Technology

Subject Area: Mathematics, Science and Technology

Secteur de la formation professionnelle et technique et de la formation continue

CCBE
COMMON CORE BASIC EDUCATION

Direction de l'éducation des adultes et de l'action communautaire

Québec

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Development Team

Coordination

Fidèle Medzo, Basic Education Coordinator

Direction de la formation générale des adultes (DFGA)

Louise Laroche and Michel Ruel, Subject Area Coordinators, DFGA

Content Development

France Dugal, Commission scolaire des Découvreurs

Jacques Lamarche, Commission scolaire des Draveurs

Collaboration in Research and Content Development

Guylaine Martel, Commission scolaire des Rives-du-Saguenay

Caroline Poitras, Commission scolaire des Découvreurs

Frédérique Voyer, Commission scolaire de la Région de Sherbrooke

Consultation

Carmen Allison, Education Consultant

Domenico Masciotra, Education Consultant

Isabelle Nizet, Education Consultant

Michel Ruel, Commission scolaire des Découvreurs

English Version

Direction de la production en langue anglaise

Secteur des services à la communauté anglophone

Ministère de l'Éducation, du Loisir et du Sport

Subject Area: Mathematics, Science and Technology

Technology

Courses

Presecondary

Everyday Technologies — TSC-P121-2

Secondary Cycle One

Effective Use of Technologies and Personal Comfort — TSC-2121-3

Table of Contents

Presentation of the Program of Study

The *Technology* program comprises a total of 125 hours of courses divided into two levels: Presecondary and Secondary Cycle One. Its aim is the same as that of all the programs in Common Core Basic Education, which is to help adults deal competently with real-life situations.

Because technology is evolving so rapidly, adults must have some understanding of it. The courses in this program offer adult learners the means of exploring and understanding how the technical objects, devices and systems around them work. They will learn to make the proper choices and to use and maintain these objects, devices and systems. This will help them develop self-confidence when dealing with technologies. The program also introduces them to courses that are usually absent from adult general education.

Adult learners must construct scientific knowledge in order to deal with the situations in the program. Such knowledge includes the characteristics of technical objects, devices and systems, as well as the scientific principles on which they are based. By gaining a better understanding of the principles underlying different technical objects, devices and systems, they will be able to use them more effectively. The situations in the *Technology* program add a practical dimension to scientific learning and motivate adult learners to understand abstract concepts, enhance their knowledge by consulting Web sites, read more about the topic and make certain minor repairs themselves.

Although the courses in this program involve handling various technical objects and devices, the *Technology* program is not designed to train specialists, but to give adult learners the opportunity to adopt attitudes they will find useful in many areas of their personal, family and work life. The program also helps them develop intellectual curiosity and independence and adopt a positive and confident attitude toward technical objects, devices and systems.

The Courses of the Program of Study

The table below lists the courses in the *Technology* program of study.

Technology

Presecondary Course	Duration	Secondary Cycle One Course	Duration
Everyday Technologies	50 hrs	Effective Use of Technologies and Personal Comfort	75 hrs

At the Presecondary level, adult learners recognize what they already know and apply their knowledge in order to improve their methods of using, maintaining and storing technical devices. The course *Everyday Technologies* looks at how technical objects work and how to use common household products.

In Secondary Cycle One, adult learners gain a better understanding of the technical aspects of their household plumbing and electrical systems. The course *Effective Use of Technologies and Personal Comfort* equips them to safely and effectively make changes to such systems and solve related technical problems.

Links Between the Program of Study and the Broad Areas of Learning

Environmental and Consumer Awareness

The *Technology* program is closely related to the broad area of learning *Environmental and Consumer Awareness.* Adults who purchase, use and maintain various technical objects, devices and systems must take into account the consequences of their actions for society and the environment. Some situations provide adult learners with an opportunity to think about the environmental problems resulting from technological development. In many cases, they can also encourage learners to reconsider their use of natural resources and encourage them to recycle, choose environmentally friendly technologies, maintain their technical devices in order to reduce pollution and repair them rather than purchase new ones. Finally, the actions used in dealing with a situation must include measures to protect the safety of the adult learner, his or her family and the environment. Adult learners' purchases must be based on their needs and behaviours and those of their family. Adult learners must take into account the parameters established in the *Technology* program, as well as their budget.

World of Work

The *Technology* program is also closely related to the broad area of learning *World of Work.* Dealing with situations involving technological problems helps adult learners explore trades and occupations involving the use of technical devices.

Health and Well-Being

The *Technology* program is related to the broad area of learning *Health and Well-Being.* By improving comfort at home, technology contributes to adults' well-being. Some technologies enable them to deal more effectively with situations related to eating habits, fitness and relaxation. Other technologies enable them to deal with situations aimed at improving cleanliness and hygiene in the home, thereby minimizing health risks.

Contribution of the Program of Study to the Orientations of the *Government Policy on Adult Education and Continuing Education and Training*

This program of study addresses the orientations of the *Government Policy on Adult Education and Continuing Education and Training* by promoting cultural awareness, improvement in the quality of language, the exercise of citizenship rights and responsibilities, and the integration of information and communications technologies.

Cultural Awareness

Technological innovation has led to significant changes in our lifestyle habits and scientific knowledge is now an integral part of our culture. Since new techniques and technological processes require regular upgrading, the courses in the *Technology* program were developed to help adult learners understand new technologies.

Quality of Language

The written and oral presentations required of adult learners in the *Technology* courses help them enrich their language, adding to their accuracy and coherence. By reading and writing, they can learn technological vocabulary. By using language effectively, they will be able to convey their ideas and opinions and argue effectively.

