Design 11

Guide

NOVA SCOTIA
NOUVELLE-ÉCOSSE

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Design 11

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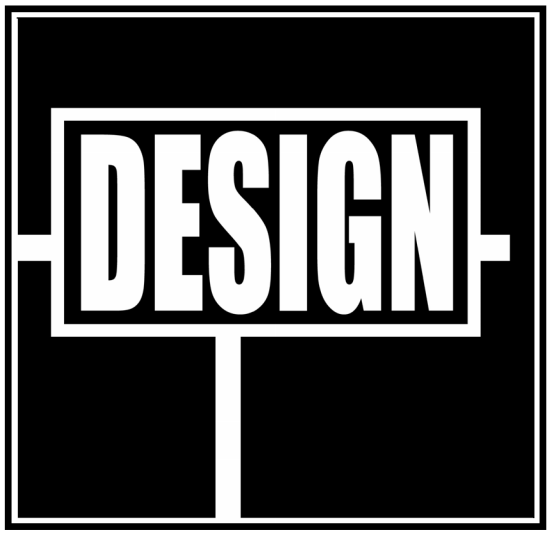
NOVA SCOTIA

Education
English Program Services

Design 11

CURRICULUM

Implementation Draft
March 2000



Design 11

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Introduction

Background

The Department of Education has made a commitment to provide a broad-based, quality education in the public school system and to expand the range of programming to better meet the needs of all students. The Department is working in collaboration with school boards and other partners in education, business, industry, the community, and government to develop a variety of new courses.

Design 11 is one of a group of innovative multidisciplinary course options which share certain characteristics.

New course options draw from and contribute to students' knowledge and skills in more than one discipline. Students synthesize and apply knowledge and skills acquired in other courses, including courses in English language arts, social studies, science, arts, mathematics, and technology.

New course options provide increased opportunities for senior high school students to

- earn the credits they require to attain a high school graduation diploma
- diversify their course options
- prepare for varied post-secondary destinations

Course options are designed to

- appeal to all high school students
- assist students in making connections among school, the community, and the workplace
- enable students to explore a range of career options

These courses offer students increased opportunities for hands-on experiences and for using technology within a variety of subject areas to expand and develop their learning and skills.

Design 11 provides learners with opportunities to understand and apply the design process, a unique way of understanding, responding to, and changing the world around us. Design 11 offers learners skills and values that they can apply to a range of learning challenges and career opportunities.

The Nature of Design 11

We are surrounded by design. Design is used to solve problems and answer questions in every aspect of the environment created by humanity. The results of design can be seen, for example, in gardens, signs, displays, furniture, automobiles, clothing, banquets, houses, computer games, road systems, shopping centres, and Web pages.

When we study design, we solve visual, structural, and organization problems; apply skills and knowledge to explore visual, structural, and organizational relationships; and create innovative approaches, products, and systems.

The study of design can lead to a broad range of potential occupations and fields, including

- architects
- draftspersons
- engineers
- exhibition/display designers
- fashion designers
- furniture designers
- multimedia/graphic designers
- industrial product designers
- interior designers
- landscape designers
- set designers
- sound designers
- teachers
- Web masters

Design 11 is organized into five modules, of which students must take four to receive a full credit or two to receive a half credit. In addition to the compulsory module, Design Fundamentals, schools and students can choose modules from The Built Environment, Communications Design, Product Design, and Independent or Design Team Project.

Outcomes

Essential Graduation Learnings and Design 11

The Atlantic provinces worked together to identify the abilities and areas of knowledge that they considered essential for students graduating from high school. These are referred to as Essential Graduation Learnings. Details may be found in the document *Public School Programs.*

Some examples of learning in Design 11 which helps students move toward attainment of the essential graduation learnings are given below.

Essential Graduation Learnings	Design 11
Aesthetic Expression Graduates will be able to respond with critical awareness to various forms of the arts and be able to express themselves through the arts.	By the end of Design 11, students will be expected to • render forms through drawing and other ways of representing • apply understanding of the design process in evaluating and planning a design • describe and apply design strategies: plan, communicate, inquire, and make decisions • explain designs' power to persuade inform, entertain and/or otherwise engage • identify and use the elements and principles of design, and processes associated with design, as they apply to projects in interior, architectural, environmental, and/or product design
Citizenship Graduates will be able to assess social, cultural, economic and environmental interdependence in a local and global context.	By the end of Design 11, students will be expected to • describe the technical, moral, economic, social, aesthetic, environmental, and cultural values that have an impact on design decisions and apply this understanding to design issues • demonstrate an understanding of the impact of a living environment on human beings and of how human factors can affect architectural, environmental, and interior design • describe the responsibility design has toward the human and natural environment

Essential Graduation Learnings	Design 11
Communication Graduates will be able to use the listening, viewing, speaking, reading, and writing modes of language(s) as well as mathematical and scientific concepts and symbols to think, learn, and communicate effectively.	By the end of Design 11, students will be expected to • use a variety of communication tools to create texts for a range of purposes • analyse text from various forms of communication created by themselves and others • explain designs' power to persuade inform, entertain, and/or otherwise engage • identify and interpret the strategies used by themselves and by others to create texts which engage
Personal Development Graduates will be able to continue to learn and to pursue an active, healthy lifestyle.	By the end of Design 11, students will be expected to • produce advanced level designed solutions for problems in one or more design disciplines • analyse text from various forms of communication created by themselves and others • select and use appropriate tools and materials to produce creative design solutions
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.	By the end of Design 11, students will be expected to • identify and interpret the strategies used by themselves and by others to create texts which persuade, inform, entertain, and/or otherwise engage • design and create texts which persuade, inform, entertain, and/or otherwise engage • use elements, principles, and processes of design to deal with identified human and/or environmental needs within design solutions • utilize problem solving processes to create prototype products
Technological Competence Graduates will be able to use a variety of technologies, demonstrate an understanding of technological applications, and apply appropriate technologies for solving problems.	By the end of Design 11, students will be expected to • use a variety of communication tools to create texts for a range of purposes (module 4) • use relevant technology to create a design drawing (plan) or prototype

Design 11 Outcomes

Module 1: Design Fundamentals	Students will be expected to apply the elements and principles of design to a range of problems in a variety of contexts.
Module 2: Design in the Built Environment	Students will use their understanding of issues, principles, processes, and technology to solve design problems in the built environment.
Module 3: Communications Design	Students will be expected to use a variety of forms to design communications for a range of purposes.
Module 4: Product Design	Students will use their understanding of issues, principles, processes, and technology to design products used in their environments.
Module 5: Design Project	Students will be expected, independently or as members of a design team, to conduct an investigation or create a product, communication, or environment.

Specific Curriculum Outcomes

Module 1: Design Fundamentals

Students will be expected to

- demonstrate an understanding of the elements and principles of design
- render forms through drawing and other ways of representing
- demonstrate understanding of the relationship between form and function of objects
- apply their understanding of a range of issues, and their cultural/historical contexts, in making design decisions
- demonstrate an understanding of applications for a range of materials, treatments, and finishes
- apply understanding of the design process in planning and evaluating a design
- apply design strategies to plan, communicate, inquire, and make decisions
- describe and apply their understanding of the relationship between design and the environment

Module 2: The Built Environment

Students will be expected to

- describe how human requirements affect design
- describe how the environment has an impact on design
- demonstrate an understanding of the impact of a living environment on human beings
- describe how social, cultural, and economic issues have an impact on design
- describe the responsibility design has toward the human and natural environment
- demonstrate competency in the use of design tools useful in the design of built environments
- apply the elements, principles, and processes associated with design in interior, architectural, and/or environmental designs to address human and or environmental needs
- organize and present design projects

Module 3: Communications Design

Students will be expected to

- use a variety of communication tools to design and create texts for a range of purposes
- identify and interpret the strategies they and others use to create texts for specific purposes
- explain designs' power to engage
- observe, listen, critique, and subsequently learn from their own ideas and the insights offered by peers

Module 4: Product Design

Students will be expected to

- demonstrate their knowledge of the factors which influence effective product design
- demonstrate an understanding of the impact of human form in the design of products (ergonomics)
- describe how the design of products may be affected by the environment in which they are to be used including extreme and toxic environments
- describe the responsibility designers have toward the human and natural environment
- describe a range of economic factors which influence effective product design
- demonstrate competency in the use of tools useful in the design of products
- apply the elements and principles of design, and processes associated with design, as they apply to product design
- identify and use mechanical systems to effectively analyse a product design
- select, organize, and present designs for a range of products
- select and use appropriate tools and materials

Module 5: Design Project

Students will be expected to

- develop and refine a proposal for an investigation or the development of a product, communication, or environment
- identify information needs and locate and evaluate resources
- identify and extend, refine, and/or acquire required skills
- share research and reflections
- make project decisions which demonstrate creativity, innovation, and a willingness to take risks
- set deadlines and develop a work plan to manage time and resources
- develop a plan for monitoring their progress and judging success and contribute to the criteria used for evaluation
- gather, organize, and synthesize information and ideas
- present the results of their work
- reflect on and assess their own learning and the learning of others

Course Design and Components

Features of Design 11

Design 11 is characterized by the following features:

- a strong applied focus with an emphasis on integrating, applying, and reinforcing the knowledge, skills, and attitudes developed in other courses
- a strong connection to the essential graduation learnings
- a strong focus on refining career-planning skills to explore a range of pathways from school
- a strong connection to labour market opportunities with a focus on enhancing students' employability skills
- a strong connection to the community and workplace with a focus on using real community and workplace problems and situations as practical contexts for the application of knowledge and skills and for further learning
- a strong focus on hands-on learning experiences, including experiences with a range of technologies
- a flexible design framework based on learning modules

Key Concepts in Design 11

While there is no generally accepted common definition of the elements and principles of design, the following concepts will be developed in Design 11:

Elements of Design

Elements of design include

- colour
- line
- shape
- texture
- value

Principles of Design

Principles of design include

- balance
- clarity
- emphasis
- framing
- harmony
- legibility
- movement
- organization
- perspective
- point of view
- proportion
- repetition
- rhythm

- simplicity
- unity
- variety

Inquiry-Based Learning

Inquiry-based learning activities are an essential element in Design 11. Students acquire skills and knowledge by working to solve design problems or answer design questions.

Problem solving focusses on developing a practical, effective solution to meet an authentic design need. Students gain a working knowledge of old and new technologies, achieve practical results while acquiring new skills and applying new knowledge, and discover the implications their new learning has for planning a career.

Creative inquiry focusses learning on the dialogue among the maker, the media, and the concept, which eventually produces the art piece or design. The student learns to ask, "What does this situation allow me to do that I couldn't do before?" Students acquire new skills and learn to use new technologies, as they are needed. Creative inquiry encourages learners to create innovative solutions to design problems.

The Design Team Concept

The design team structure is common in many work environments, especially in design-related industries. Working in design teams, learners experience a professional design context. Design 11 offers strategies for learners to build and value teams which

- establish community within the learning or working environment
- give learners a place to freely and confidently express and share ideas
- provide individuals with positive and critical feedback to their ideas
- encourage individuals to think, inquire, and create freely
- provide a forum for constructive brainstorming activities
- offer skilful, and often insightful, support and feedback to team members' individual ideas and projects
- permit learners to offer their skills to others and benefit from the skills of other team members
- enable teachers to mentor and guide learners and to provide feedback in the context of each team's initiatives
- enable individuals to focus on specific tasks and skills, gaining a deeper understanding of an application or process
- encourage creative solutions to design problems

For a more detailed discussion, see Appendix E: Team Design Process and Collective Responsibilities.

Cross-Curricular Connections

Design 11 provides many connections to other subject areas in the high school program:

English Language Arts

Students apply and refine their knowledge and skills in reading, writing, viewing, speaking, listening, viewing, and other ways of representing in classroom interaction and the preparation and presentation of reports. Successful design is often dependent on the effective use of language and organization of ideas.

Social Studies

A critical awareness of the development of design concepts from a historical perspective is an important dimension of Design 11. An understanding of current trends is difficult without awareness of the paths taken by our predecessors in reaching our present level of development. Students will have opportunities to examine the work of a variety of historical and contemporary artists and designers.

Mathematics

Mathematical skills, both algebraic and geometric, are a basic tool in the analysis of data, as well as in the quantitative solution of design problems.

Sciences

Biology, chemistry and physics are the primary connections to the sciences in Design 11. From their first inquiries through the design and construction of complex projects, students apply chemical and physical principles as they are needed in selecting and manipulating materials, and apply biological principles in understanding and altering natural and built environments. Throughout the course students investigate, analyse, predict, and test their own ideas.

Arts

Students work with a range of media and have opportunities to extend skills acquired or required in other areas of the arts.

Technology

Students use a range of software and hardware to extend the knowledge and skills acquired in technology courses. Solutions developed in Design 11 will prepare students for learning across the range of technology courses.

Organization

Credit Options

Design 11 is structured to meet a range of learning needs. Students may earn one-half credit by completing the compulsory module, Fundamentals of Design and one additional module, or they may earn a full credit by completing an additional two modules chosen from Product Design, Design in the Built Environment, Environmental Design, Communication Design, Design Team or Independent Project.

Sequence of Modules

Learning outcomes for Module 1 may be achieved, applied, and extended during the learning experiences designed for the remaining modules. Module 1 may be undertaken prior to or concurrently with other modules, allowing teachers opportunities to use time and resources flexibly and to plan extended learning opportunities. Similarly, the Design Project optional module may be undertaken concurrently with other modules or as the culmination of the course.

Some possible configurations are as follows:

Fundamentals of Design ↓ (including portfolio development)	Design in the Built Environment
	Product Design
	Communications Design

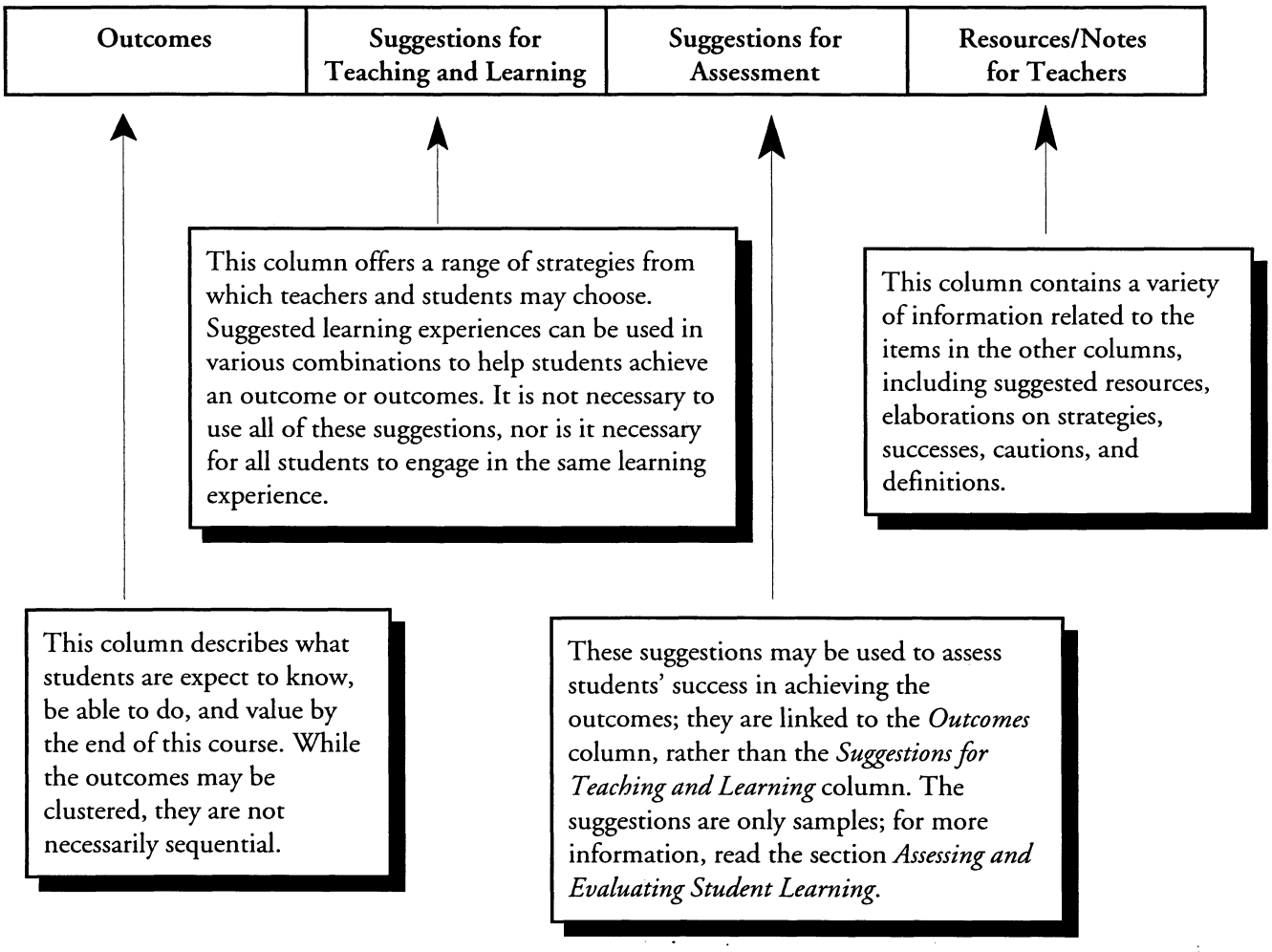
Design Project ↓	Fundamentals of Design (including portfolio development)
	Two of the following modules: Design in the Built Environment Product Design Communications Design

Fundamentals of Design (including portfolio development)
Three of the following modules: Design in the Built Environment Product Design Communications Design Design Project

How to Use the Four-Column Curriculum Matrix

The curriculum for this course has been organized into four columns for several reasons:

- The organization illustrates how learning experiences flow from the outcomes.
- The relationship between outcomes and assessment strategies is immediately apparent.
- Related and interrelated outcomes can be grouped together.
- The range of strategies for teaching and learning associated with an specific outcome or outcomes can be scanned easily.
- The organization provides multiple ways of reading the document or of searching for specific information.



Module 1: Fundamentals of Design

This module prepares students to apply their skills and knowledge to the design issues and problems that are introduced in specific areas of design in the other modules of Design 11. Students use drawing or other ways of representing to communicate and clarify ideas. Activities which apply design principles are placed in a cultural, historical, and/or environmental context.

Students will be expected to apply the elements and principles of design to a range of problems in a variety of contexts.

