

**PRINCE EDWARD ISLAND**

**SENIOR HIGH CURRICULUM**



**Introductory Computer Studies CMP521A**

**Curriculum Guide**

2009  
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# Introduction

## Background

The Computer Science 521A curriculum has been developed with the intent of responding to continually evolving education needs of students and society while preparing students for the challenges they will face throughout their lives.

On going changes in society - for example, rapidly expanding use of technologies - require a corresponding shift in learning opportunities for students to develop relevant knowledge, skills, strategies, processes, and attitudes that will enable them to function well as individuals, citizens, workers, and learners. To function productively and participate fully in our increasingly sophisticated technological, information-based society, citizens will need broad digital-age literacy abilities.

## Rationale

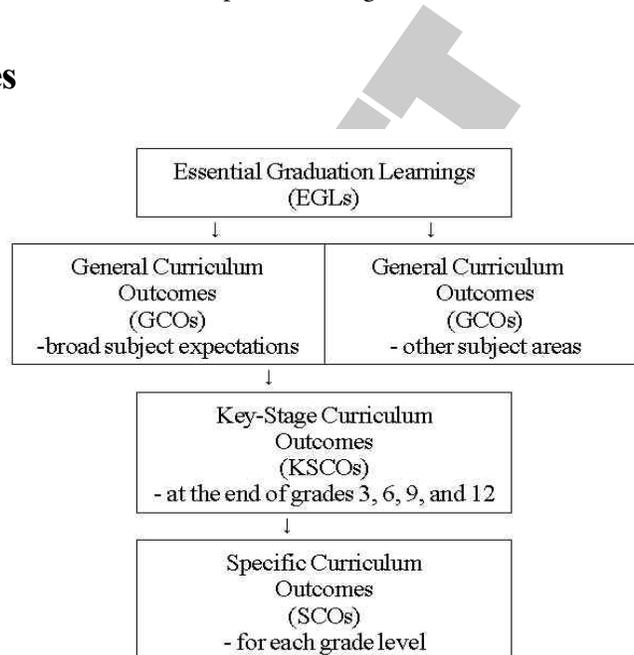
The primary goal of Computer Science 521A is to promote technological competence, communication and problem solving skills. The curriculum prepares individuals to meet personal needs, provides an awareness of the variety of careers, and lays the foundation for lifelong learning. It can serve as a vocational preparation for a career in the information processing industry, mastery of basic skills for related computing occupations, or a foundation for a post-secondary education.

# Program Design and Components

## Program Organization

The curriculum is designed to support the foundation documents created and approved in partnership with the other Atlantic Provinces. The APEF Essential Graduation Learnings (EGL) statements describe the knowledge, skills, and attitudes expected of all students who graduate from high school. Achievement of the Essential Graduation Learnings will prepare students to continue to learn throughout their lives. These cross-curriculum learnings confirm the need for students to make connections to meet the ever changing workplace in the future. The Essential Graduation Learnings serve as a framework for the curriculum developed in this guide.

## Curriculum Outcomes



## Essential Graduation Learnings

Essential Graduation Learnings are statements describing the knowledge, skills, and attitudes expected of all students who graduate from high school. Achievement of the Essential Graduation Learnings will prepare students to continue to learn throughout their lives. These learnings describe expectations not in terms of individual school subjects but in terms of knowledge, skills, and attitudes developed throughout the curriculum. They confirm that students need to make connections and develop abilities across subject boundaries if they are to be ready to meet the shifting and ongoing demands of life, work, and study today and in the future. Essential Graduation Learnings are cross-curricular, and curriculum in all subject areas is focused to enable students to achieve these learnings. Essential Graduation Learnings serve as a framework for the curriculum development process.

## Specific Essential Graduation Learnings

### **Aesthetic Expression**

Graduates will be able to respond with critical awareness to various forms of arts and be able to express themselves through the arts.

### **Citizenship**

Graduates will be able to assess social, cultural, economic, and environmental interdependence in a local and global context.

### **Communication**

Graduates will be able to use the listening, viewing, speaking, reading and writing modes of language(s) and mathematical and scientific concepts and symbols, to think, learn, and communicate effectively.

### **Personal Development**

Graduates will be able to continue to learn and to pursue an active, healthy lifestyle.

### **Problem Solving**

Graduates will be able to use the strategies and processes needed to solve a wide variety of problems, including those requiring language, mathematical, and scientific concepts.

### **Technology Competency**

Graduates will be able to use a variety of technologies, demonstrate an understanding of technological applications, and apply appropriate technologies for solving problems.

## Curriculum Outcomes

Curriculum outcomes are statements articulating what students are expected to know and be able to do in particular subject areas. These outcomes statements also describe the knowledge, skills, and attitudes students are expected to demonstrate at the end of certain key stages in their education. These are based upon their cumulative learning experiences at each grade level in the entry-graduation continuum. Through the achievement of curriculum outcomes, students demonstrate the Essential Graduation Learnings.

### General Curriculum Outcomes

are statements that identify what students are expected to know and be able to do upon completion of study in a curriculum area.

### Key-Stage Curriculum Outcomes

are statements that identify what students are expected to know and be able to do by the end of grades 3, 6, 9, and 12, as a result of their cumulative learning experience in a curriculum area.

### Specific Curriculum Outcomes

are statements identifying what students are expected to know and be able to do at a particular grade level. The specific curriculum outcomes serve as a framework for students to achieve key stage and general curriculum outcomes.

## Cross-Curriculum Specific Items

### Meeting the Needs of all Students

This curriculum is inclusive and is designed to help all learners reach their potential through a wide variety of learning experiences. The curriculum seeks to provide equal entitlements to learning opportunities for all learners.

The development of students' literacy is shaped by many factors including gender, social and cultural background, and the extent to which individual needs are met. In designing learning experiences for students, teachers should consider the learning needs, experiences, interests, and values of all students.

In recognizing and valuing the diversity of students, teachers should consider ways to:

- provide a climate and design learning experiences to affirm the dignity and worth of all learners in the classroom community
- redress educational disadvantage - for example, as it relates to students living in poverty
- model the use of inclusive language, attitudes, and actions supportive of all learners
- adapt classroom organization, teaching strategies, assessment strategies, time, and learning resources to address learners' needs and build on their strengths by:
  - providing opportunities for learners to work in a variety of learning contexts, including mixed-ability groupings
  - identifying and responding appropriately to diversity in students' learning styles
  - building upon students' individual levels of knowledge, skills, and attitudes
  - designing learning and assessment tasks that correspond to diverse learning styles
  - using students' strengths and abilities to motivate and support learning
  - offering multiple and varied avenues to learning
- celebrate the accomplishments of learning tasks by students

## Gender-Inclusive Curriculum

In a supportive learning environment, male and female students receive equitable access to teachers' assistance, resources, technology, and a range of roles in group activities. It is important that the curriculum, classroom practice, and learning resources reflect and value the experiences, interests, achievements, and perspectives of both males and females.

- Teachers promote gender equity in their classrooms when they:
- articulate equally high expectations for male and female students
- provide equal opportunity for input and response from male and female students
- model gender-fair language and respectful listening in all their interactions with students
- promote critical thinking and challenge discrimination

## Valuing Social/Cultural Diversity

In order to engage in and maximize learning, all students need to see their social/cultural identities reflected and affirmed in curriculum and classroom practices. It is important to recognize that students in Prince Edward Island come from an increasingly wider range of diverse ethnic, racial, cultural, and social backgrounds than in the past. In addition, they communicate with the wider multicultural world through technology, media, travel, and family and business connections in order to understand their own and others' customs, histories, traditions, values, beliefs, and ways of seeing and making sense of the world. Through experiential learning or through reading, viewing, and discussing authentic texts that reflect diverse social and cultural voices, students from different social and cultural backgrounds can come to understand each other's perspectives; to realize that their own ways of seeing and knowing are not the only ones possible; and to probe the complexities of the ideas and issues they are examining.

Curriculum, classroom practices, and learning resources should reflect the diverse and multicultural nature of our society, examine issues of power and privilege, and challenge stereotypes and discrimination.

## Engaging All Students

One of the greatest challenges to teachers is engaging students who feel alienated from learning. Some students who lack confidence in themselves as learners, who have a potential that has not yet been realized. Among them are students who seem unable to concentrate, who lack everyday motivation for academic tasks, who rarely do homework, who fail to pass in assignments, who choose to remain on the periphery of small-group work, who cover up their writing attempts fearing the judgements of peers, who are mortified if asked to read aloud, and who keep their opinions to themselves. These students are significantly delayed when it comes to learning. Some, though not all, exhibit behaviors in classrooms that further distance them from learning. Others are frequently absent from class. Cumulatively, these are disengaged students.

These students need essentially the same experiences as their peers - experiences that:

- engage students in authentic and worthwhile communication situations
- allow them to construct meaning, connect, collaborate, and communicate with each other

- form essential links between the world of text and their own world
- give them a sense of ownership of learning and assessment tasks

They need additional experiences as well - experiences designed to engage them personally and meaningfully to make their learning pursuits relevant. They need substantial support in reading and writing. They need positive and motivational feedback. They need all of these experiences within purposeful and interactive learning contexts. Ultimately, the curriculum for students should prepare them for adult life.

Preparing students means engaging them with resources and with people from whom they can learn more about themselves and their world. Many students feel insecure about their own general knowledge and are reluctant to take part in class discussions, deferring to their peers who seem more competent. Through the curriculum, the students must find their own voice. The learning environment must be structured in such a way that all students, alongside their peers, develop confidence and gain access to information and to community.

The greatest challenge in engaging learners is finding an appropriate balance between supporting their needs by structuring opportunities for them to experience learning success and challenging them to grow as learners. Teachers need to have high expectations for all students and to articulate clearly these expectations.

## Links to Community

A complete curriculum allows for the flexibility of inclusion of the community through various means. Activities such as guest speakers, field trips, and historical presentations allow the students to become more aware of the influence of the community on their lives. Students gain insight into the current workings of their local society, as well as observe role models and establish contacts with the community.

This curriculum guide provides suggestion, wherever possible, for community involvement to become an integrated part of the course.

## Role of Parents/Guardians

Parents and guardians play a vital role in the educational focus of the students. Although parents and guardians may or may not necessarily feel comfortable to help in specific subject learning with their children, their role is a vital link to the development of the students. It is most important that the parents and guardians understand and support the

school policies. Parents and guardians are a vital component in the facilitation of the learning of student responsibility in such areas as attendance, safe school policies, goal setting and career investigations. Schools need parents and guardians to share in their children's successes.

Teachers should invite opportunities for parents and guardians to discuss these matters. Frequent parent-teacher conferences are encouraged via telecommunications and/or school-based meetings.

Involvement in school councils, home and school associations, and/or other school-based organizations enable parents and guardians to play an active role in the educational development of their child. Parents and guardians may become actively involved as guest speakers in the classroom for students to understand the community in which they live or as a spokesperson on a particular career.

## Homework

Homework is an essential component of a program as it extends the opportunity to think and reflect on ideas investigated during class time. Meaningful homework experiences can allow the students to learn self-discipline and team responsibility while acquiring a sense of self-worth.

Homework provides an effective means to model classroom practice. This might involve seeking community input, constructing a model, group discussion to prepare a presentation, or answering questions for assessment purposes.

Teachers use their professional judgement to assign homework as a means of reinforcement, assessment, and/or further investigation.

Homework is another channel for parents and guardians to be involved. It is a tool for parents and guardians to understand the focus of their child's education in a specific subject area. In some cases, it opens the opportunity for parents and guardians to become actively involved in the homework process.

## The Senior High School Learning Environment

Learning environment for grades 10-12 is:

- participatory, interactive, and collaborative
- inclusive
- caring, safe, challenging
- inquiry based, issues oriented

- a place where resource-based learning includes and encourages the multiple uses of technology, the media, and other visual texts as pathways to learning and as avenues for representing knowledge

The teacher structures the learning situation and organizes necessary resources. In assessing the nature of the task, the teacher may find that the situation calls for teacher-directed activities with the whole class, small groups of students, or individual students. Such activities include direct instruction in concepts and strategies and brief mini-lessons to create and maintain a focus.

