Manual of Policies, Procedures and Guidelines (Ministry of Education, 1995)

Individual Education Planning for Students with Special Needs: A Resource Guide to Support Teachers (Ministry of Education, 1995)

Students with Visual Impairments—A Resource Guide to Support Classroom Teachers (Ministry of Education, 1995)

Gifted Students—A Resource Guide to Support Classroom Teachers (Ministry of Education, 1995)

Students with Intellectual Disabilities: A Resource Guide to Support Teachers (Ministry of Education, 1995)

Teaching for Student Differences—A Resource Guide to Support Classroom Teachers (Ministry of Education, 1996)

Resource Handbook for Adapted Curriculum Software (Ministry of Education, 1995)

Awareness of Chronic Health Conditions: What the Teacher Needs to Know (Ministry of Education, 1995)

This summary is derived from the *Handbook for Curriculum Developers*, February 1994, and *Special Education Services—A Manual of Policies, Procedures and Guidelines*, June 1995.

Appendix D

Assessment and Evaluation

Prescribed learning outcomes, expressed in measurable terms, provide the basis for the development of learning activities and assessment and evaluation strategies. After a general discussion of assessment and evaluation, this appendix uses sample evaluation plans to show how activities, assessment, and evaluation might come together in a particular information technology program.

ASSESSMENT AND EVALUATION

Assessment is the systematic gathering of information about what students know, are able to do, and are working toward. Assessment methods and tools include: observation, student self-assessments, daily practice assignments, quizzes, samples of student work, pencil-and-paper tests, holistic rating scales, projects, oral and written reports, performance reviews, and portfolio assessments.

Student performance is evaluated from the information collected through assessment activities. Teachers use their insight, knowledge about learning, and experience with students, along with the specific criteria they establish, to make judgments about student performance in relation to prescribed learning outcomes.

Students benefit most when evaluation is provided on a regular, ongoing basis. When evaluation is seen as an opportunity to promote learning rather than as a final judgment, it shows learners their strengths and suggests how they can develop further. Students can use this information to redirect efforts, make plans, and establish future learning goals.

Evaluation may take different forms, depending on the purpose.

- Criterion-referenced evaluation should be used to evaluate student performance in classrooms. It is referenced to criteria based on learning outcomes described in the provincial curriculum. The criteria reflect a student's performance based on specific learning activities. When a student's program is substantially modified, evaluation may be referenced to individual goals. These modifications are recorded in an Individual Education Plan (IEP).
- Norm-referenced evaluation is used for large-scale system assessments; it is not to be used for classroom assessment. A classroom does not provide a large enough reference group for a norm-referenced evaluation system. Norm-referenced evaluation compares student achievement to that of others rather than comparing how well a student meets the criteria of a specified set of learning outcomes.

CRITERION-REFERENCED EVALUATION

In criterion-referenced evaluation, a student's performance is compared to established criteria rather than to the performance of other students. Evaluation referenced to prescribed curriculum requires that criteria are established based on the learning outcomes listed under the curriculum organizers for Information Technology 8 to 10.

Criteria are the basis of evaluating student progress; they identify the critical aspects of a performance or a product that describe in specific terms what is involved in meeting the learning outcomes. Criteria can be used to evaluate student performance in relation to learning outcomes. For example,

weighting criteria, using rating scales, or performance rubrics (reference sets) are three ways that student performance can be evaluated using criteria.

Samples of student performance should reflect learning outcomes and identified criteria. The samples clarify and make explicit the link between evaluation and learning outcomes, criteria, and assessment. Where a student's performance is not a product, and therefore not reproducible, a description of the performance sample should be provided.

Criterion-referenced evaluation may be based on these steps:

- **Step 1** ▶ Identify the expected learning outcomes (as stated in this Integrated Resource Package).
- **Step 2** ▶ Identify the key objectives for instruction and learning.
- **Step 3** ▶ Establish and set criteria. Involve students, when appropriate, in establishing criteria.
- **Step 4** ▶ Plan learning activities that will help students gain the knowledge or skills outlined in the criteria.
- **Step 5** ▶ Prior to the learning activity, inform students of the criteria against which their work will be evaluated.
- **Step 6** ▶ Provide examples of the desired levels of performance.
- **Step 7** ▶ Implement the learning activities.
- **Step 8** ▶ Use various assessment methods based on the particular assignment and student.
- **Step 9** ▶ Review the assessment data and evaluate each student's level of performance or quality of work in relation to criteria.
- **Step 10** ▶ Where appropriate or necessary, assign a letter grade that indicates how well the criteria are met.
- **Step 11** ▶ Report the results of the evaluations to students and parents.