Citizenship

The courses in the *Technology* program introduce adult learners to the virtually limitless possibilities of technology, its constant development and its consequences for society. In this respect, the program is designed to provide them with a better understanding of the community and the roles people play in scientific and technological discovery and its applications.

Integration of Information and Communications Technologies

The information and communications technologies in the *Technology* program support adults' learning. They include correction, organization and production tools. Adult learners can produce various documents and access a wealth of information. Using a computer, they can share ideas, consult experts, work in collaboration, access a variety of information, etc.

Course
Everyday Technologies
TSC-P121-2
Presecondary

"Man and his safety must be the main concern of any technological venture."

Albert Einstein (1879-1955)

Presentation of the Course *Everyday Technologies*

The course *Everyday Technologies* is designed to help adult learners deal competently with real-life situations in which the adequate use of technology requires an understanding of its concepts and principles.

The course prepares adult learners to perform various household chores safely and effectively.

By the end of the course, adult learners will be able to use everyday technologies in an appropriate and safe manner. In their planning, they will be able to take into account their needs and any constraints, diagnosing the problem, identifying what they can do about it and consulting a specialist when needed.

Dealing With the Real-Life Situations

Dealing effectively with real-life situations is based on actions. These actions are grouped into categories and make use of a set of resources that include operational competencies and essential knowledge. During the learning process, adults are expected to construct knowledge related to these resources in order to be able to deal appropriately with their real-life situations.

The class of situations, categories of actions, operational competencies and essential knowledge constitute the compulsory elements of the course. These elements are explained in detail under their respective headings.

Class of Situations Addressed by the Course

This course addresses a single class of situations: *Using everyday technologies at home.*

These situations involve making minor home repairs, doing housekeeping tasks, maintaining tools and devices and using toxic substances safely. Adult learners perform household tasks involving technology with a greater sense of comfort, confidence and independence. The situations in this class force adult learners to reconsider how they use, store and maintain equipment, tools, devices and household products, to explore how they work and to plan actions that ensure their family's safety.

Class of Situations	Examples of Real-Life Situations
Using everyday technologies at home	- Assembling furniture - Doing minor home repairs - Repairing equipment - Repairing surfaces - Maintaining devices - Gardening - Doing housekeeping tasks - Doing seasonal housekeeping tasks (spring, fall) - Washing clothing - Repairing furniture - Improving their comfort level - Keeping hazardous objects or products out of children's reach - Using toxic substances

Categories of Actions

The *categories of actions* are groups of actions that are appropriate for dealing with the real-life situations addressed in the course. *Examples of actions* are provided to illustrate the scope of the category in a variety of contexts.

Categories of Actions	Examples of Actions
▪ Studying a technical problem in the home	▪ Identifies an error in using the tool, technical device or household product ▪ Identifies a defect in the tool or technical device ▪ Explores the main functions of the tool, technical device or household product ▪ Explores the main components of a device or household product ▪ Explores the characteristics of various materials ▪ Explores the characteristics and underlying principles of a tool, technical device or household product ▪ Considers the possible uses of the material, device, tool or household product ▪ Considers the impact of certain materials on the environment
▪ Handling materials, tools, technical devices or household products safely	▪ Consults directions or other sources of information ▪ Consults a drawing or diagram ▪ Considers the advantages and disadvantages of the material, tool, device or household product ▪ Considers the safety rules associated with a material, tool, device or household product ▪ Takes into account the properties and characteristics of the material, tool, device or household product ▪ Recognizes the more fragile parts

Categories of Actions	Examples of Actions
▪ Correcting an everyday problem requiring the use of technology	▪ Identifies the steps in a minor repair ▪ Produces a drawing or diagram ▪ Chooses the appropriate material ▪ Chooses a tool, device or household product appropriate to the chosen material ▪ Considers the risks associated with the task at hand ▪ Considers his/her ability to perform the task ▪ Consults support services ▪ Uses tools and materials safely and methodically, taking their properties and characteristics into account

Compulsory Elements and End-of-Course Outcomes

The compulsory elements are those that the teacher must absolutely take into account when designing learning situations.

Class of Situations

Using everyday technologies at home

Categories of Actions

- Studying a technical problem in the home
- Handling materials, tools, technical devices and household products safely
- Correcting an everyday problem requiring the use of technology

Operational Competencies

Acts methodically

- Follows the established procedure
- Develops an effective plan of action
- Adapts his/her actions
- Determines his/her ability to do the job
- Puts away tools and materials

Thinks logically

- Formulates hypotheses
- Establishes causal links between the characteristics of a technology and its use
- Identifies the operating conditions and principles of technologies
- Anticipates the effects of his/her actions

Essential Knowledge

- Safety
- Properties and characteristics of materials
- Properties and characteristics of tools and technical devices
- Properties and characteristics of common household products
- Graphics

The end-of-course outcomes describe how adult make use of the compulsory elements to deal with the real-life situations addressed in the course.