As students develop a focus for their learning, the teacher moves to the perimeter to monitor learning experiences and to encourage flexibility and risk taking in the ways students approach learning tasks. The teacher intervenes, when appropriate, to provide support. In such environments, students will feel central in the learning process.

As the students accept more and more responsibility for learning, the teacher's role changes. The teacher notes what the students are learning and what they need to learn, and helps them to accomplish their tasks. The teacher can be a coach, a facilitator, an editor, a resource person, and a fellow learner. The teacher is a model whom students can emulate, a guide who assists, encourages, and instructs the student as needed during the learning process. Through the whole process, the teacher is also an evaluator, assessing students' growth while helping them to recognize their achievements and their future needs.

Learning environments are places where teachers:

- integrate new ways of teaching and learning with established, effective practices
- have an extensive repertoire of strategies from which to select the one most appropriate for the specific learning task
- value the place of dialogue in the learning process
- recognize students as being intelligent in a number of different ways and encourage them to explore other ways of knowing by examining their strengths and working on their weaknesses
- value the inclusive classroom and engage all learners in meaningful activities
- acknowledge the ways in which gender, race, ethnicity and culture shape particular ways of viewing and knowing the world
- structure repeated opportunities for reflection so that reflection becomes an integral part of the learning process

The physical learning environment should not be restricted to one classroom. There should be ample physical space for students to use cooperative learning techniques as well as other learning styles. There should be access to other learning centers in the school building such as labs and gymnasiums. Learning should be extended to community facilities, allowing field trips and guest speakers to expand the learning environment.

## Safety

Students and teachers need to feel safe, both physically and emotionally, in the school setting. In a learning environment where cooperative, active, and collaborative teaching strategies are utilized, students must become knowledgeable of their role in enabling a safe environment to exist.

Empowering students to take ownership for their own safety and those of their peers is an essential component of the classroom learning. Teachers can provide students with the knowledge necessary to prevent unnecessary risks in their learning environment. By educating students about the risk factors involved in the classroom setting, they can become active participants in the ownership of their own safety. In all learning situations, the teacher needs to encourage a positive, responsible student attitude toward safety.

Risk is involved in everything a person does. To minimize the chance of harm, the student must become a conscious participant in ensuring a healthy, safe learning environment. Complacent attitudes regarding safety reflect a behavior which invites a less protected setting.

While physical safety is of utmost importance in the classroom setting, emotional safety is equally important. Students need to know the unacceptable behavior and the consequences that ensue. Students should be encouraged to be active learners without being intimidated by others. In every learning environment, teachers foster cooperative, respectful verbal dialogue, and physical presence. Student consequences to the contrary are essential components to the learning process.

## Motivation

Motivation plays a very important role in student understanding and successful completion of curriculum. Motivation for the student is heightened when the emphasis within the classroom is placed on the “whole person”. This environment provides a focus which recognizes achievements accomplished and initiates the growth of a safe place to belong.

Many factors are cited as instruments that foster student motivation. Clear expectations and flexibility of structure enhance the desire to learn. When students have a structure which enables them to accomplish goals, the motivation increases.

Support must exist for both the teacher and the student. Daily support for teachers via such modes as “pairing and sharing” techniques, education web sites, and professional development should be available.

Student support should include career awareness. Promoting student goal-setting strategies enables her/him to develop higher self-esteem which is a natural motivator to success.

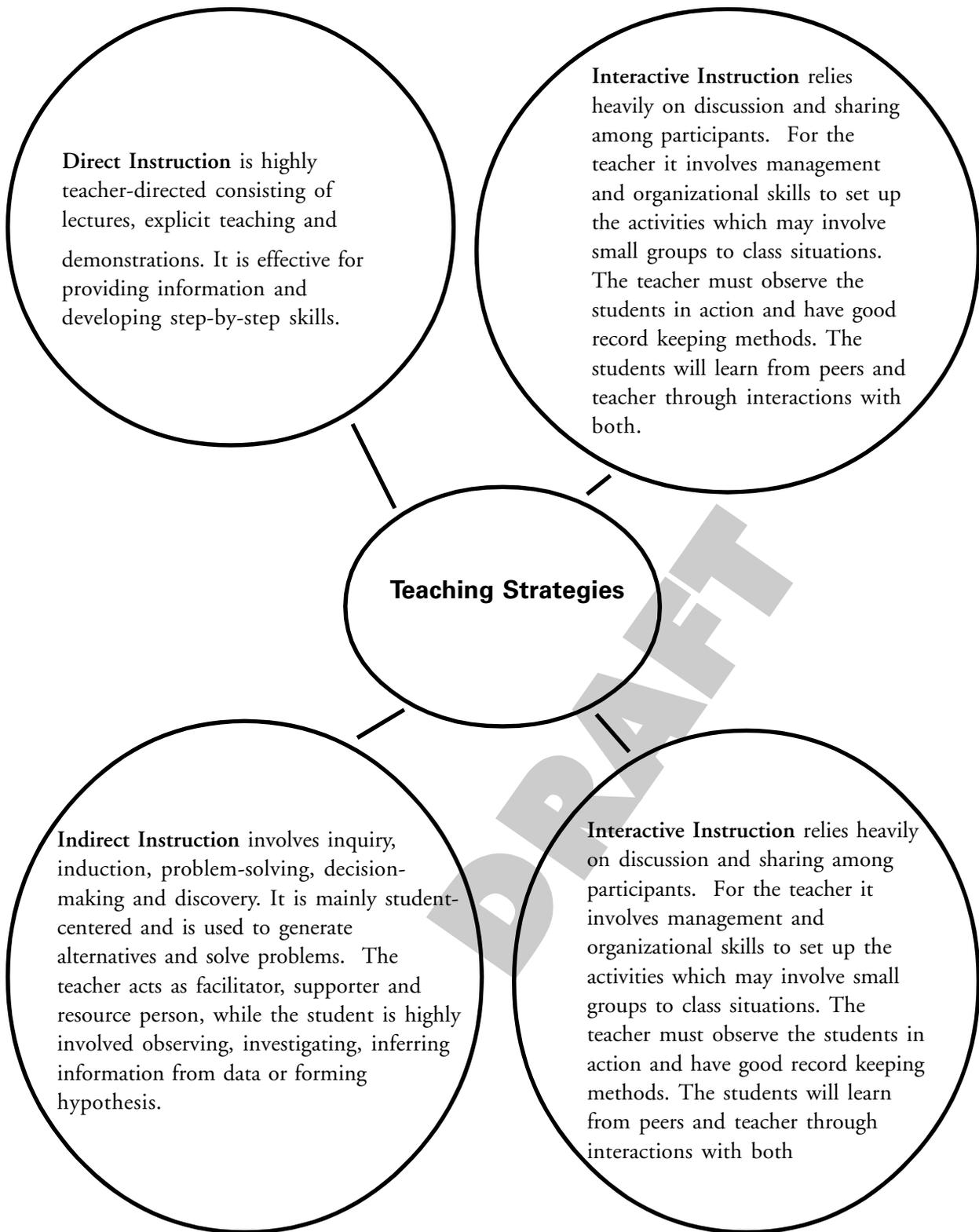
Varied instructional strategies within the class time also excites motivation. Students need variety, choices, and opportunities to take ownership of their learning.

There should be a limited amount of “traditional homework” and the home assignments given should relate to the students interests in real life.

## Teaching Strategies

Learning theory research clearly indicates that teachers need to employ a wide variety of instructional strategies to address the learning styles of all learners. Moreover, the nature of certain content or processes can only be taught effectively if specific instructional strategies are employed. In order to achieve this objective, students must have an opportunity to cooperatively brainstorm, discuss, evaluate information, and make informed decisions. Students often point to experiential activities as the best part of a program as they have the chance to work cooperatively and be actively involved in the learning process.

Teachers are ultimately responsible for determining the best teaching methods for their student, the best way of grouping them, and the best way to present material to make it relevant and interesting. Exemplary teachers use a variety of instructional strategies and have the flexibility to call upon several different strategies both within one period and during a unit of study. Adolescent learners need a balance between practical work, listening, discussing, and problem-solving.



# Assessment and Evaluation

The terms “assessment” and “evaluation” are often used interchangeably. However, they are not exactly the same. “Assessment” refers to the process of collecting and gathering information about student performance as it relates to the achievement of curriculum outcomes. “Evaluation” refers to the systematic process of analyzing and interpreting information gathered through the process of assessment. Its purpose is to make judgements and decisions about student learning. Assessment provides the data. Evaluation brings meaning to the data. Assessment must reflect the intended outcomes, be ongoing, and take place in authentic contexts.

Meaningful learning involves reflection, construction, and self-regulation. Students are seen as creators of their own unique knowledge structures, not as mere recorders of factual information. Knowing is not just receiving information but interpreting and relating the information to previously acquired knowledge. In addition, students need to recognize the importance of knowing how to perform, when to perform and how to adapt that performance to new situations. Thus, the presence or absence of discrete bits of information S which has been the traditional focus of testing S is no longer the focus of assessment of meaningful learning. Rather, what is important is how and whether students organize, structure, and use that information in context to solve problems.

Evaluation may take different forms depending on its purpose. *Diagnostic* evaluation will identify individual problems and suggest appropriate corrective action. Evaluation may be *formative* in that it is used during the instructional process to monitor progress and to make necessary adjustments in instructional strategies. *Summative* evaluation is intended to report the degree to which the intended curriculum outcomes have been achieved. It is completed at the end of a particular instructional unit.

Since the specific curriculum expectations indicate behaviors involving knowledge, skills, and attitudes, assessment must reflect student performance in each of these areas. The learning outcomes specific to the cognitive domain emphasize the acquisition of cognitive skills at three taxonomic levels: knowledge, understanding, and higher-order thinking. This will help to ensure that the focus on instruction goes beyond the lower levels of learning - recalling facts, memorizing definitions, solving problems and so on. Likewise, the focus of evaluation should also go beyond testing at the knowledge level.

## Assessment/Evaluation Techniques

The evaluation plan should include a wide variety of assessment methods. Any single item of information about a student's learning is only a minuscule sample of that individual's accomplishments. All types of learning outcomes cannot adequately be evaluated with a single type of instrument. Notions about students having different learning styles also apply to their performance on items designed for purposes of evaluation.

Evaluation strategies must closely resemble the nature of the instructional program, curriculum, and modern learning theory. There is significant movement toward authentic assessment or performance assessments. These could include such strategies as open-ended questions, exhibits, demonstrations, hands on execution of experiments, computer simulations, writing, and portfolios of students' work over time.

A multifaceted plan is needed to respond to the differences in the intended learning outcomes, the learning styles of students, and to reflect the CAMET Essential Graduation Learning.

Individual learning outcomes, the criteria for success and the form that assessment and evaluation will take, should be clearly understood by teachers, students, and parents. This involves clearly describing unit and lesson objectives and how the achievement of these objectives will be assessed. If students are to see themselves as responsible for their own learning, the requirements for attaining success in a unit of work must be clearly understood. The assessment and evaluation of the unit should contain no surprises.

## Using Varied Assessment Strategies

Teachers must realize they are preparing students for a world where knowledge is expanding at a rate we can no longer track. This requires that we shift emphasis from content knowledge to information processing skills. Our students need to be able to select, process, and evaluate knowledge.

This knowledge does not always need to be tested directly on evaluations that rely strictly on recall of facts during tests, rather it can be encompassed in higher level objectives such as comprehension, synthesis, or application. These could be better measured through a problem-solving approach.

It is therefore important to emphasize a variety of strategies in evaluation plans. These must reflect the teaching strategies employed in the delivery of the specific topic.