Appendix D

Assessment and Evaluation Samples

The samples in this section show how a teacher might link criteria to learning outcomes. Each sample is based on prescribed learning outcomes taken from one or more organizers. The samples provide background information to explain the classroom context; suggested instruction tasks and strategies; the tools and methods used to gather assessment information; and the criteria used to evaluate student performance.

HOW THE SAMPLES ARE ORGANIZED

There are four parts to each sample:

- identification of the prescribed learning outcomes
- planning for assessment and evaluation
- defining the criteria
- assessing and evaluating student performance

Prescribed Learning Outcomes

This part identifies the organizer or organizers and the specific prescribed learning outcomes selected for the sample.

Planning for Assessment and Evaluation

This part outlines:

- background information to explain the classroom context
- instructional tasks
- the opportunities that students were given to practise learning
- the feedback and support that was offered students by the teacher
- the ways in which the teacher prepared students for the assessment

Defining the Criteria

This part illustrates the specific criteria (based on prescribed learning outcomes), the assessment task, and various reference sets.

Assessing and Evaluating Student Performance

This part includes:

- assessment tasks or activities
- the support that the teacher offered students
- tools and methods used to gather the assessment information
- the way the criteria were used to evaluate the student performance

EVALUATION SAMPLES

The samples on the following pages illustrate how a teacher might apply criterion-referenced evaluation in Information Technology 8 to 10.

▼ SAMPLE 1: GRADE 8

Topic: *Career Exploration*

Prescribed Learning Outcomes:

Foundations

It is expected that students will:

- protect information using information technology tools
- enter information accurately using appropriate keyboarding techniques and software that allows for the storage, retrieval, and editing of material
- use appropriate information technology terminology
- demonstrate the ability to install software
- apply a variety of troubleshooting techniques related to information technology
- identify careers and occupations that use information technology

Process

It is expected that students will:

- apply predetermined search criteria to locate, retrieve, and evaluate information
- synthesize information from a variety of electronic sources for their presentations

Presentation

It is expected that students will:

- identify and consider ethical and legal issues when presenting information
- use a variety of software to present messages
- demonstrate the ability to arrange information in different forms to create new meaning

PLANNING FOR ASSESSMENT AND EVALUATION

- As part of the career and personal planning curriculum, students investigated the use of technology in a variety of careers and occupations. Students brainstormed occupations and the information technology tools used and listed them on a two-column chart. The chart was posted in the classroom for reference.
- The class developed a general list of interview questions concerning the use of technology in occupations. Students chose occupations of interest to them and scheduled interviews with professionals in their community.
- Students shared their findings with the class. Discussions focussed on the types of tools and software used, and privacy issues. Each student then identified the tools and applications (e.g., databases, spreadsheet programs, telecommunications) that were unfamiliar to them, then spent several lessons learning to use them.
- Students practised installing software and setting up a password system.
- The teacher presented the following assignment.

  Take the role of the professional you interviewed and:
  - *use a software application to create a list of all information technology tools required to do your job effectively*
  - *install at least one piece of available software*
  - *create a password system with two levels of user access*
  - *access a variety of electronic sources (e.g., e-mail, on-line catalogues, CD-ROMs) to research your occupation, and use a word-processing program to write a job description*
  - *cite all information sources accessed*

Enter and save all your work on a disk to be handed in for assessment. Please attach a note identifying both passwords, so that I can access your list of information technology tools, job description, and list of information sources.

DEFINING THE CRITERIA

Installing Software

To what extent does the student:

- follow on-screen instructions
- use the help function
- refer to instructions for clarification
- try alternative methods if problems occur
- run the newly installed program to ensure that it works
- ensure that the program is installed and saved in the correct folder or directory

Final Report (On Disk)

To what extent is the student able to:

- create a password system with two levels of user access
- access a variety of electronic-information sources
- cite information sources appropriately
- use a word-processing program effectively

ASSESSING AND EVALUATING STUDENT PERFORMANCE

Installing Software

While students were engaged in the activities, the teacher used a checklist to record students' abilities to install software.

Installing Software

Criteria	With Assistance	Competently	Confidently
• follows on-screen instructions			
• uses the help function			
• refers to instructions for clarification			
• tries alternative methods if problems occur			
• runs the newly installed program to ensure that it works			
• ensures program is installed and saved in the correct folder or directory			

Final Report (On Disk)

The teacher used a performance scale to assess the disks, determining the extent to which students were able to use a word-processing program, create a password system, and cite sources of information.

