PRINCE EDWARD ISLAND

CURRICULUM

Intermediate Industrial Technology Education

Curriculum Guide

Prince Edward Island
Department of Education
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Prince Edward Island Department of Education gratefully acknowledges the contribution of the following individuals in the development of the **Intermediate Industrial Technology** Curriculum Guide.

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I Introduction

A. Background

This document assists educators, students, and others to construct meaningful learning experiences in Technology Education in the discipline of Industrial Technology

B. Rationale

The vision for technology education in Atlantic Canada fosters the development of all learners as technologically literate and capable citizens who can develop, implement, and communicate practical, innovative, and responsible technological solutions to problems. Intermediate Industrial Technology Education provides modular curriculum components designed to achieve the general curriculum outcomes (GCOs) for technology education.

A Technological Responsibility

B Technological Systems

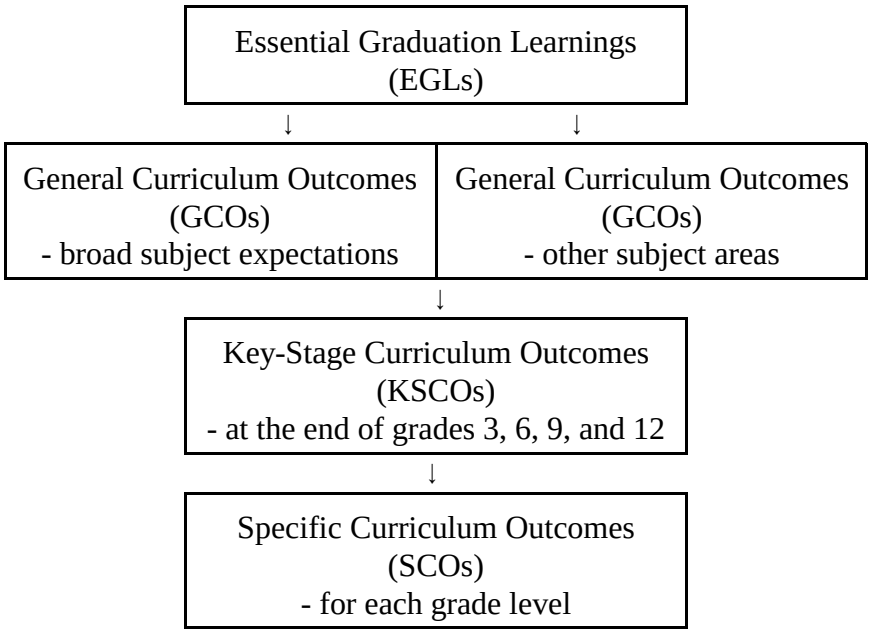
C History and Evolution of Technology

D Technology and Careers

E Technological Problem Solving

II. Program Design and Components

Specific Curriculum Outcomes



Essential Graduation Learnings:

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

Specific Essential Graduation Learnings:

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

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

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

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

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

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

Curriculum Outcomes:

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

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

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

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

III Cross-Curriculum Specific Items

A. Meeting the Needs of all Students

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

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

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

- provide a climate and design learning experiences to affirm the dignity and worth of all learners in the classroom community
- redress educational disadvantage - for example, as it relates to students living in poverty
- model the use of inclusive language, attitudes, and actions supportive of all learners
- adapt classroom organization, teaching strategies, assessment strategies, time, and learning resources to address learners' needs and build on their strengths
- provide opportunities for learners to work in a variety of learning contexts, including mixed-ability groupings
- identify and respond to diversity in students' learning styles
- build upon students' individual levels of knowledge, skills, and attitudes
- design learning and assessment tasks that draw on learners' strengths
- ensure that learners use strengths as a means of tackling areas of difficulty
- use students' strengths and abilities to motivate and support learning
- offer multiple and varied avenues to learning
- celebrate the accomplishments of learning tasks that learners believed were too challenging for them

B. Gender-Inclusive Curriculum

In a supportive learning environment, male and female students receive equitable access to resources, including the teacher's time and attention, technology, learning assistance, and a range of roles in group activities. It is important that the curriculum reflect the experiences and values of both male and female students and that texts and other learning resources include and reflect the interests, achievements, and perspectives of males and females.