**Anecdotal Records** are positively written reflections of a student's actions and work while activities are occurring. As an informal assessment process, it is typically based on notes or a check list with space for writing comments. It is completed when appropriate.

**Teacher Student Conferences** are valuable evaluation techniques to gather information about students not obtained in other ways. More information is shared through conversation than through writing. It allows teachers to assess progress through questioning content and feelings on selected topics. A written record of the conference is advised.

Checklists:

**Student self-evaluation of:**

- interest
- attitudes
- social
- group skills
- understanding

**Teacher evaluation of:**

- laboratory skills
- groups skills
- interests
- attitudes

**Group Self-evaluation of:**

- group skills
- achievement

**Testing** assesses the student's knowledge and understanding of the subject matter. The most common methods include: essay, column matching, true/false, and multiple choice questions. Also included are problem solving, interpretation and production of graphs, data tables, and illustrations.

**Student Work Samples** are means for students to communicate what they are learning through a variety of experiences including:

*portfolios*- a collection of student's work

*laboratory reports*- documentation of experiential activities

*major reports and written reports*- further research on topics

*homework*- opportunity for parent/guardian involvement

*learning journals*- individual perceptions of progress

*oral presentations*- individual or group form of communicating ideas.

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# Programming

**Software: Liberty Basic 4.03 and ALICE**

**Recommended Time Allocation: 50% (40 periods)**

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**operate and manage technological systems**

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**Outcomes**

*Students will be expected to*

PR1: examine the implications and uses of programming, interpreters, compilers

**Elaboration- Strategies for Learning and Teaching**

Produce a working definition of a computer program. As a minimum, a definition would include the following aspects; a computer program is a series of instructions that the computer follows in order to do a task. These instructions must be explicit and accurate requiring skills in problem solving, logic and organization.

Discuss the differences between a compiler and a translator. When translating a computer language into another one of two methods is generally used:

1. The complete file is translated at one time and then read later. This means that the original only need be translated once and then the translated version used as often as necessary. This process of “compiling” allows the program to be executed very quickly.
2. The file is translated one line at a time, and used as it is translated. This means that the original is translated every time it is used. This method uses a program called an interpreter and has the advantage that mistakes can be found easily as each line is translated.

Older programming languages were designed to use one method or the other. Newer languages have features that provide the user with a combination of both methods. It is important to understand the differences between a compiler and an interpreter and also the strengths and weaknesses of each.

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## operate and manage technological systems

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### Tasks for Instruction and/or Assessment

- PR1.1 Identify consumer electronic products that perform particular user-defined functions. Discuss whether the function would be controlled through the use of a computer program.
- PR1.2 Research 5 computer languages and identify whether a compiler or interpreter is used by each language.

### Resources/Notes

CMP 521A, Teacher, Liberty Basic Lab Manual, 2006

CMP 521A, Student, Liberty Basic Lab Manual, 2006

CMP 521A, ALICE Student Resource, ATutor Workspace, 2008 <http://24.224.240.211/atutor16/login.php> (electronic)

CMP521A, Alice Student Manual, 2009.

Liberty Basic Programming Language, <http://www.libertybasic.com/education.html>

ALICE Programming, <http://www.alice.org/>

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## design, develop, evaluate, and articulate technological solutions

### Outcomes

*Students will be expected to*

PR2: identify and describe a problem

PR2n: relate and apply mathematical knowledge through problem solving (numeracy outcome)

### Elaboration- Strategies for Learning and Teaching

#### Problem-Solving Model

This is a generic process to solve "real world" complex problems. Programmers would use this model to design client information processing solutions. Is the suggested solution what the client really wants? Ask them before using expensive resources to program a project that will need to be redone!

#### 1. Identify the problem

- What is the current situation/problem?
- What is the problem to be solved?

#### 2. Analyse the problem

- What do we know already about the situation/problem?
- What are our assumptions?
- What is the knowledge base of the person for whom we're trying to problem-solve? What can or do they understand?
- What don't we know yet about the whole situation/problem?

#### 3. Brainstorm ideas

- List all possible ideas to solve the problem.
- No value judgment is to be passed on any suggestions.
- The more ideas, the better.

#### 4. Prioritize ideas

- Establish pros and cons of each suggestion in step 3.
- Rank the suggested ideas from step 3 according to criteria.

#### 5. List the steps to be taken following the chosen solution

- What are the steps/instructions we should take according to the top solution ranked in step 4?
- Will these steps/instructions be understood according to the knowledge base established in step 2?

#### 6. Evaluate/test the solution

- Do we have the desired results after following the steps in 5?
- Does the solution satisfy the needs of the person with the problem?
- What are some of the areas that are not correct/satisfactory? (back to step 1)

Lau, Joe (2008) *Problem Solving Procedures*. Retrieved June 1, 2008 <http://philosophy.hku.hk/think/strategy/problem-solving.php> (Adaptation of Polya, *How to Solve it*)

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**design, develop, evaluate, and articulate technological solutions**

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**Tasks for Instruction and/or Assessment**

- PR2.1 Apply the problem solving model to programming assignments. e.g.: Write a program to find the sum, difference, product and quotient of two numbers; Create a custom recipe of your choice for a user's desired number of servings; Create a madlib story and prompt user for words (nouns, verbs, etc.) to fill in blanks of the story; Create an outdoor scene; Create an outdoor scene with at least 4 distinct objects. The user can select to view the landscape during the day or at night; Create a program to determine if a maze has a solution or not.
- PR2.2 Observe students as they solve problems. Note how they develop solutions and evaluate their problem-solving and planning processes.
- PR2.3 Explain how a solution to a given problem was developed. Can students identify specific features of a problem and come up with possible solutions?

**Resources/Notes**

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## design, develop, evaluate, and articulate technological solutions

### Outcomes

*Students will be expected to*

PR3: list the steps required to solve a problem

PR3n: reason and justify mathematical thinking (numeracy outcome)

### Elaboration- Strategies for Learning and Teaching

There are six (6) programming steps that are used by programmers that assist in the planning and writing of a computer program. Use these six steps when writing a computer program.

1. **Problem Analysis.** Define the problem and determine the desired output of the program. Students will find that if the output of a program is understood, then it becomes easier to plan the solution to the problem. Create an input/processing/output (IPO) chart.
2. **Define all variables and constants.** Variables and constants are used to store data in the program. Storing data for use throughout the program is an essential part of writing a program.
3. **Plan the successful solution using an algorithm, pseudocode and/or flowcharts.** An algorithm is simply a solution to a problem. An algorithm must be developed before any problem can be solved. Once that algorithm is developed, it is often easier to write the solution in language similar to English (pseudocode) than to try to code directly into a computer language.
4. **Code the algorithm** This step involves translating the pseudocode solution into a language that can be understood by the computer. Once this is done, the code is entered into the computer.
5. **Verify the code using test data with known results, debug syntax, runtime, and logic errors.** Seldom is code correct the first time a program is run. In this step any errors that are present in the program are analyzed and corrections are made.
6. **Document the program using both internal and external documentation.** Because programs are often changed at later times, it is necessary to document the program that is written. This documentation is done internally as comments within the code itself, and externally as written documentation.

Programming forces students to be methodical and precise in formulating solutions to problems. A solution must be fully documented prior to coding.

## design, develop, evaluate, and articulate technological solutions

Tasks for Instruction and/or Assessment	Resources/Notes
<p>PR3.1 The most important aspect of computer programming is the planning of the program. Emphasis should be placed on correct planning of a program. With this in mind, problems should be presented to the students with the aim of planning solutions to these problems. Model the solution to these problems, demonstrating how the solution can be arrived at by using the six steps to structured programming.</p>	<p>Computer Science Teachers Association (CSTA), Pair Programming Video Download <a href="http://csta.acm.org/Resources/sub/DownloadableResources.html?searchterm=pair+programming">http://csta.acm.org/Resources/sub/DownloadableResources.html?searchterm=pair+programming</a></p>
<p>PR3.2 In the “real” programming world, programs are not written by one individual. Programming teams are used to write a program. Use pair programming groups and pedagogy to solve problems presented. Each group should then plan a solution to the problem. The solution of each group should be discussed with the other groups to demonstrate that there may be more than one solution to a given problem.</p>	
<p>PR3.3 Observe how students problem-solve the steps of completing a daily task. Note how they: interact in a group, identify the components of the task, develop the steps to complete the task.</p>	
<p>PR3.4 After planning a solution to a problem, each group should write documentation to explain how the solution was developed. The written solution should describe how the algorithm was developed. This will demonstrate the need for external documentation in programming.</p>	
<p>PR3.5 Create programming teams and assign each a problem or project. Teams will provide a complete solution to the problem, and follow all six steps of structured programming. The solution must include both internal and external documentation.</p>	
<p>PR3.6 Analyse own contribution to group work and identify skills and activities that made the group effective. Identify factors that interfered with work progress. As a class, have students develop a rubric to assess teamwork skills in future group activities.</p>	

**design, develop, evaluate, and articulate technological solutions**

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**Outcomes**

*Students will be expected to*

PR4: demonstrate the logic required to solve a problem

**Elaboration- Strategies for Learning and Teaching**

Work in small groups to create an algorithm to solve a problem in pseudocode that is unrelated to programming. Test the solution by having a partner physically perform the steps exactly as written. Are there unexpected results? Identify the type of problem encountered. e.g.: missing instructions, logic problems, instructions out of order, poor wording of instructions, etc. Other tasks may include i.e.: changing a tire, specific directions to get from classroom to bus, etc.

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**Tasks for Instruction and/or Assessment**

- PR4.1 Model writing the specific logical steps for an activity such as baking cookies. Have students suggest directions that are out of sequence or ambiguous.
- PR4.2 Observe groups as activities are broken down into specific tasks. Provide guidance and feedback as necessary.
- PR4.3 In discussing the solutions that each group presents' other groups are encouraged to comment about the solution. These comments might point out potential problems with the solution. If problems are found, the original group should be asked to debug their solution.
- PR4.4 Have individuals reflect on their level of participation in group projects and make plans for improvement.

**Resources/Notes**

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**Outcomes**

*Students will be expected to*

PR5: plan a solution using an algorithm, pseudocode, flowcharts and/or storyboard

**Elaboration- Strategies for Learning and Teaching**

The solution to a problem may be outlined using an algorithm, pseudocode or visually presented through the use of flowcharts and storyboards. Point out that the use of these planning strategies will uncover logical problems early before valuable time is spent coding the solution only to find that the work must be redesigned.

Explain the differences between pseudocode, flowcharts and storyboards and the application of each. Introduce basic flowchart symbols.

Model the use of a planning strategy when solving computer problems in the classroom.

Insist that coded solutions to programming problems be documented with evidence of planning.

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**Tasks for Instruction and/or Assessment**

- PR5.1 Reflect upon the statement “Weeks of programming can save hours of planning.”
- PR5.2 Use existing algorithms and programs to create flow charts that use symbols for input/processing/output. A concept mapping software such as Inspiration 7.5 may be used to create a flowchart electronically.
- PR5.3 Plan solutions to programming problems with a partner. Compare the solution plan with another group prior to coding the algorithm. Reviewing groups may sign the planning sheet and specify an assessment scheme based upon an agreed upon rubric. e.g.: planning logic is accurate, instructions are complete, conventions utilized, solution original and/or creative.
- PR5.4 Assess students’ algorithms for completeness and structure.
- PR5.5 Select an artifact for a personal learning portfolio that demonstrates planning and organizational skills. Describe why a particular item was included.

**Resources/Notes**

Search for “online concept mapping” or “online mind mapping” to locate an online tool for use at home.

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**design, develop, evaluate, and articulate technological solutions****Outcomes**

*Students will be expected to*

PR6: develop a program using keywords, commands, statements, operators, subroutines and functions

PR6a: iteration

**Elaboration- Strategies for Learning and Teaching**

Reference a listing of keywords for the programming language being used. Keywords can not be used for variable names.

Understand and be able to use an iteration that is repeated a set number of times. In BASIC this type of iteration uses the FOR...NEXT command structure.