Outcomes	Suggestions for Teaching and Learning
Students will be expected to • demonstrate an understanding of the elements and principles of design	Teachers can • begin with an activity to establish a team environment and introduce design concepts. For example, distribute a few video cameras (some students may be able to bring in a camera from home), divide the classroom into teams of four or five, and ask the teams to produce a short video, starting with an opening and ending situation which must be connected. Teams construct videos using only in-camera editing, and each team member may act, shoot, and produce segments of their team video. Students can explore concepts of continuity, cooperation, and creativity. • organize students to work in groups to develop a list of occupations related to art or design, starting with individual lists, then group lists, and finally a class list. Students identify occupations of interest and help one another clarify their understanding of skills and aptitudes common to the occupations in the design sector. • use an introductory text, for example, Todd, et al., *Introduction to Design and Technology* or Garratt, J., *Design and Technology*, to help students develop a more academic understanding of the design process; design elements, including point, line, shape, form, texture, and colour; and principles, including proportion, balance, repetition, emphasis, variation, and pattern Students can • use Internet sites to explore fundamental concepts in an engaging way: **http://www.uni.uiuc.edu/~artspace/tempexhib/art1/elements.html** **http://www.coe.uh.edu/courses/cuin7317/design.html** • perform an Internet search for "principles of design" and develop an annotated list of design-related sites. For help on searching, look in the Design Support Web site maintained by the Nova Scotia Department of Education **http://www.ednet.ns.ca/educ/** • use conventional materials (pencils, pencil crayons, or pastels) to make thumbnail sketches which illustrate these concepts, write their own definitions, and compare the concepts of the various writers • scan magazines for examples that illustrate each principle and element of design

Students will be expected to apply the elements and principles of design to a range of problems in a variety of contexts.

Suggestions for Assessment

Teachers can

- ask students to represent elements and principles of design with an image, either drawn, selected, or present in another visual form and to explain how their designs exemplify these concepts
- create or acquire visual examples of the elements and principles in isolation or combined with other elements and principles and have students identify the elements and principles
- organize a classroom display, for example, a mural or collage, with elements created by students to illustrate specific design elements and concepts. The display might include excerpts from students' journals explaining their design decisions.

Students can

- create a rubric to assess what they have learned from creating
- short videos including items that indicate the extent to which they have cooperated, used strategies that ensure continuity, learned basic in-camera editing techniques, and made use of the elements and principles of design
- work in groups to assess two unrelated objects, for example, a hairbrush and a glass, and develop a list for each object of anything they associate with the object. Students choose an item for each list and combine them to create a new object. For example, from the brush list, choose hair, and from the glass list, choose vessel, then design a vessel made from hair.
- identify objects that show the use of various elements and principles of design and explain what they illustrate

Resources/Notes for Teachers

A standard hardcover sketchbook can serve as a tool for evaluation and as a journal for the learners creative ideas and other design process work. Hardcover sketchbook tend to be durable, inexpensive, and archival, and can play an integral role in the learner's portfolio, illustrating that the process, as well as the final product, is valued.

Teachers might consult with drama educators for examples of theatre games and apply them through video. It is important that each student have the opportunity to act in, produce, and shoot a part of a video.

The *elements* and *principles* of design are not agreed upon by educators, practitioners, and scholars who often use different terminology The concepts below represent a common collection of elements:

- *elements of design*: colour, line, shape, texture, and value
- *principles of design*: balance, clarity, emphasis, framing, harmony, legibility, movement, organization, perspective, point of view, proportion, repetition, rhythm, simplicity, unity, and variety

For teaching and assessment strategies and information on the fundamentals of design see: Todd, et al., *Teacher's Resource Guide: Introduction to Design and Technology*, and Garratt, *Design and Technology*.

For an outline of the design process, see Appendix B: The Design Process.

Students will be expected to apply the elements and principles of design to a range of problems in a variety of contexts.

Outcomes	Suggestions for Teaching and Learning
Students will be expected to	Students can
• demonstrate an understanding of the elements and principles of design	• isolate and respond to each element individually while gaining experience with a range of mediums. For example, – *line*, draw a self portrait using non-conventional materials (not a pen, pencil or brush) and discuss their decisions with their peers – *colour*, organize and paint a colour wheel using acrylics, gouache, tempera, pencil crayons, magazine cut-outs; develop one colour wheel showing primary, secondary, and harmonious tertiary colours and another showing complementary and analogous colours, and high or low key pallets – *shape*, practise rendering a range of three-dimensional shapes and objects – *value*, gain control over the range of a medium, for example, a pencil. Students could form a grey scale by drawing seven connecting two-inch by two-inch squares. In each square the student could *hatch* a layer of graphite, adding further layers of graphite in boxes, from left to right. Students should be able to represent a slow progression from white through black, each square becoming one shade darker or lighter than the previous. – *texture*, use a hard dry medium on a thin but strong sheet of paper (e.g., an HB graphite stick in vellum); search within the school environment for surfaces from which to make rubbings • generate collages from found materials (for example, in magazines, newspapers, flyers) which illustrate an element or principle of design. See Internet links to examples on the Design 11 Web site. This Web site also includes a list of student and teacher resources to support Design 11, including publication information. • select music that has a clear relationship to a specific principle, or that illustrates the opposite of these principles – *simplicity*—song from a music box – *clarity*—Mozart – *balance*—Beethoven *Ode to Joy*.... "drink milk love life.." – *harmony*—a barbershop quartet – *organization*—Nine Inch Nails – *variation*—jazz

Students will be expected to apply the elements and principles of design to a range of problems in a variety of contexts.

Suggestions for Assessment

Teachers can

- examine student sketch books and look for sketches that exemplify a search for understanding of the elements of design. Such sketches might be thumbnail sketches, a section dedicated to the recording of a range of mark making techniques, the layering or blending of colours, rubbings of surfaces, grey scales, drawings from life or collages.

Students can

- through their sketchbooks, search for ways to represent the elements of design. They can experiment with materials, variations of line, collage, for example, by creating a record of 100 different ways to make a mark. Such an activity can occupy a section of their sketchbook and might be engaged in until the end of the year.
- share their work with others and offer constructive comments
- draw comparisons between various works of music and visual art using the principles of design as the criteria of comparison
- create visual works inspired by the elements and principles of design they identify in particular tracks of music
- choose music which uses two or more principles and elements, and make visual work which reflects these concepts
- begin their portfolios with a reflection on what they have learned about the elements and principles of design supported by a selection of key pieces which illustrate their progress toward the achievement of this outcome

Teachers and students can

- assess students' ability to recognize the principles of design in various aesthetic forms (e.g., music, graphics, paintings, sculpture, architecture, products). This might be done as a class in which students identify the elements and principles at play in a range of examples. Students could participate in selecting and organizing the examples to be used, as well as in developing criteria for selection.

Resources/Notes for Teachers

Line is a rich concept and is an essential element in design. Students should gain an understanding of line as an element that can be rendered in virtually all forms of matter. Line is not restricted to the pen or pencil, or the brush and ink; line can be created with lasers, snow, tread marks on a road, a scalpel, etc. Line can describe most aspects of our world. It can be used to create tonal value, form a caricature, write poetry, design furniture.

Since each element of design possesses its own rich vocabulary, history, and text, teachers and learners might find it most effective to engage the fundamentals of each element in its own context, only combining various elements later in a more complex design project.

Useful materials might include

- hardcover sketchbooks
- fine quality coloured pencils
- acrylic or gouache paints
- bristle and camel hair brushes
- graphite sticks
- vellum (durable and translucent)
- Mayfair one-ply cardstock
- a range of pencils and technical pens
- a variety of tools and objects with simple forms

The Internet is an excellent source of music samples. If using the Internet to gather sound bites, *Realaudio* is a useful necessary piece of software, available free at their Web site as is *Quicktime* available at their Web site.

Students will be expected to apply the elements and principles of design to a range of problems in a variety of contexts.

Outcomes	Suggestions for Teaching and Learning
Students will be expected to	Students can
• render forms through drawing and other ways of representing • demonstrate understanding of the relationship between form and function of objects	• work through a range of drawing exercises, such as the following: – *gesture drawing*: A student volunteers to stand in a variety of dynamic and simple poses for short periods of time (60 seconds). Students work to capture the gesture of the way the model's form is positioned and energy is directed. This exercise will help the student to become more free and confident with the chosen medium, to value time engaged with the model rather than being fixated on the drawing, and to value the complexity and order of the human form. – *responsive line drawing*, or *contour drawing*: The student observes the curves and gestures of the body. With this method of drawing, often rendered with a reed or other dip pen, the student carefully plans strokes and completes them in a controlled gesture. The marks are continuous and minimal. The pen never leaves the page and the observer rarely removes his or her eyes from the subject. This method can be most effective if the student can pace his or her strokes with his or her own breaths. – *perspective drawing*: As a demonstration, the teacher leads the students through one- and two-point perspective drawings of simple rectangular shapes. Students work to describe their ideas through three-dimensional renderings, then develop a one-point perspective drawing of a simple tool and a two-point perspective drawing of a simple internal or external space. – *hatching and shading to describe form and/or light*: Students bring in objects that are white or can be painted white. Students set up *still life* stations around the room to observe at a close range. If possible, the teacher might attempt to reduce the light on each still life to one light source on each. Students draw the objects in front of them, paying close attention to the light as it describes the form of the subject. Students investigate this problem using pencil, charcoal, then markers. – *collage*: Selecting images for their texture, colours, and shapes, students construct an image that interprets or realistically represents a physical subject. – *sculpture*: Using new or found materials, students construct objects that replicate the form and function of a real subject.

Students will be expected to apply the elements and principles of design to a range of problems in a variety of contexts.

Suggestions for Assessment

Teachers can

- give frequent, personal feedback while students are working, and provide positive reinforcement when students
  - capture gestures of a subject in minimal time
  - create quick drawings that represent the physical gestures and position of their subject
  - make confident marks, holding the pencil by its far end, instead of by its tip for more control over making such marks
  - make drawings which mirror the proportions and relationships of their subject's form
  - observe hand and eye activity; students get best results when they spend more time observing and responding to a subject than consciously altering their drawing. For example, pairs of students could take turns to draw a portrait of each other. The subject would have the responsibility of watching the eyes of his or her partner, encouraging the partner to look at him or her, rather than at the drawing.
  - create responsive line drawings with marks which respond to, rather than represent, the form of their subject
  - use hatching and other ways of modelling to describe form and the presence of light reflecting off a subject
  - mix and apply colours that are true to the subjects likeness or character
  - respect and investigate the possibilities within the mediums they are using

Resources/Notes for Teachers

Drawing can be performed through a range of conventional and non-conventional materials, from the pencil or brush to CAD applications or lipstick on a napkin. Each medium contains its own range of possibilities. The pencil and pastel offer a great variety of mark making possibilities.

Visual representations, especially drawings, are an important vehicle for communicating design solutions. As students become skilled in the use of a range of media and materials, they build their confidence in creating precise, innovative, and effective design solutions.

There are many drawing languages which the students could investigate. Resources to provide strategies to help them gain these skills include Edwards, Betty, *Drawing on the Right Side of the Brain.*

See the sculptures and paintings of Alberto Giaccometti which exemplify the human gesture as it is studied with great attention by the artist.

Examples can be found in line drawings found in traditional Japanese art.

Escher drawings provide excellent examples of dynamic perspective drawing.

Masters of the High Renaissance, such as Michelangelo and Albrecht Durer, provide excellent examples, as do the drawings and paintings of Claus Oldenburg.

Students will be expected to apply the elements and principles of design to a range of problems in a variety of contexts.

Outcomes	Suggestions for Teaching and Learning
Students will be expected to	Students can
• apply their understanding of a range of issues, and their cultural/historical contexts, in making design decisions	• discuss design processes used to develop an existing sport or recreational product (e.g., compare with three brands of skateboard, including past and current models); record information on the development of the design, including variations in design elements, structure, and materials (e.g., wood versus composite); determine how these variations relate to function and aesthetics • illustrate the design process by keeping journals in their portfolios (or notes in a hardcover sketchbook) to record their own design experiences from specific projects and to reflect on their learning and the design processes they are undertaking • examine the principles and elements of design at play in advertisements or advertisement campaigns and the overall impact they might they have on an audience • consider why they should care about how a corporation is marketing products and how they are personally affected by marketing strategies • discuss whether advertisers attempt to manipulate an audience, identifying any forms of manipulation used • describe how a series of advertisements reflects a society and how it might contribute to a culture's identity • study their own work and that of peers to assess and improve on gestures of form, responses to the patterns of form, one- and two-point perspective drawings, and ways to describe light and form through hatching and other methods of shading

Students will be expected to apply the elements and principles of design to a range of problems in a variety of contexts.

Suggestions for Assessment

Students can

- examine a series of advertisement s which promote, for example, sporting goods, smoking, for gender roles and behaviours. Students might de-construct the form and content of advertisements and other designs to identify the social, psychological, cultural, and economical impact of these devices
- develop a collection of advertisements and advertising campaigns to identify and classify according to the intentions of the advertiser and the potential impact of these designs on an audience
- study the theme of good and evil as represented in design. Good as in Zen gardens; paintings by Barnet Newman an Mark Rothko; schools, hospitals, and other public institutions. Evil as in nationalist or war propaganda, concentration camps and human ovens; evaluate and compare past designs and ones of the present, establishing the motives for the designs.
- select a product (e.g., telephone, fax machine) and research the development its design; use a variety of resources (e.g., on-line searches, electronic forums, community sources, magazine archives) to gather information about the historical development of the product design, the impact of specifications on the product design, technological developments, ergonomics, environmental values, engineering principles, and aesthetics; use a range of communication tools to present their findings to the class

Resources/Notes for Teachers

When creating their own designs or assessing the designs of others, students need to consider a range of issues, including

- technical issues involving processes, materials, and media
- moral and ethical issues
- economic issues
- social and cultural issues
- environmental issues
- aesthetic issues concerning design elements

Lesson plans for investigating design issues can be found on the Internet screen.com (see the Design 11 Web site for the specific URLs.) or in Todd, et. al. *Teacher's Resource Guide: Introduction to Design and Technology*, and Garratt, *Design and Technology*.

Students will be expected to apply the elements and principles of design to a range of problems in a variety of contexts.

Outcomes	Suggestions for Teaching and Learning
Students will be expected to	Students can
• apply their understanding of a range of issues, and their cultural/historical contexts, in making design decisions	• track a TV/magazine/newspaper commercial series (e.g., an automobile series) in order to – identify the principles and elements of design at play and discuss how these properties interact – note the order of the series, where applicable, and its impact – identify and describe the music theme (artist, ear written in, style of music, standard audience) and its impact – identify the product being sold – identify the central theme of the campaign – discuss how *branding* is accomplished in the series • critically examine a spoof advertisement such as those published in *Adbusters* magazine or on their Web site, to – identify the intent or purpose of the spoof – assess from their own experience, the accuracy and validity of the spoof – assess the potential impact of such spoof advertisements on an audience

Students will be expected to apply the elements and principles of design to a range of problems in a variety of contexts.

Suggestions for Assessment

Teachers can

- determine students' media analysis skills: Are students taking time to ask questions about the media example (e.g., its context, intentions of the maker, strategies used, intended audience), or are students judging the example without consciously evaluating it?
- look for the ability to articulate and support a point of view concerning the impact of technical, moral, economic, social, aesthetic, environmental, and cultural values on design decisions

Students can

- become "experts" on a particular subject and present their findings and ideas to a larger group or the entire class
- show that they can assess the design elements of an advertisement by
  - creating an ad
  - dramatizing a commercial
  - presenting a freeze-frame commentary on a commercial
  - collecting ads which illustrate one design principle especially well
  - sorting ads into categories
  - creating a proposal for a client
  - creating a "how to" poster or fact sheet
  - writing a letter to a student who missed that learning experience

Resources/Notes for Teachers

Many satirical magazines, for example, *Mad Magazine* often uses spoofs. An Internet search on "spoof" will identify a number of sites which should be previewed by teachers before classroom use.

Students will be expected to apply the elements and principles of design to a range of problems in a variety of contexts.

Outcomes

Students will be expected to

- demonstrate an understanding of applications for a range of materials, treatments, and finishes
- apply understanding of the design process in planning and evaluating a design
- apply design strategies to plan, communicate, inquire, and make decisions

Suggestions for Teaching and Learning

Teachers can

- introduce or review a design process model (e.g., IDEATE, see Todd et al.) and help students to use the process to create their own magazine ad, a video commercial, or a commercial performed live
- outline, using examples, the steps taken to design an advertising campaign and provide examples of how a design process might be used. See *Todd et al.* for more explicit explanation of a design process and examples.

Students, independently or in design teams, can

- design and create an advertisement or advertisement campaign which either promotes or undermines an industry's or corporation's marketing intention
- examine an existing product, and evaluate materials, treatments, finishes and other elements making up the product; assess properties which should remain with the product and ones which should be added or removed and illustrate or make a model of the modified product
- maintain a journal record and outline all design ideas, inquiries and decisions, reflections, and insights
- following the designing and creating of their advertisement designs, defend their designs by
  - presenting the advertisement or advertising campaign to the class inviting the class to discuss the intent, principles, and elements of design at play in the advertisement, effectiveness of the advertising concept and/or its execution, etc.
  - writing an explanation for their design decisions or submitting a journal which outlines their design problems, questions, and solutions in progress

Students will be expected to apply the elements and principles of design to a range of problems in a variety of contexts.

Suggestions for Assessment

Teachers can

- examine journals or sketchbook and give feedback to encourage use of design process steps represented as notes which apply logical steps to a design problem
- look for the learners' ability to assess and apply technical, moral, economic, social, aesthetic, environmental, and cultural values that have an impact on design decisions to their projects. In a design proposal these elements might be identified and ways in which they apply to their project could be discussed.
- assess possible interpretations and uses for the text resulting in the project. Class or group discussions might offer a range of interpretations of a given text (design).
- compare the product with the documentation in learners' journals. Learners should communicate through their journals the plans, questions and decisions they made during their design process.
- assess presentations or reports developed by the learner, looking for evidence that learners
  - have considered the impact and possible interpretations of their design
  - use terminology that clearly articulates their ideas and addressing the elements and principles at play in their design
  - are developing critical understanding of the influential relationship of design and the environment
  - have made a record of their creative and explorative process, including insights, questions, and decisions

Students can

- reflect upon their journal and product, evaluating the nature, results, and possible alternatives to their decisions
- participate in designing performance criteria for their projects
- offer strategies for new designs which they would like to create (see Appendix B)

Resources/Notes for Teachers

IDEATE (Todd, p. 17) is a good example of an effective design process:

- identify and define the problem (I)
- develop the design brief—clarifying the results you want to achieve (D)
- explore possible alternatives (E)
- accumulate and assess the alternatives (A)
- try out the best solutions (T)
- evaluate the results (E)

See Appendix B: The Design Process.
See Appendix C: Design Brief Development.