Both male and female students are disadvantaged when oral, written, and visual language creates, reflects, and reinforces gender stereotyping.

Teachers promote gender equity in their classrooms when they:

- articulate equally high expectations for male and female students
- provide equal opportunity for input and response from male and female students
- model gender-fair language and respectful listening in all their interactions with students

C. Valuing Social/Cultural Diversity

Social and cultural diversity is a resource for expanding and enriching the learning experiences of all students. Students can learn much from the diverse backgrounds, experiences, and perspectives of their classmates in a community of learners where participants discuss and explore their own and others' customs, histories, traditions, values, beliefs, and ways of seeing and making sense of the world. In reading, viewing, and discussing a variety of texts, students from different social and cultural backgrounds can come to understand each other's perspectives, to realize that their ways of seeing and knowing are not the only ones possible, and to probe the complexities of the ideas and issues they are examining.

All students need to see their lives and experiences reflected in their learning. Learning resources should allow students to hear diverse social and cultural voices, and to broaden their understanding of social and cultural diversity.

D. Engaging All Students

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

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

- engage students in authentic and worthwhile communication situations
- allow them to construct meaning and connect and collaborate and communicate with each other
- form essential links between the world of text and their own world
- give them a sense of ownership of learning and assessment tasks

They need additional experiences as well - experiences designed to engage them personally and meaningfully, to make their learning pursuits relevant. They need substantial support in reading and writing. They need positive and motivational feedback. They need all of these experiences within purposeful and interactive learning contexts. Ultimately, the curriculum for these students should prepare them for the world they will go into after high school completion.

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

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

E. Links to Community

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

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

F. The Intermediate High School Learning Environment

Learning environment for grades 7-9 is:

- participatory, interactive, and collaborative
- inclusive
- caring, safe, challenging
- inquiry based, issues oriented
- places where resource-based learning includes and encourages the multiple uses of technology, the media, and other visual texts as pathways to learning and as avenues for representing knowledge.

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

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

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

Learning environments are places where teachers:

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

G. Safety

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

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

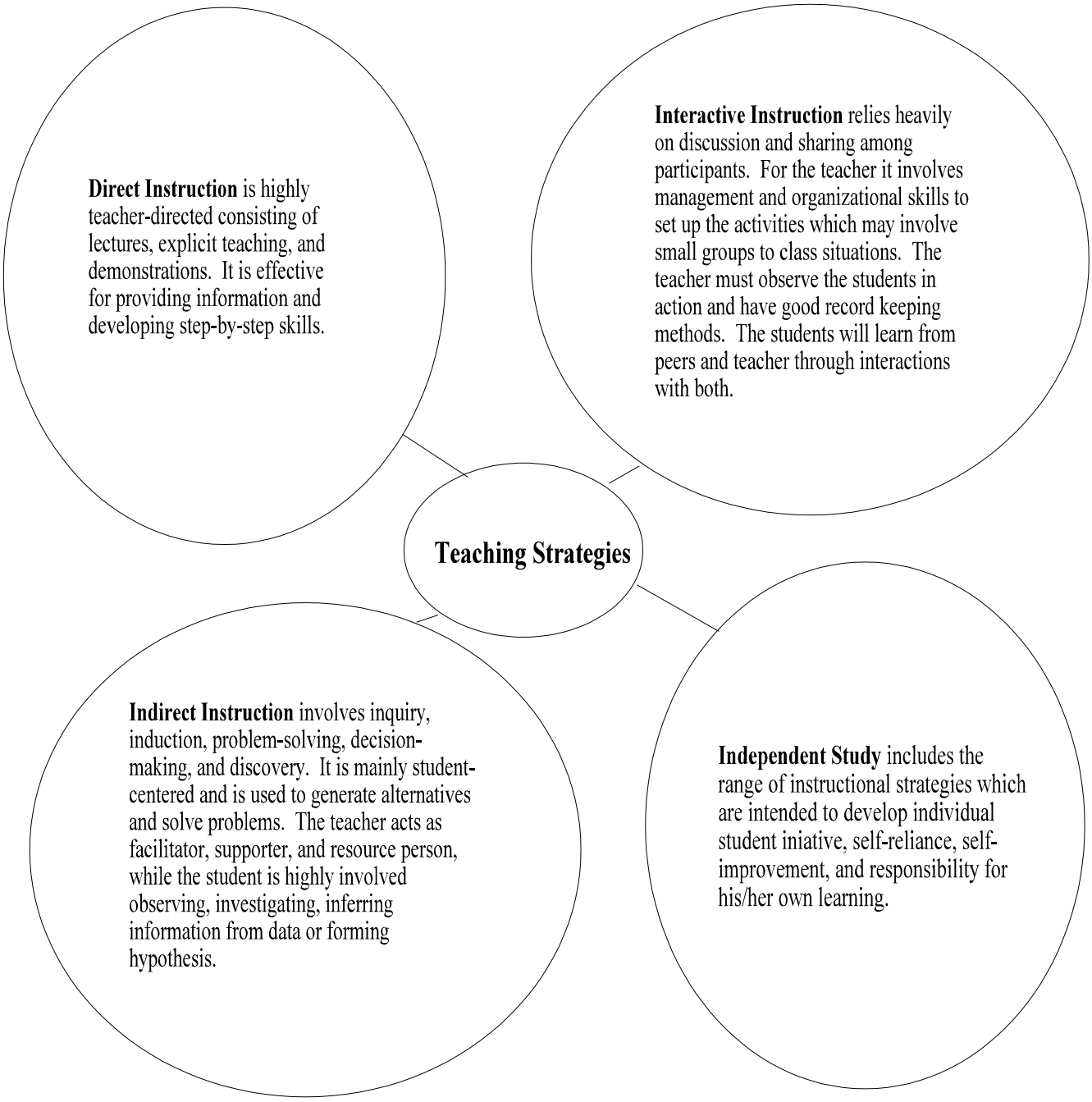
Risk is involved in everything a person does. To minimize the chance of harm, the student must become a conscious participant in ensuring a healthy, safe learning environment. Complacent attitudes regarding safety reflect a behavior which invites a less protected setting.