Use and understand accumulators and how they are used in a FOR...NEXT loop. An example of an accumulator is a variable that keeps a running total.

Nested loops are iterations that are performed within other iterations. Although multidimensional arrays are not covered in the this course, nested loops are often used to fill these arrays.

Because computers run at speeds that are faster than people can see what is happening, it is often necessary to slow the computer down. Delay or timing loops are used to do this. Students should be able to use delay loops within a computer program.

Loops that run until a condition is met are called conditional loops. In BASIC the commands that are used for conditional loops are: DO UNTIL ... LOOP, DO WHILE ... LOOP, DO ... LOOP UNTIL. The differences between each type of conditional loop should be understood.

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## design, develop, evaluate, and articulate technological solutions

### Tasks for Instruction and/or Assessment

- PR6.1 If at first you don't succeed, try ... try again. This is the premise used in solving some problems by repetition. This method of problem solving should be discussed. The discussion should lead into how computers can solve problems by using repetition. It should also be mentioned that although this method might prove very slow for humans, computers are very fast and can solve problems quickly that might take humans a long time.
- PR6.2 Provide examples of when a program might require the use of a FOR ... NEXT statement. Examples might include simple things such as counting from one to ten.
- PR6.3 The use of the STEP value in a FOR ... NEXT statement should be presented and the STEP statement should be discussed.
- PR6.6 The use of an accumulator in a FOR ... NEXT loop should be demonstrated. The speed at which a computer operates could be shown by using an accumulator to add all the integers between 1 and 1000. This could be compared with using the formula  $SUM = 500(LAST - FIRST)$ .
- PR6.7 Programming teams should write programs that determine the sum of all even numbers between two integers, for example the sum of all the even integers between 200 and 1000.
- PR6.8 A simple computer program that counts from one to ten and displays the numbers on the screen runs far too quickly for the user to understand that the numbers are actually being displayed one number at a time. To slow down the output of each number, a delay loop should be placed within the program.
- PR6.9 Ask students to trace and predict the output of a program using nested loops. For example, what is the output of this program segment:
- ```
FOR j = 1 to 3
  FOR k = 1 to j
    PRINT j,k
  NEXT k
NEXT j
```

### Resources/Notes

CMP521A ATutor workspace  
<http://24.224.240.211/atutor16/login.php>

**Note:** Should an infinite loop be encountered the key combination CTRL+Break will interrupt processing.

## design, develop, evaluate, and articulate technological solutions

### Outcomes

*Students will be expected to*

PR6: develop a program using keywords, commands, statements, operators, subroutines and functions ... continued

PR6b: conditional statements

### Elaboration- Strategies for Learning and Teaching

Conditional statements IF ... THEN are used in a computer program to change the way in which a computer program may be run. Conditional statements are used to change the flow of a program.

The statement following an IF clause will only be executed if and only if the condition is TRUE. If the condition is FALSE, then the statement after the IF structure will be executed. The programmer however can force an alternate action with the ELSE clause and even more complex tests with ELSEIF. Note: any given IF-Block can have any number of ELSEIF statements but only one ELSE statement.

The Boolean operators allow for the testing of more complex conditions. The Truth table of each Boolean should be explained. AND is a logical conjunction that produces a result of True, if and only if, both of the operands are True. On a Venn diagram this would be the area of intersection of the sets. OR is a logical disjunction that results in True whenever one or more of its operands are True. On a Venn diagram this would be all members of the sets.

For example:

**AND:**

| p | q | Result |
|---|---|--------|
| T | T | T      |
| T | F | F      |
| F | T | F      |
| F | F | F      |

**OR:**

| p | q | Result |
|---|---|--------|
| T | T | T      |
| T | F | T      |
| F | T | T      |
| F | F | F      |

The NOT operator negates a condition, eg. a TRUE condition becomes FALSE and a FALSE condition becomes TRUE.

The CASE structure is an efficient decision making structure that simplifies choosing among several actions. It avoids the complex (and hard to follow) use of nested IFs.

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**Tasks for Instruction and/or Assessment****Resources/Notes**

PR6.10 Write some simple programs that use the IF ... THEN statement. For example, students might write a program that asks for a mark in computer class. If the mark is 50 or greater the computer prints that it is a “pass mark”.

PR6.11 Ask students to write a computer program that asks for student mark. If the mark is 50 or greater then the computer prints that it is a passing mark. If the mark is below 50, the computer prints that it is a failing mark.

PR6.12 Let students determine the error (if any) in conditionals. For example:

```
IF flag = 0 THEN
    flag = 1
ENDIF
IF flag = 1 THEN
    flag =0
ENDIF
```

This error of intent could be avoided through the use of an “ELSE” statement where the flag is set to zero. For example, should the variable “flag” have a value of 2 when the conditional is encountered it would be set to zero in the ELSE part of the statement.

PR6.13 Ask students to write conditionals with Booleans to test the following conditions:

- If a number lies between and including 1 and 5
- If a value is greater than 100 but not greater than 200
- If a name starts with Mac but not with Mc

PR6.14 Students should discuss the various benefits of using the IF ... THEN statement and the CASE structure. Give students an example employing a CASE structure and ask them to re-write the segment, using IF -ELSEIF and ELSE statements.

PR6.15 Although conditional statements can be used to write a program that contains a menu, it is not necessarily the most practical way of coding the menu. The menu can usually be coded more simply by using the CASE structure. Ask students to write a menu to which a user can respond, employing the CASE structure.

PR6.16 Provide a worksheet regarding the use of parenthesis and the order of operation.

## design, develop, evaluate, and articulate technological solutions

### Outcomes

*Students will be expected to*

PR6: develop a program using keywords, commands, statements, operators, subroutines and functions ... continued

PR6c: functions

PR6d: operators

PR6d: subroutines

### Elaboration- Strategies for Learning and Teaching

Built into many computer languages are functions that can assist the programmer in writing a computer program. These functions generally help the programmer for often repeated tasks. For example, a function that will easily determine the square root of a number is often built into a computer language. Students should understand and know how to use functions in a computer program.

Use a function to find the square root of a number. They should be aware that many functions are available for their use. Many of these functions, such as trigonometric functions, will be valuable to them as they complete high school.

There are also many string functions available for use in a programming language. Students should be able to use the functions LEN(string), MID\$, LEFT\$, and RIGHT\$ to determine what characters are present within a string, as well as the ASC() and CHR\$() functions.

The TIME\$ and DATE\$ function have widespread application within a program and should be understood.

Review order of operation conventions and the use of parenthesis in the formulation of equations. Common operators include subtraction (-), addition (+), multiplication (\*), division (/), exponent (^).

A subroutine is a portion of code within a larger program. Advantages to breaking a program up into subroutines, include:

- reducing the duplication of code in a program, enabling reuse of code across multiple programs
- decomposing complex problems into simpler pieces
- improving readability of a program

Specify that complex programs be written with subroutines.

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**Tasks for Instruction and/or Assessment**

- PR6.17 Select a program that has been programmed without subroutines and convert it into one with subroutines.
- PR6.18 Identify advantages of using subroutines.
- PR6.19 Use functions to calculate the integer, square root, and log of a number or solve a trigonometry problem using functions.

**Resources/Notes**

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**Outcomes**

*Students will be expected to*

PR7: use constants, variables and operands

**Elaboration- Strategies for Learning and Teaching**

An Input-Processing-Output chart is useful in writing a computer program to identify variables and constants that are used in a program. The output data required and associated variables are identified first. The input data needed and associated variables are considered second. Finally, the processing requirements are formulated.

In order to be able to use variables and constants in a program, the naming conventions used for naming variables and constants must be understood. Identify the difference between a string variable and a numeric variable and how each are represented in the computer program. When writing a program a variable declaration should be made at the beginning of the program so that the programmer and the computer are aware of the names of the variables and the types of variable that are used in the program.

Assign values to variables using the three methods of assignment:

1. The equal sign is used to directly assign a value to a variable. Students should understand that the equal (=) sign in a computer program is not like the equal sign in a mathematical equation. The symmetric property in mathematics cannot be used in assigning values to a variable.
2. Making computer programs that respond to the input of the user helps in making a “user friendly” program. In BASIC, the INPUT statement is used when the programmer wants the user to enter a value into the program.
3. Large amounts of data are often read into a computer program by using sequential files. Sequential files are not covered in the CMP521 course; however, using READ ... DATA statements models the way in which a sequential file is read into a computer. For this reason, students should be able to have data read into a computer program using the READ ... DATA statement in BASIC.

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**Tasks for Instruction and/or Assessment****Resources/Notes**

- PR7.1 In order to store data in a computer program, variables are needed. Variable naming procedures should be presented. Because computers work with binary numbers, unexpected answers may arise when performing mathematical calculations on the computer. It is extremely important to explain to students that numeric variables consist of two types of variables, integer and floating-point. It is also important to discuss that integer variables consist of two types, regular and long, and that floating-point variables also consist of two types, single-precision and double -precision. The problems that could occur if the variable type is not declared correctly should be demonstrated.
- PR7.2 The use of the equal (=) sign in assigning values to variables should be demonstrated. Point out that the variable must always be on the left hand side of the statement, and the value that is being stored must always be on the right hand side of the assignment statement.
- PR7.3 Provide opportunities to name and assign string and numeric variables. Identify errors contained in existing assignment statements and suggest corrections.
- DRAFT**

**operate and manage technological systems**

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**Outcomes**

*Students will be expected to*

PR8: input, process, and output data to solve a problem

**Elaboration- Strategies for Learning and Teaching**

Writing a computer program involves using a programming editor that has built in features for entering and editing data, functions, subroutines, and debugging tools for the language. Other common features include preprogrammed commands for the language being used, syntax checking for code entered, windows for entering and testing code, automated indenting and colouring of code lines, ready made objects or routines, tools for tracing and debugging program code as it is executed, online help, etc. Particular attention should be given to how to use the help section and accessing online tutorials.

The first step in writing a compute program is to determine the output of a program. The PRINT statement is the major output statement in BASIC and conventions used with this statement must be understood.

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## operate and manage technological systems

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### Tasks for Instruction and/or Assessment

- PR8.1 Open a programming editor software and identify 5 features that will assist programmers to code and debug.
- PR8.2 Provide sample programs to enter into the programming editor.
- PR8.3 Demonstrate the PRINT statement. The use of the semicolon (;) and comma (,) to space output should be introduced.
- PR8.4 Introduce the LOCATE statement for positioning output.

### Resources/Notes

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**operate and manage technological systems**

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**Outcomes**

*Students will be expected to*

PR9: run, debug, document, and execute a program solution

**Elaboration- Strategies for Learning and Teaching**

Run sample program listings that have been entered or solutions that have been created. Encourage the testing of program subroutines in longer programs. This allows the program to be verified in smaller units making problems easier to find and correct.

Correct all syntax errors and use test data that has known results. Should there be exception cases for the problem being solved enter this data as well.

Provide internal documentation for the program coding and external documentation for program conventions and features for users. Stress the importance of documentation in commercial programming applications where teams of programmers collaborate on the creation of subroutines that are combined into a single program.

Once a program has been tested and debugged it is ready for distribution to users. Programs written in Liberty Basic are interpreted as they are run in the program editor. This means that the program is run line-by-line and makes it easier to identify and locate errors. An executable file is compiled completely into binary machine language. This enables the program to be run independently of the program editor and enables the program to run much faster. Creation of an executable file is not usually a requirement for assignments in the CMP521 course. An awareness of this procedure and the opportunity to practice creating an executable once or twice is recommended.