Students will be expected to apply the elements and principles of design to a range of problems in a variety of contexts.

Outcomes	Suggestions for Teaching and Learning
Students will be expected to • describe and apply their understanding of the relationship between design and the environment	Teachers can • screen a film such as *Triumph of the Will* or Michael Moore's *Roger and Me* and ask students to discuss what they would ask the film maker about the ethics surrounding his/her design decisions • lead students on a tour through various spaces and places within the school or local community, asking students to ascertain and discuss the function of each space, and the effect of the place on each student, attempting to isolate the factors or conditions which stimulate moods and concepts within the student • introduce students to SimCity 3000; this computer game takes into consideration many design factors which have an impact on the built environment and places them in the control of the user • have students examine the impact which industrial designs have on the environment. The students could conduct interviews with designers or regulators to investigate the environmental factors an industrial designer in Canada must consider when designing a product (e.g., highways, exhaust systems in cars or smoke stacks for industrial ovens). Students can, working alone or in design teams, • design a persuasive poster • create a plan for an environment with the intent to manipulate an audience or create or simulate a particular experience, for example, a doctor's waiting room or an automobile showroom. The learner will likely need to research decisions made in other spaces and apply the appropriate concepts. • create a small city using available materials or SimCity 3000 • research and report on a range of environmental factors which a designer would have considered in the creation of a known product and elaborate on the reasoning for the designer's decisions. Students might create a project proposal, a critique, or both.

Students will be expected to apply the elements and principles of design to a range of problems in a variety of contexts.

Suggestions for Assessment

Teachers can

- monitor and give feedback on students'
  - use of techniques which support, explain, and share their project work with their peers
  - use of design language to express and defend their creative decisions
  - use of relevant design theory in journals, reports, and/or presentations
  - consideration of how the implications, methods, and/or perceptions of students' design decisions contextualize the content or form of their projects

Students can

- participate in developing ways which they can creatively present their projects to an audience. Group responses to presentations could focus on exploring ways in which a project might be presented to given audience. For example, the class might explore how a presentation could change if it were for a design firm, a client, a family member, or a child.
- assess the relationship established between the form of the presentation of their projects and the content and form of their projects' subject. Do the presentation devices support or compete with the goals of the presentation or project?
- investigate the relationship of design and environment and share with their peers the nature and results of their creative explorations
- based on the exercise they participated in to investigate the relationship between design and the environment, reflect upon their new understanding of this relationship to create a meaningful definition of it

Resources/Notes for Teachers

Recommended resources

- Internet access
- a scanner
- Web page design software
- Adobe Photoshop or other photo-manipulation software
- a video camera
- a word processor
- hardcover sketchbooks
- graphic markers, or paints
- a variety of writing and drawing implements
- scaled rulers

Useful software might include

- Adobe PageMaker or Quark Express
- Avid Cinema
- Adobe Illustrator, Corel Draw, or Macromedia Freehand
- SimCity 3000

Module 2: Design in the Built Environment

Students acquire an understanding of the many environmental issues and forces which play a part in designing built environments. Project work provides opportunities to explore the interrelationship between humans and their environments, and focusses students on the ethical, economic, practical and creative considerations that must be part of effective design solutions.

Students will use their understanding of issues, principles, processes, and technology to solve design problems in the built environment.

Outcomes

Students will be expected to

- describe how human requirements affect design
- describe how the environment has an impact on design
- demonstrate an understanding of the impact of a living environment on human beings
- describe how social, cultural, and economic issues have an impact on design

Suggestions for Teaching and Learning

An exciting way for learners to become aware of the relationship between built environments, humans, climate, and design might be to visit locations that offer a range of phenomenological experiences and to discuss what they see, understand, and feel. Learners might also identify built environment design issues through a study of exemplars of built places and designs of places. Libraries and the Internet provide a range of useful resources.

Teachers can

- arrange for learners to visit environments that offer a range of experiences as a result of their designs. Natural environments might also provide experiences that learners can use to begin their journals with notes and sketches which they can return to when they begin to consider design problems and work toward design solutions, for example, offices, malls, farms, or gardens.
- work with the students to develop a critical scheme to understand and value built environments; and to organize their insights; and to recognize, describe, and solve design problems
- select resources to introduce learners to a range of built environment design problems and solutions, for example, a study of architecture history
- provide a list of places that a group of learners could visit to discuss how the environment and people influence design decisions, and to experience and discuss the impact of design decisions on the environment and people. The list could include, for example, a school, mall, playground, historic site, recycling centre, or hospital.
- help students develop a list of the limits and restrictions placed on the design of environments by legislation dealing with health, safety, and ecological issues

Students can

- identify and share with peers examples of built environments unique to their own cultural experience (e.g., In an Italian village homes are often built with flat roofs, to build additional levels as the family grows.)

Students will use their understanding of issues, principles, processes, and technology to solve design problems in the built environment.

Suggestions for Assessment

Teachers can

- observe, guide, and give feedback to students in group discussions following visits to a selection of places and spaces that offer a range of phenomenological experiences
- listen for and reinforce statements that indicate student recognition, understanding, and valuing of phenomena offered by a selection of places
- assess student written and oral comments for evidence of understanding how the environment, humans, and design relate to and affect one another. This understanding could also be demonstrated by students through
  - written or oral descriptions of a particular place's effect on them and by identification of factors that might be contributing to this effect
  - responses to questions relating to the reasons for and results of historical built environment design decisions
  - suggestions for design solutions for built environments which consider the impact on humans or the environment
- recognize student preparation for and participation in guiding their peers through spaces that offer a range of cognitive and/or affective experience

Students can

- create and defend a proposal for design solutions of an existing or invented built environment design problem
- choose an extreme environment, for example, arctic, tropical, or desert environments, and develop a list of the problems which it would present to a designer
- guide peers through spaces that offer a range of cognitive and/or affective experience
- critique design solutions of their own creation and/or offered by peers, looking for evidence of the relationships among the environment, humans, and design, and enter their observations in their journals
- select a list of factors to guide a design and explain their decisions

Resources/Notes for Teachers

Students and teachers could examine the impact of design, people, and climate on the design and construction of built environments through survey of architecture or through a field trip to view local architectural features.

For a challenging but easy to use interactive educational activity see The Piero Project, Princeton University Web site.

Students can examine built environment issues from the reconstructed point of view of Piero della Francesco.

Students will use their understanding of issues, principles, processes, and technology to solve design problems in the built environment.

Outcomes	Suggestions for Teaching and Learning
Students will be expected to • describe the responsibility design has toward the human and natural environment	Teachers can • organize a walking tour, and work with students to develop an observation/comment sheet to be used during the tour. The results could be combined with photographs to create an impressive classroom or school display. Sites might include – day care centres and nurseries – commercial sites including restaurants, stores, garages, malls – recreation facilities and parks – schools – offices and factories – a range of dwellings Students can • work with others to undertake a WebQuest (see Appendix D), exploring Internet sites and reporting on a topic which exemplifies the need for design to act responsibly towards humans and the natural environment • record, elaborate on, and share observations, insights, and emotions resulting from experiencing examples of design decisions on humans and natural environments. Learners can also work together in design teams to create a design solution for a problem they have identified. • research and report on the impact of design of the built environment on humans and the natural environment • use their research to create arguments and stage a debate on the need for designers to act responsibly when designing built environments • work in design teams to develop a solution to the environmental problems associated with designing for space (e.g., a space station), in particular dealing with the absence of air, gravity, heat, and water

Students will use their understanding of issues, principles, processes, and technology to solve design problems in the built environment.

Suggestions for Assessment

Teachers can

- encourage students to include in their journals entries which will demonstrate their intellectual and emotional understanding of the effect of design decisions on humans and environments
- use a WebQuest (see Appendix D) to provide students with many opportunities to record their discoveries, observations, and insights in oral and written reports and in their journals
- assess reports generated by students (e.g., from a WebQuest) for understanding of design's responsibilities towards various environments or journal entries that relate professions, educational requirements, industry needs, and activities to design considerations
- assume a role other than "teacher," (e.g., "client") to respond to student research or WebQuest. For examples of teachers in a role situations and strategies see Appendix E: Team Design Process and Collective Responsibilities.

Students can

- share and assess research and reflections made by themselves and their peers in conversations and in their journals
- participate in team activities by encouraging peers, suggesting and assessing solutions, and conducting research tasks
- take an active position to promote environmental responsibility issues
- reflect in their journals on their research process and findings
- respond to their peers' research and reflections

Resources/Notes for Teachers

Interesting films demonstrating the impact of design on humans and the natural environment include the following:

- *Threads*, a British view of WWII
- television news coverage of storms, fires, earthquakes
- *Backdraft*
- *Titanic*
- *Brazil*

For WebQuest information, designs, and templates see
http://edweb.sdsu.edu/webquest/webquest.html
http://www.thoths.com
http://www.oznet.com

The design team concept is an effective way to organize students to work together in Design 11. The structure represents the organization used in many workplaces and helps students make connections between their learning and a career in design.

When people work in design teams, they contribute to the project according to their skills, contributing technical skills (doing the task, solving the problem, making the product), human skills (communicating and motivating people to work together), and conceptual skills (monitoring progress and group functioning, linking the work to that of other groups and to the overall project, dividing and delegating, judging success). When teachers assume a supervisory role that replicates the workplace, it can have a dramatic effect on classroom dynamics and relationships.

Students will use their understanding of issues, principles, processes, and technology to solve design problems in the built environment.

Outcomes

Students will be expected to

- demonstrate competency in the use of design tools useful in the design of built environments

Suggestions for Teaching and Learning

Teachers can

- provide information on the use of traditional drafting tools, such as drafting pens, design markers, pencils, T-squares, and of computer-assisted drafting tools
- create or use a module to guide learners through the dynamics of a CAD system
- demonstrate and engage students in the construction of 3-D models

Students can

- learn how traditional and/or CAD systems may be used to design an environment
- work through a module designed for them to build skills in a particular traditional or CAD application
- as individuals or in teams, complete a prescribed task developed to allow them to demonstrate competency in the use of tools commonly used in the design of an environment. Such a task could be to sketch, design and/or build a crude (basic) model of a fantastic or calming place; an ideal bedroom; an ideal outdoor place; a place that is, in the learners' mind, a nightmare; an automobile; a set for a scene in a favourite movie or play
- use a more communications-based application, (e.g., Photoshop or Pagemill) to alter the physical attributes and aesthetics of an image of an existing place
- design a house or cottage, undertaking some or all of the following: a floor plan, elevations, a section, a perspective drawing, a model, a site plan, materials lists, and costing

Students will use their understanding of issues, principles, processes, and technology to solve design problems in the built environment.

Suggestions for Assessment

Teachers can

- provide checklists so that students can track their skill in applying the a range of functions provided within software applications
- assign journal entries in which students can demonstrate that they recognize and have reflected on the role played by the elements and principles of design in their creations
- read and to respond to student journals, looking for coherent and detailed notes of students' growth towards gaining new knowledge and proficiency in applications
- model and prompt students to use relevant terminology to articulate and defend design decisions

Students can

- assess their proficiency with new applications through comparing notes and design decisions with peers
- contribute insight and criticism to peers and apply the insights and criticisms of peers and teachers to their own development

Resources/Notes for Teachers

For a list of traditional tools and their uses, see Todd.

CAD refers to computer aided drafting tools. Popular CAD applications include

- AutoCAD Light
- MacDraft

Shareware versions of a range of drafting programs are available free from several Internet sites. Since these sites change frequently, it is best to conduct an Internet search using the key words "CAD" and "shareware."

See *Communication Strategies for Teaching and Learning* for skill development strategies in applications such as Photoshop.

Students will use their understanding of issues, principles, processes, and technology to solve design problems in the built environment.

Outcomes

Students will be expected to

- apply the elements, principles, and processes associated with design in interior, architectural, and/or environmental designs to address human and or environmental needs

Suggestions for Teaching and Learning

Students can

- work toward achieving these outcomes through individual or design team projects
- choose design projects that will give them the best opportunity to demonstrate the knowledge, skills, and values they have collectively gathered in this and previous modules

Teachers can

- use this project as an ideal opportunity for learners to prepare their work-in-progress and completed projects to be presented on a Web site. Many providers give free Web spaces to the public. A Web space can be conceived of as a built environment.
- with reference to Appendix E: Team Design Process and Collective Responsibilities, guide and mentor individuals or teams of students through the following tasks:
  - gathering relevant data, or expanding on earlier research, and using CAD software in the design of a basic plan for an environmentally responsible structure with a commercial, residential, or industrial purpose. Students might be expected to explain and defend their practical and aesthetic design decisions.
  - researching data and developing a series of designs for spaces constructed to evoke particular moods in a targeted audience. Learners might make designs for a nursery, classroom, study, play space, dungeon, etc. This installation might be planned out in detail, and/or actually installed in an existing place. Learners might be expected to explain and defend their practical and aesthetic design decisions.
  - designing a garden environment which is accessible to pedestrians (e.g., a public space). Students should research and consider appropriate plant life, soils, path and fence materials, irrigation, etc. Students might be expected to explain and defend their practical and aesthetic design decisions.

Students will use their understanding of issues, principles, processes, and technology to solve design problems in the built environment.

Suggestions for Assessment

Teachers can

- monitor and provide feedback on students'
  - behaviours which encourage creativity and positive team building dynamics
  - successes at critiquing peer projects, fairly and meaningfully
  - conscious consideration of design elements and principles in journals and projects
  - creative and effective use of the right tools for the job
  - the balance of variety and simplicity in their designs

Students can

- reflect on their own designs and respond to those of others
- consider the extent to which the designs persuade, inform, entertain, or otherwise engage an audience

Resources/Notes for Teachers

Creative and practical designs of the built environment might be found in the design of

- store layout
- bedroom
- dream home
- care facility
- city
- bridge
- park, yard, garden, or playground
- artistic installation and transformation of a space

For an example, see Appendix G: The Built Environment.

Students will use their understanding of issues, principles, processes, and technology to solve design problems in the built environment.

Outcomes	Suggestions for Teaching and Learning
Students will be expected to	Students can
• organize and present design projects	• upon completion of a built environment design project, share, argue, and defend their design decisions • participate in the assessment of their peers' projects • consider ways to make best use of their knowledge and skills in their presentations • organize their selected materials into a presentation package. Such a package might be a(n) – interactive Web site – slide, Macromedia Director, or PowerPoint-style presentation – traditional classroom presentation – experiential situation, where the designer's peers and teacher participate in the presentation. For example, a learner might create an installation and invite his or her peers and teacher to participate by engaging the installation as pedestrians. The pedestrian can experience the phenomenon of the installed space. – a video presentation

Students will use their understanding of issues, principles, processes, and technology to solve design problems in the built environment.

Suggestions for Assessment

Teachers can

- work with students to develop a rubric which includes
  - content and format choices and students' abilities to share and defend design decisions with an audience of peers
  - the quality of organization in project presentations, focussing on clarity and the capacity of the presentation to reasonably inform and hold an audience's attention
  - the effectiveness of the presentation in intriguing and engaging, as well as informing, an audience
- see Appendix F

Students can

- participate in a discussion or critique of presentations
  - describe their design process experience and explain and justify their design decisions, especially those which address or ignore the relationship among their design, humans, and the environment
  - observe, describe, analyse, interpret, and evaluate the work and design decisions evident in their own projects and the projects of peers
- help to create a rubric or rating scale which can be used to evaluate their projects according to particular requirements, strengths, and weaknesses
- guide peers and their teacher to discuss aspects of their projects according to a particular set of criteria
- develop criteria for evaluating their own and their peers' presentations

Resources/Notes for Teachers

For suggestions on activities that may occur in a design team context and on teachers' roles, see Appendix E: Team Design Process and Collective Responsibilities.

A design team might

- identify a problem
- collaborate and brainstorm to propose solutions
- identify skills and allocate responsibilities and roles
- engage in creative inquiry to investigate and test possible solutions
- assess results, selecting solution(s) for further investigation and/or execution
- create a design solution
- prepare to present, sell, and/or defend solution for a specific problem in a specific setting or business/social context
- present, share, sell, defend, assess, and/or critique a design
- design and construct a scaled-down model of a set for a play or movie, an ideal home, an ideal school, or other environment
- explain and defend their practical and aesthetic design decisions
- use SimCity to create and maintain an entire city

Presentations may occur over several class hours; teachers may need to limit the amount of preparation and presentation time.

Module 3: Communications Design

Communications design provides opportunities for students to work with tools and materials ranging form traditional to high-tech. Through a combination or project work and analysis, students develop an understanding of the strategies and features at work in powerful communications in a range of media.

Students will use a variety of forms to design communications for a range of purposes.

Outcomes

Students will be expected to

- use a variety of communication tools to design and create texts for a range of purposes
- identify and interpret the strategies they and others use to create texts for specific purposes

Suggestions for Teaching and Learning

Teachers can

- help students to identify information provided by the clothing, styling, and accessories of their teachers, themselves, their peers, or any other person
- gather images from the Internet or magazines and help students identify, describe, compare, and evaluate the information within the graphic and its context
- create with the students conceptual constructions of visual or audio text which communicates ideas that are, for example, meaningful/ meaningless, concrete/analytical, linear/non-linear
- explore with students the impact of visual culture on our lives
- introduce students to the communication capacities of various media

Students can

- deconstruct the fashion of their peers or teacher in order to identity the text information offered by their subject
- respond to text from various forms of communication created by themselves and others
- deconstruct the text within any visual image or physical construction, identifying what and how it communicates
- work in design teams to identify, describe, compare, place into a context, and evaluate the text of visual images. Students might, for example, examine critically a tobacco or alcohol advertisement or campaign, identifying the intent and the potential on a target audience.
- explore, create, and exchange ideas through a range of media

To investigate and manipulate communication tools, students can

- critically observe and deconstruct examples of communication design
- use applications to create their own communication designs
- explain how design strategies contribute to the effectiveness, value, and meaning of communication designs
- use a combination of strategies and applications in the creation of a communication design project

Students will use a variety of forms to design communications for a range of purposes.