End-of-Course Outcomes
In order to deal with the class of situations *Using everyday technologies at home,* adult learners effectively carry out tasks using materials, tools, technical devices and household products. These actions are based on an understanding of the concepts and principles underlying how they work.
In the case of a minor problem, adult learners examine the situation based on an adequate understanding of the properties and characteristics of the technologies involved. They formulate hypotheses about the causes of the problem and possible solutions. They establish causal links between the characteristics of the technologies and their use, which enables them to choose the appropriate materials, tools, devices and products. They identify the scientific principles and operating conditions associated with the technologies in question.
Adult learners who use different technologies take their properties, characteristics and safety rules into account. They consult directions, drawings and any other appropriate source of information. They take into account the advantages and disadvantages of various materials, as well as the principles governing the transformation of certain materials upon contact with certain products. They plan their actions carefully and consider their results and their effect on the situation.
The means chosen to correct the problem must be consistent with the results of their analysis and their choice of technology. Adult learners formulate a plan, make drawings or diagrams and follow the established procedure. They determine their ability to act effectively and safely, and recognize their limits. Throughout the process, they verify the quality of their work and make the necessary adaptations. They ensure that the results are consistent with the desired outcome. Finally, they safely store tools and materials.

Evaluation Criteria

- Methodically evaluates a technical problem in the home
- Appropriately and safely handles materials, tools, technical devices and household product
- Makes the appropriate corrections to an everyday problem requiring the use of technology

Operational Competencies

The contribution of each operational competency is described in terms of the actions that are appropriate for dealing with the real-life situations in this course. These operational competencies are addressed in other courses and therefore all of the courses taken together contribute to their development.

In this course, only the following operational competencies are addressed: *Acts methodically* and *Thinks logically*.

Contribution of the Operational Competency *Acts methodically*

The operational competency *Acts methodically* enables adult learners to organize how they deal with real-life situations. It enables them to systematically choose and use the appropriate methods and techniques. Adult learners can organize a sequence of appropriate actions starting with an analysis of the situation and ending with their plan of action, taking into account possible constraints, the desired outcome and their ability to achieve the intended goal.

This competency helps adult learners follow the appropriate steps after reading directions, and develop an appropriate plan of action following an analysis of the situation. They choose different solutions, explore various strategies, demonstrate thoroughness in the performance of the tasks and determine their ability to act. Throughout the process, they evaluate the progress of the work in order to make the necessary adaptations. Once they have completed the task, they consider the consistency of the result with the desired outcome. Finally, they put away the tools and materials and clean up.

Contribution of the Operational Comeptency *Thinks logically*

The operational competency *Thinks logically* enables adult learners to apply a rational approach to dealing with real-life situations. It enables them to create an accurate representation of the situation and to plan appropriate and consistent actions. The approach includes analyzing the situation, making appropriate choices and using material resources judiciously. The construction of logical thinking helps adult learners structure their thoughts.

Faced with a problem related to using everyday technologies at home, adult learners mobilize this operational competency to formulate hypotheses and draw conclusions based on the information gathered as they consult user's and maintenance guides and analyze or use the material, tool, technical device or household product in question. They establish causal links between the characteristics of a material or technical device, identify the underlying principles and justify their choices. They use technology rationally and anticipate the effects of their actions.

Essential Knowledge

Safety

- Pictograms
- Safety measures
- Emergency measures
- Safe handling of materials, tools, devices and household products

Properties and characteristics of materials

- Properties of materials: density, elasticity, rigidity, mechanical strength, corrosion resistance, fire resistance, durability, maintainability, conductivity

Properties and characteristics of tools and technical devices

- Effects of one or more forces on an object (on its direction, principles of reinforcement and opposition)
- Characteristics of motion: direction, speed
- Types of motion: rotation, translation
- Basic mechanical functions: linking, lubrication
- Basic principles of simple machines: lever, inclined plane
- Classification of tools and products based on various properties and characteristics
- Appropriate handling of materials, tools, devices and household products

Properties and characteristics of common household products

- Characteristics: detergent, solvent, active ingredient (chlorine bleach, ammonia)
- Use of household products: solubility, concentration and dilution, cleaning, stain removal, protection, adhesion, lubrication

Graphics

- Properties and characteristics of a drawing
- Interpretation of a drawing
- Sketch

Attitudes

The following attitudes are provided as suggestions only. The development of these attitudes can help adults to become more competent in dealing with the real-life situations in this course.

Curiosity	Caution
Curiosity is indispensable if adult learners are to keep abreast of technological developments and new ways of doing things.	There are risks involved in using different technologies. Adult learners must consider their own safety as well as that of others.

Complementary Resources

The following resources are provided as suggestions only and consist of references that may be consulted in learning situations.

Social Resources	Material Resources
▪ Suppliers ▪ Specialists ▪ Colleagues	▪ Calculator ▪ User's guides ▪ Manufacturer's instructions ▪ Materials ▪ Computer with Internet access ▪ Common home maintenance tools (e.g. hammer, screwdriver) ▪ Various products

Contribution of the Subject Areas

The contribution of other subject areas, in particular knowledge related to Languages and to Mathematics, Science and Technology, is also useful for dealing with the real-life situations in this course. The elements identified for each subject area are not compulsory and do not constitute prerequisites.

Subject Area: Languages

Program of Study: *English, Language of Instruction*

Course (Presecondary): *Everyday Living*

- Categories of actions related to every technologies in the class of situations *Using language in everyday home life*

Subject Area: Mathematics, Science and Technology

Program of Study: *Mathematics*

- Calculating ratios when preparing household products
- Creating sets and subsets of elements associated with household products and tools
- Interpreting drawings and diagrams
- Constructing plane figures when sketching the operating principles of a tool or technical device

Program of Study: *Computer Science*

- Consulting Web sites (or the appropriate computer media) for information related to the use or maintenance of technologies: manufacturers, retailers, renovation, household tips, etc.
- Requesting information about how to do minor repairs or maintenance by e-mail or using word processing software
- Taking notes using word processing software

Andragogical Context

The course *Everyday Technologies* requires adult learners to demonstrate intellectual curiosity, independence and a responsible and confident attitude toward technologies. It is designed to shed light on how certain technologies work so that adult learners feel a sense of empowerment faced with innovation and are capable of safe and effective action.