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

IV Teaching Strategies

Learning theory research clearly indicates that teachers need to employ a wide variety of instructional strategies to address the learning styles of all learners. Moreover, the nature of certain content or processes can only be taught effectively if specific instructional strategies are employed. In order to achieve this objective, students must have an opportunity two co-operatively brainstorm, discuss, evaluate information, and make informed decisions. Students often point to laboratory activities as the best part of the program. This is not necessarily because of the principles learned, but rather because they have a chance to work co-operatively and be actively involved in the learning process. Teachers are ultimately responsible for determining the best teaching methods for their students, the best way of grouping them, and the best way to present material to make it relevant and interesting. Exemplary teachers use a variety of instructional strategies and have the flexibility to call upon several different strategies both within one period and during a unit of study. Adolescent learners need a balance between practical work, listening, discussing and problem-solving.

Instructional Strategies



V Assessment and Evaluation

The terms “assessment” and “evaluation” are often used interchangeably. However, they are not exactly the same. “Assessment” refers to the process of collecting and gathering information about student performance as it relates to the achievement of curriculum outcomes.

“Evaluation” refers to the systematic process of analyzing and interpreting information gathered through the process of assessment. Its purpose is to make judgements and decisions about student learning. Assessment provides the data. Evaluation brings meaning to the data.

Assessment and evaluation are integral parts of the teaching/learning process. Assessment must reflect the intended outcomes, be ongoing, and take place in authentic contexts.

Assessment and learning are two sides of the same coin. The methods used to collect educational data define in measurable terms what teachers should teach and what students should learn. And when students engage in an assessment exercise, they should learn from it.

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

Evaluation may take different forms depending on its purpose. *Diagnostic* evaluation will identify individual problems and suggest appropriate corrective action. Evaluation may be *formative* in that it is used during the instructional process to monitor progress and to make necessary adjustments in instructional

strategies. *Summative* evaluation is intended to report the degree to which the intended curriculum outcomes have been achieved. It is completed at the end of a particular instructional unit.

