Course

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