Addressing challenges encourages adult learners to adopt a critical approach. They are more likely to participate in a situation involving action and reflection. After having experienced difficulties at school in the past, they are now introduced to concrete and interesting learning, which stimulates their need to construct knowledge.

This course enables adult learners to acquire learning based on observation, analysis and a hands-on approach. The advantage of this approach is that adult learners experiment with concrete applications of the basic scientific principles needed to deal with the situations. This means of integrating science and technology may spark adult learners' interest in assimilating abstract concepts. The course is not intended to train technicians and certainly not to compete with specialized and semi-specialized training. It is designed to introduce adult learners to basic scientific and technological principles and logical thinking. It facilitates the safe use of appropriate technologies at home. Adult learners are encouraged to reflect on their work methods and results. They consider their actions in order to make improvements and apply them in their immediate environment.

When they successfully perform technological tasks, adult learners gain greater self-confidence and self-esteem. Success in one field sparks success in others.

Learning Situation

The learning situation that follows is provided as an example to show teachers how the principles of the education reform can be applied in the classroom.

It is authentic in the sense that it addresses a real-life situation (taken from the class of situations in the course) that adults may find themselves in. It is sufficiently open and comprehensive to allow adult learners to explore several important aspects related to dealing with this real-life situation.

The examples of actions presented in the course help the teacher to identify those actions that an adult would take to deal with the real-life situation. The teacher can then refer to these examples in order to develop pertinent learning activities.

The learning situation is organized in terms of the three steps of the teaching-learning process, which are as follows:

- planning learning
- actual learning
- integrating and reinvesting learning

These steps highlight the principles of the education reform insofar as they encourage adults to be active, to reflect on their learning and to interact with their peers when the learning context is suitable. They include learning activities and may also include evaluation activities intended to support adults in the learning process.

These activities help learners to construct knowledge related to the compulsory elements of the course that are targeted by the learning situation concerned: one or more categories of actions, essential knowledge and the actions of the operational competencies associated with the categories of actions.

The example provided also refers to certain teaching strategies— pedagogical methods and techniques—that can be selected according to the learners, the context and the learning environment. Certain learning strategies may also be suggested, as well as a variety of material and social resources.

Example of a Learning Situation

Replacing a Thermostat

The situation proposed in the course *Everyday Technologies* involves improving one's comfort level. This project reflects adult learners' need to deal with the onset of winter, in particular by adjusting the heating system. Using a programmable thermostat improves the comfort level and reduces energy consumption. In order to contextualize the project in class, the teacher provides a programmable thermostat and the tools needed to install it, as well as a circuit diagram of a system with a power supply panel, a junction box with a mechanical thermostat and a heater. In this type of situation, adult learners must be able to interpret a drawing and choose and use the necessary tools and technical devices. They must use the competencies *Thinks logically* and *Acts methodically* and perform actions in the categories *Studying a technical problem in the home, Handling materials, tools, technical devices and household products safely* and *Correcting an everyday problem requiring the use of technology*.
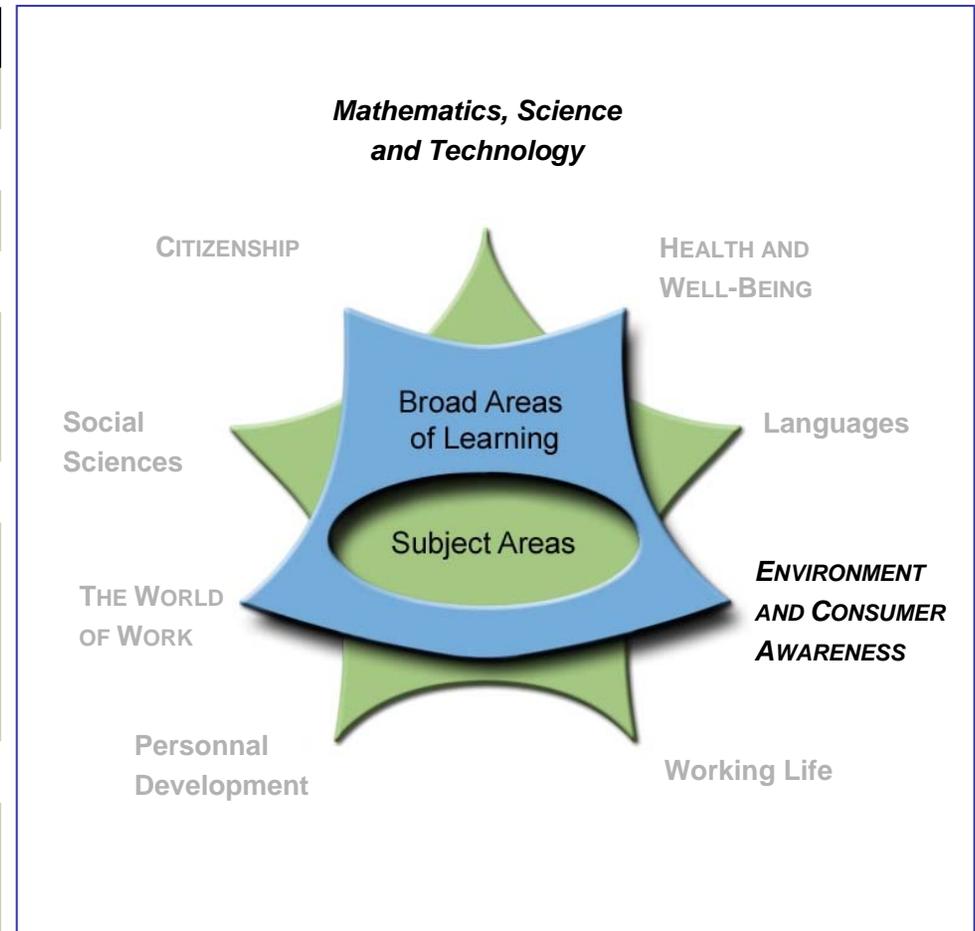
The teacher gives a lecture on the materials the adult learners will need: junction box, bracket, tape, programmable thermostat, multimeter, pliers, screwdriver, wire strippers, connectors and screws. He or she helps the adult learners read the instructions and interpret the drawing accompanying the thermostat.