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

Assessment/Evaluation Techniques

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

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

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

Individual learning outcomes, the criteria for success, and the form that assessment and evaluation will take, should be clearly understood by teachers, students, and parents. This involves clearly describing unit and lesson objectives and how the achievement of these objectives will be assessed. If students are to see themselves as responsible for their own learning, the requirements for attaining success in a unit of work must be clearly understood. The assessment and evaluation of the unit should

contain no surprises.

The techniques and strategies for assessment and evaluation are as varied as the approaches to teaching and learning. Routman (1994) and Gough and Griffiths (1994) provide lots of useful information on assessment (evaluation) techniques and practices. Following are some brief notes on some of the more common techniques.

Teacher Observation

Teacher observation is probably the most underrated means of assessing student achievement. While many observations are subjective, they are still valid because of the teacher's knowledge of the individuals and the environment in which the learning took place. In order to make their observations as valid as possible and to facilitate the recording of information, teachers may select from a variety of common techniques for recording observations or may devise their own method. Some common recording systems include checklists, rating scales, and anecdotal records.

Checklists are useful for the assessment of the scientific process skills (classifying, inferring, etc.) or skills such as using a microscope or other piece of equipment. In these situations there are specific behaviors which are considered essential. The disadvantage of the checklist is that it can only indicate success or failure and not degrees of success.

Rating scales can be used in the same way as checklists except that rating scales have the added advantage of allowing the evaluator to indicate degrees of success.

Anecdotal records can be used to record the many informal observations made by teachers. Anecdotal records can provide information which is either not available or very difficult to obtain through other means. Teachers prepare charts containing the students' names, the date and the type of progress observed. At the end of an activity, observations may be shared with students and ways to improve an activity may be discussed. Recording the results of these discussions provide teachers with guidelines to assess the effectiveness of the learning activities.

Teacher Student Conferences
While teachers spend a lot of time with the whole class or with groups of students, they spend much less time in one-on-one situations with students. The interview or conference is a way to gather information about students which is not easily obtainable in other ways. On a one-to-one basis students will be able to share much more information through conversation than through assessment techniques which require writing.

The conference can provide an opportunity for the teacher to ask questions about content, to determine the student's facility with particular skills, or to question students on their feelings about the topic or activity.

It is important that teachers keep a written record of the conference discussion for future reference. While time constraints of large classes and tight timetables at the intermediate level often prevent the use of student/teacher conferences, they are an evaluation technique worthy of consideration where time permits.

Written Tests
Written tests, which might include multiple-choice, extended response, and/or free-response questions, are used most often to determine the student's achievement in the cognitive domain. Care must be taken to ensure the questions are constructed in a manner that reflects the presentation mode of the content as well as the reading level of the students.

Performance Tests
For tasks that involve technical skills, teachers may use performance tests to determine whether a student understands the fundamental concept and can complete the task at hand. For example, the teacher may provide the appropriate materials and ask the student to complete a simple electric circuit given the circuit diagram. This task requires that the student understands the concept of a circuit and can assemble the materials into the concrete representation of the concept. A simple checklist or a rating scale could be a valuable tool for recording the teacher's observations of the student's performance.

Laboratory Reports
Laboratory reports are used to assess a variety of concepts, skills, and attitudes. They can test a student's ability to develop a hypothesis, control variables, design an experiment, and to communicate their findings in various ways. They also test the student's ability to record and handle data, to analyze, extrapolate, synthesize, and evaluate their findings. However, it is not necessary to require students to do detailed laboratory reports on each activity that is done in a laboratory setting. This often creates "busy work" for the students and requires the teacher to spend a great deal of time reading and grading reports. For example, if an activity requires that students produce a graph of the data collected, the assessment could focus on the students' ability to produce a proper graph. Other aspects of laboratory work would be selected for assessment in subsequent activities. A detailed lab report may be required at the culmination of a unit or term.

Journals
Journals are especially useful for students to express their feelings or attitudes toward a particular topic or issue. These writings are useful for the evaluation of students' attitudes to science.

Projects
Projects include research projects, and activities done individually or as group endeavors. Projects are particularly useful for evaluating cognitive skills, technical skills, and cooperative group skills.

