Course

CMP-5070-1

Electronic Spreadsheets: Data Analysis

Computer Science

INTRODUCTION

The goal of the *Electronic Spreadsheets: Data Analysis* course is to provide adults with the means to analyze data so that they can hone their ability to analyze and synthesize information. Its focus is on advanced data analysis concepts.

In this course, adult learners deal with various learning situations that help them acquire practical knowledge about data analysis using an electronic spreadsheet. By presenting data in charts or pivot tables (data pilots), adult learners discover what computers can do. They work with care, evaluate their work and make sure they have met the standards that have been set.

By the end of this course, adult learners will be able to create charts and pivot tables (data pilots) to present data to be analyzed. They will understand the nature, usefulness and purpose of charts and pivot tables (data pilots) as well as the commands and functions that are used to create them.

SUBJECT-SPECIFIC COMPETENCIES

This course targets the following subject-specific competencies:

- *Interacts in a computer environment*
- *Produces computerized documents*

Thus, it is by activating and integrating these two subject-specific competencies and by using other resources that adults are able to effectively structure their learning.

During the learning situations, adult learners use the resources of a computer network, while carefully planning their work and making adjustments to their plan as they work. When they analyze information, they make sure it is relevant and check it against other sources.

PROCESSES AND STRATEGIES

As they learn about computers, adult learners are called upon to use various processes and strategies. These processes and strategies represent the way in which adults go about solving problems, meeting challenges and, in general, carrying out their learning activities.

For the *Electronic Spreadsheets: Data Analysis* course, the suggested approach is the production process.

<table>
<tr><th colspan="2">Production process</th></tr>
<tr><td colspan="2">• This process consists of two steps: planning and production. Four values are associated with it: communicate clearly; validate the production on a regular basis; maintain ongoing feedback and collaboration; accept the change.
• During the planning stage, adult learners must define the work to be done as precisely as possible. Planning must be flexible and allow adjustments throughout the project
• During the production stage, adult learners must complete the project according to the planning established; maintain ongoing feedback and collaboration; accept change, even at the end of the production stage, and respond to change rather than following the initial plan.</td></tr>
<tr><td>Examples of strategies</td><td>- Comparing the current situation with the desired situation
- Determining the steps involved in carrying out the work
- Drawing up a work schedule
- Choosing a work method
- Making adjustments to the plan as they work
- Analyzing their results</td></tr>
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To meet the requirements of the production process, the initial plan must be flexible enough to allow for adjustments throughout the project. Through discussions with the teacher or with their peers, adults learn to reflect on each step in their process and arrive at a result that will differ from their original plan. By applying the above process, they learn to cooperate with others and to accept changes during the course of a project.

CROSS-CURRICULAR COMPETENCIES

The cross-curricular competencies are not developed in a vacuum; they are rooted in learning situations and contribute, to varying degrees, to the development of the subject-specific competencies, and vice versa.

Several cross-curricular competencies can be useful in dealing with the learning situations in the *Electronic Spreadsheets: Data Analysis* course. Two are considered particularly relevant to this course: *Uses information* and *Adopts effective work methods.*

- **Intellectual Competency**

By using data tables, adults learn to *use information* based on its source. By sorting and filtering information, or even using a pivot table (data pilot), adult learners systematize the information-gathering process and gather information in order to eventually put it to use.

- **Methodological Competency**

To arrive at meaningful results, adult learners must *adopt effective work methods*. Thus, they learn to consider all aspects of a problem involving adding calculated fields to a table before going on to the next steps. They understand and thoroughly plan the steps in their work.

SUBJECT-SPECIFIC CONTENT

The subject-specific content consists of knowledge and cultural references. The prescribed content for this course is outlined below. However, depending on the context (e.g. if certain tools or functions are not available in a given software program), other equivalent content may be substituted for that outlined below.

KNOWLEDGE

- ***Data tables***
  - Heading row
  - Field
  - Record
- ***Logical functions***
  - "If"
  - "True," "False"
  - "And," "Or"
- ***Charts***
  - Types of charts
  - Nature of data to be presented
  - Cell range
- ***Pivot tables (data pilots)***
  - Source
  - Structure
  - Data
  - Column, row
  - Page
- ***Terminology associated with electronic spreadsheets***
- ***Creating and using a data table***
  - Naming fields based on the data to be inserted
  - Arranging data
  - Freezing a pane

- Formatting data and cells
- Filtering and sorting data
- Using logical functions
- Adding a calculated field

- ***Creating a chart***
  - Selecting a cell range
  - Making the chart
  - Choosing the chart type based on the data to be presented
  - Vertical and horizontal scales
  - Properties of the chart
  - Understanding how data is organized and presented in order to analyze it
- ***Creating a pivot table (data pilot)***
  - Manipulating the data source
  - Grouping items
  - Layout
  - Understanding how data is organized in order to analyze it

CULTURAL REFERENCES

The following cultural references will help adults understand some of the factors that influenced the development of computer science. These references give a cultural dimension to instruction, expand the adult learners' knowledge and make their learning meaningful. The teacher, with input from adult learners, may choose other references that are more appropriate to the task at hand.

- ***Events and chronology***
  - Herman Hollerith and the 1890 U.S. census
  - Spreadsheets and technological advances (space exploration, statistics, etc.)
  - Spreadsheet file used in business
- ***Heritage objects***
  - Examination answer sheets to be completed with an HB pencil so they can be scanned by an optical reader
  - Tabulating machine

- ***Regional or national references***
  - Employers
  - Anecdotes
  - School-related elements

FAMILIES OF LEARNING SITUATIONS

The goal of the *Electronic Spreadsheets: Data Analysis* course is to help adult learners use means to analyze data so that they can hone their ability to analyze and synthesize information. This course gives adult learners the opportunity to perform actions that will enable them to produce quality computerized documents while adopting behaviours that reflect a concern for ethics, safety and critical thinking.

