

**Centre de
développement
pédagogique**

Name

**Training session
for science and technology
resource persons**

TASK ANALYSIS

**Brigitte Loiselle ADP
Daniel Mamane ADP**

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ANALYSIS OF THE LEARNING SITUATION WITH RESPECT TO THE QUEBEC EDUCATION PROGRAM

Foreword

This analysis of the learning situation will help you understand the elements that were taken into account when the Quebec Education Program was developed. Although we are introducing it at the end of the training session, this activity was developed at the same time as the learning situation. It enabled us to organize tasks and design a logbook that would better reflect the orientations of the program.

Teachers play a vital role in helping students develop competencies, strategies, attitudes and techniques. Without the teacher's emphasis, not all students would be able to achieve competency.

Students must be given time to reflect on and discuss issues, as well as additional tools to assess and record information so that they may fully grasp concepts and acquire the competencies set out in the program.

Broad Area of Learning: Environmental Awareness and Consumer Rights and Responsibilities

Focuses of Development:

- Awareness of his/her environment

Awareness that exploiting natural resources (metals and fossil fuels) causes acid rain, which in turn affects the survival of certain species by altering their habitats.

- Construction of a viable environment based on sustainable development

Understanding of possible actions that can help solve the problem of acid rain. (Reducing the source of nitrogen oxide and sulphur oxide emissions or trying to counter their effects.)

- Awareness of social, economic and ethical aspects of consumption

Source of NO_x and SO_x emissions and reasons why they are discharged into the environment (i.e. automobile industry and use of fossil fuels to produce energy).

CROSS-CURRICULAR COMPETENCIES DEVELOPED THROUGH THIS PROBLEM

Intellectual Competencies

- Uses information

*Searches for information during specialist meetings and summarizes this information on worksheets and in the group report. Develops the elements to be used during the group presentation (e.g. model, display and transparencies).
Gives sources of information and validates sources by comparing them.*

- Solves problems

Designs an experiment to determine the pH of household products and verify their buffering capacity. Designs a model and prepares a presentation.

- Uses creativity

*Designs a model and an instrument.
Prepares a presentation according to the chosen scenario.*

Methodological competencies

- Adopts effective work methods

*Working with the group, understands the problem and tackles it by searching for information.
Seeks a consensus among specialists on the information to record in the logbook.
Respects the time limits set for each step.
Records all the necessary information in the logbook. (Keeps a record of the procedure followed in each step.) Observes conventions for writing lab reports. Observes the design specifications.*

Personal and social competencies

- Cooperates with others

*Working in a multidisciplinary team, shares tasks and assigns roles to search for information and prepare the presentation elements.
Working in a multidisciplinary team, appreciates the quantity of information processed by his/her teammates in order to reach a common goal.*

Communication-related competencies

- Communicates appropriately

Correctly summarizes the information on thematic worksheets.

During his/her experiment, records information according to established standards.

Observes grammar and syntax rules when writing the lab report, labelling the model or producing any other document used in the presentation.

Communicates orally during group presentations.

SUBJECT-RELATED COMPETENCIES DEVELOPED IN THIS TASK

1. Seeks answers or solutions to scientific or technological problems

- Defines a problem

Searches for information as part of a committee of experts, conducts an experiment on pH and prepares a presentation.

- Chooses a design scenario

Comes up with various ideas and chooses a concept for a model and an instrument illustrating buffering capacity.

- Analyzes his/her solution

Based on his/her research and experiment, identifies the solution to the problem and its components, and integrates them into the model and instrument, taking into account the specifications and requirements of the presentation. Compares his/her work to that of peers and evaluates it.

2. Makes the most of his/her knowledge of science and technology

- Identifies the effects of science and technology

Understands the causes and environmental issues involving industry and recognizes the importance of mastering a variety of scientific and technological concepts in order to define the problem.

- Understands natural phenomena

Explains how acid rain is formed, understands how species evolve as a result of increased acidity in the environment, creates a display on the buffering capacity of the soil.

3. Communicates in the languages used in science and technology

- Participates in exchanging scientific and technological information

Works in a group to collect information and present the problem to his/her peers.

- Divulges scientific and technological knowledge or results

Records information in the logbook, writes a lab report on the pH experiment, prepares visual aids for the presentation, as well as a model and a display explaining the causes and effects of acid rain.

- Interprets and produces scientific and technological messages

Searches for information in a group of specialists, writes a representation of the problem with a multidisciplinary team, writes a lab report, draws schematic diagrams.

SUBJECT-SPECIFIC CONTENT

The Material World

- States of matter - *rock and water cycles*
- Acidity/alkalinity - *thematic information and experiment*
- Chemical change - *demonstration on acid rain, buffering capacity*
- Mixtures - *composition of rocks, distilled water vs. salt water, fresh water, drinking water, air and its components*
- Solutions - *percolation and runoff, mineral salts*

The Living World

- Habitat - *reproduction site of species that populate a lake; characteristics of the lake*
- Species - *influence of the environment on the survival of species and biodiversity*

The Earth and Space

- Types of rocks - *rock cycle and physiographic regions of Quebec*
- Atmospheric layers - *composition of the Earth's atmosphere and characteristics of the layers*
- Air - *composition of air; presence of water vapour and pollutants in the air*
- Types of soil - *physiographic regions of Quebec and buffering capacity*
- Winds - *displacement of air mass in Quebec*
- Water cycle - *formation of precipitation; chemical and physical transformations in the environment*

The Technological World

- Specifications - *construction of a model; design of the display*
- Raw material - *acid rain resulting from mineral extraction of metals*
- Energy transformations - *acid rain resulting from coal-burning plants*

STRATEGIES, TECHNIQUES AND ATTITUDES

Strategies

- Dividing a complex problem into simpler subproblems
- Identifying the constraints and elements that must be taken into account to solve the problem
- Exploring various ways of solving the problem
- Ensuring that the procedure is appropriate and safe, and making the necessary adjustments
- Using different tools for recording information (e.g. diagrams, notes, graphs, procedures, logbook)
- Using various means of communication (e.g. oral presentation, written presentation, Web sites)

Techniques

- Drawing schematic diagrams
- Assembling
- Using laboratory materials and equipment safely

Attitudes

- Curiosity
- Attentiveness
- Team spirit
- Receptivity to original solutions
- Personal discipline
- Objectivity
- Concern for a job well done
- Willingness to work hard
- Willingness to cooperate effectively with others
- Respect for life and the environment