In the lab, adult learners explore the characteristics of different thermostats and the principles underlying the tools and materials needed to do the job. These involve the different types of motion and principles applicable to the basic linking functions. In a supervised team, the adults learn to handle the different tools and materials.

In the workshop, guided by the teacher, adult learners make sure that the safety measures mentioned in the instructions are followed. They formulate a plan including a work method and the list of necessary resources. This analysis also enables them to determine whether they can do the job or whether they need to ask for help. The thermostat is installed taking into account safety information and information about the tools and materials. The adult learners make sure that their results are consistent with the desired outcome and make the necessary adjustments. Finally, they put everything away and clean up.

Elements of the Course Addressed by the Learning Situation

Class of Situations
Using everyday technologies at home

Learning Situation
Replacing a Thermostat

Categories of Actions

- Studying a technical problem in the home
- Handling materials, tools, technical devices and household products safely
- Correcting an everyday problem requiring the use of technology

Operational Competencies	Essential Knowledge
- Acts methodically - Thinks logically	- Safety - Properties and characteristics of materials - Properties and characteristics of tools and technical devices - Graphics

Complementary Resources

- Electrical circuit with a power supply panel, a mechanical thermostat and a heater - Tools: pliers, wire strippers, screwdriver, multimeter - Bracket, tape, connectors and screws	- Electronic thermostat - Safety glasses - Manufacturer's manuals and guides - Pencil and paper

Mathematics, Science and Technology

CITIZENSHIP

HEALTH AND WELL-BEING

Social Sciences

Broad Areas of Learning

Subject Areas

Languages

THE WORLD OF WORK

ENVIRONMENT AND CONSUMER AWARENESS

Personnal Development

Working Life

Effective Use of Technologies and Personal Comfort

TSC-2121-3

Secondary Cycle One

"The world does not exist so we may understand it; it exists so that we may grow in it."

G.C. Lichtenberg

Presentation of the Course *Effective Use of Technologies and Personal Comfort*

The course *Effective Use of Technologies and Personal Comfort* is designed to help adult learners deal competently with real-life situations related to household safety and personal comfort reliant on the proper functioning of electrical and plumbing systems.

The course prepares adult learners to work safely on household systems, analyzing and taking into account the characteristics of the objects and devices involved.

By the end of the course, they will be able to solve a problem related to the maintenance, upgrading or repair of a household system.

Dealing With the Real-Life Situations

Dealing effectively with real-life situations is based on actions. These actions are grouped into categories and make use of a set of resources that include operational competencies and essential knowledge. During the learning process, adults are expected to construct knowledge related to these resources in order to be able to deal appropriately with their real-life situations.

The class of situations, categories of actions, operational competencies and essential knowledge constitute the compulsory elements of the course. These elements are explained in detail under their respective headings.

Class of Situations Addressed by the Course

This course addresses a single class of situations: *Household safety and personal comfort*.

These situations involve power failures, water damage and defective household appliances. They are characterized by the systematic approach they require. To deal with these situations, adult learners must take into account a whole set of parameters related to their home and the systems in question. Situations in this class may require that adult learners plan a household installation or solve a technical problem related to the electrical or plumbing system. Adult learners must explore various solutions and develop a plan of action to improve their personal comfort as well as the effectiveness and safety of their household appliances and systems.

Class of Situations	Examples of Real-Life Situations
Household safety and personal comfort	- System breakdown - Defective toilet flushing system - Power failure - Installation of a light fixture - Defective appliance - Defective outlet - Minor water damage

Categories of Actions

The *categories of actions* are groups of actions that are appropriate for dealing with the real-life situations addressed in the course. *Examples of actions* are provided to illustrate the scope of the category in a variety of contexts.

Categories of Actions	Examples of Actions
▪ Studying a problem	▪ Identifies the source of a problem ▪ Consults a drawing for a project ▪ Develops a plan of action ▪ Chooses tools ▪ Chooses an electric heater ▪ Chooses materials ▪ Considers the impact of his/her choices of materials on the environment
▪ Becoming familiar with the operation and maintenance of a household system	▪ Explores the main functions of a household system ▪ Consults directions or other sources of information ▪ Analyzes the main components of a system ▪ Consults a drawing or diagram ▪ Consults a maintenance program ▪ Explores the defects in a system
▪ Safely repairing a household system	▪ Repairs a toilet tank ▪ Repairs a water leak ▪ Remodels a kitchen ▪ Installs an air conditioner ▪ Changes the kitchen hood exhaust fan ▪ Sets up a home theatre

Compulsory Elements and End-of-Course Outcomes

The compulsory elements are those that the teacher must absolutely take into account when designing learning situations.