Final Report

Rating	Criteria
Capable	• files cannot be accessed without passwords but are easily accessed using passwords • two distinct levels of user access • citations reference a wide variety of electronic sources • an appropriate word-processing program has been used efficiently and effectively
Developing	• only one password has been created, or both passwords allow the same level of access • citations reference some electronic sources • an appropriate word-processing program has been used, but there are some errors in formatting, layout, or both
Beginning	• password(s) created with teacher or peer assistance • citations reference few or no electronic sources • word-processing program has been used, but the document includes several formatting and layout errors

▼ SAMPLE 2: GRADE 9

Topic: *Research Project*

Prescribed Learning Outcomes:

Foundations

It is expected that students will:

- enter information accurately using appropriate keyboarding techniques and software that allows for the storage, retrieval, and editing of material
- demonstrate the ability to use the Internet to access, capture, and store information

Process

It is expected that students will:

- demonstrate the use of a variety of software and appropriate information technology tools to solve problems
- evaluate the suitability of information for use in specific contexts
- analyse electronically organized information for authenticity, bias, timeliness, and usefulness

Presentation

It is expected that students will:

- select, use, and evaluate a variety of information technology tools for making presentations
- consider ethical and legal issues when presenting information
- develop an awareness that all media can be digitized for electronic presentation

PLANNING FOR ASSESSMENT AND EVALUATION

- The students brainstormed a list of topics they had studied in curricular areas such as Science 9 (body systems), Social Studies 9 (Industrial Revolution), or Physical Education 9 (nutrition, anorexia, AIDS, steroids). One topic was chosen from this list.
- Students worked with partners to list five to seven questions about the topic that they would like answered. In a whole-class activity, students discussed the questions they had generated and compiled a list of their most frequently asked questions.
- Students worked in small groups to identify possible sources of information that could be found in the school (e.g., CD-ROMs, periodicals, encyclopedias, almanacs, media loans, human resources) and in the community (e.g., public library on-line catalogues, the Internet, museums, municipal offices, human resources). The students spent several lessons accessing several of the identified information sources. They practised using keywords to streamline their search from a broad topic to more narrow terms.
- Each group located, stored, and presented three pieces of information (e.g., articles, Internet files, videotapes, statistical reports, still images) to be analysed by the class for authenticity, bias, and timeliness. The class sorted their collected information into categories (e.g., books, periodicals, encyclopedias, CD-ROMs, videos) and explored the standards for correctly citing each source.

- Throughout all of the activities, students had frequent opportunities to share their work with others and receive feedback.
- Students were asked to choose a different topic and work individually to develop a research strategy for finding information to answer frequently asked questions. They were encouraged to survey their peers and use this information to refine the guiding questions for their research. Students had access to a variety of information technology tools and were able to choose the format for their end products (e.g., word-processed research paper, videotape, hypertext document, multimedia presentation).
- Evaluation criteria were developed cooperatively by the teacher and students.

DEFINING THE CRITERIA

Research Strategy

To what extent is the student able to:

- plan a research strategy
- access several different sources
- use keywords to narrow the search
- store information electronically

Choosing Information

To what extent does the student:

- choose information that answers guiding questions
- provide detailed information
- provide current information
- provide information that is free of bias or that identifies and compensates for bias

Citing References

To what extent does the student:

- cite all sources
- use correct formats

Presentation

To what extent is the student able to:

- use or integrate a variety of tools
- present information clearly and logically
- design an effective layout or use special effects to enhance impact

ASSESSING AND EVALUATING STUDENT PERFORMANCE

Research and Presentation Skills

The teacher used the following weighted scale to evaluate how effectively students were able to conduct research, choose appropriate information, cite sources, and present information using information technology tools.

Research and Presentation Skills

Criteria	Weight	Comments
▼ **Research Strategy** • plans a research strategy • accesses several different sources • uses keywords to narrow search • stores information electronically	**15**	
▼ **Choosing Information** • answers guiding questions • provides details • uses current sources • is free of bias, or bias is identified and compensated for	**15**	
▼ **Citing References** • cites all sources • uses proper formats	**10**	
▼ **Presentation** • uses or integrates a variety of tools • presents information clearly and logically • uses an effective layout design or special effects to enhance impact	**10**	

▼ SAMPLE 3: GRADE 10

Topic: *Evaluating Information for Bias*

Prescribed Learning Outcomes:

Foundations

It is expected that students will:

- demonstrate the ability to formulate questions and to use a variety of sources and tools to access, capture, and store information
- practise handling Internet information in an ethical way

Process

It is expected that students will:

- use information technology tools to gather and organize information and produce documents
- develop guidelines for evaluating and using information in an ethical way
- develop criteria to evaluate information for bias

Presentation

It is expected that students will:

- create multimedia documents using a variety of electronic sources
- demonstrate the ability to use special effects in multimedia presentations to influence a message
- apply ethical and legal principles when presenting information

PLANNING FOR ASSESSMENT AND EVALUATION

While studying a novel in English class about racism, students investigated bias on the Internet. They were asked to explore Internet postings and capture, save, and download evidence of bias (e.g., racism, sexism, ageism).