Suggestions for Assessment

Teachers can

- help students develop checklists of the range of functions within applications and help them track their ability to manipulate them and use them creatively
- help students choose items for a portfolio which demonstrate that they can recognize and reflect on the role played by the elements and principles of design and apply them in their creations
- encourage journal entries with coherent and detailed notes which track student growth towards new knowledge and proficiency in applications
- regularly provide constructive feedback to encourage students to use relevant terminology to articulate and defend design decisions

Addressing communications as the exchanging of ideas through forms of text provides the student with a tangible and inclusive context through which they can

- identify information in communication devices and products
- use appropriate language to explore and discuss the effects of forms of writing, sounds, visuals, smells, flavours, textures, etc.
- assess the effectiveness, intent, and impact of their own communication designs and those of their peers

Students can

- deconstruct a poster to identify and explain particular features or concepts
- create an image, form, or arrangement which conveys specific ideas, for example, design a plan for positioning items in a food market, clothing, or toy store
- using visual information, create a visual essay arranged to communicate an engaging idea. Movie posters and album covers, for example, are often visual essays.
- reflect on the effectiveness of the techniques they have used
- assess their proficiency with new applications through comparing notes and design decisions with peers
- contribute insight and criticism to peers and apply the insights and criticisms of peers and teachers to their own work

Resources/Notes for Teachers

Students need to work with a variety of traditional and software applications and to examine a variety of products created through the numerous tools of communication designs

Students should have opportunities to gain basic proficiency in the uses of two or more communication applications (approximately ten class hours per application).

Photo sources might come from scanned personal photographs, CD-ROMs, or Internet sites. These photos could be altered to change the image's dominant element or principle of design to another one. For example, a symmetrical image of a doorway could be altered to have the door repeated, thus allowing the new image to be described as exhibiting *rhythm*.

With illustration software, students could take a photo of themselves and render it using several different styles of line. One could be an accumulation of dots, another could be drawn with fat lines, yet another could be classically modelled through hatching.

The teacher and students might set up a classroom display of texts created in a range of forms for a variety of purposes—for example, to persuade, inform, entertain, or otherwise engage a particular audience. Students might add to the display as the course progresses.

See Appendix H: Communication Tools.

Students will use a variety of forms to design communications for a range of purposes.

Outcomes

Students will be expected to

- explain designs' power to engage
- observe, listen, critique, and subsequently learn from their own ideas and the insights offered by peers

Suggestions for Teaching and Learning

Students can

- gather a number of designs or art work, and
  - respond in writing to identify what they see, think, and feel as a result of being confronted by this image or object or event
  - reflect on why they were affected by the design
  - share their chosen image or object with a small group of peers and elicit from their peers other responses, then come to a consensus on how a design can be understood
  - reassess their initial responses, identifying and justifying their evidence and reasons for their new responses
- select a design or art work for which they can find resources to research the context from which the work was made. In this research activity students should describe, analyse, interpret, and evaluate the work, providing evidence and arguments with a focus on the context in which the work was made.
- make masks to project an image which they want to declare or disguise

Teachers can

- display examples of design meant to persuade, inform, entertain, and/or otherwise engage, for example, war propaganda posters
- guide and mentor students to assess the design by
  - giving looking time so that students can examine the design
  - making looking broad and adventurous so that students can appreciate the range of information and readings made available in the design
  - making looking clear and deep so that students can explore the various pieces of information and readings in depth
  - making looking organized so that the students might assess the text of the design according to a schema (e.g., Feldman's model)
- help students to understand that the content of the design will not change, but their beliefs and perspectives may have to change to enable their understanding of the design

Students will use a variety of forms to design communications for a range of purposes.

Suggestions for Assessment

Students can

- work together to develop a rubric to track in their own responses and in those of peers evidence of their understanding of designs' power to persuade, inform, entertain, and/or otherwise engage
- select, design, and create texts that persuade, inform, entertain and/or otherwise engage, and include them in their portfolios
- use their journal entries to identify and interpret the strategies they and others use to create texts that persuade, inform, entertain and/or otherwise engage

Teachers can work with students to develop rubrics which can be used to assess

- positive team building dynamics
- fair and meaningful critiquing
- conscious consideration of design elements and principles in journals and projects
- projects that use the right tools for the right job
- designs that balance variety and simplicity
- designs for their ability to persuade, inform, entertain, and/or otherwise engage an audience
- journal notes and sketches that show curiosity and a willingness to experiment

Teachers can

- critique group accomplishments, placing value on student behaviours which build positive design team dynamics
- assess written reflections for coherent writing, relevant and accurate use of terminology, confidence in personal ideas, and an openness to and respect for the ideas of their peers
- establish design team critique groups to present and offer commentary on works that illustrate the impact of design on a visual culture

Resources/Notes for Teachers

Students might create as their project for this module

- poster(s)
- stickers, labels
- paintings
- commercials and adds
- slogans and signatures
- logos and branding
- personal portfolios
- Web pages
- magazine layouts
- graphic images

A design team might

- identify a problem
- collaborate and brainstorm
- propose solutions
- identify skills and allocate primary responsibilities. Assign roles
- engage in creative inquiry to investigate and test possible solutions
- assess results, selecting solution(s) for further investigation and/ or execution
- create a design solution
- present, share, sell, defend, assess, and/or critique a design

For examples, see Appendix H: Communication Tools.

Module 4: Product Design

Students undertake projects to develop products or prototypes that respond to real needs in the world beyond the classroom. Effective design solutions require students to conduct research and to balance the range of practical, material, creative, economic, and environmental requirements in their designs.

Students will use their understanding of issues, principles, processes, and technology to design products used in their environments.

Outcomes

Students will be expected to

- demonstrate their knowledge of the factors which influence effective product design

Suggestions for Teaching and Learning

Students can

- create lists of products used in their everyday lives and assign them attributes according to the following criteria:
  - For what will it be used?
  - Who will use it?
  - In what locales might it be used?
  - In what circumstances and locations might it be sold?
- present the results of their investigations in a variety of ways (Examples could include class presentations, preparation of charts and graphs and other methods with which they are familiar.)
- participate in group activities by experiencing, discussing, and critiquing the effects of design decisions on environments, people, and processes
- engage in WebQuests to research and report on products found in a range of cultural environments

Teachers can

- help students select strategies for Internet or library searches that are suitable to their investigations
- ensure that classroom practices are consistent with the *Public School Program's Internet Access and Use Policy*

Students will use their understanding of issues, principles, processes, and technology to design products used in their environments.

Suggestions for Assessment

Students can

- assess and critique design solutions of their own creation and/or offered by peers, with reference to criteria indicating a clear and growing understanding of the relationship among the products, humans, and design
- share and assess the products of their
- reflect on their research process
- participate in team activities by encouraging peers, suggesting and assessing solutions, and resolving research issues
- assess responses to real or fictional documentation of design's impact on the environment
- take an active position to understand and promote environmental responsibility issues in designing products

Resources/Notes for Teachers

All broad-based technology programs include the three major areas of study: physical products, human processes, and environmental systems. Each of these areas is studied within the framework of the concepts used in technology education. Teaching and learning focus on open-ended problem solving and the use of a variety of design processes.

We use technology in three main ways to adapt the world around us to human needs: (1) to create physical products for our use; (2) to manage and assist human production processes; and (3) to use or control aspects of our natural environment.

To achieve broad technological competence, therefore, students need to understand the uses of technology in the three major areas of physical products, human processes, and environmental systems. They also need to understand the connections among these areas and the ways they interact with one another and with society as a whole. Studies in this area require students to design and build a variety of objects using different types of tools and equipment and a wide range of natural and processed materials. Students also investigate the uses made of various products and their effects on society and the environment.

Students will use their understanding of issues, principles, processes, and technology to design products used in their environments.

Outcomes	Suggestions for Teaching and Learning
Students will be expected to • demonstrate an understanding of the impact of human form in the design of products (ergonomics)	Students can • prepare lists of products which depend upon ergonomics for their successful marketing and distribution • describe how the products in their lists depend upon ergonomics • prepare lists of the factors related to the human form which affect product design • conduct an Internet search for sites related to industries that design and manufacture products used by humans in their everyday lives • organize and present the results of their search Teachers can • arrange trips to industries where products are designed and manufactured • ensure that Internet facilities are available for students to perform searches • design or apply a critical scheme that will help students to understand and value products, organize their understandings; and can later call upon their experiences to recognize, describe, and solve design problems • select resources that can be used to introduce students to a range of product design problems and solutions. Examples include – automobile design – various types of furniture – Web site design – design of biodegradable containers – clothing – furniture • see Appendix I for a definition of design and crafts

Students will use their understanding of issues, principles, processes, and technology to design products used in their environments.

Suggestions for Assessment

Teachers can

- observe, guide, and assess student learning in group discussions arising from visits to a manufacturers and designers of products
- assess students' written and oral communication for evidence of their understanding how products, humans, and design relate to and affect one another. This understanding could also be demonstrated by students through
  - written or oral descriptions of a particular product's effect on them and identification of the factors that might be contributing to this effect
  - written or oral presentations indicating the various technologies involved in the creation of a range of designs
  - answers to test questions on the reasons for and results of historical product design decisions
  - suggestions for design solutions for existing or invented products that consider the impact of and on humans and/or the environment

Resources/Notes for Teachers

Students need to analyse and learn about different environmental systems and the technologies that enable us to use or modify those systems to suit our own purposes. They also need to examine the impact of technology on the natural environment. They should examine both beneficial and harmful effects and short-term and long-term consequences of various types of technological intervention.

Students need to analyse and learn about a range of human production processes and undertake projects that require them to design, develop, and use examples of such processes. In doing so, students should take account of the impact of the processes on individuals, the environment, and society as a whole. All things used by humans are products of one kind or another. The difference between products encountered in the built environment module of this course and those encountered in this module are basically differences of scale. The design considerations are very much the same for both.

Any cursory Internet search for the term "product design" will lead one to the conclusion that most product design schemes in current use employ computer technology of some sort, whether it be CASE, CAD, CAM or any of the other varied types of technology.

Students will use their understanding of issues, principles, processes, and technology to design products used in their environments.

Outcomes	Suggestions for Teaching and Learning
Students will be expected to • describe how the design of products may be affected by the environment in which they are to be used including extreme and toxic environments	Students can • participate in group activities by experiencing, discussing, and critiquing the effect of design decisions and environments on people • create and defend a proposal for design solutions of an existing or invented product • note the similarities between aspects of product design and design in the built environment and prepare class presentations which demonstrate them • select work activities that require specific clothing, such as fishing and nursing, and investigate problems and solutions to related clothing requirements Teachers can • arrange trips to industries where products are designed and manufactured for a range of environments, for example, clothing designers or manufacturers and industrial equipment manufacturers • take students on a walking tour of an industrial neighbourhood and have them record the clothing worn by a range of persons working in that neighbourhood. Students should be encouraged to provide examples from the communities in which they live.

Students will use their understanding of issues, principles, processes, and technology to design products used in their environments.

Suggestions for Assessment

Students can

- assess their proficiency with new applications through comparing notes and design decisions with peers
- contribute insight and constructive criticism to peers and apply the insights and feedback of peers and teachers to their own development
- devise strategies for evaluation; students might develop criteria that can be used to evaluate their projects according to their particular strengths
- guide peers and their teacher to discuss aspects of their project according to particular criteria
- demonstrate and clarify their understanding by active participation in presentations and discussions
- evaluate the quality of their own presentation and assess the overall effectiveness of peer presentations
- through experiencing peer presentations, understand and assess devices used to engage the audience
- reflect critically on the selection of materials, presentation format, and organization of their own presentations and those peers

Resources/Notes for Teachers

Students must become aware that all design is not computer oriented. Much design still comes about as a result of an idea or perception of a designer and might result in the creation of purely decorative products such as jewelry and other art objects.

Design 11 gives ample opportunity for all students to express their feelings and develop insights into how they might, themselves, best fit into a technological world.

The following list gives several examples of professional product design sites:

http://www.bradforddesign.com/
http://www.adiginfo.com/
http://www.inspire-design.com/
http://userweb.interactive.net/~jah/index.htm
http://members.aol.com/Kendall244/
http://www.eleveneng.com/
http://www.pdg-fga.com/
http://www.zetec.co.nz/

The sites listed here are a very small cross-section of the sites available on the Internet. Students should be encouraged to visit product design sites which may be of interest to them.

Students will use their understanding of issues, principles, processes, and technology to design products used in their environments.

Outcomes

Students will be expected to

- describe the responsibility designers have toward the human and natural environment

Suggestions for Teaching and Learning

Teachers can

- share effective examples of the effect design decisions have on humans and the natural environment
- design a WebQuest (see Appendix D) in which students investigate topics based on the responsibility design has toward humans and natural environments. Topics could include
  - design of furniture for a computerized office
  - design of clothing for a range of occupations
  - the relationship between technology and design practices

Students can

- survey the range of technology and tools available to designers
- trace, through a flowchart, the many professions represented in the design of a school, hospital, or other large structure, for example, fishing, farming, computer operations
- independently research and report on ways design is, or should be, responsible to human and natural environments
- examine magazine, Web site, and newspaper articles and discussions that argue for or against the need for responsibility in product design. Resources could include
  - articles on atmospheric pollution caused by, for example, the use of inefficient air conditioning devices, aerosol products, and newsprint production
  - articles on the design of biodegradable containers to reduce environmental pollution
  - articles about product recycling at all levels of product use
- with a team, engage in a WebQuest, exploring and reporting on a topic which illustrates the need for designers to act responsibly towards humans and the natural environment. Significant amounts of information are available, for instance, on aerosol products and the harmful effects of Freon on the ozone layer.
- create and share videos that provide effective examples of the impact design decisions have on humans and the natural environment

Students will use their understanding of issues, principles, processes, and technology to design products used in their environments.

Suggestions for Assessment

Students can

- share observations, insight and emotions arising from their experiences with design decisions that have had an impact on humans and natural environments
- suggest alternate solutions to related design problems
- report on an assigned topic to describe the impact of the design of a product on humans and the natural environment
- organize a debate on the need for designers to act responsibly in designing products

Resources/Notes for Teachers

Examples of product design in which students may be interested include

- Web sites
- musical instruments
- computer games
- clothing
- furniture
- automobiles and other transportation devices
- electronic control devices
- electronic entertainment devices
- kitchen utensils
- wood-working tools

An Internet site is available for collaboration among teachers of Design 11:
http://www.ednet.ns.ca/educ/currwebs/design

Students will use their understanding of issues, principles, processes, and technology to design products used in their environments.

Outcomes

Students will be expected to

- describe a range of economic factors which influence effective product design
- demonstrate competency in the use of tools useful in the design of products

Suggestions for Teaching and Learning

Students can

- perform case studies on products which failed in the marketplace. Notable examples include the 'Edsel' automobile, triangular milk containers, the 'amphicar', discos, 'aerocars' and others. Students usually find looking at other peoples problems interesting and instructive. Group presentations will expose students to a range of case studies.
- prepare a business plan for a company to design and market a real or invented product. This strategy could be expanded to a project which could meet all outcomes for this module.
- learn how traditional and/or CAD systems may be used to design products
- undertake a tutorial designed to build skills in a particular traditional or CAD application

Teachers can

- ensure students have available the necessary tools for Internet searches
- encourage the active participation of parents who may be involved in marketing or design of products for use in the marketplace
- demonstrate applications for traditional and computer assisted drafting tools
- provide instruction on how to use and apply traditional and computer assisted drafting tools through
  - traditional drafting tools, such as drafting vellum, design markers, T-squares, and scales
  - 3-D modelling
  - a tutorial to introduce students to CAD software

Students will use their understanding of issues, principles, processes, and technology to design products used in their environments.

Suggestions for Assessment

Teachers can

- listen for evidence of student understanding their responses to documents exemplifying the effect of design decisions on humans and environments
- use a WebQuest to provide students with opportunities to report their discoveries, observations, and insights
- use student reports to assess their understanding of design's responsibilities towards various environments
- offer suggestions for ways students might improve their research or WebQuest process
- monitor student successes in the completion of assigned tasks within deadlines
- check for students' creativity in the ways they use and manipulate design tools
- ask students to identify and consider the role played by the elements and principles of design in their creations
- examine and respond to student journals, looking for coherent and detailed notes of their growth towards gaining new knowledge and proficiency in applications
- assess the ability of students to use relevant terminology to clearly articulate and defend design decisions
- critique group accomplishments, placing value on student behaviours that encourage creativity and positive team building dynamics
- assess students' competency in the use of design tools to sketch, design, or build, a basic model of
  - a computer workstation
  - a computer game
  - a Web site
  - an article of clothing to meet a practical or aesthetic purpose
  - an automobile
  - a set for a scene in a movie or play

Resources/Notes for Teachers

For suggestions on activities that may occur in a design team context, and for roles teachers might act in, see Appendix E: Team Design Process and Collective Responsibilities.

A design team might

- identify a problem
- collaborate and brainstorm
- propose solutions
- identify skills and allocate primary responsibilities
- assign roles
- engage in creative inquiry, where as a team and as individuals they investigate and test possible solutions
- assess results, selecting solution(s) for further investigation and/or execution
- create a design solution
- prepare to present, sell, and/or defend the solution
- consider the context for their presentation
- present, share, sell, defend, assess, and/or critique design

Students will use their understanding of issues, principles, processes, and technology to design products used in their environments.

Outcomes

Students will be expected to

- apply the elements and principles of design, and processes associated with design, as they apply to product design
- identify and use mechanical systems to effectively analyse a product design
- select, organize, and present designs for a range of products
- select and use appropriate tools and materials

Suggestions for Teaching and Learning

Teachers can

- provide topics to direct inquiry, for example,
  - window displays
  - exhibitions
  - jewellery
  - pottery
  - boats
  - instruments
  - flower arrangements
  - CD and album covers
- provide access to the World Wide Web so that students can prepare work in progress and completed projects to be displayed on a Web site (Some IS providers offer free Web spaces.)
- provide opportunities for students to participate in national competitions such as the Carleton University Design competition
- for students who are mechanically inclined, provide information on mechanical devices to implement their design (See Nuffield, *Design and Technology.*)
- guide and mentor individuals or teams of students through
  - gathering data, or expanding on earlier research, and using CAD software in the design of a basic plan for a product (see Appendix L: Ensuring Your Design Makes Sense). Students might be expected to explain and defend their practical and aesthetic design decisions.
  - creating designs for a product to meet a specified need. Students might be expected to explain and promote their practical and aesthetic design.
- see Appendix E: Team Design Process

Students will use their understanding of issues, principles, processes, and technology to design products used in their environments.