The shaded cells in the table below provide specifics about the contexts in which the prescribed families of learning situations are applied in this course.

Subject-specific competencies	Families of learning situations related to . . .		
	Information	**Creation**	**Critical thinking**
Interacts in a computer environment	Interacts by interpreting signals he/she receives and using input and output peripherals	Discovers what computers can do by consulting documentation and by experimenting	Critically examines computerized communication tools by applying evaluation criteria
Produces computerized documents	Communicates by using computerized services	Creates by correctly using the appropriate functions	Evaluates his/her work by setting quality standards
Adopts behaviours that reflect a concern for ethics, safety and critical thinking	Communicates respectfully, using the conventions of a given medium	Acts prudently by adopting safe behaviours	Validates information by using validation criteria

First, to discover what computers can do, adult learners create documents by correctly using the appropriate functions. This allows them, for example, to work more efficiently and become more versatile.

As they create documents, adult learners evaluate their work by setting quality standards in order to take corrective action, if necessary.

BROAD AREAS OF LEARNING

The broad areas of learning deal with major contemporary issues. Ideally, the situations to be studied should be selected in keeping with the educational aims of the broad areas of learning, since these areas of learning provide a broader context for the learning situations and thus serve to make learning more meaningful. Two broad areas of learning are considered particularly relevant to this course: Health and Well-Being, and Career Planning and Entrepreneurship.

- **Health and Well-Being**

Helping adult learners understand the importance of healthy living habits is an essential aspect of the Computer Science program. Thus, a learning situation that requires that adult learners analyze health statistics helps them become aware of health issues and meets the educational aim of the BAL Health and Well-Being.

- **Career Planning and Entrepreneurship**

By developing computer competencies, adult learners increase their overall employability. Thus, a learning situation that introduces adult learners to the analysis of business data meets the educational aim of the BAL Career Planning and Entrepreneurship.

EXAMPLE OF A LEARNING SITUATION

All learning situations, no matter what broad area of learning is targeted, place adult learners at the heart of the action. Learning situations promote the development of subject-specific and cross-curricular competencies, the acquisition of computer knowledge and skills and the mobilization of various resources that are useful in carrying out the tasks at hand.

The table below shows the elements that need to be considered when developing learning situations and highlights those used in the learning activity described on the following page.

ELEMENTS REQUIRED IN LEARNING SITUATIONS	
Broad area of learning (targeted) - Contextualizes learning to make learning more meaningful	• Career Planning and Entrepreneurship
Subject-specific competencies (prescribed) - Are developed in action and require the active participation of adult learners	• Interacts in a computer environment • Produces computerized documents

Families of learning situations (prescribed)
- Group together situations appropriate to the course, based on issues drawn from reality
- Promote the acquisition of computer knowledge and skills
	• **Creation**
	  ○ Discovers what computers can do by consulting documentation and by experimenting
	  ○ Creates by correctly using the appropriate functions
	• **Critical thinking**
	  ○ Evaluates his/her work by setting quality standards

Cross-curricular competencies (targeted) - Are developed in context together with the subject-specific competencies	• Uses information • Adopts effective work methods
Knowledge (prescribed) - Includes computer knowledge and skills that adult learners must acquire in the course	• Selecting a range of cells and presenting it as a chart in order to analyze it

This section provides an example of a learning activity. It includes a context that serves as a common thread throughout the activity; however, it is not formally spelled out. Although they may not be explicit, the learning situation includes the elements identified in the table above: the broad area of learning, the subject-specific competencies, the families of learning situations, the cross-curricular competencies and the prescribed knowledge. To promote learning, these elements must be structured in a coherent and meaningful way.

Teachers can target any element as a focus of learning, be it actions related to the subject-specific or the cross-curricular competencies or the prescribed knowledge that adults must acquire.

EXAMPLE OF A LEARNING SITUATION

Analyzing market study data

Task: Use the results of a student survey regarding the implementation of a cooperative video club at the adult education centre, and analyze and present the data to be included in a market study report.

To start off the activity, adult learners become familiar with the survey results and the report. They plan how they will present the results and determine the procedure to follow.

To carry out the activity, adult learners enter the survey results in one or more worksheets. They compile and analyze the data in accordance with their plan, and create charts to illustrate the survey results in the best way possible. To do this, they use the commands and functions that allow them to clearly present data in a chart.

At the end of the activity, adult learners attach their charts to the market study report. The teacher comments on the report and the accuracy of the analysis.

END-OF-COURSE OUTCOMES

To deal with situations related to data analysis using a spreadsheet, adult learners identify and use the required functions. To do this, they use the following subject-specific competencies: *Interacts in a computer environment* and *Produces computerized documents*.

Thus, when adult learners *discover what computers can do*, they consult the documentation provided, interpret information, and experiment in order to develop research strategies. They identify essential data and are able to accurately define the work they need to do before they carry out the task.

When adults *create*, they plan their work by becoming familiar with the objective of the task and evaluating its complexity. As they carry out their work, they mobilize the necessary resources and follow their plan. At this stage, they use the appropriate commands and functions and thus demonstrate their efficiency.

When adult learners *evaluate their work*, they check whether they have achieved the objectives that have been set and go over the steps they have taken in order to determine the effectiveness and the limits of their approach. They question their computer practices related to data analysis.