- Students shared their evidence in groups and discussed three critical questions:
  - From whose viewpoint is the article written?
  - What are the possible consequences of this article?
  - What is your responsibility with respect to handling this information?
- Class discussions were held to share and develop ideas about biassed information and its ethical handling.
- Students had an opportunity to create short presentations on their findings, using a variety of multimedia tools (e.g., overhead projector, TV and VCR, video camera, audiotape, slides), and receive constructive feedback.
- Students worked in teams, each team focussing on one particular type of bias (e.g., gender, culture, ability, age). Each team developed a multimedia presentation to share evidence of bias, its origins, and its impacts. Each team also developed a set of criteria for evaluating information in order to detect bias and a code of ethics for handling biassed information.

DEFINING THE CRITERIA

Accessing Information on the Internet

To what extent does the student:

- accurately enter Internet addresses
- use "bookmarks" or "hotlists" to mark relevant sources
- download data from the Internet
- communicate courteously in e-mail correspondence

Multimedia Presentation

To what extent does the student:

- use a variety of information technology tools
- use information technology tools effectively to enhance a presentation
- cite electronic sources of information correctly
- synthesize and present information clearly and in a logical sequence

Evaluating Information for Bias

To what extent is the student able to:

- identify examples of bias
- identify types of bias (e.g., culture, gender, race, ability)
- speculate about possible origins of bias
- develop evaluative criteria that are clear, succinct, and easily applied and that address relevant issues

ASSESSING AND EVALUATING STUDENT PERFORMANCE

Accessing Information on the Internet

While students were engaged in accessing information on the Internet, the teacher used a checklist to record observations.

Multimedia Presentation

During the presentations, both the teacher and peers used a rating scale to assess the presenter's work.

Evaluating Information for Bias

During class discussions, the multimedia presentations, and the development of evaluative criteria, the teacher used a scale to record students' abilities to evaluate information for bias.

Accessing Information on the Internet

Criteria	Rarely	Sometimes	Always
• accesses a variety of electronic sources			
• enters Internet addresses accurately			
• uses "bookmarks" or "hotlists" to mark relevant sources			
• downloads data from electronic sources			
• is courteous in e-mail correspondence			

Multimedia Presentation

Presenter: _____

Topic: _____

Criteria	Rating	Comments
• used a variety of information technology tools		
• used information technology tools effectively to enhance the presentation		
• cited electronic sources of information correctly		
• synthesized information and presented it in a logical sequence		

Key: **5**—Excellent
4—Very Good
3—Good
2—Satisfactory
1—Minimally Acceptable
0—Not Evident

Evaluating Information for Bias

Rating	Criteria
3	• can identify subtle and complex examples of bias and offer insights into their origins • criteria developed are clear and succinct, easily applied, and show insight into the issue of bias
2	• can identify most forms of bias and offer some understanding of their origins, although explanations may tend to be simplistic or deal only with surface issues • criteria are clear and can be applied in a variety of situations
1	• identifies obvious examples of bias but may not recognize more subtle ones, or may tend to recognize some forms of bias but not others • may have difficulty speculating on origins of specific examples of bias, or may offer very simplistic explanations • criteria are simplistic, difficult to apply, or fail to show insight

▼ SAMPLE 4: GRADE 10

Topic: *Managing a Multimedia Project*

Prescribed Learning Outcomes:

Foundations

It is expected that students will:

- practise and reinforce their keyboarding skills
- demonstrate the ability to formulate questions and to use a variety of sources and tools to access, capture, and store information

Process

It is expected that students will:

- solve problems using information technology tools and resources
- use information technology tools to gather and organize information and produce documents
- evaluate the suitability of information technology tools for solving problems related to specific tasks

Presentation

It is expected that students will:

- create multimedia documents using a variety of electronic sources
- demonstrate the ability to use special effects in multimedia presentations to influence a message
- evaluate the effectiveness of the component parts of multimedia presentations
- demonstrate the ability to manage the process of creating multimedia presentations