Class of Situations

Household safety and personal comfort

Categories of Actions

- Studying a problem
- Becoming familiar with the operation and maintenance of a household system
- Safely repairing a household system

Operational Competencies

Acts methodically
- Establishes an appropriate plan of action
- Follows instructions when using technical devices
- Determines his/her ability to do the job
- Follows the steps in the procedure
- Adjusts his/her actions
- Puts away tools and materials

Thinks logically
- Formulates hypotheses
- Identifies the laws, principles and effective and safe operating conditions associated with a system
- Anticipates the consequences of his/her actions
- Considers the effects of his/her actions on the safety of individuals and the environment

Essential Knowledge

- Household systems
- Measuring devices
- Materials: properties and characteristics
- Energy
- Safety
- Drawings and diagrams

The end-of-course outcomes describe how adults make use of the compulsory elements to deal with the real-life situations addressed in the course.

End-of-Course Outcomes

In order to deal with the class of situations *Household safety and personal comfort*, adult learners use tools and technical devices to improve the effectiveness of household electrical and plumbing systems within the limits of their ability, thereby increasing personal comfort levels.

Given a minor problem, they examine the situation based on an accurate understanding of the system in question and its main components. They interpret diagrams and correctly use measuring devices. They formulate hypotheses in order to establish the necessary procedures.

In order to become familiar with the normal operation and maintenance of a household system, adult learners draw schematic diagrams. They identify the laws, principles and effective and safe operating conditions associated with the system. They understand different forms of energy, as well as how they are transmitted and transformed. They understand the overall functioning of the system, processes and command functions.

Adult learners take their examination into account when repairing a household system. They establish an appropriate plan of action and draw diagrams. They anticipate the consequences of their work, taking into account the characteristics of the household systems, constraints and priorities. They consider the effects of their actions on the safety of individuals and the environment. They determine their ability to do the job and recognize where they can act effectively and within the law before calling upon professionals. They follow the steps in the procedure. They use measuring instruments, materials and the appropriate specialized tools, following instructions and taking into account the properties and characteristics of the materials used.

Throughout the process, adult learners assess the progress of the work and make adjustments in order to optimize results. When the work is done to their satisfaction, they put away the tools and materials and clean up.

Evaluation Criteria

- Studies a problem methodically
- Becomes familiar with the operation and maintenance of a household system
- Safely and effectively repairs a household system

Operational Competencies

The contribution of each operational competency is described in terms of the actions that are appropriate for dealing with the real-life situations in this course. These operational competencies are addressed in other courses and therefore all of the courses taken together contribute to their development.

In this course, only the following operational competencies are addressed: *Acts methodically* and *Thinks logically.*

Contribution of the Operational Competency *Acts methodically*

The operational competency *Acts methodically* enables adult learners to deal methodically and rigorously. It enables them to establish a sequence of appropriate actions starting with an analysis of the situation and ending with the satisfactory correction of the problem, taking into account possible constraints, the desired outcome and their ability to achieve the intended goal. This competency helps adult learners follow directions, choose the proper work method, plan their actions appropriately and do precise work. It helps them learn how to proceed step by step and verify all of the parameters in order to determine what needs to be done and to work safely.

Adult learners plan their actions appropriately, establishing their priorities and anticipating difficulties when dealing with the situations. They determine their ability to do the job and recognize where they can act effectively, safely and legally before calling upon professionals. To repair the household system, they use measuring instruments, materials and tools, following instructions. They proceed step by step and make adjustments in order to optimize results. At the end of the process, they review their work to ensure that it is consistent with the desired outcome and make any necessary modifications. Finally, they put away tools and materials and clean up.

Contribution of the Operational Competency *Thinks logically*

The operational competency *Thinks logically* enables adult learners to apply a rational approach to situations involving household safety and personal comfort. The construction of logical thinking helps them structure their thoughts and enables them to create an accurate representation of the situation: their examination of the situation helps them understand and establish the goal to be achieved, and to distinguish between what they can do themselves and what requires the help of a specialist. This competency helps adult learners develop systemic thinking and establish causal links between the characteristics of a technical device and its underlying principles.

This competency also enables adult learners to formulate hypotheses and draw conclusions based on the information gathered as they consult user's guides and maintenance manuals and experiment with the system in question. Adult learners analyze the facts and identify the laws, principles and conditions associated with the safe and effective operation of the system. They anticipate the consequences of their work. They make corrections and choose appropriate actions, while considering the effects of their actions on the safety of individuals and the environment.

Essential Knowledge

Household systems (plumbing, electrical)

- General operation of the system (inputs, transformation mechanisms, outputs)

- Main components

    - Electrical system: meters, service entrance boxes, cables, light fixtures, light bulbs, outlets, switches, heaters, household appliances, telecommunications cables, antennas

    - Plumbing system: water supply, toilet tanks, wastewater treatment, meters, water inlets, pipes, taps, valves, toilet bowls, sinks, showers, bathtubs, water softeners, sewers, water heater, pumps

- Household system processes (transportation, transformation, water supply, drainage)

- Command functions: fuses and breakers, thermostat, dimmer, level detectors, valves, etc.

Measuring devices

- Using meters, thermometers, multimeters

Materials: properties and characteristics

- Exploration of various types of materials found in household systems: metals and alloys, plastic, ceramic, glass, silicone, rubber, etc.