Student Self-Evaluation
Students need to be aware of their own strengths, weakness, areas needing improvement, and attitudes. Students can engage in simple self-evaluation techniques which draws their attention to their own learning. Self-evaluation can be used for the student's assessment of his/her attitudes, interests, and opinions. In a general way, self-evaluation can be used to gauge a student's impressions about his/her achievement of specific knowledge and skills.

Portfolios
A portfolio is a selection of a student's work over a period of time. It is intended as a source of information about the student's achievement of the curriculum outcomes.

The main purpose of the portfolio is to provide a means for monitoring progress over time. The portfolio should enable the user to demonstrate that learning has or has not taken place.

Each piece of work must have some significance or a reason for its selection. The only guideline which can be offered regarding the number of pieces of work is that the portfolio should be representative of the student's work over time. This might suggest that samples be included which represent the topics covered or that samples be included on a regular basis (e.g. one sample per week) so that the user of the information can get a picture of the development over time. For management purposes, the portfolio should be updated periodically, removing items which are no longer relevant or appropriate.

The management of portfolios may create a problem for the teacher. The selection of items for the portfolio and the required updating is a time-consuming process. The initial setting up and establishment of the portfolio must be the responsibility of the teacher but the ongoing maintenance should be completed by the student. Conversations between a teacher and students about assessment tasks and the teacher's evaluation of performance provide students with necessary information to assess their own work. In concert with opportunities to apply it to individual work and to the work of peers, that information contributes to the development of students' self-assessment skills. By developing these skills, students become able to take responsibility for their own learning.

Developing a Plan

Instruction and evaluation must reflect the specific curriculum expectations of the guide. While these guide the teacher in selecting instructional strategies and activities, they will also influence the assessment procedures used in constructing a student's profile.

Teachers hold widely diversified opinions on what constitutes appropriate instructional and evaluation strategies. No single plan will work for all teachers or students. The best option is to include a variety of assessment strategies that are congruent with those used in instruction.

Some tools and procedures used to create a student profile through evaluation are provided in the "Reference List of Assessment

Tools and Procedures".

This list is not intended to be exhaustive nor is any attempt made to describe the construction and use of these items. The teacher's professional judgement should determine the best instruments and techniques to evaluate a topic or theme.

A Reference List of Assessment Tools and Procedures

1. Testing
    - Essay
    - Matching
    - True/False
    - Multiple Choice
    - Interpretation/production of illustrations
    - Interpretation/production of graphs/data tables
    - Numerical problems
2. Student Work Samples
    - Laboratory Reports
    - Major projects and written reports
    - Homework
    - Learning Journals
    - Oral Presentations
3. Checklists
    - Student self-evaluation of:
        - interest/attitudes
        - social/group skills
        - understanding
    - Teacher observation of:
        - laboratory skills
        - group work
        - interest/attitudes
    - Group Self-Evaluation
        - group skills
        - achievement
4. Anecdotal Records
5. Teacher/Student Conferences

Using Varied Assessment Strategies

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

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

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

Intermediate Industrial Technology Curriculum

Technological Responsibility

GCO: Students will be expected to demonstrate an understanding of safety in technology.

SCO: by the end of this module students are expected to:	**Elaboration - Instructional Strategies/Suggestions**
• identify and use the proper personal safety equipment for student activities • practice good housekeeping and identify/avoid obvious hazards • understand how to select and operate fire safety equipment • identify and use hand tools responsibly • identify and use materials responsibly • identify and use machines responsibly • identify WHMIS symbols • understand the relationship between training and experience to safety • demonstrate an understanding of the safety principal that accidents are preventable and avoidable	It is important for students to realize that safety equipment must be used in a work environment and that the equipment protect those near by, as well as the person using a tool or machine. • show students where safety equipment is located • discuss the rationale for the technology lab safety rules • recognize safety hazards in the work setting • ensure work space is orderly, well-maintained, and free of tripping hazards, clutter, spilled liquids or grease • replace or repair broken or damaged tools • store oily rags in metal covered containers • identify location of fire safety equipment • demonstrate use of fire safety equipment • demonstrate safety aspects of common hand tools, machines, and processes • display and use protective devices that can be worn by the student for specific activities • discuss the damaging effect of loud noises • wear proper hearing protection • wear proper eye protection • follow WHMIS procedures for use, handling, and disposal of hazardous materials These SCO's also meet the following Technology Education general curriculum outcomes: ▸ Technological Responsibility ▸ Technological Problem Solving

Technological Responsibility
GCO: Students will be expected to demonstrate an understanding of safety in technology.