PLANNING FOR ASSESSMENT AND EVALUATION

- Several lessons were spent using electronic tools and resources to locate information. Students used a variety of information technology tools to retrieve information related to topics under study in any curricular area, and evaluated this information for relevance and bias. Students organized the information collected and stored it electronically.
- The teacher provided the students with several opportunities to view and analyse multimedia presentations. Class discussions were held to focus attention on the effectiveness of the presentations and the ability of multimedia to influence a message. Students discussed the component parts of the presentations and described the tools and techniques that might have been used in the creation process.
- The students spent several class sessions using information technology tools to collect text, sounds, and images, which were then digitized and stored electronically. Students worked in small groups to explore multimedia techniques to manipulate these media elements and create presentations. Ongoing feedback was provided to students as they refined their skills and gained confidence using multimedia tools.
- Students then worked in small groups to plan, design, and create a multimedia presentation related to a topic in a curricular area. (e.g., Identify a local industry and show how it contributes to the economy of British Columbia.) Particular emphasis was placed on the students' abilities to manage the production process and monitor their own progress. Each

group was asked to submit a detailed plan, including a statement of the purpose, the proposed end product, the tasks involved, the steps necessary to complete each task, and a timeline for completion.

- After students had both planned and presented their projects, they were asked to reflect on their learning by completing the following sentence stems:
  - Three alternatives I considered when I began planning my multimedia project were: _____.
  - One design issue I had to find background information on was: _____.
  - I was able to test the effectiveness of my solution by: _____.
  - One part of the project I would change if I made this product again is: _____.

DEFINING THE CRITERIA

Planning a Multimedia Presentation

To what extent is the student able to:

- clearly define a purpose for the presentation
- generate ideas
- define and delineate tasks
- develop a workable timeline

Multimedia Presentation

To what extent does the student:

- develop a presentation that fulfills the intended purpose
- develop a clear and easy-to-understand message
- present relevant information
- use special effects to emphasize key ideas
- use multimedia tools with confidence
- integrate text, sound, video, and graphics creatively

ASSESSING AND EVALUATING STUDENT PERFORMANCE

Planning a Multimedia Presentation

The teacher used a rating scale to assess student planning.

Multimedia Presentation

The teacher used a weighted scale to assess the multimedia presentations. The weight for each element was determined collaboratively with the students.

Planning a Multimedia Presentation

Rating	Criteria
Maturing	• purpose of presentation is clearly stated, and details are provided for clarification • clear vision of the end product—or many viable possibilities—is thoughtfully considered • tasks are clearly defined and delineated • timeline is reasonable and workable
Developing	• purpose is stated, but student may have difficulty providing clarification • has a good conception of the end product or of some viable possibilities • tasks are defined, although necessary steps for completion may need clarification • timeline is reasonable and workable
Beginning	• purpose is unclear or undeveloped • is unsure of the end product or has difficulty generating ideas • tasks are defined, although necessary steps for completion may be incomplete or illogical • requires assistance to develop reasonable timeline

Multimedia Presentation

Criteria	Weight	Comments
• fulfills intended purpose		
• presents a clear and easy-to-understand message		
• presents relevant information		
• uses special effects to emphasize key ideas		
• uses multimedia tools with confidence		
• integrates text, sound, video, and graphics creatively		

Appendix E

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APPENDIX E: ACKNOWLEDGMENTS

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Appendix F

Glossary

application	Software designed to accomplish a specific task such as desktop publishing or word processing.
Boolean operators	Words (e.g., AND/OR, NOT) that help focus an information search.
browser *or* **web browser**	An application that allows a user to access information on the World Wide Web.
CAD (computer-aided design)	A precision-drawing program that speeds up the design process by making it easier to create and modify draft designs. Also: computer-aided design and drafting.
card	The basic unit of organization in a hypertext document.
CD-ROM (compact disc-read only memory)	A device that uses a rigid disc to store information in a form that can be read by a computer.
clip art	Digitized pictures that can be copied and used in other documents.
CLN (Community Learning Network)	Network services available on the Internet that have been organized and are provided by the Ministry of Education.
database	A collection of data that is structured and organized into a chosen format. A computer database makes it easy to create, retrieve, and sort data stored electronically.
digital camera	A camera that digitizes images and stores them on a computer disk.
digitize	A process in which information is converted into a format that allows it to be stored and retrieved by a computer.
directory	An organization structure that allows files to be stored on and retrieved from a disk.
disk	A device on which information is stored for later retrieval on a computer.