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## operate and manage technological systems

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### Tasks for Instruction and/or Assessment

- PR9.1 Observe how students troubleshoot programs to find and correct errors. In particular, note how they ask for help from each other and how they interact as they help each other.
- PR9.2 Ask students to explain how they identify and correct errors in programs. Do they use programming terminology accurately in their explanations?
- PR9.3 Develop criteria for each program to evaluate programming style, utility, and aesthetics. Have students use the criteria to give feedback to others on how to improve their assignments before they are submitted.
- PR9.4 Assess students' programs for:
- programmer header information
  - variable, type, procedure identifiers
  - internal formatting and style
  - logic errors
  - syntax and grammar errors
  - accuracy of execution
  - user interface
- PR9.5 Provide an executable file for at least one programming assignment.

### Resources/Notes

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**operate and manage technological systems**

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**Outcomes**

*Students will be expected to*

PR10: distinguish between objects, classes, methods and inheritance

**Elaboration- Strategies for Learning and Teaching**

Object oriented Programming (OOP) uses terminology that is essential to understanding computing concepts and processes.

A class is a programming construct used to group related methods and attributes. For example, in ALICE, a class would be found in the library e.g.: penguin. The class can be considered a “cookie cutter” or a “blue print”. It does not exist in a program or have a program memory allocation while in the library.

Objects are created from classes. A penguin may be added to the program world once or many times. Each penguin is an instance of an object which refers back to the library class. Each penguin can be programmed with its own action instructions but the object itself is stored in the library. This is much like a web site referring to the same .jpg file for multiple pages. The use of instances and a library object is referred to as inheritance and allows the program file size to remain small, even if large numbers of objects (penguins) are added to a scene. Adobe Flash uses the same mechanism in order to keep file sizes to a minimum.

Objects are often made up of many components. For example, the penguin object is made up of other objects such as a head, left eye, right eye, left arm, right arm, left hand, right hand, etc. Methods are rules by which each of these objects behave. Methods are predefined actions that relate to an object or one of its components. e.g. coaches arm - may turn, swing, bend, etc.

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**operate and manage technological systems**

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**Tasks for Instruction and/or Assessment**

- PR10.1 Use proper terminology when referring to classes, objects, and methods. Ensure that the concept of inheritance is understood.
- PR10.2 Research the concept of inheritance and note other well-known programs or programming languages that use these structures.

**Resources/Notes**

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# Database

**Software: Microsoft ACCESS 2007**

**Recommended Time Allocation: 26% (20 periods)**

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## describe the evolution of technology and its social and cultural implications

### Outcomes

*Students will be expected to*

DB1: describe the importance and functions of a database

DB2: explain the difference between a flat file and relational database

### Elaboration- Strategies for Learning and Teaching

Brainstorm examples of non-computerized databases. Describe how each item in a database relates to each other and how each record in a database has some consistent form for collecting the data. Identify some challenges in managing a non-computerized database. (Examples: library card catalogue, recipe file box). List the advantages of computerizing a database such as ease of maintenance, searching for information, sorting of information and saving of space.

Databases may be termed **Flat** or **Relational**. A flat data base stores data in the form of one table. This structure has the advantage that it is easy to set up and understand. Flat databases are especially useful for simple applications where there are few fields or pieces of data. As the number and types of fields increase the limitations of the flat structure become apparent. The user is forced to read large amounts of text data and must enter the same information in many different records. It is time-consuming to update changes in records and it may be impossible to search or create reports containing the exact information required.

A relational database is one that stores information in several tables that are linked together by a special **key field** such as student ID. For example Trevlac, the school student administration system, is a relational database. The database would be set up with one table to hold student contact information. A second table might hold the timetable information. A third table may hold grades for all courses that the student has taken. A fourth table may be used to track student attendance. The computer may search and combine information from all four tables into a report very easily. If data changes are necessary only the table that contains that data needs to be accessed and updated.

Databases are the most widely used computer applications in business. (e.g.: financial, inventory, personnel, customer records and dynamic web sites) Popular relational database software includes Oracle, Microsoft Access and Visual FoxPro, IBM DB2, Corel Paradox and Sun Microsystem MySQL (MySQL has versions released as open source) Programmers use these programs to build custom applications. e.g.: Trevlac Student Information System

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**describe the evolution of technology and its social and cultural implications**

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**Tasks for Instruction and/or Assessment**

- DB1.1 Design a non-computerized method of cataloguing a CD collection. List the important characteristics which should be kept for each CD. Identify the problems with the system.
- DB2.1 Visit online sites such as Air Canada (<http://www.aircanada.ca>) to view an example of a relational database. Note the various possible separate tables that may be accessed by the database ie. customer profile, booking flight, timetables, flight status, baggage tracer, hotels, cars, etc. and fields in which queries may be made.
- DB2.2 Identify a situation where a flat database would be most appropriate for keeping track of data. Identify a second situation that would require a relational database in order to meet the information requirements.

**Resources/Notes**

CMP521A Access Database Manual, 2009

CMP521A ATutor workspace, <http://24.224.240.211/atutor16/login.php>

Microsoft Access, 2007 software

Microsoft Office 2007 Online Training learning objects, <http://office.microsoft.com/en-us/training/HA102255331033.aspx>

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**Outcomes**

*Students will be expected to*

DB3: plan the design of a database

**Elaboration- Strategies for Learning and Teaching**

Database information is stored in a **file** (e.g. all library cards) . Each item is stored in a **record** (e.g.: all information regarding one library user). Information in a record is divided into **fields**. Every record has the same fields but the data in the fields differ from record to record (library user first name, last name, address, card number, telephone number, etc.)

Plan a database using the following steps:

1. Make a general list of data to be stored in each record.
2. Decide on the specific uses of the database, what reports or queries will be needed.
3. From steps #1 and #2 make a specific list of Field Names and specify data type (numeric, text, logical, etc.) and the field sizes.
4. On paper design a sample form for a single record.

Provide an example of a relational database. Explain how like data has been grouped into separate tables and how they may be linked through the use of primary and key fields. An objective of a relational database is that a single piece of data is never entered twice in the database.

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**design, develop, evaluate, and articulate technological solutions**

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**Tasks for Instruction and/or Assessment**

- DB3.1 Use the four planning steps to create a flat file electronic database for a CD, movie, book, or card collection.
- DB3.2 Discuss situations where the information requirements for the CD, movie, book or card database would necessitate a relational database. (e.g.: added complexity of vendor information, purchase dates, purchased good description, purchase quantities, purchase price, purchase taxes, inventory on hand, genre, author, publisher, customer information, selling date, sold goods description, quantities sold, price, selling taxes, shipping information, etc.)
- DB3.3 Demonstrate the planning of a relational database example.

**Resources/Notes**

Library Thing. <http://www.librarything.com>

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**design, develop, evaluate, and articulate technological solutions**

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**Outcomes**

*Students will be expected to*

DB4: create fields and assign properties for data types

**Elaboration- Strategies for Learning and Teaching**

Create fields with names or abbreviations that are easily recognized and relate to the data stored in that field. Properties are assigned for datatypes to ensure that the data contained in the database is accurate and may be manipulated with flexibility. Assigning data properties has implications for the design of an input form and the integrity of data entry. e.g.: autonumber field insures a unique number is assigned to each record, pull down menu list, checkbox, radio buttons, auto fill, etc. Input error rates are much lower for selected items than for where data must be keyed.

Recognize that the selection of datatypes has implications for file size of the database. A number field may be assigned the following types:

- byte
- integer
- long integer
- decimal
- single
- double

A field that will contain only a single digit number from 0-9 should be assigned a byte type to save memory and storage space in the database. This may not seem significant for small databases with few records but would have a substantial impact upon the efficiency of a large database, such as one maintained by Revenue Canada that contains records for several million Canadians.

Database field type options include **OLE objects** (files, graphics, video, audio) and **hyperlink** which has implications for dynamic web page construction which will be a topic of the CMP621 course.

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**Tasks for Instruction and/or Assessment**

- DB4.1 Identify common field types (text, number, memo, date, time, currency, autonumber, yes/no, lookup)
- DB4.2 Create fields and assign datatypes for a simple database.

**Resources/Notes**

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**design, develop, evaluate, and articulate technological solutions**

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**Outcomes**

*Students will be expected to*

DB5: create and modify a form

**Elaboration- Strategies for Learning and Teaching**

Forms provide a quick and easy way to modify and insert records into the database. Forms are called Graphical User Interfaces (GUI) in some database applications. An advantage of creating a form is that it hides the database tables and complexities from end users who may not have training. Forms can lock users to a particular area of the database therefore providing security to the data. Separate forms can be designed for different users or different functions i.e.: to provide a particular report, to query or search for distinct records or to enter information about a particular type of transaction.

Forms may be designed with custom graphics, colour and text. Fields are placed within the form and formatted in adherence to datatypes that were assigned during the field creation stage. For example, menu lists, radio buttons, checkboxes, or auto insert may be formatted. Tab order is set during form creation. Add instructions to forms to ensure consistent and accurate data entry. These features enable the efficient input and integrity of data.

Simple design principles of contrast, alignment, repetition and proximity should be applied to form creation.

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**design, develop, evaluate, and articulate technological solutions**

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**Tasks for Instruction and/or Assessment**

- DB5.1 Discuss design principles in relation to form ease of use and esthetics.
- DB5.2 Create a form for a simple database using the four planning steps found in DB3 and the activity in DB3.1
- DB5.3 Incorporate menu lists, radio buttons, checkboxes, yes/no features and set tab order in a database form.
- DB5.4 Modify a form. Change fields, layout, tab order and/or design.
- DB5.5 Critique forms designed by a class mate.
- DB5.6 Reflect upon the form you created. Describe three items you would change or do differently.
- DB5.7 Select a form as an artifact for inclusion in a personal learning portfolio.

**Resources/Notes**

Robin Williams & John Tollet,  
design principles  
[http://edweb.sdsu.edu/Courses/  
EDTEC470/graphics/carp/  
index.htm](http://edweb.sdsu.edu/Courses/EDTEC470/graphics/carp/index.htm)

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**operate and manage technological systems**

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**Outcomes**

*Students will be expected to*

DB6: enter, modify and use data in a database

**Elaboration- Strategies for Learning and Teaching**

A database is only as good as the data in the database. Discuss the importance of consistent and accurate data entry for report and query generation. (e.g.: Do not have different ways of entering the same data, PE or PEI and do not make spelling mistakes, eg. Cahrlottetown)

Demonstrate the ease of editing and maintaining a computerized database. This will include being able to find a record easily, being able to edit data within fields and adding fields to a form even after a database has been created.

Display the database in table view to change the width of fields and change the order of fields. Change the justification of fields and the style of fields, i.e. bold, italics or currency.

Queries make it possible to work with records that meet a specific criteria. Simple queries will involve filtering records for exact matches of text. Perform more complex queries using the techniques listed below:

1. Matches on partial text by using the wildcard symbol (\*).
2. Using the logical operators (>, <, >=, <=, <>) on text and numeric fields.
3. Using the boolean operators (AND, OR, NOT) to combine two logical comparisons and/or to search on two different fields at the same time.

Demonstrate the ease of making changes to multiple records by querying records and applying changes feature to alter several records. (e.g.: after amalgamation it is necessary to change all the records for people who live in Parkdale to Charlottetown).

Reports provide for more flexibility in displaying information from a database. Reports allow the selection of fields to display, sorting and grouping of records and addition of summary statistics. They can also provide descriptive information about the report in the form of Titles, Time/Date Generation and customised headings. Demonstrate creating a report in design mode and printing it. Modify a report layout by adjusting field widths, margins or printing in landscape orientation.

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**operate and manage technological systems**

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**Tasks for Instruction and/or Assessment**

- DB6.1 Enter 20 records that the teacher supplies. After completion students can be provided with a list of data corrections which should include finding a particular record to edit. They should ensure all data is accurate and has been entered consistently. Create a field addition and enter the new data for the new field into all the existing records.
- DB6.2 Make changes to a database using sort and query to locate records.
- DB6.3 Use simple queries, wild card symbols, logical symbols and boolean operators
- DB6.4 Create and print a report containing specified data. Reports should address techniques regarding adding fields, summary calculations, sorting and grouping records, adding title and automatic date generation.
- DB6.5 Print a report in landscape orientation.