Worthwhile Tasks for Evaluation and/or Assessment	**Suggested Resources**
• wear appropriate eye and ear protection • wear appropriate clothing and safety equipment • examine a work area for potential safety risks • use hand tools safely • use materials safely • use machines safely • follow specified safety rules • develop basic housekeeping practices in relation to tools and materials • identify unsafe practices • read and sign student safety contract	*Experience Technology Manufacturing Construction* by Harms, Kroon and Weigel *Standards for Technological Literacy* from the International Technology Education Association Safety Calendar Department of Education Safety Consultant Canadian Occupational Health and Safety http://www.ccohs.ca/ **Safety in the shop** http://grassroots.brunnet.net/fundyhs/co2/safety.htm Instruction sheets from owners manual **Appendix** • Examples of student safety contract including safety rules

Technological Systems
GCO: Students will be expected to innovatively use tools, machines, and materials**.**

SCO: by the end of this module students are expected to:	**Elaboration - Instructional Strategies/Suggestions**
• demonstrate the innovative use of tools • describe safety precautions for each tool • use tools in a safe, productive manner • name common tools and describe their function • choose and use hand tools appropriately for the intended operations	• identify, develop and practise skills with the tools common to industrial technology labs: **Layout tools** tape measures squares rulers scribes marking gauges compasses **Separating tools** saws chisels shears planes utility knives tin snips sanding tools **Finishing tools** paint brushes wiping rags polishing wheels **Forming tools** box/pan break forming pans strip heater vice anvil hammers **Combining tools** welder hammer screw driver rivets glue drills biscuit joiner These SCO's meet the following Technology Education general curriculum outcomes: ▸ Technological Problem Solving ▸ Technological Systems ▸ History and Evolution of Technology ▸ Technoloy and Careers ▸ Technological Responsibility

Technological Systems
GCO: Students will be expected to innovatively use tools, machines, and materials**.**

Worthwhile Tasks for Evaluation and/or Assessment	**Suggested Resources**
• demonstrate the use of tools in a safe productive manner • students use drawings of tools to identify parts and settings of the tools, in particular the safety aspects • complete a safety test on each tool • evaluate student use of tools	*Experience Technology Manufacturing Construction* by Harms, Kroon, and Weigel *Standards for Technological Literacy* from the International Technology Education Association CO2 Car Web page http://grassroots.brunnet.net/fundyhs/co2/main.htm **Appendix** • sample projects • lesson plans • Design Brief examples • Production guide

Technological Systems
GCO: Students will be expected to innovatively use tools, machines, and materials**.**

SCO: by the end of this module students are expected to:	**Elaboration - Instructional Strategies/Suggestions**
• demonstrate the innovative use of machines and materials • describe safety precautions for each machine and material • use machines and materials in a safe productive manner • name common machines and materials and describe their function • choose and use machines and materials appropriately for the intended use and operations	• identify, develop and practice skills with machines and materials common to industrial technology labs: **Materials** softwood hardwood laminates ferrous metals non-ferrous metals plastics wood composets ceramic materials photographic materials **common machines** band saw drill press wood lathe metal machine lathe circular saw miter saw chop saw cut off saw planer router jigsaw radial arm saw jointer angle grinder belt sander disk sander These SCO's meet the following Technology Education general curriculum outcomes: ▸ Technological Problem Solving ▸ Technological Systems ▸ History and Evolution of Technology ▸ Technology and Careers ▸ Technological Responsibility

Technological Systems
GCO: Students will be expected to innovatively use tools, machines, and materials**.**

Worthwhile Tasks for Evaluation and/or Assessment	**Suggested Resources**
• machines and material identification activity • students use drawings to identify parts and settings • identify all safety components • complete safety test on each machine	*Experience Technology Manufacturing Construction* by Harms, Kroon and Weigel *Standards for Technological Literacy* from the International Technology Education Association Canadian Centre for Occupational Health and Safety http://www.ccohs.ca/

Technological Problem Solving
GCO: Students will be expected to design, develop**,** evaluate, and articulate technological solutions.