Suggestions for Assessment

Teachers can

- assess student fairness in responding to critiquing peer projects
- examine journals and projects for evidence of a conscious consideration of design elements and principles
- monitor work to ensure that students and design teams use the right tools for the right job
- look for evidence in designs that balance of variety and simplicity have been fairly considered
- assess designs for their ability to persuade, inform, entertain, and/or otherwise engage an audience
- assess journals for detailed notes and sketches that illustrate effective design
- monitor students choices of presentation materials
- evaluate the organization in presentations for clarity and capacity to inform and hold an audience's attention
- find opportunities to guide the effectiveness of presentations
- provide constructive suggestions and positive feedback to students

Students can

- undertake a project using the knowledge, skills, and values gathered in this, and previous, module(s)
- categorize the type of mechanical system into which a range of mechanical products can be put by
  - a change of direction (e.g., clockwise to counterclockwise, horizontal to vertical)
  - a change in the type of movement (e.g., rotating to linear, reciprocating to oscillating)
  - alteration of the axis of movement (e.g., horizontal to vertical)
  - increasing speed and distance while output force is reduced
  - increasing output force while speed or distance is reduced
  - application and maintenance a force
  - transmission of force and movement

Resources/Notes for Teachers

Teachers are encouraged to share interesting Internet sites with other teachers through the Ednet Design 11 forum:

http://www.ednet.ns.ca/educ/curric/design

That site has pages for both teachers and students, and all are free to participate in discussions.

For WebQuest information, designs, and templates see

http://edweb.sdsu.edu/webquest/webquest.html

http://www.thoths.com

http://www.oznet.com

Module 5: Design Project

This module offers teachers and students considerable flexibility in developing learning experiences that both meet the needs of individuals and give students practical experience in working with others in settings that resemble the workplace.

Students will be expected, independently or as members of a design team, to conduct an investigation or create a product, communication, or environment.

Outcomes

Students will be expected to

- develop and refine a proposal for an investigation or the development of a product, communication, or environment
- identify information needs, and locate and evaluate resources
- identify and extend, refine and/or acquire required skills
- share research and reflections
- make project decisions which demonstrate creativity, innovation, and a willingness to take risks

Suggestions for Teaching and Learning

Students can

- develop and present written suggestions for projects they want to undertake. Some students may suggest projects that exceed their skill levels or ability to complete. Teachers should suggest ways to help the student choose a project in which they have a fair chance of success. However, students must also be given the chance to undertake projects which lead to mixed results. Such risk-taking on the part of students should not go unrewarded. Students learn valuable lessons in the process of problem solving. Teachers must, therefore, monitor student progress carefully during project work so that their assessments validate the learning process as well as the results.
- generate lists of Web sites and other information sources they have investigated and include assessments of the value of the information contained in them to their projects
- negotiate with the teacher to agree upon a list of skills which should be acquired during project work. For example, it might be necessary to learn some HTML programming to present a report for the Web. It might be necessary for a student to learn how to use a piece of computer software like Macromedia Director in order in order to manage images and information in a particular way.
- participate in discussions with their peers and make suggestions for improvement. Students may discover strategies which may be useful in their own projects.
- if a project is being done in a group, work with others to encourage peers, suggest and assess solutions, and resolve research tasks
- select or develop a criterion which can be used to evaluate their projects according to their particular strengths and weaknesses

Teachers can

- help students find a project focus by making available sample project topics

Students will be expected, independently or as members of a design team, to conduct an investigation or create a product, communication, or environment.

Suggestions for Assessment

Students can

- maintain a journal or portfolio throughout the development of their projects
- keep their portfolios electronically in a central location to enable frequent monitoring over the course of the project
- record agreements made with the teacher about goals they would reach at several stages in the development of their projects in order that the teacher can monitor their progress and provide timely feedback
- participate in discussions about the projects of other students and provide comments and suggestions for their improvement
- critique project designs of their own creation and/or offered by peers using criteria which focus on a growing understanding of the relationship between the products, humans, and design

Teachers can

- provide students with a rubric to use as a basis for negotiating expectations for project work (An example of such a rubric is included in Appendix J).
- monitor student progress and provide feedback at regular intervals
- prepare assessment materials for students who need to acquire skills not directly associated with Design 11. For instance, if a student has had to learn some HTML programming, the teacher may ask the student to build a simple Web page as a demonstration of his/her competence
- ask students to identify and consider the role played by the principles of design in the projects they propose

Resources/Notes for Teachers

Project work is a critical component of Design 11. Projects may be undertaken as the focus of a separate module in its own time block, if the project is substantial enough to require 25–30 hours of instructional time. Alternatively, project work may be integrated with the other components of Design 11 either as a continuing project integrating the learning in various modules or a series of smaller projects.

Project work provides opportunity for students to investigate topics of particular interest while working toward achievement of curriculum outcomes in the context of particular modules or to apply and extend their learning from those modules.

Project topics should be engaging for the students and should afford opportunities for independent research as well as group investigations. Teachers and students must comply with the *Internet Acceptable Use Policy for Nova Scotia Schools*. While the Internet provides access to a wealth of information, it also facilitates plagiarism. To help students avoid this temptation, teachers can

- encourage topics with unique and original features
- require students to maintain daily journals of their work
- monitor students' progress on a regular basis

Students will be expected, independently or as members of a design team, to conduct an investigation or create a product, communication, or environment.

Outcomes

Students will be expected to

- set deadlines and develop a work plan to manage time and resources
- develop a plan for monitoring their progress and judging success and contribute to the criteria used for evaluation

Suggestions for Teaching and Learning

Teachers can

- work with students to ensure that their suggestions for projects are within the scope of Design 11. For instance, a student could suggest a project involving Internet Web site construction as a presentation tool and devote most of his/her effort to learning HTML programming instead of to the design project content needed to achieve the outcomes of Design 11.
- work co-operatively with students to develop a plan for completion of projects and suggest revisions to students who have proposed a project which they would probably not be able finish in the allotted time or which would not be challenging enough to be of value to the student
- make project management software available to students if possible
- encourage students to visit Web sites which deal specifically with time management

Students can

- identify the resources they will require for specific tasks and investigate their availability
- consider their learning needs in reference to project goals and determine the new skills they will need to learn and the time and other resources they will require to learn those skills
- learn to use a project management tool such as Microsoft Project to create a plan for completion of their projects. As with any software, teachers should help them to realize that operating software is in most cases a tool to accomplish specific goals and should not become so important to the student that it hinders the achievement of project goals
- present the teacher with a written plan for completing their projects showing time lines, tools to be used, and presentation materials under consideration
- work with the teacher to identify journal and portfolio requirements for their project work

Students will be expected, independently or as members of a design team, to conduct an investigation or create a product, communication, or environment.

Suggestions for Assessment

Students can

- include calendars in their journals so that they may record their progress
- if using project management software, include printed copies of the up-to-date schedule in their journals
- present and explain their learning and assessment plan

Teachers can

- involve students in establishing the criteria by which their learning and performance will be evaluated
- review the purpose and features of effective portfolios and collaborate with students to identify required items related to their projects
- monitor student progress and success in meeting their agreed upon time lines by frequently examining their journals
- provide constructive feedback and suggestions to students who may be falling behind in their schedules. In some cases the project goals may have to be modified as the project proceeds. The ability of students to deal with necessary changes could be included among evaluation criteria.

Resources/Notes for Teachers

A software planning tool called Inspiration is included in *Authorized Learning Resources*. The company producing it makes other resources available at their Web site: **http://www.inspiration.com/**

Many project management software programs are available ranging in value from shareware to very expensive programs suites designed for corporate use. Teachers should be reasonably familiar with the software in order to give students appropriate support. Examples include

- Microsoft Project
- Time Wizard from AC Software **http://www.timewzrd.com/**
- Captor **http://www.captor-time.com/**

Teachers can also use spreadsheet programs to track time use, for example, Microsoft Excel.

Students will be expected, independently or as members of a design team, to conduct an investigation or create a product, communication, or environment.

Outcomes	Suggestions for Teaching and Learning
Students will be expected to	Students can
• gather, organize, and synthesize information and ideas	• keep journals to record their progress, identify their learning needs, and monitor deadlines • comment on the work of other students during seminars arranged by the teacher to review student progress • collate the information they collect in an organized manner. For example, they may use a software database program such as Microsoft Access to maintain their information. Possible data columns for the purpose might be – date – source – information – applicability – binary information such as images Teachers can • monitor the use of software to ensure that it is used to support the students' project investigations only and not become so time consuming as to interfere with the students' achievement of their goals • help students to identify and develop connections to knowledgeable people and experts who might serve as mentors and provide advice to students on various aspects of their projects • encourage students to relate their project work to local resource so their work will have personal meaning

Students will be expected, independently or as members of a design team, to conduct an investigation or create a product, communication, or environment.

Suggestions for Assessment

Students can

- keep written or electronic records of information they have gathered or products they are building
- discuss their progress with the teacher on a regular basis
- document activities, decisions, and milestones
- include trial and error information in their records

Teachers can

- read student journals or software records regularly and provide constructive feedback
- question students' appropriate use of resources and suggest alternatives
- conduct regular seminars so that students can benefit from the experiences and work of others
- look for evidence of growth in collaborative and team skills

Resources/Notes for Teachers

With the wealth of tools available to students for project work, teachers must monitor work closely to ensure that time on task is effective. Internet searches and the use of software, for example, can become ends in themselves distracting students from achievement of Design 11 outcomes.

Students will be expected, independently or as members of a design team, to conduct an investigation or create a product, communication, or environment.

Outcomes

Students will be expected to

- present the results of their work
- reflect on and assess their own learning and the learning of others

Suggestions for Teaching and Learning

Students can

- present their projects in one of several ways, for example:
  - written presentations
  - class oral presentations
  - demonstration or showcase
  - dramas or videos
  - media presentations using presentation software such as Microsoft PowerPoint
  - combinations of the above
- reflect on the thinking and planning processes they used
- identify the processes and components that were successful in their project, and those that were not
- prepare a written reflection for their portfolios, describing and explaining their growth in design capability

Teachers can

- conduct brief conferences with each student
- provide opportunities for students to rehearse their presentations
- remind students that evaluation will include the following criteria
  - organization
  - completeness
  - appropriate use of language, including technical terminology
  - effectiveness in achieving project purpose
- invite other staff members, parents, or other members of the community to observe presentations and evaluate them according to questionnaires generated and provided by the teacher and the students

Students will be expected, independently or as members of a design team, to conduct an investigation or create a product, communication, or environment.

Suggestions for Assessment

Students can

- contribute insight and positive feedback to peers and apply the insights and suggestions of peers and teachers to their own development
- discuss aspects of their projects according to specific criteria
- assess the techniques they used to engage the audience
- reflect on the selection of materials, format, and organization of their own presentations and those peers
- reflect on their growth in collaborative and team skills
- in their journals, reflect on peers' presentations and provide reasons for their opinions and preferences
- analyse the choices they and their peers made in developing and presenting their products.
- identify, and consider the role played by the principles of design in their projects

Teachers can

- respond to reports generated by students
- ask students to
- examine student journals, looking for coherent and detailed notes of their growth towards new knowledge and proficiency in their choice and use of design tools
- monitor students' use of relevant terminology to clearly articulate and defend project decisions
- assess student successes at critiquing peer projects, fairly and meaningfully
- assess the materials selected by students to share and defend decisions with an audience of peers
- evaluate the quality of organization in project presentations
- capacity of the student presentation to inform and hold an audience's attention
- assess presentation techniques, including students' decisions regarding the most appropriate vehicle through which to present their project accomplishments
- determine the overall effectiveness of the presentation and project success

For a sample rubric, see Appendix J.

Resources/Notes for Teachers

Teachers should encourage students to go further with their project work than originally planned if they find information that may help them evaluate future career choices.

For more detailed information see

- Appendix B: The Design Process
- Appendix K: Choosing Design Projects
- Appendix L: Ensuring Your Design Makes Sense

Contexts for Learning and Teaching

Principles of Learning

The public school program is based on principles of learning that teachers and administrators should use as the basis of the experiences they plan for their students. These principles include the following:

1. **Learning is a process of actively constructing knowledge.**

Therefore, teachers and administrators have a responsibility to

- create environments and plan experiences that foster inquiry, questioning, predicting, exploring, collecting, educational play, and communicating
- engage learners in experiences that encourage their personal construction of knowledge, for example, hands-on, minds-on science and math; drama; creative movement; artistic representation; writing and talking to learn
- provide learners with experiences that actively involve them and are personally meaningful

2. **Students construct knowledge and make it meaningful in terms of their prior knowledge and experiences.**

Therefore, teachers and administrators have a responsibility to

- find out what students already know and can do
- create learning environments and plan experiences that build on learners' prior knowledge
- ensure that learners are able to see themselves reflected in the learning materials used in the school
- recognize, value, and use the great diversity of experiences and information students bring to school
- provide learning opportunities that respect and support students' racial, cultural, and social identity
- ensure that students are invited or challenged to build on prior knowledge, integrating new understandings with existing understandings

3. **Learning is enhanced when it takes place in a social and collaborative environment.**

Therefore, teachers and administrators have a responsibility to

- ensure that talk, group work, and collaborative ventures are central to class activities
- see that learners have frequent opportunities to learn from and with others

- structure opportunities for learners to engage in diverse social interactions with peers and adults
- help students to see themselves as members of a community of learners

4. Students need to continue to view learning as an integrated whole.

Therefore, teachers and administrators have a responsibility to

- plan opportunities to help students make connections across the curriculum and with the world outside and structure activities that require students to reflect on those connections
- invite students to apply strategies from across the curriculum to solve problems in real situations

5. Learners must see themselves as capable and successful.

Therefore, teachers and administrators have a responsibility to

- provide activities, resources, and challenges that are developmentally appropriate to the learner
- communicate high expectations for achievement to all students
- encourage risk-taking in learning
- ensure that all students experience genuine success on a regular basis
- value experimentation and treat approximation as signs of growth
- provide frequent opportunities for students to reflect on and describe what they know and can do
- provide learning experiences and resources that reflect the diversity of the local and global community
- provide learning opportunities that develop self-esteem

6. Learners have different ways of knowing and representing knowledge.

Therefore, teachers and administrators have a responsibility to

- recognize each learner's preferred ways of constructing meaning and provide opportunities for exploring alternative ways
- plan a wide variety of open-ended experiences and assessment strategies
- recognize, acknowledge, and build on students' diverse ways of knowing and representing their knowledge
- structure frequent opportunities for students to use various art forms—music, drama, visual arts, dance, movement, crafts—as a means of exploring, formulating, and expressing ideas

7. **Reflection is an integral part of learning.**

Therefore, teachers and administrators have a responsibility to

- challenge their beliefs and practices based on continuous reflection
- reflect on their own learning processes and experiences
- encourage students to reflect on their learning processes and experiences
- encourage students to acknowledge and articulate their learnings
- help students use their reflections to understand themselves as learners, make connections with other learnings, and proceed with learning

A Variety of Learning Styles and Needs

Learners have many ways of learning, knowing, understanding, and creating meaning. Research into links between learning styles and preferences and the physiology and function of the brain has provided educators with a number of helpful concepts of and models for learning. Howard Gardner, for example, identifies eight broad frames of mind or intelligences: linguistic, logical/mathematical, visual/spatial, body/kinesthetic, musical, interpersonal, intra personal, and naturalistic. Gardner believes that each learner has a unique combination of strengths and weaknesses in these eight areas, but that the intelligences can be more fully developed through diverse learning experiences. Other researchers and education psychologists use different models to describe and organize learning preferences.

Students' ability to learn is also influenced by individual preferences and needs within a range of environmental factors, including light, temperature, sound levels, nutrition, proximity to others, opportunities to move around, and time of day.

How students receive and process information and the ways they interact with peers and their environment, in specific contexts, are both indicators and shapers of their preferred learning styles. Most learners have a preferred learning style, depending on the situation and the type and form of information the student is dealing with, just as most teachers have a preferred teaching style, depending on the context. By reflecting on their own styles and preferences as learners and as teachers in various contexts, teachers can

- build on their own teaching-style strengths
- develop awareness of and expertise in a number of learning and teaching styles and preferences
- identify differences in student learning styles and preferences
- organize learning experiences to accommodate the range of ways in which students learn, especially for whom the range of ways of learning is limited

Learning experiences and resources that engage students' multiple ways of understanding allow them to become aware of and reflect on their learning processes and preferences. To enhance their opportunities for success, students need

- a variety of learning experiences to accommodate their diverse learning styles and preferences
- opportunities to reflect on their preferences and the preferences of others to understand how they learn best and that others may learn differently
- opportunities to explore, apply, and experiment with learning styles other than those they prefer, in learning contexts that encourage risk taking
- opportunities to return to preferred learning styles at critical stages in their learning
- opportunities to reflect on other factors that affect their learning, for example, environmental, emotional, sociological, cultural, and physical factors
- a time line appropriate for their individual learning needs within which to complete their work

More information may be found in Appendix A: Learning Styles.

The Senior High School Learning Environment

Creating Community

To establish the supportive environment which characterizes a community of learners, teachers need to demonstrate a valuing of all learners, illustrating how diversity enhances the learning experiences of all students. For example, by emphasizing courtesy in the classroom through greeting students by name, thanking them for answers, and inviting, rather than demanding participation. Students could also be encouraged to share interests, experiences, and expertise with one another.

Students must know one another in order to take learning risks, make good decisions about their learning, and build peer partnerships for tutoring, sharing, cooperative learning, and other collaborative learning experiences. Through mini-lessons, workshops, and small-group dynamic activities during initial classes, knowledge is shared about individual learning styles, interpersonal skills, and team building.

The teacher should act as a facilitator, attending to both active and passive students during group activities, modelling ways of drawing everyone into the activity as well as ways of respecting and valuing each

person's contribution, and identifying learners' strengths and needs for future conferences on an individual basis.

Having established community within the classroom, the teacher and students together can make decisions about learning activities Whether students are working as a whole class, in small groups, in triads, in pairs, or individually, teachers can

- encourage comments from all students during whole class discussion, demonstrating confidence in and respect for their ideas
- guide students to direct questions evenly to members of the group
- encourage students to discover and work from the prior knowledge in their own social, racial or cultural experiences
- encourage questions, probing but never assuming prior knowledge
- select partners or encourage students to select different partners for specific purposes
- help students establish a comfort zone in small groups where they will be willing to contribute to the learning experience
- observe students during group work, identifying strengths and needs, and conference with individuals to help them develop new roles and strategies
- include options for students to work alone for specific and clearly defined purposes

Engaging All Students

A supportive environment is important for all learners and is especially important in encouraging disengaged or underachieving learners.