**Resources/Notes**

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# Introduction to HTML/CSS Coding

**Software: Notepad and Dreamweaver**

**Recommended Time Allocation: 12% (10 periods)**

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**design, develop, evaluate, and articulate technological solutions****Outcomes**

*Students will be expected to*

IP1: apply HTML syntax

**Elaboration- Strategies for Learning and Teaching**

Construct the minimum structure for an html document.

```
<html>
<head>
</head>
<body>
</body>
</html>
```

Explain the coding conventions for tags. Tags are enclosed in <> and are opened to hold data or perform a formatting function. Tags are closed using a / when a particular formatting or section is no longer required. Notice that tags are keyed in lower case.

Tags may also have attributes associated with them. For example, <body bgcolor= "#000000"> the bgcolor attribute will make the background of the web page white. A number of attributes may be assigned for one tag, such as shown in the following example:  
<fontface= "arial " color="#FFFFFF" size="2">text</font>

Note that tags may be “nested” and must be closed in a particular order. i.e.: the last tag applied must be the first one to be closed within a nested structure.

IP2: create simple layout structures

Headings are defined with the <h1> to <h6> tags. <h1> defines the largest heading. <h6> defines the smallest heading.

```
<h1>heading</h1>
```

HTML automatically adds an extra blank line before and after a heading.

Paragraphs are defined with the <p> tag.

```
<p>This is a paragraph</p>
```

HTML automatically adds an extra blank line before and after a paragraph. Do not leave out the closing tag.

Line breaks <br> are used along with the paragraph <p> tags to create spacing withing text.

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**Tasks for Instruction and/or Assessment**

IP1.1: Use notepad, an online code generator, NVU Kompozer or Dreamweaver split screen to examine HTML tags and attributes.

IP1.2: Provide HTML code where tags have been opened and closed incorrectly. Identify and correct errors.

IP2.1: Format headers.

IP2.2: Format two paragraphs using paragraph tags.

**Resources/Notes**

ATutor Electronic Resource  
HTML/CSS Coding <http://24.224.240.211/atutor16/login.php>

HTML/CSS Coding Lab  
Manual, 2009.

HTML code generator applet  
<http://www.edu.pe.ca/wsb/departments/technology/topics/webdesign/html/tester.htm>

AHFB2000.com <http://www.ahfb200.com/colors.html>

W3Schools HTML Reference  
<http://www.w3schools.com/sitemap.asp>

NVU Kompozer <http://www.nvu.com>

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**Outcomes**

*Students will be expected to*

IP2: create simple layout structures

IP3: modify HTML code in a webpage

**Elaboration- Strategies for Learning and Teaching**

Lists may be defined as ordered <ol> where a number or letter precedes a list item <li></li> or unordered <ul> where a bullet precedes the list item. Attributes were assigned to ordered or unordered lists to control numbering or bullet size and shape. This is now accomplished through CSS styles.

Modify text attributes such as font, color, and size. Tags that format text include bold <b>, strong <strong>, italics <i>, small <small>, big <big>, superscript <sup>, subscript, <sub>, emphasis <em>, address <address>, blockquote <blockquote> and preformatted text <pre>. Special characters may be inserted by referring to an ISO symbols chart. e.g.: the copyright symbol may be inserted using the codes &copy; or &#169.

Images display size is controlled through the use of height and width attributes of the <img> tag. Images may be linked from a folder within the website or externally from other online sources. Similarly, multimedia objects (sound, video, shockwave and tools, such as calendars) may be embedded locally from within the website or externally from other websites. Explain the concept of absolute referencing of a URL to external resources and relative referencing of links to internal files.

Basic table structure including the spanning tag must be understood.

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**Tasks for Instruction and/or Assessment**

- IP2.3: Create an ordered list.
- IP2.4: Create an unordered list.
- IP2.5: Nest an ordered and unordered list together.
- 
- IP3.1: Compose a document that includes several text formatting tags.
- IP3.2: Insert three special characters into a web page.
- IP3.3: Link to a local media file using relative addressing and to an external file using absolute addressing.
- IP3.4: Embed an external tool such as an online calendar.
- IP3.5: Use notepad to construct a basic table structure.

**Resources/Notes**

W3Schools special character chart [http://www.w3schools.com/tags/ref\\_entities.asp](http://www.w3schools.com/tags/ref_entities.asp)

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**design, develop, evaluate, and articulate technological solutions**

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**Outcomes**

*Students will be expected to*

IP4: create complex layout structures

IP5: describe page (head) information

**Elaboration- Strategies for Learning and Teaching**

Plan a web page design using paper and pen. Create a table with spanning and invisible borders to position elements. Nested tables may be required in order to position elements into the planned design.

Consider the use of percentage pixel settings for the width of the table if dimensions should expand and collapse based upon the content entered or the screen resolution used. For information that must be placed exactly, fixed tables must be used.

Frames were popular at one time for creating layout structures where the navigation appeared static and content appeared within a window frame. Frame structures are now considered to be obsolete and are not widely used.

The head section contains information that may include doctype, title, base, link, style, script and metadata.

*Document Type Definition* defines the version of HTML implemented and is used by browsers and markup validators to process the web page. The human language, such as French, may be set using a two-letter code - "fr".

*Title* places text into the title bar of the browser. Usually this is a description of the page being viewed.

*Base* establishes a relative URL to resources used on the web page.

*Link* defines a relationship between the current page and another page or resource.

*Style* specifies internal cascading style sheets code

*Script* is programming code used to make web pages more interactive. Common scripting languages are Javascript or vbscript

*Meta* provides information about the web page, such as descriptions and keywords for search engines. The <meta> tag always goes inside the head element and has no end tag in HTML.

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**Tasks for Instruction and/or Assessment**

- IP4.1: Examine the HTML table code used in complex web pages found online.
- IP4.2: Plan a complex web page structure on paper. Evaluate this design with a peer.
- IP4.3: Create a table structure to position content on a paper mockup.

- IP5.1: Examine meta tag information from well known corporate sites (e.g.: Toyota Canada, GM Canada). Note meta tag keywords that are used. Did any of the words chosen surprise you?
- IP5.2: Brainstorm meta tag keywords for a fictitious company that sells one product. e.g.: PEI potatoes. Compare key word listings with other groups.
- IP5.3: Research various ways that search engines determine relevance ranking of web sites.
- IP5.4: Enter meta tag information in the <head> section of a web page.

**Resources/Notes**

Web Style Guide - page design  
<http://webstyleguide.com/page/index.html>

MetaTag Ca <http://www.metatags.ca/>

Search Engine Watch <http://searchenginewatch.com/webmasters>

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**Outcomes***Students will be expected to*

IP5: describe page (head)  
information  
...continued

**Elaboration- Strategies for Learning and Teaching**

Meta tag example:

```
<head>
<meta name="description" content="PEI golfing destinations" />
<meta name="keywords"
content="golf,golfer,golfing,vacation,PEI,packages,holiday,
courses,tee times,low prices,cheap,discount,promotion,
club,iron,driver,ball,tournament,membership,travel,pei,Prince
Edward Island,cart,proshop,tour,championship" />
</head>
```

Meta tags assist search engine crawlers in classifying web page content according to a description provided by the web site author. The relevance of this content for particular searches is provided through the use of keywords. Keywords provide words that are used in the body of the web page as well as stemming, truncation, synonyms, and alternative spellings (e.g.: golf, golfing, golfer). The objective of selecting precise keywords is to improve ranking or the order in which the web page is listed in the search engine results.

Search engines use multiple methods to determine ranking such as paid listings, traffic count, meta tag information, user satisfaction surveys, link evaluation, etc. Google claims to use an algorithm of 200 factors to determine relevance and ranking order.

**design, develop, evaluate, and articulate technological solutions**

**Tasks for Instruction and/or Assessment**

**Resources/Notes**

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## understand the history and evolution of technology and of its social and cultural implications

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### Outcomes

*Students will be expected to*

IP6: identify website development standards organizations

### Elaboration- Strategies for Learning and Teaching

The World Wide Web Consortium (W3C) is international in scope and develops standards for web design and the implementation of new web technologies. Consistent standards ensure systematic development and that vendors produce products that recognize accepted protocols. Another objective is to ensure that the world wide web is accessible to the widest range of users.

#### W3C Themes:

*The Web for Everyone* - accessibility options for physically challenged individuals, those with older technology and slow Internet line speeds. Everyone needs access to the same information but not necessarily in the same medium.

*Web on Everything* - device and operating system independent services.

*Data Searching and Sharing* - common search methods and interoperability between systems to search and organize the world knowledge base.

*Trust and Confidence* - privacy of information and security of interactions. Understanding of what data is appropriate to share and what must remain private.

Online tools are available to assess web pages for browser compatibility and the presence of features for accessibility.

As better, more efficient, technologies are developed new standards are written and older methods are retired. For instance, frames, animated gifs, image maps, forms that “post” information, and many tag attributes are no longer widely used. These methods have been replaced by cascading style sheets, flash objects and dynamic web interfaces for online databases.

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## understand the history and evolution of technology and of its social and cultural implications

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### Tasks for Instruction and/or Assessment

- IP6.1: Identify ten considerations for web page design that allow accessibility.
- IP6.2: Research a listing of HTML tags or attributes that are no longer used or that will soon be replaced.
- IP6.3: Test a web page design for accessibility. Appraise the extent to which HTML standards have been applied to this site.
- IP6.4: Refer to the four W3C themes. Appraise how these themes relate to the underlying early development of the Internet. Discuss how these themes are important to maintain as the Internet develops?

### Resources/Notes

World Wide Web Consortium  
<http://www.w3.org>

University of Toronto, Adaptive Technology Resource Center  
<http://checker.atrc.utoronto.ca/index.html>

Cynthia, online accessibility checker <http://www.contentquality.com/>

Adobe Test site for accessibility  
<http://www.adobe.com/macromedia/accessibility/usablenet.html>

t.a.w Web Accessibility Test  
<http://www.tawdis.net>

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## operate and manage technological systems

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### Outcomes

*Students will be expected to*

IP7: describe where a web site is located

### Elaboration- Strategies for Learning and Teaching

Generally, a web site is designed and tested on the local hard drive of the users' computer. An *index.htm* file is typically found at the root (highest level) of the web site. Folders are created to house HTML files relating to specific areas of the site as it makes these files easier to find and update. e.g.: a school site may have separate folders for "sports", "student council", "academics", "staff" and "policies". Other folders are created to hold media files such as "images", "video", "audio" or "pdf".

Navigational links and links to resources are created using relative referencing. Relative addressing specifies the path to a resource from the current page without specifying a device drive letter such as C: This allows the browser to find specified resources should the site be transferred to a thumb drive, DVD, "uploaded" to a web server or other online storage location.

Once a website has been designed and tested it is "uploaded" to a webserver which is owned by a "service provider" who rents hard drive space and provides the user with a web address URL. In addition to hard drive space rental on the webserver, the user may be charged for "traffic" or "usage" above a particular base level.

A program called FTP (File Transfer Protocol) is configured with the address of the server, user starting directory, ports and a password. The website files and folders are transferred using FTP from the users' computer to the web server. Once the files are on the webserver they are available to anyone who has Internet access.

Some web editors, such as Dreamweaver, have the FTP functionality built into them. After the server web address and password have been set up in Dreamweaver files may be transferred to or from the webserver or they may be deleted.

Other programs, such as Adobe Contribute, allow users to access and edit HTML files on the server without creating "local" copies of the files beforehand. An advantage of editing files directly from the server is that it allows several users to collaborate to maintaining a website. Often one person is designated the webmaster who grants other people "permissions" to edit and change all or a portion of the web site. Each person has his/her own password and a log file is created showing when a particular file was changed and by whom.