download	Retrieve information from one computer and save it on another.
e-mail (electronic mail)	Messages typed into computer terminals or communications networks and sent electronically to other computer users.
electronic document	Any information that is stored in an electronic format (e.g., a computer file, videotape).
electronic slide show	A series of images (e.g., pictures, text) that are created and presented using information technology tools.
ergonomics	The science that studies the relationship of humans to their working environment and seeks to improve working conditions and increase efficiency.
field	A category of information in a database.
file folder	An organizational structure that allows files to be stored on and retrieved from a disk.
font	A complete set of type of one size and style.
format a disk	Prepare a disk for storing information.
freenet	A community-sponsored electronic bulletin board that allows for low-cost access to the Internet.
FTP (file transfer protocol)	A set of rules used to govern the exchange of files over the Internet.
graphics bank	A collection of digitized pictures.
graphics program	An application used to create and manipulate pictures.
hard drive	Computer hardware on which information is stored for later retrieval.
hardware	A term used to refer to the components of a computer system.

home page	The opening or title page on a World Wide Web site.
HTML (hypertext markup language)	The computer language that is used to format documents for use on the World Wide Web.
hypertext	A method of organizing text that allows it to be accessed in a non-linear fashion.
icon	A graphic symbol used to represent an idea or electronic document.
information highway	A term used to describe the Internet.
information literacy	The ability to access, evaluate, organize, manipulate, and present information (including electronic information).
information technology	Electronic equipment that stores, sends, retrieves, or manages information. It includes computers, networks, electronic databases, CD-ROMs, laserdiscs, video cameras, tape-recorders, and fax machines.
integrated software	Software that combines the features of several different applications in a single program (e.g., word processing, database, spreadsheet, graphics, and communications).
Internet (the)	A global information network linking computers and computer networks.
keyboard commands	Commands selected using a keyboard to accomplish tasks on a computer.
keyword	A word used to search for information on a particular topic.
LAN (local area network)	A local collection of interconnected computers, printers, modems, and other devices.
laserdisc	A disc on which sound and visual images are recorded.

link	A connection between two parts of a hypertext document or two separate hypertext documents.
menu commands	Computer commands selected from a menu or list using a mouse or keyboard to accomplish tasks on a computer.
multimedia	The combination of text, sound, and video used to present information.
network	A connected system of hardware and software that transmits data.
numeric keypad	A built-in number pad on a computer keyboard that is used to enter information into a computer program.
on-line	When one is connected to the Internet or a network of computers.
on-line help function	A feature built into many applications that provides on-screen help for the user.
on-line services	Services and resources that can be accessed by subscribers using a modem and a computer.
paint program	An application that permits users to "draw" on a computer.
password	A secret combination of characters that a user must enter to access a computer application or network.
pathway	A connection between two parts of a hypertext document. See also *link.*
point size	The size of the characters of a typeface.
software	A computer application or program.
spell checker	Software that checks the accuracy of spelling in a document.
spreadsheet	A program that can manipulate, calculate, and analyse numerical information.

stack	Several cards in a hypertext document that are connected or linked together. See also *card.*
telecommunications tools	Hardware and software that permit users to communicate with one another.
template	An empty or generic document that can easily be adapted to specific user needs.
tool palette	A collection of tools available in a program. These tools allow a user to modify, draw, or select objects.
tool *or* **button bar**	A portion of the screen (in some applications) that contains buttons for common commands.
troubleshooting	Strategies used to define and solve problems encountered while using information technology tools.
undo	A feature of many applications that allows a user to reverse the last command.
Unix	An interactive time sharing operating system invented in 1969.
virus	A program that destroys or alters files. Viruses spread from computer to computer via contaminated disks or software.
WAN (wide area network)	A collection of networks connected by communication lines to a central computer.
web browser	See *browser.*
word processor	An application that allows text documents to be edited and formatted on-screen before being printed.
World Wide Web	A part of the Internet that allows users to access linked text, graphics, video, and sound via a web browser.
write-protect	A way of ensuring that the contents of a disk or file can be read but not altered.

Appendix G

Planning an Integrated Information Technology Program

The prescribed learning outcomes of the Information Technology K to 7 and 8 to 10 Integrated Resource Packages (IRP)s have been designed for integration into other curricular areas. While there are significant skills, levels of knowledge, and attitudes to be learned in the area of information technology, it is important that students apply these skills to facilitate learning in other areas of study.