SCO: by the end of this module students are expected to:	**Elaboration - Instructional Strategies/Suggestions**

• develop a problem solving approach to technological situations
 	
• demonstrate an understanding of the design process
  • examine problem situations
  • once a need is established, clearly state the design brief
  • gather information
  • investigate related solutions
  • develop alternative solutions
  • select and develop the best solution (Design Brief)
 	
• evaluate the effectiveness of both their own and other's technological solutions
 	
• communicate ideas and information about technological solutions
	Design Process - a systematic strategy
	
	Design Brief - a written plan that identifies a problem to be solved, its criteria, and its constraints. The design brief is used to encourage thinking of all aspects of a problem before attempting a solution. Aspects to consider include:
	• possible materials to be used
	• budget
	• time frame for completion of the project
	
	Students should have input into the design of their individual and group projects. Flexibility and student initiative in design are encouraged.
	
	Brain storming is a process in which group members suggest ideas as they think of them. It is a group problem solving method.
	
	Review the advantages and the disadvantages of the design process and the group problem solving method. Include the following:
	• cost analysis
	• ease of manufacture
	• time allotment
	
	These SCO's also meet the following Technology Education general curriculum outcomes:
	• Technological Problem Solving
	• Technological Systems
	• History and Evolution of Technology
	• Technology and Careers
	• Technological Responsibility

Technological Problem Solving
GCO: Students will be expected to design, develop**,** evaluate, and articulate technological solutions.

Worthwhile Tasks for Evaluation and/or Assessment **Project Planning**	**Suggested Resources**

• participate in brain storming sessions
• gather and collect information
• look at similar existing products in flyers or magazines
• collect pictures of designs
• evaluate student use of a design brief
  • sketch of product
  • working drawings
  • list of materials
  • manufacturing procedure
 	
Teacher observation of:
• laboratory skills
• performance
• group work
• interests/attitudes
 	
Student Work Examples:
• project and written reports
• laboratory reports
• homework
• journals
• models
• oral presentation
• portfolios
 	
Sketch some possible solutions that include details of their ideas with orthographic views and isometric views.
 	
Projects/models could be built at this stage.
	Experience Technology Manufacturing construction by Harms, Kroon, and Weigel
	
	Standards for Technological Literacy from the International Technology Education Association
	
	Inventors
	http://inventors.miningco.com/
	
	Appendix
	Design process guidelines
	Example design briefs

Appendix

COMPONENTS OF A DESIGN BRIEF

CONTEXT

This section should outline the problem and provide a realistic background or setting for the problem. It should address the anticipatory set which will engage the learner and grab their interest. It should motivate the student to research and apply the results to a specific area of their life.

CHALLENGE

This section provides for the establishment of the design problem. The challenge should describe the problem of the design brief. Enough information should be provided to give students direction but not the answer. Guidelines and parameters are provided to the students in this section.

OBJECTIVES

This section provides students with expected outcomes they should experience as they complete the design problem. More than one objective should be provided to address cognitive, affective, and psychomotor skills.

RESOURCES

These are the basic reference materials students may need to complete the design activity. It may include articles the students should read for background information or an area here students can list resources they found while completing the activity.

MATERIALS AND EQUIPMENT

This section lists materials that students have access to while engaged in the activity. Which materials are acceptable and who will provide them. A list of equipment or tools that students may use should also be detailed in this section of the design brief.

EVALUATION

Criteria for judging the success of the design solution should be described in detail in this section of the design brief. Who will judge the results, what will be evaluated, and how solutions are assessed is made clear.

Understanding Your Rights

Industrial Technology Safety Assignment

Birchwood Intermediate School

Safety Assignment: Read each of the rights and answer the questions. Use sentences please.

Right to Know
You have the right to know about unsafe materials and/or dangerous machinery in your workplace. You must be on the lookout for hazards present on your work site, and should be taught how these hazards can affect you and your co-workers. The first step is to get proper health and safety training, including learning how to identify workplace hazards and knowing the proper course of action when there is an accident or spill.

Question: List five potential hazards in the Industrial Lab or in your work place.

Question: Which one of these hazards did you feel was most threatening to you? Explain.