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**operate and manage technological systems**

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**Tasks for Instruction and/or Assessment**

- IP7.1: Plan a website folder structure.
- IP7.2: Create folders to house website pages and resources.
- IP7.3: Create relative links to HTML pages and resources.
- IP7.4: Follow good file management and naming conventions for websites.
- IP7.5: Describe how a web site is placed online for the world to see.
- IP7.6: Demonstrate how to connect, upload and download files on a hosted server site.
- IP7.7: Investigate local Internet Service provider web hosting packages. Determine options that influence pricing.

**Resources/Notes**

Maintain Your Files - software  
Any FTP program or Internet Explorer  
Dreamweaver MX-2004 - software

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**operate and manage technological systems**

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**Outcomes**

*Students will be expected to*

IP7: describe where a web site is located  
...continued

**Elaboration- Strategies for Learning and Teaching**

An intranet is an organization's internal website that has been configured with a firewall and internal gateway (IP address) to securely share information with onsite employees. The concept of an intranet may be demonstrated on the school LAN. Teachers may transfer files to folders on the school LAN M: drive and link to these from online websites. These files may only be viewed by those within the school LAN. An example of the format for a linked resource might be:

```
<a href= "m:/mr_smith/cmp521/index.htm">CMP521 Class  
Project Proposals</a>
```

An explanatory note should be provided for Internet visitors that indicates the link is available only from within the school network.

Portals are widely implemented by organizations wishing to securely share information and collaborative tools with onsite and offsite employees, customers, etc. A portal is accessed through the open Internet with user's logging into the site with a username and password (much like the ATutor learning content management system currently used in the PEI education system). The portal provides a consistent interface and offers services such as webpage publishing, file storage/sharing, discussion forum, email, calendar, private team spaces, chat, video meeting, blogs, wikis, etc. Each user may be assigned only those tools or services needed to perform his or her job.

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**operate and manage technological systems**

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**Tasks for Instruction and/or Assessment**

**Resources/Notes**

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**design, develop, evaluate, and articulate technological solutions**

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**Outcomes**

*Students will be expected to*

IP8: apply cascading style sheet syntax

**Elaboration- Strategies for Learning and Teaching**

The advantages of using cascading style sheets (CSS) must be understood. At the end of the HTML coding section web pages were constructed using tables to position elements. Tag attributes were assigned to format text, paragraphs and table appearance and presentation. CSS allows the developer to change the layout or appearance and enable the page (or the entire site) to be consistent.

The development of Web 2.0 technologies and dynamic web pages that obtain content “on-the-fly” from databases necessitate the flexibility in design that cascading style sheets provide.

- reformat HTML elements instantly throughout a page or site
- format content by creating styles i.e.: custom tags
- keep the display and content structure separate, making it easier to update websites

Add to this list of advantages of CSS while working through this section.

Indicate from the outset that the web page that was designed in HTML will be redesigned using CSS.

*Format a style rule.* A style “rule” is a statement that tells a browser how to display content on a web page. The rule is made up of two parts - a selector and a declaration block. In general:

*selector {property:value; property:value; property:value}*

e.g.: `h1 {color:blue; font-size:33pt; font-family:Arial}`

Note that each declaration is separated by a semicolon (;)

*Choose the most appropriate selector.* There are three common selectors.

- *Type selectors* target every instance of a HTML element on a page that matches the selector.
- *Class selectors* are used to select a HTML element that has a class attribute.
- *id selectors* are used to select a HTML element that has an id attribute. An *id* attribute may be applied only once per page.

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**design, develop, evaluate, and articulate technological solutions**

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**Tasks for Instruction and/or Assessment**

- IP8.1: Identify the advantages that cascading style sheets (CSS) provide for website design.
- IP8.2: Format a type selector rule and format in an HTML page using an embedded style sheet. Format using an external style sheet.
- IP8.3: Format a class selector rule and format in an HTML page using an embedded style sheet. Format using an external style sheet.
- IP8.4: Format an id selector rule and format in an HTML page using an embedded style sheet. Format using an external style sheet.
- IP8.5: Provide examples of inline, embedded and external CSS style definitions used in combination. Identify the formatting that will be rendered by the browser by following inheritance rules.
- IP8.6: Use CSS measurement units to format page layout.
- IP8.7: Use an online CSS code checking utility to test examples generated.

**Resources/Notes**

Max Design CSS Selectors  
<http://css.maxdesign.com.au/selectutorial/>

W3C CSS Validation Service  
<http://jigsaw.w3.org/css-validator/>

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**design, develop, evaluate, and articulate technological solutions**

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**Outcomes**

*Students will be expected to*

IP8: apply cascading style sheet syntax  
...continued

**Elaboration- Strategies for Learning and Teaching**

*Format embedded and external style sheets.* The style rules for an embedded style sheet are included in the <head> section of the HTML page. The style rules for an external style sheet are entered in a separate file with a .css file extension. The .css file is referenced from the <head> section of the HTML page. The advantage of an external style sheet is that the same style rules may be applied to all HTML pages in a web site.

*Inheritance.* CSS rule styles may be formatted *inline* within the body of the web page (not often used), *embedded* in the <head> section of the web page or created in an *external* .css file. If these methods are used in combination, styles affecting the same elements are applied to the web page in the following order: inline styles take effect over embedded or external; if no inline style embedded styles take effect over external style sheets. Custom class properties take precedence over tag style definitions and nested tag definitions take precedence over a parent tag's definition.

*Format Page Layout.* CSS provides several measurement units to allow precise positioning of HTML elements. These units include percentage (%), inch (in), centimeter (cm), millimeter (mm), current font size (em), current font height (ex), point (pt), pica (pc) and pixel (px).

**design, develop, evaluate, and articulate technological solutions**

**Tasks for Instruction and/or Assessment**

**Resources/Notes**

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## design, develop, evaluate, and articulate technological solutions

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### Outcomes

*Students will be expected to*

IP9: create and edit cascading style sheets

### Elaboration- Strategies for Learning and Teaching

Code CSS rules and apply them to HTML pages by using embedded and external style sheets. Create and apply CSS type, class and ID selectors to control background, colour, text, and font attributes.

Examine the code used to format the HTML webpage project. Use rules to control page format elements.

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**design, develop, evaluate, and articulate technological solutions**

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**Tasks for Instruction and/or Assessment**

- IP9.1: Apply a type selector rule to a HTML page using an embedded style sheet. Apply using an external style sheet.
- IP9.2: Apply a class selector rule to a HTML page using an embedded style sheet. Apply using an external style sheet.
- IP9.3: Apply an ID selector rule to a HTML page using an embedded style sheet. Apply using an external style sheet.
- IP9.4: Use an online CSS code checking utility to test examples generated.

**Resources/Notes**

W3C CSS Validation Service  
<http://jigsaw.w3.org/css-validator/>

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## design, develop, evaluate, and articulate technological solutions

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### Outcomes

*Students will be expected to*

IP10: create a page layout using cascading style sheets

### Elaboration- Strategies for Learning and Teaching

Using a previously planned web page or devising a new web page design, create the page layout structure using CSS rules and selector tags. <div> and <span> tags are used to divide the page into sections.

Create separate CSS page design for displaying and printing purposes that may be selected by the user. The printing style allows for pagination, usually with 8.5”x 11” paper.

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**design, develop, evaluate, and articulate technological solutions**

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**Tasks for Instruction and/or Assessment**

- IP10.1: Apply CSS measurement units within CSS tags to format page layout.
- IP10.2: Prepare a CSS layout for printing.

**Resources/Notes**

Zen Garden, alternative layouts created with CSS <http://www.csszengarden.com/>

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# Computer Literacy

**Recommended Time Allocation: 6% (5 periods)**

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## operate and manage technological systems

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### Outcomes

*Students will be expected to*

LY1: examine binary arithmetic

LY1n: Demonstrate an understanding of the use of different number bases and measurement units (numeracy outcome)

LY2: apply practices to organize and protect computer data

### Elaboration- Strategies for Learning and Teaching

Discuss the importance of binary numbers to computer and communication technology. Convert from base 10 numbers to base 2 and vice versa.

Examine security and practices such as antivirus, antispyware, robust password creation, data backup, acceptable use policies, and location of hardware devices and wiring.

Discuss operating system maintenance and security tools and procedures such as CHKDSK, DEFRAG and SYSTEM RESTORE commands.

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## operate and manage technological systems

### Tasks for Instruction and/or Assessment

- LY1.1 Research ASCII code symbols for their binary code equivalents. Spell your first name using binary representation.
- LY1.2 Digital encoding is used for all electronic media. Research an aspect of encoding. i.e.: sound (wave to digital format), images (colour to digital format), laser, DVD, IP addressing, etc.)
- LY1.3 Convert base 10 numbers to binary. Convert binary numbers to base 10 numbers.
- LY1.4 Explain the process to convert base 10 numbers to binary to a partner. Provide an example for the partner to solve. Verify solution.
- LY2.1 Maintain a file structure on G: drive. Demonstrate regular file management and maintenance practices.
- LY2.2 Research backup rotation strategies such as “Grandfather, Father, Son” or “Tower of Hanoi”.
- LY2.3 Research hardware that is used to backup computer systems. e.g.: RAID backup, tape, DVD
- LY2.4 Discuss the differences among viruses, trojans, worms, spyware and malware.
- LY2.5 Identify personal firewall and virus protection software that is available for home use. Specify any that are “open source”.
- LY2.6 Compare the PEI Government and School Acceptable Use Agreements. Suggest additions.
- LY2.7 Demonstrate CHKDSK and DEFRAG utilities.
- LY2.8 Configure security features in an ACCESS database.
- LY2.9 Demonstrate the assignment of resources and users in Usernet. (Collaborate with school STC)
- LY2.10 Prepare a list of questions for a guest speaker (or web interview) regarding security of IT facilities, equipment and data.

### Resources/Notes

ATutor Computer Science Teacher Workspace, Computer Literacy Teacher Information  
<http://24.224.240.211/atutor16/>  
<http://doit.ort.org/course/inforep/134.htm>  
[http://forums.cisco.com/CertCom/game/binary\\_game.swf](http://forums.cisco.com/CertCom/game/binary_game.swf)  
 Liberty Basic Teacher lab Manual, pg. 77

ATutor CMP521 Teachers Workspace, ITSS Awareness Articles:

- What is acceptable use?
- P2P File Sharing
- Social Networking
- PC Security Do's and Don'ts
- 10 Vital Steps for Protecting Your Computer

## **demonstrate technological responsibility**

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### **Outcomes**

*Students will be expected to*

LY3: adhere to intellectual property laws and demonstrate ethics in information technology

### **Elaboration- Strategies for Learning and Teaching**

Discuss copyright. Define ethics in the information technology sector. Distinguish between legal and ethical behaviour.

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## demonstrate technological responsibility

### Tasks for Instruction and/or Assessment

- LY3.1 Prepare a list of questions for a guest speaker on the topics of copyright laws, privacy, and/or ethics.
- LY3.2 Identify copyright information on a favourite music or video recording.
- LY3.3 Identify steps involved in registering an original media creation.
- LY3.4 Research a recent case of copyright infringement. Summarize and report.
- LY3.5 Provide an example of a legal and an ethical issue.
- LY3.6 Develop a code of ethics for computer users.
- LY3.7 Collaboratively, prepare a rubric regarding standards and expectations regarding content of animations and games.
- LY3.8 Storyboard and pitch ideas for animations and games prior to development.

### Resources/Notes

Copyright Matters: Some Key Questions and Answers for Teachers. (Wanda Noel, 2005)  
<http://www.cmec.ca/else/copyright/matters/CopyrightMatters.pdf>

Note: Bill C-61 which will revise Canadian Copyright Law was tabled in June, 2008. It's introduction has been disrupted by the call of a Federal election at the writing of this document. This is an area that is expected to undergo many changes and will need to be researched by teachers and students.