- Exploration of the properties of certain materials found in household systems: expansion, hardness, elasticity, buoyancy, insulation, conductivity, malleability, gauge

Energy

- Forms of energy: mechanical, electrical, thermal, light

- Direct and alternating current

- Transmission of energy in a household system: thermal and electrical conductivity, convection, radiation, induction

- Transformation of energy in a household system (e.g. electrical to thermal)

- Measurements of energy: voltage, quantity, resistance, power, consumption, flow

Safety

- Safe handling of tools

- Safety devices associated with different tools

- Safe operation of a system

- Manufacturing and application standards: Canadian Standards Association (CSA), Bureau de normalisation du Québec (BNQ), International Organization for Standardization (ISO), Building Code

Drawings and diagrams

- Interpretation of drawings of a household system or installation

- Production of schematic diagrams

- Production of construction diagrams

Attitudes

The following attitudes are provided as suggestions only. The development of these attitudes can help adults to become more competent in dealing with the real-life situations in this course.

Curiosity	Caution
Curiosity is indispensable if adult learners are to keep abreast of technological developments and new ways of doing things.	There are risks involved in using different technologies. Adult learners must consider their own safety as well as that of others.

Complementary Resources

The following resources are provided as suggestions only and consist of references that may be consulted in learning situations.

Social Resources	Material Resources
- Specialists (e.g. plumber, electrician, architect) - Suppliers - Manufacturers	- Computer with Internet access - Tools - Measuring devices - Measuring and drafting instruments - Manufacturer's manuals and instructions - User's guides and maintenance manuals - Technical references - Information sheets on measuring instruments, tools and materials - Specialized information documents

Contribution of the Subject Areas

The contribution of other subject areas, in particular knowledge related to Languages and to Mathematics, Science and Technology, is also useful for dealing with the real-life situations in this course. The elements identified for each subject area are not compulsory and do not constitute prerequisites.

Subject Area: Languages

Program of Study: *English, Language of Instruction*

- Oral interaction to obtain and give information, instructions and advice (e.g. about operating, maintaining and repairing a household system)
- Listening to informative discourse (e.g. television home repair and renovation programs, promotional videos, how-to demonstrations) related to household technologies
- Reading informative texts (e.g. fact sheets, instruction manuals, how-to books, user guides, maintenance manuals, warranties, service contracts) related to household technologies
- Writing informative texts (e.g. notes, records, work plans, letters/e-mails of inquiry/complaint) pertaining to the use of technologies

Subject Area: Mathematics, Science and Technology

Program of Study: *Mathematics*

- Referring to perimeters and areas
- Performing mathematical operations on fractions when reading or taking measurements related to different household systems or installations, for example
- Performing mathematical operations on decimals when reading or taking measurements for an installation
- Interpreting and producing drawings and diagrams for a household system or installation

Program of Study: *Computer Science*

- Consulting Web sites (or the appropriate computer media) for information related to the technology in question
- Writing brief instructions or directions using word processing software
- Taking notes on articles, using word processing software
- Taking notes, using word processing or spreadsheet software, to produce personalized directions

Andragogical Context

The course *Effective Use of Technologies and Personal Comfort* is not intended to train specialists. Rather, it offers adult learners the means of exploring and understanding how household technological systems, in particular plumbing and electrical systems, work. The effectiveness of these two systems is essential to maintain and improve personal comfort levels. The learning situations addressed in this course require that learners apply their observation and analysis skills to solving problems related to the functional organization of their home.

The course introduces adult learners to basic scientific and technological principles requiring logical thinking. It facilitates the safe and effective operation of household systems and their appropriate maintenance. When a problem arises, the adult learners must take into account the characteristics and operation of several components in interaction so that their actions are safe and effective. They must be able to recognize to what extent their abilities and government regulations enable them to act safely before calling upon a professional.

The course *Effective Use of Technologies and Personal Comfort* is based on learning situations that foster experimentation and reflection. It involves simulations of problems that adults are likely to encounter in their daily lives. They are contextualized and concrete and therefore give meaning to the learning and have a positive effect on learners' motivation. The successful completion of technological tasks improves their self-confidence and self-esteem. Success in one field often results in success in others.

The learning situations are also an opportunity for adult learners to consider their influence on everyday technologies and to become aware of certain scientific and technological issues.

The course requires learners to reflect on their work methods and results in order to improve their actions. They can then transfer actions carried out in learning situations to real-life situations.

Learning Situation

The learning situation that follows is provided as an example to show teachers how the principles of the education reform can be applied in the classroom.

It is authentic in the sense that it addresses a real-life situation (taken from the class of situations in the course) that adults may find themselves in. It is sufficiently open and comprehensive to allow adult learners to explore several important aspects related to dealing with this real-life situation.

The examples of actions presented in the course help the teacher to identify those actions that an adult would take to deal with the real-life situation. The teacher can then refer to these examples in order to develop pertinent learning activities.

The learning situation is organized in terms of the three steps of the teaching-learning process, which are as follows:

- planning learning
- actual learning
- integrating and reinvesting learning

These steps highlight the principles of the education reform insofar as they encourage adults to be active, to reflect on their learning and to interact with their peers when the learning context is suitable. They include learning activities and may also include evaluation activities intended to support adults in the learning process.

These activities help learners to construct knowledge related to the compulsory elements of the course that are targeted by the learning situation concerned: one or more categories of actions, essential knowledge and the actions of the operational competencies associated with the categories of actions.

The example provided also refers to certain teaching strategies—pedagogical methods and techniques—that can be selected according to the learners, the context and the learning environment. Certain learning strategies may also be suggested, as well as a variety of material and social resources.

Example of a Learning Situation

Repairing a Toilet Flushing System

The situation proposed in the course *Effective Use of Technologies and Personal Comfort* is *Repairing a toilet flushing system.* This project meets a need, since the adult learners are likely to encounter a problem requiring that they repair the toilet tank. In order to contextualize the project in the classroom, adult learners are asked to change parts on a toilet tank in the workshop.