Design 11 provides opportunities to engage students who lack confidence in themselves as learners, who have a potential that has not yet been realized, or whose learning has been interrupted, for example refugees. These students may need substantial support in gaining essential knowledge and skills and in interacting with others.

Students need to engage fully in learning experiences that

- are perceived as authentic and worthwhile
- build on their prior knowledge
- allow them to construct meaning in their own way, at their own pace
- link learning to understanding and affirming their own experiences
- encourage them to experience ownership and control of their learning
- feature frequent feedback and encouragement
- include opportunities for teachers and others to provide individuals with clarification and elaboration
- are not threatening or intimidating
- focus on successes rather than failures
- are organized into clear, structured segments

Acting as facilitators to encourage students to take more responsibility for their own learning, teachers can provide opportunities for Students to decide how intensively to focus on particular areas. Within the Design 11 curriculum outcomes framework, teachers can work with individual students to identify learning outcomes that reflect the student's interests and career plans.

It is important that teachers design learning experiences that provide a balance between challenge and success, and between support and autonomy.

All students benefit from a variety of grouping arrangements that allow optimum opportunities for meaningful teacher-student and student-student interaction. An effective instructional design provides a balance of the following grouping strategies:

- large-group or whole-class learning
- teacher-directed small-group learning
- small-group-directed learning
- co-operative learning groups
- one-to-one teacher-student learning
- independent learning
- partnered learning
- peer or cross-age tutoring
- mentoring

Health and Safety

Activities in shop, laboratory, or workplace settings should include an element of safety education. Teachers should plan learning experiences with a specific safety focus, and also embed safe practices in classroom procedures and routines in order that students may acquire

- a strong orientation toward both personal and group safety
- an awareness of potential safety hazards at school and in the workplace
- a knowledge of safety procedures and safe work habits
- a knowledge of emergency procedures
- the ability to design and maintain safe work areas

Learning beyond the Classroom

Design 11 offers many opportunities for students to extend learning beyond the classroom. Alternative settings provide students with opportunities to connect their learning to tangible, practical purposes; their future education and career plans; and the world beyond the high school setting. Teachers may choose to organize learning experiences which include workplace settings for some or all students. Learning experiences may include

- practices and procedures to encourage students to use technology properly and with care
- activities with mentors
- classroom visits from workplace experts
- field trips to local business, industry, and community sites
- a focus on career exploration through job shadowing
- work placements which extend and reinforce learning
- entrepreneurship-related projects
- community and service learning projects
- use of Internet listserv, newsgroup, bulletin board, and on-line conversations

It is important that administrators and teachers work to establish mutually beneficial relationships with businesses, organization, and industries in the community. Class or group field trips are an effective way to initiate the contact. In organizing field trips teachers should

- visit the facility beforehand to identify potential safety issues, establish a relationship with personnel and clarify the purposes of the trip
- establish class practices and procedures that promote positive and ongoing community relationships
- work with students to articulate clear expectations for learning during the field trip experience
- schedule field trips to complement preceding and subsequent classroom learning experiences
- ensure that the field trip complies with their Board's guidelines and policies

Meeting the Needs of All Students

Learners require inclusive classrooms, where a wide variety of learning experiences ensure that all students have equitable opportunities to reach their potential.

In designing learning experiences, teachers must accommodate the learning needs of individuals, and consider the abilities, experiences, interests, and values which they bring to the classroom.

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

- create a climate and design learning experiences to affirm the dignity and worth of all learners in the classroom community
- give consideration to the social and economic situations of all learners
- model the use of inclusive language, attitudes, and actions supportive of all learners
- acknowledge racial and cultural uniqueness
- adapt classroom organization, teaching strategies, assessment

- practices, time, and learning resources to address learners' needs and build on their strengths
- provide opportunities for learners to work in a variety of contexts, including mixed-ability groupings
- identify and utilize strategies and resources that respond to the range of students' learning styles and preferences
- build on students' individual levels of knowledge, skills, and attitudes
- design learning and assessment tasks that draw on learners' strengths
- use students' strengths and abilities to motivate and support their learning
- provide opportunities for students to make choices that will broaden their access to a range of learning experiences
- acknowledge the accomplishment of learning tasks, especially those that learners believed were too challenging for them

In a supportive learning environment, all students receive equitable access to resources, including the teacher's time and attention, technology, learning assistance, a range of roles in group activities, and choices of learning experiences when options are available. All students are disadvantaged when oral, written, and visual language creates, reflects, and reinforces stereotyping.

Teachers promote social, cultural, racial, and gender equity when they provide opportunities for students to critically examine the texts, contexts, and environments associated with Design 11 in the classroom, in the community, and in the media.

Teachers should look for opportunities to

- promote critical thinking
- recognize knowledge as socially constructed
- model gender-fair language and respectful listening in all their interactions with students
- articulate high expectations for all students
- provide equal opportunity for input and response from all students
- encourage all students to assume leadership roles
- ensure that all students have a broad range of choice in learning and assessment tasks
- encourage students to avoid making decisions about roles and language choices based on stereotyping
- include the experiences and perceptions of all students in all aspects of their learning
- recognize the contributions of men and women of all social, cultural, linguistic, and racial backgrounds to all disciplines throughout history

Social and cultural diversity in student populations expands and enriches the learning experiences of all students. Students can learn much from the backgrounds, experiences, and perspectives of their classmates. In a community of learners, participants explore the diversity of their own and others' customs, histories, values, beliefs, languages, and ways of seeing and making sense of the world.

When learning experiences are structured to allow for a range of perspectives, students from varied social and cultural backgrounds realize that their ways of seeing and knowing are not the only ones possible. They can come to examine more carefully the complexity of ideas and issues arising from the differences in their perspectives and understand how cultural and social diversity enrich their lives and their culture.

The curriculum outcomes designed for Design 11 provide a framework for a range of learning experiences for all students.

Teachers must adapt learning contexts, including environment, strategies for learning and strategies for assessment, to provide support and challenge for all students, using curriculum outcomes to plan learning experiences appropriate to students' individual learning needs. When these changes are not sufficient for a student to meet designated outcomes, an individual program plan is required. For more detailed information, see *Special Education Policy Manual (1996)*, Policy 2.6.

A range of learning experiences, teaching and learning strategies, resources, and environments provide expanded opportunities for all learners to experience success as they work toward the achievement of designated outcomes. Many of the learning experiences suggested in this guide provide access for a wide range of learners, simultaneously emphasizing both group support and individual activity. Similarly, the suggestions for a variety of assessment practices provide multiple ways for students to demonstrate their achievements.

In order to provide a range of learning experiences to challenge all students, teachers may adapt learning contexts to stimulate and extend learning. Teachers should consider ways that students can extend their knowledge base, thinking processes, learning strategies, self-awareness, and insights. Some learners can benefit from opportunities to negotiate their own challenges, design their own learning experiences, set their own schedules, and work individually or with learning partners.

Some students' learning needs may be met by opportunities for them to focus on learning contexts which emphasize experimentation, inquiry, and critical and personal perspectives; in these contexts, teachers should work with students to identify and obtain access to appropriate resources.

The Role of Technologies

Vision for the Integration of Information Technologies

The Nova Scotia Department of Education has articulated five components to the learning outcomes framework for the integration of IT within curriculum programs:

- **Basic Operations and Concepts**
  concepts and skills associated with the safe, efficient operation of a range of information technologies

- **Productivity Tools and Software**
  the efficient selection and use of IT to perform tasks such as
  - the exploration of ideas
  - data collection
  - data manipulation, including the discovery of patterns and relationships
  - problem solving
  - the representation of learning

- **Communications Technology**
  the use of specific, interactive technologies which support collaboration and sharing through communication

- **Research, Problem Solving, and Decision Making**
  the organization, reasoning, and evaluation by which students rationalize their use of IT

- **Social, Ethical, and Human Issues**
  that understanding associated with the use of IT which encourages in students a commitment to pursue personal and social good, particularly to build and improve their learning environments and to foster stronger relationships with their peers and others who support their learning

Integrating Information and Communication Technologies within the Design Classroom

As information technologies shift the ways in which society accesses, communicates, and transfers information and ideas, they inevitably change the ways in which students learn.

Students must be prepared to deal with an information and communications environment characterized by continuous, rapid change, an exponential growth of information, and expanding opportunities to interact and interconnect with others in a global context.

Because technologies are constantly and rapidly evolving, it is important that teachers make careful decisions about applications,

Because technologies are constantly and rapidly evolving, it is important that teachers make careful decisions about applications, always in relation to the extent to which technology applications help students to achieve the curriculum outcomes.

Technology can support learning for the following specific purposes.

Inquiry

Theory Building: Students can develop ideas, plan projects, track the results of growth in their understanding, develop dynamic, detailed outlines, and develop models to test their understanding, using software and hardware for modelling, simulation, representation, integration, and planning.

Data Access: Students can search for and access documents, multimedia events, simulations, and conversations through hypertext/hypermedia software; digital, CD-ROM, and Internet libraries, and databases.

Data Collection: Students can create, obtain, and organize information in a range of forms, using sensing, scanning, image and sound recording and editing technology, databases, spreadsheets, survey software, and Internet search software.

Data Analysis: Students can organize, transform, analyse, and synthesize information and ideas using spreadsheets, simulation, statistical analysis or graphing software, and image processing technology.

Communication

Media Communication: Students can create, edit, and publish, present, or post documents, presentations, multi-media events, Web pages, simulations, models, and interactive learning programs, using word processing, publishing, presentation, Web page development, and hypertext software.

Interaction/collaboration: Students can share information, ideas, interests, concerns, and questions with others through e-mail; Internet audio, video, and print conferences; information servers; Internet news groups and listservs; and student-created hypertext environments.

Teaching and Learning: Students can acquire, refine, and communicate ideas, information, and skills using tutoring systems and software, instructional simulations, drill and practice software, and telementoring systems.

Construction

Students can explore ideas and create simulations, models, and products using sensor and control systems, robotics, computer-aided design, artificial intelligence, mathematical and scientific modelling, and graphing and charting software.

Expression

Students can shape the creative expression of their ideas, feelings, insights, and understandings using graphic software, music making, composing, editing and synthesizing technology; interactive video and hyper media, animation software; multimedia composing technology; sound and light control systems and software; and video and audio recording and editing technology.

The Role of Technology in Design 11

The design industry makes use of a wide range technologies. In a Design 11 environment, students should have the opportunity to make use of some of these real world tools. Though designers may use traditional tools such as scales, rulers, graphic, markers, and pencils, most designers also use the latest computer enhanced applications to create and produce their designs. The Design 11 curriculum recognizes, values, and responds to recent technological advances in design, and attempts to bring these changes into the classroom. Students should have opportunities to gain practical design experience in the application of current hardware and software, for example Avid Cinema, Adobe Photoshop, HTML Editors, Quark Express or PageMaker, AutoCAD or MacDraft, Pagemill, Macromedia Director, Soundedit 16, digital still and video cameras, and scanners.

Design 11 uses technology to illustrate how the world around us may be adapted to human needs by

- creating physical and virtual products for our use
- managing and assisting human production processes
- using or controlling aspects of our natural environment

Students need to understand the connections among these areas and how they interact with one another and with society as a whole.

The study of physical products requires students to design and build a variety of objects using different types of tools and equipment and a wide range of natural and processed materials. They also study the uses made of various products and their effects on society and the environment.

Students analyse and learn about a range of human production processes and undertake projects that require them to design, develop, and use examples of such processes.

Students analyse and learn about different environmental systems and the technologies that enable us to use or modify those systems to suit our own purposes. They also examine the impact of design on the natural environment and on society.

Assessing and Evaluating Student Learning

Assessment is the systematic process of gathering information on student learning.

Evaluation is the process of analysing, reflecting upon, and summarizing assessment information, and making judgements or decisions based upon the information gathered.

The Principles of Assessment and Evaluation articulated in the document *Public School Programs* should be used as the basis of assessment and evaluation, policies, procedures, and practices.

Effective Assessment and Evaluation Practices

Effective assessment improves the quality of learning and teaching. It can help students to become more reflective and to have control of their own learning, and it can help teachers to monitor and focus their instructional programs.

Assessment and evaluation of student learning should accommodate the complexity of learning and reflect the complexity of the curriculum. Evaluation should be based on the full range of learning outcomes towards which students have been working during the reporting period, be proportionate to the learning experiences related to each outcome, and focus on patterns of achievement as well as specific achievement.

In reflecting on the effectiveness of their assessment program, teachers should consider the extent to which their practices

- are fair in terms of the student's background or circumstances
- are integrated with learning
- provide opportunities for authentic learning
- focus on what students can do rather than on what they cannot do
- provide students with relevant, supportive feedback that helps them to shape their learning
- describe students' progress toward learning outcomes
- help them to make decisions about revising, supporting, or extending learning experiences
- support learning risk taking
- provide specific information about the processes and strategies students are using
- provide students with diverse and multiple opportunities to demonstrate their achievement
- accommodate multiple responses and a range of tasks and resources
- provide evidence of achievement in which students can take pride

- acknowledge attitudes and values as significant learning outcomes
- encourage students to reflect on their learning and to articulate personal learning plans
- help them to make decisions about teaching strategies, learning experiences and environments, student grouping, and resources
- include students in developing, interpreting, and reporting on assessment

Involving Students in the Assessment Process

When students are aware of the outcomes they are responsible for and the criteria by which their work will be assessed or evaluated, they can make informed decisions about the most effective ways to demonstrate they know, are able to do, and value.

It is important that students participate actively in the assessment and evaluation of their learning, developing their own criteria and learning to judge a range of qualities in their work. Students should have access to models in the form of scoring criteria, rubrics, and work samples.

As lifelong learners, students assess their own progress, rather than relying on external measures, for example marks, to tell them how well they are doing. Students who are empowered to assess their own progress are more likely to perceive their learning as its own reward. Rather than asking What does the teacher want? students need to ask questions such as What have I learned? What can I do now that I couldn't do before? What do I need to learn next?

Effective assessment practices provide opportunities for students to

- reflect on their progress toward achievement of learning outcomes
- assess and evaluate their learning
- set goals for future learning

Diverse Learning Styles and Needs

Teachers should develop assessment practices which affirm and accommodate students' cultural and linguistic diversity. Teachers should consider patterns of social interaction, diverse learning styles, and the multiple ways oral, written, and visual language are used in different cultures for a range of purposes. Student performance takes place not only in a learning context, but in a social and cultural context as well.

Assessment practices must be fair, equitable, and without bias, providing a range of opportunities for students to demonstrate their learning. Teachers should be flexible in evaluating the learning success of students and seek diverse ways for students to demonstrate their personal best. In inclusive classrooms, students with special needs have opportunities to demonstrate their learning in their own way, using media which accommodate their needs, and at their own pace.

Using a Variety of Assessment Strategies

When teachers make decisions about what learning to assess and evaluate, how to assess and evaluate, and how to communicate the results, they send clear messages to students and others about what learning they value; for example, teachers can communicate that they value risk taking or lateral thinking by including these elements in determining marks.

Assessment involves the use of a variety of methods to gather information about a wide range of student learning and to develop a valid and reliable snapshot of what students know and are able to do that is clear, comprehensive, and balanced. The assessment process provides information about each student's progress toward achievement of learning outcomes that teachers can use to assign marks, to initiate conversations with students, or to make decisions in planning subsequent learning experiences.

Teachers align evaluation and assessment practices with student-centred learning practices when they

- design assessment and evaluation tasks that help students make judgements about their own learning and performance
- provide assessment and evaluation tasks that allow for a variety of learning styles and preferences
- individualize assessment and evaluation tasks to accommodate specific learning needs
- work with students to describe and clarify what will be assessed and evaluated and how it will be assessed and evaluated
- provide students with regular and specific feedback on their learning

Assessment activities, tasks, and strategies include, for example,

- anecdotal records
- artifacts
- audiotapes
- checklists
- conferences
- certifications
- demonstrations
- dramatizations
- exhibitions
- rating scales
- interviews (structured or informal)
- inventories
- investigations
- learning logs or journals
- media products
- observations (structured or informal)

- peer assessments
- performance tasks
- presentations
- portfolios
- reports
- presentations
- projects
- questioning
- questionnaires
- quizzes, tests, examinations
- reviews of performance
- sorting scales (rubrics)
- self-assessments
- surveys
- videotapes
- work samples
- written assignments

Portfolios

A major feature of assessment and evaluation in Design 11 is the use of portfolios. A portfolio is a purposeful selection of a student's work that tells the story of the student's efforts, progress, and achievement. The design portfolio documents design activities.

Portfolios engage students in the assessment process and allow them to participate in the evaluation of their learning. Portfolios are most effective when they provide opportunities for students to reflect on and make decisions about their learning. The students and teacher should collaborate to make decisions about the contents of the portfolio and to develop the criteria for evaluating the portfolio.

Portfolios should include

- the guidelines for selection
- the criteria for judging merit
- evidence of student reflection

Portfolio assessment is especially helpful for the student who needs significant support. Teachers should place notes and work samples from informal assessment in the portfolio and use the portfolio to collaborate with the student in identifying strengths and needs, selecting learning experiences, and selecting work that best reflects the student's progress toward achievement of learning outcomes.

It is important that students share their portfolios with other students so that all students may see exemplars that represent a range of strategies for expression and levels of complexity in ideas and understanding.

Outlines and other evidence of planning, allow students to examine their progress and demonstrate achievement to teachers, parents, and others.

Students should be encouraged to develop a portfolio which demonstrates their achievements in a context beyond a particular course, including letters, certificates, and photographs, for example, as well as written documents. A portfolio can be very helpful when students need to demonstrate their achievements to potential employers or admission offices of post-secondary institutions.

The Design Brief

The design brief, negotiated between student and teacher, sets the conditions under which the student engages in a design activity. The brief parallels the industrial and commercial practice of design briefs and contracts, with one notable difference—design professionals are assessed mainly on the solution to the problem, while students are assessed on growth in design capability.

The design brief is a significant tool for the assessment of student learning. See Appendices B and C for more information.

Tests and Examinations

Traditional tests and examinations are not, by themselves, adequate to assess student learning. The format of tests and examinations can be revised and adapted to reflect key aspects of the curriculum. Some teachers, for example, have designed tests and examinations based on collaborative or small-group learning, projects, or portfolio learning. Creating opportunities for students to collaborate on a test or examination is an effective practice in the interactive classroom, to assess learning of a higher order than recall of information, for example, learning that requires synthesis, analysis, or evaluation.

In learning activities that involve solving a design problem, for example, students might work collaboratively to clarify and define the task, and then work either collaboratively or individually to develop a solution. Students might be given a range of questions, issues, or problems, and work collaboratively to clarify their understanding of the assignments and plan responses in preparation for the examination for which only one of the questions, issues, or problems will be assigned.