Right to Participate
You should report any unsafe practices or conditions you see. For example, if you notice that an electrical power cord is frayed, notify your supervisor as soon as possible to fix it before an accident or fatality occurs. In Canada there are many workplaces which have committees devoted to health and safety. Learn who you can get help from if you have questions about the safety of your working conditions.

Question: Have you ever participated in safety in this way? **Tell of a time** at home, school, or work when you told someone in authority about an unsafe practice or condition that was a risk to you. **Describe the danger as you would to the supervisor.**

Right to Refuse Unsafe Work

You have the right to refuse unsafe work. If you think that the work you do or the piece of equipment you use is unsafe, you can stop this work immediately by citing your legal right to refuse unsafe work. Once you refuse to continue, procedures exist for rectifying the situation. Contact your supervisor or health and safety representative to find out how to correct the unsafe situation. Don't continue to work until you have been advised that the situation has been corrected.

Question: Do you think that you would be confident enough to refuse to do something that your teacher or employer asked you to do because you did not feel safe? **Explain your answer.**

Asking Questions

Everyone needs to have his or her tasks explained. Your employer should first explain your job duties, then show you what to do. If you have a good understanding of these tasks, you should be able to explain the tasks back to your supervisor. Once you can do this, try to perform the tasks under supervision - at least for the first few times - to be sure that you understand all the details.

Remember, if you don't understand the instructions, it's okay to ask questions. Understanding instructions means that you will have a much greater chance of doing the work properly and safely.

Question: Choose any one task or activity that you have learned to do in the Industrial Lab and write down at least four questions that you needed answers for before you started.

1.

2.

3.

4.

Learn How to Work Safely - Apply These Rules:

Question: Write a definition for each of the key terms in bold below the rules.

- Don't perform any task until you have been **properly trained**.

- If you feel that you have been getting too much information too fast, ask your **supervisor** to slow down and repeat the instructions.

- Don't leave your work area unless you've been told to do so. Other work sites may have **special hazards** you don't know about. Examples might include overhanging power lines, slippery floors, or toxic chemicals.

- If you are unsure of something, **ask** someone first. A supervisor or co-worker might help prevent an accident from happening.

- Don't **hesitate** to ask for more training.

- Wear the proper **personal protective equipment** for the task. For example, if you are using safety shoes, hard hat or gloves, be sure that you know when to wear the protective equipment, where to find it, how to use it, and how to care for it.

- Find out what to do in an **emergency situation**, whether it is a fire alarm, power failure, or other situation.

- **Report** any accidents to your supervisor immediately.

K.I.S.H. Industrial Arts Department

Production Guide

Name: _____

Product: _____

Date started: _____ Date completed: _____

Total cost: _____

Procedure

Sketch of Product	
Working Drawing	
List of Materials (on back of sheet)	
Manufacturing Procedure	
	Sketch of Product
Estimate Cost	

K.I.S.H. Industrial Arts Department
General Laboratory Rules

Use common sense and be safety-minded at all times. Safety must become a habit. Wear appropriate eye protection at all times.

1. Horseplay is not permitted.
2. Keep talking to a minimum and keep your mind on your work.
3. Never throw a tool to another person.
4. When cut or injured, report at once to the instructor.
5. No student will be allowed to operate any machine until he has been instructed in its proper use.
6. Never use power tools without permission.
7. Report any tool or machine that is out of order to the instructor.
8. Keep you tools properly arranged on your bench.
9. Don't wear loose clothing or jewelry. Long hair should be tied back.
10. Keep the floor clean.
11. Never leave a machine running when not in use.
12. Keep flammable objects, such as oily paint-soaked rags, in a covered metal can.

I HAVE BEEN MADE FULLY AWARE OF THE ABOVE RULES BY THE INSTRUCTOR AND AGREE TO ABIDE BY THEM.

Parent: _____ Student: _____

Home Address: _____

Birth Date: _____

Grade: _____ Family Doctor: _____

In case of accident, notify:
Name: _____
Relation: _____
Place: _____
Phone: _____

Does this student have any impairments important to an Industrial Arts Teacher?

_____
_____
_____

Is this student on any medication that may affect vision, hearing, or balance?

_____
_____