ACHIEVING SUCCESSFUL IMPLEMENTATION

Co-ordinators, schools, and districts can assist in the successful implementation of the Information Technology 8 to 10 curriculum by:

- supporting and encouraging teachers to identify their individual strengths, needs, and interests in the use of information technology tools and resources
- developing school and district goals that can be used as a framework to direct technology acquisition and implementation, and teacher in-service models
- developing and communicating strategies to support teachers before and during implementation of the curriculum
- promoting a climate for teachers to explore a variety of approaches and teaching strategies to incorporate essential information technology skills

The Role of the Teacher

When planning for the implementation of Information Technology 8 to 10, teachers, schools, and districts should ensure that all prescribed learning outcomes are met. This appendix includes a suggested checklist for designing a lesson (or series of lessons) that integrates information technology into other curricular areas. A suggested lesson-design template is also provided. This lesson-design template will help teachers to:

- ensure that learning outcomes from each of the curriculum organizers are addressed
- provide students with opportunities to explore and feel comfortable with a range of information technology tools (e.g., video camera, sound equipment, computer peripherals) and processes (e.g., constructing flow charts, storyboarding, writing documentation)
- set developmental objectives appropriate to student needs
- plan learning activities that provide for individual and group work
- acknowledge and plan for a range of student learning styles
- include activities and strategies relevant to students and their communities

CONSIDERATIONS PRIOR TO INSTRUCTION

There are several education, social, and technical issues that teachers should consider before starting an information technology program. Thinking through the following issues will help teachers to get new programs off to a good start.

Integration

The key to successfully implementing Information Technology 8 to 10 lies not in teaching it as a separate subject, but in using it to enhance student learning in other curricular areas. If information technology is integrated successfully, students will complete the learning outcomes of this curriculum as well as those of other subjects.

Exploring Information Technology

Learning can be more meaningful when teachers and students collaborate. Exploring information technology learning strategies may involve some risk for teachers and students, but the potential rewards are worth the effort.

Awareness

Information technology is a part of our daily lives. Today's students require information technology skills to participate in society. The importance of information technology is evident in all curricular areas. Teachers should be aware of information technology tools and their effect on their lives, their students' lives, and on society in general.

Personal Skills and Interests

Teachers should do a personal inventory of their information technology skills. In doing so, they will be able to identify their strengths and weaknesses in the areas of information technology processes and related tools.

Teachers are aware that self-improvement and professional development must occur on a continuing basis. The rapid rate of change in information technology makes it especially important for teachers to keep updating their skills in this area.

Awareness of Equipment, Software, Concepts, and Skills

Since Information Technology 8 to 10 is a prescribed curriculum to be integrated into all subject areas, teachers need to assess the resources available in their school. Are computers configured as stand-alones or in pods, or is there a networked lab? What software is available to students and teachers? Does the school have specialized equipment that students can use (e.g., digital camera, scanner, printers)?

It is also essential for teachers to have an awareness of the technological capabilities available in the school. In many cases, information technology tools and resources work together to produce results, so that a weakness in one link of the chain may affect the entire process. For example, computers with insufficient memory may not allow a certain software package to function correctly; as a result, the software package may not be suitable for purchase by the school. Likewise, the teacher does not need to be a keyboarding expert but may need to be aware of research on learning proper keyboarding at an early age.

Community

The community offers many opportunities for teachers to increase their information technology skills. Teachers can often use community-based resources. Business and corporate partnerships may provide resource people to bring information technology tools to the classroom. Retail outlets might also be willing to provide equipment and other resources on a review or demonstration basis. In many schools, parents can provide a pool of information technology users who are willing to offer their expertise to the teacher and class.

Extended Education Community

Many postsecondary organizations have expertise, facilities, and resources that they may share with the public school system. By participating in community education, credit and non-credit courses, and specialized workshops provided by postsecondary institutions, teachers can increase their information technology skills.

Platforms

There are a variety of computer platforms and operating systems (e.g., Windows, Unix) that teachers should consider when they begin to determine their program needs. The newer generations of software are capable of working on multiple platforms such as Macintosh and Windows, and teachers may need to be aware of these variables.

Assessing Information Technology as an Integrated Program

The Information Technology 8 to 10 learning outcomes can be used to enhance students' work in many curricular areas (e.g., English/language arts, social studies, science, mathematics) and to increase the relevance of these subjects and improve student performance. As well, information technology tools can provide a powerful addition to the variety of learning resources available to today's students.

Assessment strategies should recognize the extent to which information technology tools and processes have enhanced student learning. In addition, teachers must evaluate the achievement of learning outcomes that are specific to Information Technology 8 to 10.

Teachers might use the following strategies to assess the integration of information technology learning outcomes:

1. Evaluate students' achievement of learning outcomes specific to each curriculum.
2. Evaluate students' achievement of the Information Technology 8 to 10 learning outcomes.

Assessing the integrated learning outcomes for Information Technology 8 to 10 will improve the level and quality of learning by students who use information technology tools. In the end, the use of information technology tools and processes will enhance the quality of students' learning and decision making.

Models for Integration

The following table and templates will help the individual teacher to answer the question "How do I integrate information technology into my subject area?"