The initial list of questions, issues, or problems can be developed by the teacher, negotiated by the teacher with students, or developed by students and screened by the teacher.

Process-based tests and examinations allow students demonstrate knowledge and skills and apply strategies at multiple stages in learning processes, for example, in identifying problems, challenges, and

opportunities; gathering, evaluating, and synthesizing information; generating options; and developing and evaluating solutions.

Traditional tests and examinations may present a number of problems in scheduling and resource allocation. Process-based tests and examinations may be undertaken in steps during several class periods over a number of days. Students have opportunities to revise, reflect on, and extend their knowledge and understanding. Teachers have opportunities to develop comprehensive assessments, to monitor and evaluate learning at multiple points in a process, and to use time flexibly.

Certification

In some courses, students will need to prepare to demonstrate their learning through entrance tests and examinations, or to obtain or upgrade a certification. Replicating this type of assessment in the classroom can help students prepare for the conditions and assessment formats they may encounter in workplace and post-secondary situations.

To make this kind of assessment an effective learning experience, teachers should define a specific context and purpose, for example, the operation of a device, the identification of materials labels, or the demonstration of a technique or procedure.

APPENDICES

Appendix A: Learning Styles

Learners have characteristic strengths and preferences in accessing and processing information. Some prefer to focus on facts. Others may prefer theories and models. Some respond strongly to visual information, whereas others learn more effectively written or spoken explanations. Some prefer to learn actively or with other learners. Others function more introspectively and prefer to work alone.

To be successful in the world beyond high school, learners need to use effectively a range of learning modes and styles. Effective workers in any field are observant, methodical, and careful, as well as innovative and curious. Full use of the rapidly expanding availability of information requires both visual and verbal learning skills.

Teachers need to help students understand their preferred learning style and recognize how their preferences influence the decisions and choices they make during their learning. Students need to build skills in both their preferred and less preferred modes of learning. For some students, their learning style is not a preference but a necessity resulting from a special need or disability. It is important for teachers to design learning experiences that will accommodate these students learning needs.

Learning Style Models

Learning style models can provide useful frameworks for the design of learning experiences that provide choice and encourage variety in learning style. There are many models for describing differences in learning preference. Commonly used models include the following:

Myers–Briggs Type Indicator (MBTI)

The Myers–Briggs Type Indicator uses scales derived from Carl Jung's theory of psychological types and identifies the following eight learning preference profiles:

- extroverts (try things out, focus on the outer world of people) or introverts (think things through, focus on the inner world of ideas)
- sensors (practical, detail-oriented, focus on facts and procedures) or intuitors (imaginative, concept-oriented, focus on meanings and possibilities)
- thinkers (skeptical, tend to make decisions based on logic and rules) or feelers (appreciative, tend to make decisions based on personal and humanistic considerations)
- judgers (set and follow agendas, seek closure even with incomplete data) or perceivers (adapt to changing circumstances, resist closure to obtain more data)

These preferences can be combined to describe 16 different learning style types, for example, ESTJ (extrovert, sensor, thinker, perceiver) or INFJ (introvert, intuitor, feeler, judger).

Kolb's Learning Style Model

Kolb's Learning Style Model identifies preferences along two dimensions to yield four learning types.

Accessing information	concrete	abstract
Internalizing information	active	reflective

- *Type 1* (concrete, reflective) asks "Why?"
- *Type 2* (abstract, reflective) asks "What?"
- *Type 3* (abstract, active) asks "How?"
- *Type 4* (concrete, active) asks "What if?"

Herrmann Brain Dominance Instrument (HBDI)

HBDI classifies relative preferences for thinking in four different modes based on the task-specialized functioning of the physical brain.

	Cerebral	Limbic
Left Brain	A	B
Right Brain	D	C

The four modes are

- *Quadrant A* (left brain, cerebral): logical, analytical, quantitative, factual, critical
- *Quadrant B* (left brain, limbic): sequential, organized, planned, detailed, structured
- *Quadrant C* (right brain, limbic): emotional, interpersonal, sensory, kinesthetic, symbolic
- *Quadrant D* (right brain, cerebral): visual, holistic, innovative

Felder-Silverman Learning Style Model

This model classifies learners as

- *sensing* learners (concrete, practical) or *intuitive* learners (conceptual, innovative)
- *visual* learners (pictures, diagrams, flow charts) or *verbal* learners (prefer written and spoken explanations)
- *inductive* learners (from specific to general) or *deductive* learners (from general to specific)
- *active* learners (trying things out, working with others) or *reflective* learners (thinking things through, working alone)
- *sequential* learners (linear, orderly) or *global* learners (holistic, systems thinkers)

Howard Gardner's Theory of Multiple Intelligences

Howard Gardner proposes that people are not simply more or less intelligent; rather they have different "intelligences." He has identified seven intelligences and recently proposed an eighth, naturalistic intelligence:

- verbal/linguistic
- visual/spatial
- musical
- logical/mathematical
- bodily/kinesthetic
- interpersonal
- intrapersonal
- naturalistic

Gardner suggests that the most effective learning experiences would incorporate all these intelligences.

More about Learning Styles

The following links to Internet pages provide more information:

http://fre.www.ecn.purdue.edu/FrE/asee/fie95/3a2/3a22/3a22.htm
Addressing Diverse Learning Styles through the Use of Multimedia

http://www.bham.wednet.edu/mod9.htm
Bellingham Public Schools Multiple Intelligences and Learning Styles

http://www.ilt.columbia.edu/k12/livetext/docs/berry1.html
Cognitive Apprenticeship Models

http://odie.ascd.org/pubs/el/sept97/campbell.html
Educational Leadership: How Teachers Interpret MI Theory

http://www.interserf.net/mcken/im.htm
Internet Links Exercising Your Multiple Intelligences (MI)

http://www.keirsey.com/cgi-bin/keirsey/newkts.cgi
Keirsey Temperament Sorter II

http://www.algonquinc.on.ca/edtech/gened/styles.html
Learning on the Internet—Learning Styles

http://www.wavefront.com/~nelson/styles.htm
Learning Styles

http://snow.utoronto.ca/Learn2/lstyle2.htm
Learning Styles

http://edweb.gsn.org/edref.mi.intro.html
EDWeb: The Theory of Multiple Intelligences

http://www.fortunecity.com/millenium/garston/49/multiintell.htm
Mrs. Young's Page on Multiple Intelligences

http://www.mmhschool.com/products/mlmi5.html
Multimedia Literature: Multiple Intelligences

http://www.newhorizons.org/art_miclsrm.html
New Horizons for Learning: Multiple Intelligences Theory in the Classroom by Bruce Campbell

http://www.angelfire.com/oh/themidas/index.html
The MIDAS (Multiple Intelligence Developmental Assessment Scales)

Appendix B: The Design Process

An approach to teaching and learning that emphasizes open-ended problem solving is the best way to prepare students for the challenges they will meet in the world outside the school. In the workplace, projects may not always be clearly defined, and traditional methods and procedures may need to be modified and adapted to meet the unique requirements of a specific project. Experience with open-ended problem solving will give students practice in responding to challenges for which prescribed solutions do not already exist.

The steps or techniques used in solving a problem are known as the problem-solving process. In technological studies, this process is often called "the design process." At the beginning of a design process the student analyses a given set of conditions in order to identify a problem, challenge, or need. The student then works through a number of identifiable stages in order to arrive at a solution.

A design process includes all the stages in the development of a product or process. Designing is not necessarily a linear activity, however, and may require the student to reformulate or restate the problem, or revise the plan for solving it, or both. Although the process may have distinct stages, those stages will not necessarily be followed in a rigid sequence. For example, students should evaluate (reflect on) their work at each stage of the process. As they do so, they may discover that they need to return to an earlier stage to make modifications; or they may decide to complete a particular step sooner than was originally planned.

The design process described below has five stages. Sections in italics indicate the instructions for each stage that could be addressed to the student(s) designing the product or providing the service.

Stages in the Design Process

Developing a Focus

The students identify the problem or challenge and begin keeping a record of the design process (a technological report or design brief). Initially, students should use the design brief to outline the broad aims of the project and describe in a general way what needs to be done to achieve those aims. As work progresses on the project, students may periodically revise the initial broad plan to reflect what is actually happening.

Meet with your client or the group for whom your product or service is being developed. Discuss the project with them to determine what you must accomplish and to establish goals for completing the product or delivering the service.

Developing a Framework

The students identify various possible solutions and the resources required to achieve them; they determine whether the various resources are available and record their findings in the design brief. During this stage they may discover that they need to redefine the problem or challenge.

Identify various ways in which the possible solutions could be achieved. Evaluate each of these alternatives in terms of quality, cost, durability, expectations, etc. As at any other stage in the process, you may need to redefine what you want to accomplish.

Choosing the Best Solution

The students consider such factors as what materials, tools, and resources are available, the amount of time needed to carry out different procedures, and any relevant ergonomic and aesthetic requirements. If necessary, they construct and evaluate a model. Based on the results of these activities, they choose the solution that seems best. They record the reasons for choosing a particular solution in the design brief.

Draw up a technical report that sets out for your client the recommendations or best alternatives. Develop a draft plan of action, which may include preliminary drawings.

Implementing a Plan

The students try out different ways of achieving the best solution and construct the product, process, or system. For physical products, they make a prototype using production-type materials, tools, and equipment. As they assess every aspect of the construction phase, they may make changes to the production plan. They may even modify the original conception of the product to reflect ideas that emerge during construction or to solve problems they did not think of when they began the process. The students record any and all such changes in the design brief.

Develop a final plan, including final working drawings and a prototype for the approval of your client. Make the product, or provide the service, to your client's specifications.

Reflecting on the Process and the Product

The students evaluate the process used and the end result in light of their own expectations and the reactions of peers and the client. As a result of their evaluation, they may decide to modify the production process, the product, or even the original definition of the problem or challenge. Also at this stage they complete the design brief or technological report and communicate their results.

As a group, evaluate the final product or service, including your client's reaction to it. Redesign and make changes to the process or product that will be incorporated when filling subsequent orders.

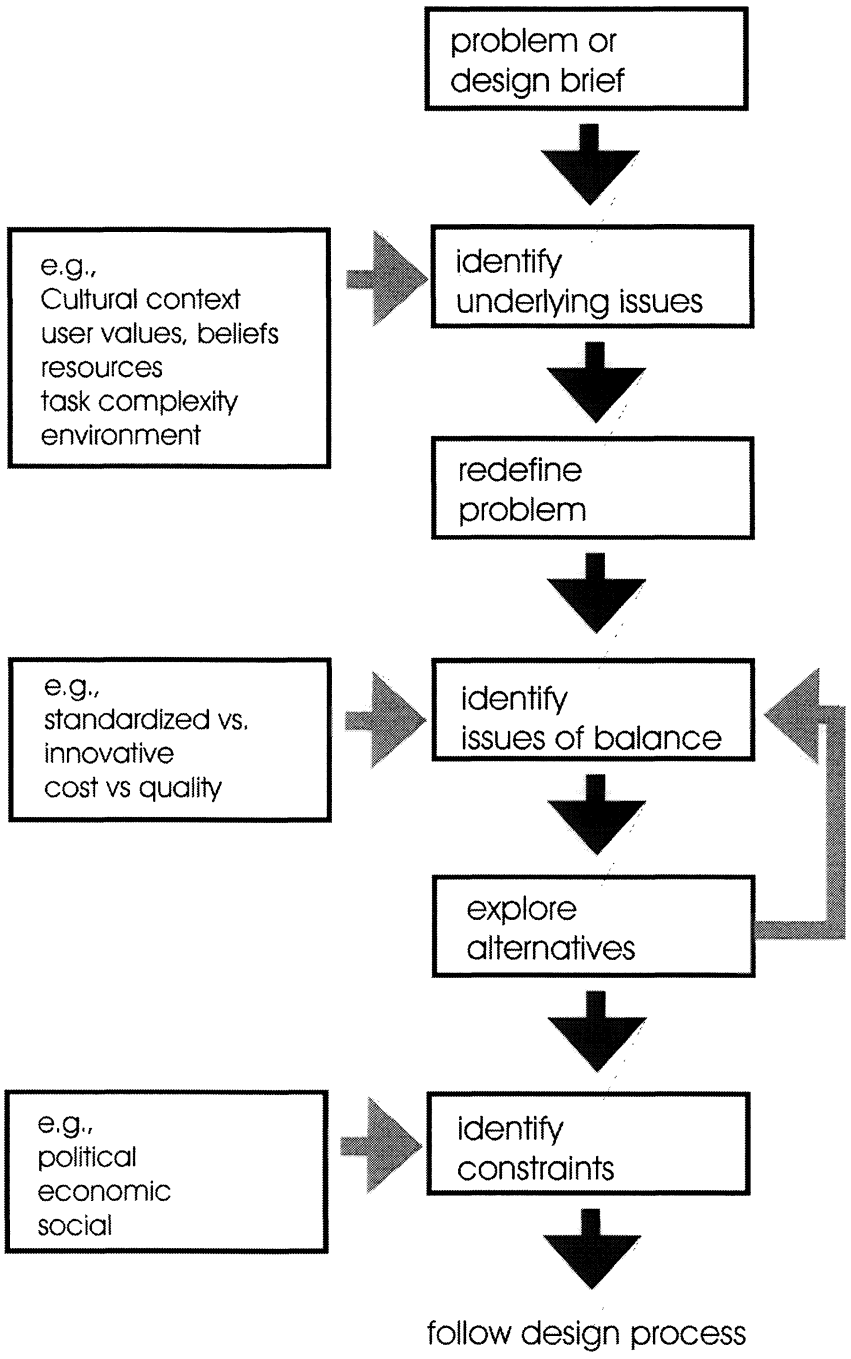
Prepare reports and marketing strategies. Outline quality-control procedures that should be used for further products or services.

Project work

Projects that students develop should be closely monitored by the teacher to ensure that students acquire the knowledge, skills, and values described in the learning outcomes for the course. Before approving a student's project, the teacher should analyse it carefully to determine whether it will promote the necessary learning. Teacher and students should collaborate to ensure that safety issues have been taken into account and that the required resources, learning aids, tools, equipment, and materials are identified and obtained for each project.

Students should be aware that they are expected to participate in evaluating their own learning. When they find themselves in the world of work, they will often be called upon to make judgments about their own work before it is seen by others, and in some cases the only quality control will be in the hands of the original designer. Students should also value imagination and risk-taking as important indicators of learning, recognizing that a project need not necessarily be successful to achieve a valid educational result.

Appendix C: Design Brief Development



Appendix D: WebQuest

A WebQuest is an Internet-based inquiry or problem-solving learning experience in which students, usually working in groups, have access to a range of on-line and other resources. Students gather information and ideas to build a scaffold of understanding leading to insights or solutions that they can share with others.

introduction	use background information to articulate an engaging topic, issue, or question
task	define the scope and limits of the task
plan	identify steps, develop a graphic organizer, guiding questions, and assessment
resources	make a list of Internet, text*, and human resources
process	analyse, evaluate, and synthesize ideas; organize, refine, and present results
conclusion	summarize, reflect on, and extend learning

*text describes any language event, whether oral written, or visual

WebQuest Links	
A WebQuest about WebQuests	**http://edweb.sdsu.edu/courses/edtec596/webquestwebquest.html**
Building Blocks of a WebQuest	**http://edweb.sdsu.edu/people/bdodge/webquest/buildingblocks.html**
Matrix of Example WebQuests	**http://www.esc20.net/techserv/projects/webquests.html**
Examples of WebQuests	**http://edweb.sdsu.edu/people/bdodge/Professional.html**
Introduction to WebQuests	**http://www.esc20.net/techserv/webquest/default.html**
WebQuest In-service	**http://www.nde.state.ne.us/SS/webqinfo.html**
Thoughts About WebQuests	**http://edweb.sdsu.edu/courses/edtec596/about_webquests.html**
The WebQuest Page	**http://edweb.sdsu.edu/webquest/webquest.html**
Triton Summer Symposium	**http://edweb.sdsu.edu/people/bdodge/Professional.html**
WebQuest Index (MISD)	**http://www.macomb.k12.mi.us/wq/webqindx.htm**
WebQuests Created by Teachers	**http://www.plainfield.k12.in.us/hschool/webquest.htm**
WebQuests for Learning	**http://edweb.sdsu.edu/edfirst/courses/webquest.html**
WebQuests in Our Future	**http://www.capecod.net/schrockguide/webquest/wqsl1.htm**
Teaching with the Web	**http://www.thacher.pvt.k12.ca.us/weaving/ExampleWebQuests.html**

Appendix E: Team Design Process and Collective Responsibilities

When a classroom is divided into teams that are expected to engage in a team project, the following events might occur.

Teachers might take on a role within the groups in their classroom. Taking a role in student projects allows teachers to guide and mentor learning while being in a position to assess and provide feedback on achievements and decisions in a context relative to student projects. A teacher in a role situation could act as

- an editor or publisher who must critique writing and layout work
- a client who must be cautious about the product he/she might buy
- a project builder or engineer who must be concerned about design decisions
- an environmental assessment agent

As a collaborative team, learners

- identify a concept or product and proceed to explain in a proposal the design problems and hypothetical solutions
- use a design or other critical process to plan and develop their design project
- keep detailed records of their process and their decisions
- brainstorm, investigate, and deduce consequences for a variety of potential design strategies solutions, recycling this activity until they have exhausted all possible design solutions

Having settled on design strategies to support a potential design solution, the team identifies

- ways in which they can investigate and/or execute their project
- primary and collaborative functions for each team member
- potential themes for their design(s)
- applications they plan to use and the team's proficiency to use these tools
- the knowledge, skills, and values they hope to gain and/or exemplify through this project

Team members

- keep detailed records
- engage in the physical execution of their project
- brainstorm on the alternative modes of presentation available that could most effectively promote the success of their design

- present their design project to their teacher and peers, using proper terminology and meaningful reasoning and evidence to defend their design decisions
- engage in individual reflections on the intent, progress, effect, successes, and/or failings of their project

Appendix F: Built Environment Design Project Evaluation

Student: Topic/Title: Date:

	Does not meet expectations: 1 point	Meets expectations: 2 points	Exceeds expectations: 3 points	Self evaluation	Teacher evaluation
Process					
Team Work	Works with others, but has difficulty sharing decisions and responsibilities with others.	Works well with others. Takes part in decisions and contributes fair share to team.	Works well with others. Assumes a clear role and relates responsibilities. Motivates others to do their best.		
Sketchbook	Includes a trace of brainstorming and ideas.	Includes evidence of the development and modification of at least one idea.	Includes at the development, modification and variations of at least three brain-stormed ideas.		
Product					____ X5 =
Product/ Solution/ Inquiry	The space is somewhat functional.	The designed environment is functional.	Results are innovative, sophisticated, or comprehensive.		
Format	Includes several inappropriate, incorrect, or ineffective elements. e.g., the form does not follow function.	Elements are generally used effectively, appropriately, and correctly. e.g., its spaces form follows its function.	Elements are used to enhance, clarify, and emphasize.		
Analysis/ Discussion/ Development	Information/ideas presented without questioning or analysis.	Information/ideas selected, analysed, and evaluated.	Information/ideas selected and combined clearly and comprehensively.		
Presentation					
Topic/ Content	Includes some essential information/elements but few details.	Includes essential information/ elements with enough elaboration to give audience an understanding of topic.	Covers topic completely and in-depth. Encourages audience to reflect or inquire further.		
Presentation Skills	Some difficulty communicating ideas.	Communicates ideas with adequate preparation and some enthusiasm.	Communicates ideas with enthusiasm, clarity, and control.		
					____ X5
			Total Points		____ X10 =

Appendix G: The Built Environment

1. Selecting one work or artist/designers/architect from each category below, with a partner identify the name, its creator(s), year(s) and era of creation, period (style), location of the (or a single) work, and any innovations introduced through the structure. Also, report on your understanding of the work's intent and significance, and identify the physical characteristics that make the work unique.