In this type of situation, adult learners must be able to identify the source of the problem, become familiar with the main components of a system and work carefully and methodically using tools and materials. This situation enables adult learners to use the competencies *Thinks logically* and *Acts methodically* and to carry out actions in the following categories: *Studying a problem, Becoming familiar with the operation and maintenance of a household system* and *Safely repairing a household system.*

In a formal lecture, adult learners become familiar with the general operation of a plumbing system and its main components. Thus, they are able to situate the toilet tank in the system and understand the principles of the water system.

In the workshop, in a research project guided by the teacher, adult learners explore the principles underlying the operation of different toilet parts, particularly the refill tubes and the different flapper valves. They realize that the noise can come from two sources: a refill tube or a flapper valve that does not close properly. In this learning situation, adult learners will identify the second problem with the teacher's help.
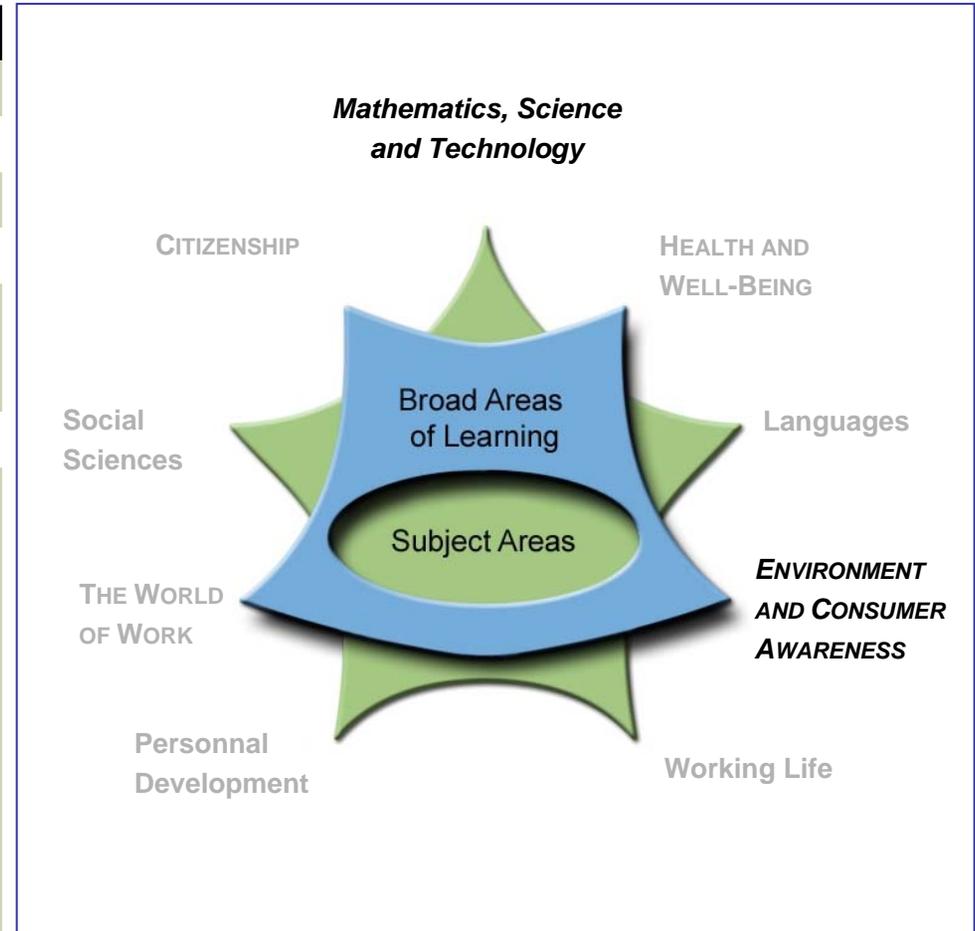
In the workshop, adult learners become familiar with different flapper valves and refill tubes and the tools needed to change them. With the teacher's help, they establish a plan of action including a diagram of a tank and toilet, a procedure, safety measures and a list of necessary resources. This will also enable them to verify whether they are able to do the job or whether they should ask for help.

Then, in pairs, the adult learners are placed in a similar learning situation involving one of the sources analyzed, but with another tank model. One of them repairs the valve, using the same safety measures, materials and tools, while the other guides him or her. They proceed step by step and verify whether their results are consistent with the desired outcome and make the necessary adjustments. The teacher supervises and checks the quality of their work. Finally, the adult learners put the tools away and clean up.

Elements of the Course Addressed by the Learning Situation

Class of Situations
Household safety and personal comfort

Learning Situation
Repairing a Toilet Flushing System

Categories of Actions

- Studying a problem
- Becoming familiar with the operation and maintenance of a household system
- Safely repairing a household system

Operational Competencies	**Essential Knowledge**
- Acts methodically - Thinks logically	- General operation of a plumbing system - Plumbing system processes - Command functions - Transmission of energy in a plumbing system - Exploration of the properties of certain materials - Diagrams - Manufacturing and application standards - Safety devices associated with different tools - Safe handling of tools - Safe operation of a system

Complementary Resources

- Pliers and adjustable wrenches - Flapper valves and refill tubes - Cleaning equipment	- Toilet - Pencil and paper - Work clothes - Safety glasses

Mathematics, Science and Technology

CITIZENSHIP

HEALTH AND WELL-BEING

Social Sciences

Broad Areas of Learning

Languages

Subject Areas

THE WORLD OF WORK

ENVIRONMENT AND CONSUMER AWARENESS

Personnal Development

Working Life

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