Suggested Lesson Design for Integrating Information Technology

The following chart provides a sample lesson design that could be used to develop a lesson plan for integrating Information Technology 8 to 10 learning outcomes into other curricular areas.

Step 1. Select curriculum learning outcomes.

- Identify learning outcomes and concepts to use in a curriculum (e.g., science, language arts, math, career and personal planning).

Step 2. Select appropriate Information Technology 8 to 10 learning outcomes.

- Relate the concepts and learning outcomes of the preceding step to the three Information Technology 8 to 10 curriculum organizers: Foundations, Process, and Presentation.
- Balance the selection of learning outcomes from each of the organizers.
- Choose learning outcomes that will augment, support, and enhance those from the curricular area selected in Step 1.

Step 3. Determine specific instructional objectives.

- Teachers may want to identify additional criteria for what students should demonstrate at the end of the lesson (derived from the prescribed learning outcomes of Information Technology 8 to 10 and other curricula).

Step 4. Identify available facilities, software, hardware, and equipment.

- In selecting resources, locations, and facilities, teachers should include their own contacts, parent groups, local businesses, and school and district resources. Use the checklist below as a guide:

❑ Internet Access	❑ E-mail Access	❑ Newsgroups	❑ Desktop Publishers
❑ Desktop Imaging	❑ Digital Video	❑ Video/Audio	❑ Video Camera
❑ Software	❑ Facility Arrangement	❑ Video Conferencing	❑ Class Location

Step 5. Identify available learning resources.

- Preview recommended software.
- Identify resources available in the school.
- Select resources that enable integration of multiple learning outcomes.
- Explore the World Wide Web to find resources in the content area.

Step 6. Develop appropriate instructional strategies.

- Develop a variety of learning activities that encourage the use of information technology tools and processes to explore learning outcomes. (Refer to the suggested instructional and assessment strategies in the IRP for additional learning activities.)

Step 7. Set criteria for assessing learning outcomes.

- Identify criteria and establish the standard of achievement for student learning.
- Provide opportunities for students to demonstrate their learning.
- Refer to Appendix D for more information.

Step 8. Extend learning.

- Develop activities to extend learning, and check for students' understanding through demonstrating, inquiring, and explaining.

Suggested Lesson-Design Template for Integrating Information Technology

Subject: _____

Grade: _____

Topic: _____

Step 1. Select curriculum learning outcomes.

_____

_____

Step 2. Select appropriate Information Technology 8 to 10 learning outcomes.

_____

_____

Step 3. Determine specific instructional objectives.

_____

_____

Step 4. Identify available facilities, software, hardware, and equipment.

_____

_____

Step 5. Identify available learning resources.

_____

_____

Step 6. Develop appropriate instructional strategies.

_____

_____

Step 7. Set criteria for assessing learning outcomes.

_____

_____

Step 8. Extend learning.

_____

_____

A Sample Lesson Design for Integrating Information Technology

Subject: **Music**

Grade: **8**

Topic: **Context (Historical and Cultural)**

Step 1. Select prescribed learning outcomes from the music curriculum.

It is expected that students will:

- compare and contrast music from a range of historical and cultural contexts
- compare and contrast music created for a variety of purposes

Step 2. Select appropriate Information Technology 8 to 10 learning outcomes.

It is expected that students will:

Foundations

- identify information technology tools used to access information

Process

- apply predetermined search criteria to locate, retrieve, and evaluate information
- evaluate information retrieved electronically for authenticity, bias, and timeliness

Presentation

- demonstrate the ability to arrange information in different forms to create new meaning

Step 3. Determine specific instructional objectives.

To illustrate similarities and differences in music used for various purposes, students:

- explore the Internet to find MIDI files that feature recordings and text (e.g., Canadian dance music in the 1990s and dance music from 18th-century Europe; opera from Italy and from China)
- work co-operatively in a team to create a presentation using a MIDI program, and download Internet files that demonstrate dance music from a range of periods

Step 4. Identify available facilities, software, hardware, and equipment.

Before starting this unit, the teacher should book the computer lab and search the Internet for appropriate sites.

Step 5. Identify available learning resources.

The teacher should work with the teacher-librarian and district or school-based computer teacher to determine what learning resources are available in the school.

Step 6. Develop appropriate instructional strategies.

Students should do the following activities:

- use a word-processing program to list the sites they visit
- create a MIDI file from the music they download
- use a graphics program to create a poster and use a word-processing program to write a song that recreates the music of an era

Step 7. Set criteria for assessing learning outcomes.

Criteria to be determined by the teacher in collaboration with students.

Step 8. Extend learning.

In their presentation, students highlight differences in metre and tempo related to various cultures and different periods.