Ancient Medieval
Phidias, Athena, and the Parthenon
Iktinos
The Pantheon
Temple of Venus
Arch of Constantine
S. Vitale, Ravena
The Hagia Sophia
Great Mosque of al-Mutawakkil
The Taj Mahal
Notre-Dame-la-Grande
Baptistery of S. Giovanni, Florence
Chartres Cathedral
Cathedral LeMans
St. Peter's Basilica
Compidoglio by Michelangelo

Modern and Postmodern

Art/Installation
Ned Smyth "Albany Street Park"
Richard Artschwager "West Thames Street Park"
Isamu Noguchi
Christo
Richard Long
Viljo Rewell
John Andrews
Kenzo Tange

Spaces
Antoni Gaudi
Frank Lloyd Wright
Mary Miss
Charles Moore
Robert Stern
Michael Graves
James Stirling

Robert Venturi
Hans Hollein
Philip Johnson and John Burgee

The following sites should be helpful in your pursuits. Please share with the class other helpful sites you find.

http://www.greatbuildings.com/architects.html
http://www.askjeeves.com
http://www.gaudi.net/index.htm

2. Select one work or designer you have researched and create a 4–7 minute presentation with the intent to share with your peers what you have learned. Be organized and focussed.

3. Individually fully design an environment to serve a particular function. The function can be conventional (e.g., a house) or unique/artistic (e.g., Christo). Follow the design process in your sketchbook, including brainstormed ideas; developed ideas; modifications, alterations, and variations of themes and designs. Be clear on the intent of your design, and identify the materials that will dress your space. The sky is the limit, so have fun.

   - If your design is done with DesignWorkshop Lite (freeware 3-D CAD software), submit your sketchbook, wireframe design and shadow and texture design of internal (one room) and external view.

   - If your design is done with more conventional materials, include professional plans from each projected view, a coloured drawing in two- or three-point perspective, and a physical model of your design. Also, submit your sketchbook.

4. When you have completed the task, prepare to deliver a five- minute visual presentation sharing your design, motives, concepts, successes and failings, with your peers. Select a peer to provide critical feedback on your design and presentation.

Appendix H: Communication Tools

Photography: Individual students might create a photo documentary of a theme, concept, person, place, or event and with it also show consideration for how this documentary can affect its audience through various ways in which can be presented.

Photoshop or Corel Photopaint: Pairs of students might walk through the tutorials which accompany one of these programs. They might also follow tutorials created by their teacher or found in quality publications. Such tutorials could be designed so that by the end of this tutorial students have significantly altered the text of an image exhibiting thoughtful consideration for the elements and principles of design.

Adobe Illustrator or Corel Draw: Pairs of students might walk through tutorials that accompany one of these programs. They might also follow tutorials created by their teacher or found in quality publications. Such tutorials could be designed so that by the end of a tutorial students have

- created a series of drawings which render a form in a variety of finishes
- developed a complex rendering of a form where a combination of graphic tools and filters have been used
- created a range of non-representational forms which illustrate the essential character of various principles of design

PageMaker or Quark Express: Pairs of students might walk through the tutorials which accompany one of these programs. They might also follow tutorials created by their teacher or found in quality publications. Such tutorials could be designed so that by the end of this tutorial students have, through the incorporation of several devices unique to layout computer applications,

- created a pamphlet promoting an event or place
- designed a poster which promotes and event, idea, business, or place
- produced a mock magazine layout that could be convincingly inserted into an existing publication

HTML Editors: Pairs of students might walk through the tutorials which accompany one of these programs. They might also follow tutorials created by their teacher or found in quality publications. Such tutorials could be designed so by the end of this tutorial students have

- created a personal Web page
- developed a Web page for a local business

- significantly and convincingly altered existing Web pages

PowerPoint or Director: Pairs of students might walk through the tutorials which accompany one of these programs. They might also follow tutorials created by their teacher or found in quality publications. Such tutorials could be designed so by the end of a tutorial students have

- created a slide show which illustrates interests particular to the student
- created a small interactive game
- incorporated video tools to produce a small video project

Video: Teams of students could write, star in, and produce a short video which focusses on one or more basic video styles.

Avid Cinema: Pairs of students might walk through the tutorials which accompany one of these programs. They might also follow tutorials created by their teacher. Such tutorials could be designed so by the end of a tutorial students have

- recorded, edited, and arranged a short video
- manipulated found video and sound footage to create a coherent production

Printmaking: Individual students could use a conventional hands-on printmaking tool to create a consistent edition of ten prints using one or more colours or plates.

Sculpture: Individual students could create text in a three dimensional form through

- an additive sculpture made out of wire, clay, or Plasticine™
- a subtractive sculpture from a block of plaster, soapstone, clay, or Styrofoam™
- the alteration of existing three dimensional forms to create new coherent texts

Performance Art: Individual or teams of students could observe and identify the essential elements of existing examples of quality performance art work and create their own short performance piece.

Drawing: Individual students might

- examine great examples of portraiture (e.g., Albrecht Durer, Leonardo daVinci, Michelangelo Beuronotti) and execute his or her own series of portrait works

- create a journal of marks. Students could investigate various mediums and marks used to construct texts in drawing, from which students might create their own drawings in the visual languages they have observed and made their own.

Painting: Students might use professional quality paints to

- create a painting which convincingly makes use of a style mastered by another artist for a specific purpose
- interpret through paint the text of a musical work
- represent objects, people, or places in an interpretive way or with coherent aesthetic likeness
- create a series of paintings which permit students to investigate how paints and colours relate (e.g., students could create a painting in purely analogous hues, another in complementary hues, one in earth tones, and perhaps one using a high key or low key palette)

Notes

Using layout software may provide a good opportunity for students to extend their learning beyond the classroom by undertaking projects for other classes, school clubs and organizations, or local businesses and community groups.

Considering potential time, safety, and economic restrictions, screen printing or block printing are recommended for printmaking activities.

A good subject for sculpture can be the human form or simple physical objects. Students could also design a formalist sculpture which clearly illustrates one or more of the elements or principles of design.

Good examples of performance art can be found in the works of the following:
Joseph Beuys, the General Idea, Suzy Lake, happenings from the 1960s and 1970s, Russian constructivist performances, Holly Hughes, Michael Snow, Lori Anderson, etc.

Other great examples of drawing through a variety of mark making styles can be found among the works of traditional English landscape drawings, Egon Sheille, Giorgio Morandi, Alberto Giocometti, Claus Oldenberg, Vincent Van Gogh, traditional Japanese, Jean-Michel Basquiet, Anselm Keiffer, Betty Goodwin, etc.

Though paints do tend to place stress on classroom finances, it is suggested that teachers do not resolve this issue by providing poor quality paints. Painting can be very frustrating, especially to those engaging in it for the first time. Poor quality paints tend to compound the negative aspects of painting for the student. Good and inexpensive

paints are available from many suppliers, though often not in famous brand names. Consult suppliers who specialize in providing artists with materials.

There are many user-friendly HTML editors available for purchasing and as shareware. Netscape Communicator, for instance, provides a good, though basic, composer.

Video styles for students to experiment in can be one or a combination of the following formats: expository, personification, dramatic, documentary.

Appendix I: Crafts Definition

Crafts is a term which has many popular definitions, although its use in formal literature and organised practice is more consistent. Concern over the lack of definition has been a feature of most major studies of craft in Canada (59 out of 75 respondents to a 1988 study[1] said that indiscriminate use of the word *craft* was either "very serious" or "somewhat serious" and was ranked by the report as the top problem). Lack of definition can be a problem for bureaucracies as well as for consumers and practitioners themselves.

In Canada and in much of the Western world, the history of the definition of craft arises directly, and as a continuous and traceable connection, from the concerns of the Arts and Crafts movement of the 19th century, begun by William Morris. This direct line of practice and definition is reflected in the establishment of crafts councils recognised in many countries, in every Canadian province, and in the national body, the Canadian Crafts Council (CCC). In broad consultation with the crafts community across the country, the CCC has established definitions, made representations, and offered guidelines which are widely recognised and, in some cases, enshrined in government policy and even law. As the collection of studies and data become more important and more common, the adherence to accepted definitions has become advisable for the sake of consistency and credibility.

The definition developed by the Canadian Crafts Council for the Federal government has much to recommend it, in that it occupied a place in Canadian law as a definition for an exemption under the Federal Sales Tax which preceded the GST. It has therefore enjoyed wide practical usage and has satisfied the national organisation for the crafts sector. The definition is as follows:

Craftspeople design and produce, from basic raw materials and through the skilful use of the person's hands and hand tools only, goods that reflect Canadian culture or heritage, but not including goods that are made in a repetitive manner through the use of jigs, templates, moulds, dies or other similar devices except that such devices may be used to produce the original or first unit. (1977)

Another useful definition for comparative purposes is from the Massey-Levesque Commission report which defines a handcraft as an "individual product of usefulness and beauty, created by hand on a small scale, preferably by the same person from start to finish, employing primarily the raw materials of his own country and, when possible, of his own locality."[2]

The most recent definition builds on the concepts of the past. Standard Industrial Classifications (SIC) of 1994 identifies the craft process as involving "the complete and variable control by the individual over the production of each and every piece produced at each and every stage of production." (Standard Industrial Classifications, 1994). This definition also allows for a category known as *craft-based industry* as follows: "a very small or micro enterprise based on the design skills and control of the process by one or more individuals as defined above; but where one or more individuals working in the enterprise, while skilled, may not necessarily control all the variables defined above." In other words, skilled employees may not control these variables, but the proprietor does. Original design, input, and control of the process at each step in the production and the final production of an object with cultural significance are the essential elements of all these definitions.

The main crafts are considered to be the following: pottery, weaving, wood work, quilting, spinning, dyeing, felting, rug hooking, leatherwork, glass (hot and stained), basketry, decorative painting, paper making, bookbinding, jewellery (including silver and goldsmithing), blacksmithing. Crafts include specific activities, including boat building and musical instrument making; many trade crafts such as masonry, gilding and coopering; and some sub-groups that have become almost classes of their own, such as wood turning as distinct from cabinet making.

Crafts include the class of product known as gift ware is also included, as many of the issues also apply to it. Although its cultural significance is less from a historical point of view, the importance of the element of design, the behavioural similarities and market acceptance make it a natural inclusion. Many giftware items, would be covered under the category of "craft-based industry."

The *1988 Nova Scotia Production Craft Review* defines production crafts as referring to "the manufacturing of unique, marketable craft-type items on a volume basis, with a high design content and a production process, which are for sale within a broad popular price range." (p. 15)

1. Nova Scotia Department of Recreation and Culture, *Nova Scotia Production Craft Review*, 1988.
2. J. Lotz, *Head, Heart, and Hands*, 1986, p. 2

Appendix J: Project Rubric

This simple tool provides an example for teachers and students to use in defining project expectations, negotiating a mark, and monitoring progress. Not all of these elements will be useful for all projects.

	Does not meet expectations: 1 point	Meets expectations: 2 points	Exceeds expectations: 3 points	Self Evaluation	Teacher Evaluation
Topic/Content	includes some essential information/elements and few details	includes essential information/elements with enough elaboration to give audience an understanding of the topic	covers topic completely and in depth. encourages audience to reflect or enquire further		
Analysis/ Discussion/ Development	information/ideas presented without questioning or analysis	information/ideas selected, analysed, and evaluated	information /ideas selected and combined clearly and comprehensively		
Product/ Solution/ Inquiry	has limited effectiveness or is not effective	is effective	results are elegant, sophisticated, or comprehensive		
Specific Requirements	includes ___ or less____ *(To be filled in by teacher and student)*	includes at least _____	includes at least ___ or more_____		
Format	includes several inappropriate, incorrect, or ineffective elements	Elements are generally used effectively, appropriately, and correctly.	Elements are used to enhance, clarify, and emphasize.		
Group Work	works with others, but has difficulty sharing decisions and responsibilities with others	works well with others; takes part in decisions and contributes fair share to group	works well with others; assumes a clear role and related responsibilities; motivates other to do their best		
Presentation Skills	some difficulty communicating ideas	communicates ideas with adequate preparation, and some enthusiasm	Communicates ideas with enthusiasm, clarity, and control		
			Total Points		

Appendix K: Choosing Design Projects

EdNet maintains a Web site for Design 11. It is a clearinghouse for ideas shared among teachers and students concerning all aspects of the course. Its address is

http://www.ednet.ns.ca/educ/currwebs/design

The following suggestions may be valuable for students who need help in deciding on a project topic:

- As a team, create a virtual tour of a place, such as your school or township, to be experienced through the Internet or a CD-ROM. This virtual tour might use video clips, sound bites, pictures, Quicktime Virtual Reality, Macromedia Director, Hyperstudio, etc., to construct an environment that will provide an audience with a reasonable conceptual and affective understanding a place.
- Develop a personal portfolio that can be experienced through a CD-ROM or other computer media. Collect all of the successful work you have created over the year and present the work through an interactive environment such as ones created using Director, HTML and Java or Hyperstudio.
- Develop a Web site for a local business or community group.
- Create a magazine or newspaper publication.
- Work in a design team to create one product each, and do a market study of your own product. Evaluate the market studies to select the one to manufacture, then manufacture the product. To complete the project, create an advertising campaign and market the product.
- Create a video game that includes local places and subjects.
- Design and produce a video production to meet a specific need (e.g., produce a video yearbook, create a weekly news broadcast, record a school trip).
- Work as a design team to develop and submit a project to meet the criteria of the Carleton University, High School Design Competition.
- Create an artistic installation of a space that will meaningfully engage an audience.
- Design, create, and promote scale models for a space that is environmentally friendly and wheelchair accessible. The space may be, for example,
  - a retirement facility
  - a holiday resort
  - a park
  - an education facility
  - an art gallery

- Design and manufacture an object or device to meet a specified need, for example:
  - a telephone amplifier for the hearing impaired
  - an automatic tracking system for the school's astronomical telescope
  - an intercom system to be used at home to monitor nurseries
  - a timer to control an automatic watering system for a greenhouse
- Design and create an Internet Web site to explain a design principle to other students. The site could outline and describe the work of a person who made significant contributions to the development of some aspect of design.
- Document the work of a famous Nova Scotian or Maritimer who advanced human understanding in design. One example would be Alexander Graham Bell who lived in Baddeck for many years. It was during his residency there that he let his creativity loose to explore many topics in addition to his most famous, the telephone. The Bell museum is a very good source of project material and may be reached through the Internet. The Nova Scotia Museum is also a good starting point for project ideas in many areas. Parks Canada also maintains a list of historic sites. Visit the following sites:

  Alexander Graham Bell Museum
  http://parkscanada.pch.gc.ca/parks/nova_scotia/alex_g_bell/alex_g_belle.htm

  Nova Scotia Museum
  http://www.ednet.ns.ca/educ/museum/

- Present an analysis of design and marketing for ideas, objects, or devices created by local entrepreneurs in your own communities.
- As part of a design team, develop a proposal, design, or product for a local business or community group.
- Conduct an investigation of worldwide Web sites that design information. If you know how to do Internet searches, you will find many of them which will lead you to others. To learn more about Internet searches you might want to visit *Thoth's Place for Learning* at

  http://www.thoths.com

- Design and construct a radio-controlled model such as an airplane or boat. Many hobby supply companies have interesting sites, for example,
  AGR Hobbies
  Remote Controlled Flying Saucer
  RC Aerowatch EMag

- Design and build a radio.
- Design and construct a video monitoring system to prevent theft in schools. Local security companies may be willing to help in a project of this sort.

URLs for the sites mentioned here may be found at the Design 11 support site.

Appendix L: Ensuring Your Design Idea Makes Sense

You will need to consider the design processes you will be using before tackling the design itself.

The first step in designing a product might be to consider

- what the product will be used for
- who will use it
- where might it be used
- where might it be sold

The above will help you to think about the design of a product in preparing a brief. Most designs begin with a design brief.

Once you have documented some ideas for your product in lists of ideas or sketches, you should carry out your first review by asking the following questions for each design idea:

- Will the design do what it is supposed to do?
- Will the design be suitable for the users?
- Will the design fit in with where it might be used or sold?
- Is the design likely to work?
- Does the design look right to the users and sellers?
- Have I noted any special requirements for the design I will have to meet later on?

You can think through these questions on your own or present your ideas in a group and ask for input. If any design idea does not get a *yes* answer to all the questions above, it should be rejected or adjusted.

After you have screened your ideas as above, perform a second review as follows:

- Am I sure that the working parts of the design will do what they are supposed to do?
- Am I sure about the accuracy with which I need to make each part?
- How long will it take me to make and assemble all the parts of my design?
- Do I have enough time to do it?
- If not, what can I alter so that I have a design that I can make on time and that still meets the specification?
- Will the materials I need be available when I need them?
- Will the tools and equipment be available when I need them?
- Am I sure that I can get the final appearance that I need?
- Have I got enough time for finishing?
- Is there anything I can do to be more efficient?

For a more detailed discussion of the design process see Nuffield Design and Technology, *Product design*, Longman, 1996.