Canadian Home Video Rating System <http://www.cmpda.ca/jsp/v-rating.jsp>

Maritime Film Classification Board, Media Awareness Network  
[http://www.media-awareness.ca/english/resources/ratings\\_classification\\_systems/film\\_classification/mar\\_film\\_classification.cfm](http://www.media-awareness.ca/english/resources/ratings_classification_systems/film_classification/mar_film_classification.cfm)

GNU Copyleft <http://www.gnu.org/copyleft/copyleft.html>

Creative Commons <http://creativecommons.org/>

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**examine the history and evolution of technology and its social and cultural implications**

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**Outcomes**

*Students will be expected to*

LY4: examine data privacy issues

**Elaboration- Strategies for Learning and Teaching**

Discuss data privacy issues as it applies to the government, the workplace and within online environments. Relate data privacy to database technology and Internet safety.

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## examine the history and evolution of technology and its social and cultural implications

### Tasks for Instruction and/or Assessment

- LY4.1 Brainstorm the various types of information that different levels of government collect on individuals. eg. birth, death, marriage certificates, drivers license, car registration, health records, school records, property tax, voter registration, census data, income tax, etc. Would there be any information in these records you might not want your next door neighbour to know? Should companies wanting to sell products have access to these sources of information?
- LY4.2 It has been suggested that based upon an individuals' past behaviours or those of family members - future behaviours might be predicted. The same is true for certain diseases. If computer databases were available to business and government departments for the objective of predicting suitability for employment, medical coverages, etc. Would this be acceptable? Discuss using an online forum. (Consider the case where you might be judged upon the actions of a family member who has shoplifted - you might not be admitted access to a certain store even though you have never committed a crime).
- LY4.3 Use of debit, credit, and promotional points cards may create a database whereby the purchasing habits of individuals may be tracked. Are there any disadvantages to having someone able to access this information about you? Discuss. Supply example purchases of an individual over a period of time and make inferences about the person based upon the products purchased. eg. liquor store purchase, cigar store, travel to Halifax by plane (one ticket), souvenir from the race track, stayed at hotel that houses the casino, etc.
- LY4.4 Research recent security/privacy concerns and rights about online services such as wiki, blog, or collaborative documents.
- LY4.5 Prepare a short report or story book for a younger relative (or his or her parents) explaining how to safely use online social networking sites.
- LY4.6 Prepare an online survey to determine the degree of knowledge peers possess about online privacy and the use of social networking sites.
- LY4.7 Create a skit or video demonstrating a privacy concern with a social networking site. e.g.: someone writing personal information on a wall for everyone to read, etc.

### Resources/Notes

Office of the Privacy Commissioner, Canada. Social Networking and Privacy. [http://www.privcom.gc.ca/fs-fi/02\\_05\\_d\\_35\\_sn\\_e.asp](http://www.privcom.gc.ca/fs-fi/02_05_d_35_sn_e.asp)

Personal Information Protection and Electronic Documents Act (2000, c. 5) <http://laws.justice.gc.ca/en/P-8.6/index.html>

**design, develop, evaluate, and articulate technological solutions**

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**Outcomes**

*Students will be expected to*

LY5: model independent and collaborative learning

**Elaboration- Strategies for Learning and Teaching**

Foster independent learning, self reliance and provide opportunities for teamwork, creativity, critical thinking and feedback to occur.

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**design, develop, evaluate, and articulate technological solutions**

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**Tasks for Instruction and/or Assessment**

- LY5.1 Prepare the solution to a problem using pair programming. (Pair programming may also be used for homework assignments. Discussion forums or chat with transcripts enabled will show the contribution of each partner in the process)
- LY5.2 Assign a constructivist learning assignment where a project that is of interest is selected. Work in teams or independently to design and develop a solution. Research, problem solve, and use multiple information sources.
- LY6.3 Post the results of research in a threaded discussion forum. Discuss finding of others and pose questions or provide insights.
- LY6.4 Share files, reusable objects with peers using online file storage.

**Resources/Notes**

ATutor Learning Content Management System <http://24.224.240.211/atutor16/>

CSTA Pair Programming Video <http://www.csta.acm.org/Resources/sub/DownloadableResources.html>

\*Web 2.0 online application (refer to outcome LY4) Please note that it would be advisable to obtain parental permission for student specific use of a particular online technology.

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**examine current and evolving careers and the influence of technology on the nature of work**

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**Outcomes**

*Students will be expected to*

LY6: examine employability and essential skills

**Elaboration- Strategies for Learning and Teaching**

Explore current employability and essential skills for various careers.

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## examine current and evolving careers and the influence of technology on the nature of work

### Tasks for Instruction and/or Assessment

- LY6.1 Have small groups select a particular workplace setting. Provide a specific instance of how one skill from each of the three employability skill areas are important to success in that workplace. e.g.: communicate; use technology; perform calculations; solve problems; demonstrate positive attitudes and behaviors; be responsible; be adaptable; learn continuously; work safely; work in teams; participate in tasks. These may be presented or performed for the class.
- LY6.2 Complete the Service Canada, Training and Careers, Employability Checklist survey.
- LY6.3 Prepare a concept map or chart illustrating the nine essential skills and a brief explanation of each.
- LY6.4 Locate an occupational profile of a career that is of interest to you. Identify the essential skills for that occupation. Consider your own strengths in relation to the nine essential skills. Are you suited for this occupation?
- LY6.5 Complete the “Career Matchmaker” survey and update your Career Cruising electronic portfolio for “careers of interest”.
- LY6.6 Interview a business person to ask what characteristics and skills a newly-hired employee must have. Compare the interview details with the employability or essential skills points.

### Resources/Notes

The Conference Board of Canada, Employability Skills 2000+ <http://www.conferenceboard.ca/education/learning-tools/employability-skills.htm>

Service Canada, Training and Careers, Employability Checklist Survey <http://www.jobsetc.ca/toolbox/checklists/employability.jsp>

Human Resources and Social Development Canada <http://www.hrsdc.gc.ca/en/home.shtml>

Prince Edward Island Cooperative Education Curriculum Guide, 2007

Application of Working and Learning National Project <http://awal.ca>

Career Cruising site <http://careercruising.com/>

Ontario Skills Passport <http://skills.edu.gov.on.ca>

**examine current and evolving careers and the influence of technology on the nature of work**

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**Outcomes**

*Students will be expected to*

LY7: recognize career opportunities due to changes in information technology

**Elaboration- Strategies for Learning and Teaching**

Examine how changes in the information technology industry directly effect careers and opportunities:

- life long learning
- careers becoming obsolete
- pace of change
- supply and demand of workforce skill

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## examine current and evolving careers and the influence of technology on the nature of work

### Tasks for Instruction and/or Assessment

- LY7.1 Identify one occupation where information technology is not used. Support your position. Alternatively, identify a job in which you are interested and list specific technology skills that are required.
- LY7.2 Research occupational profiles, such as the National Occupation Codes profiles (NOC) related to the IT sector. What essential skills are indentified for these occupations? Create a concept map of findings.
- LY7.3 Research Moore's Law or recent developments in processing speed, memory, storage and communication technologies. Are costs per unit of computing power still decreasing? Report orally, prepare a visual presentation or create a blog post collage.
- LY7.4 Identify specific changes in the workplace or careers that are the result of advances in information technology. Communicate finding through a threaded discussion forum, dramatization or video vignette.
- LY7.5 Research current career potential and salaries in the IT sector. (Statistics Canada, Information and Communication Technology Council, Canadian Coalition For Tomorrow's IT Skills, Cisco Systems, periodicals, news reports) Report findings.
- LY7.6 Adopt the role of guidance counselor and advise other students which courses they should take to prepare adequately for a particular career. What courses are required for acceptance into the post secondary program of study? What role does computer skills and knowledge play in the career choice? Should technology courses be taken in high school and/or at the post secondary level?

### Resources/Notes

Information and Communications Technology Council <http://www.shrc.ca/en/Default.aspx>

Technology PEI <http://www.techpei.com/index.php3?number=46336&lang=E>

The Conference Board of Canada, Employability Skills 2000+ <http://www.conferenceboard.ca/education/learning-tools/employability-skills.htm>

Service Canada, Training and Careers, Employability Checklist Survey <http://www.jobsetc.ca/toolbox/checklists/employability.jsp>

Human Resources and Social Development Canada <http://www.hrsdc.gc.ca/en/home.shtml>

Application of Working and Learning National Project <http://awal.ca>

Career Cruising site <http://careercruising.com/>

Ontario Skills Passport <http://skills.edu.gov.on.ca>

**examine current and evolving careers and the influence of technology on the nature of work**

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**Outcomes**

*Students will be expected to*

LY8: identify changes and requirements in education and training

**Elaboration- Strategies for Learning and Teaching**

Discuss how technology has contributed to education and/or training.

- distance education
- virtual collaboration
- expectation of basic skills (literacy and numeracy)
- ongoing professional development
- globalization

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## examine current and evolving careers and the influence of technology on the nature of work

### Tasks for Instruction and/or Assessment

- LY8.1 Research technology programs at local post secondary institutions and an industry certification. (CISCO, Novell, Microsoft, CompTIA, Nortel, Oracle, Sun, Linux, IBM, Hewlett Packard, Compaq, Adobe, etc.) Prepare a brochure describing educational and experience requirements for a particular career path.
- LY8.2 Invite a guest speaker from a post secondary institution to speak about particular technology programs and industry certification opportunities.
- LY8.3 Distance learning requires that the learner possess a particular skill set, attitude and aptitude to be successful. Create a skills inventory checklist that may be given to someone contemplating enrollment in an online course.
- LY8.4 Research IT companies who have Canadian employees who must regularly travel to or relocate in foreign countries. What special skills do these employees possess and what specialized jobs do they perform? Prepare a “help wanted” advertisement or “job description” for a particular position.

### Resources/Notes

Cisco Systems Career and Academy Information [http://www.cisco.com/web/learning/netacad/career\\_connection/promoteIT/index.html](http://www.cisco.com/web/learning/netacad/career_connection/promoteIT/index.html)

Oracle Academy <https://academy.oracle.com/>

Microsoft Academy <http://www.microsoft.com/education/msitacademy/default.aspx>

Novell Academy <http://www.novell.com/partners/training/academy/spresent.html?tab=0>

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## **Locally Determined Time**

**Research, Independent Studies or Extension Activities**  
**Recommended Time Allocation: 6% (5 periods)**

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**design, develop, evaluate, and articulate technological solutions**

**Outcomes**

*Students will be expected to*

**Elaboration- Strategies for Learning and Teaching**

Locally determined time allows for the individualization of the CMP521A program to meet the interests and needs of the learner. This allows students to engage in skill development within the context of applying this skill within specific applications. **This time may be used to extend learning in any one of the course outcomes including the following:**

**Research:**

- PR1: examine the implications and uses of programming, interpreters, compilers
- LY4: examine data privacy issues
- LY6: examine employability and essential skills
- LY8: identify changes and requirements in education and training

**Independent Projects:**

- LY2: apply practices to organize and protect computer data
- LY3: adhere to intellectual property laws and demonstrate ethics in information technology
- LY5: model independent and collaborative learning
- PR2: identify and describe a problem
- PR4: demonstrate the logic required to solve a problem
- PR5: plan a solution using an algorithm, pseudocode, flowcharts and/or storyboard
- PR6: develop a program using keywords, commands, statements, operators, subroutines and functions
- PR9: run, debug, document, and execute a program solution
- DB3: plan the design of a database
- IP8: apply cascading style sheet syntax
- IP10: create a page layout using cascading style sheets

**Extension Activity:**

- IP9: create and edit cascading style sheets
- IP10: create a page layout using cascading style sheets

**design, develop, evaluate, and articulate technological solutions**

**Tasks for Instruction and/or Assessment**

**Resources/Notes**

PR1, LY4, LY6 & LY8:

- Research and report on an area of personal interest.

LY2, LY3, LY5, PR2, PR4, PR5, PR6, DB3,IP8 & IP10

- Create a programming, database or HTML/CSS solution in an area of personal interest or as part of a team.

IP9 & IP10

- Apply CSS structure by using a web editor, such as Dreamweaver or NVU.

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