

Course
CMP-5069-1
Electronic Spreadsheets:
Calculations and Data Presentation Basics

Computer Science



INTRODUCTION

The goal of the *Electronic Spreadsheets: Calculations and Data Presentation Basics* course is to provide adult learners with the means to solve various problems using spreadsheet formulas and calculation functions.

In this course, adult learners deal with various learning situations that help them acquire practical knowledge about the fundamentals of spreadsheets. By creating and modifying worksheets, adult learners discover what computers can do. They also evaluate their work by making sure they have met the standards that have been set.

By the end of this course, adult learners will be able to create and process a data table. They will be able to plan their work and break calculations down into several operations. They will know how to analyze a problem situation, look for the mathematical equation that can solve it, and express this equation in syntax that is compatible with a spreadsheet program, using formulas or integrated functions. They will be able to distinguish different display formats and apply the correct format to cells in a data table.

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 software program and a computer network. They carefully plan their work and adapt their plan as they work. As they carry out a project and upon its completion, they evaluate their efficiency and make any necessary adjustments to their approach.

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: Calculations and Data Presentation Basics* course, the suggested approach is the production process.

Production process	
<ul style="list-style-type: none"> • 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. 	
Examples of strategies	<ul style="list-style-type: none"> - 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

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: Calculations and Data Presentation Basics* course. Two are considered particularly relevant to this course: *Solves problems* and *Adopts effective work methods*.

▪ Intellectual Competency

Solving problems is the focus of this course. In fact, using a spreadsheet makes problem solving easier, clearer, and more explicit. Spreadsheets make it possible to break a problem down into steps, present these steps clearly and make corrections efficiently.

▪ **Methodological Competency**

Using relative and absolute references and spreading data over one or more worksheets are tasks that require attention and rigour. Adult learners must therefore *adopt effective work methods* if they wish to perform their work in a satisfactory manner.

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 formatting***
 - Formatting numbers
 - Formatting alphanumerical values
 - Formatting dates
- ***Cell properties***
 - Character attributes
 - Number display format
 - Text alignment and orientation
 - Borders and shading
- ***Integrated functions in calculations***
 - Statistics
 - Maximum
 - Minimum
 - Mean
 - Number
 - Date
 - Today
 - Now
 - Text
 - Concatenation
 - Uppercase

- Lowercase
- Left
- Right
- ***Terminology associated with electronic spreadsheets***
 - Worksheets and workbooks
 - Relative and absolute references
 - Labels and values
 - Variables and constants
 - Formulas and functions
 - Incrementation
 - Cell merge
- ***Solving a problem using a spreadsheet***
 - Creating formulas
 - Controlling the order of operations
 - Using relative and absolute references
 - Using integrated functions
 - Using the increment function
- ***Working with a workbook***
 - Spreading data over several worksheets
 - Renaming worksheets
 - Processing data over several worksheets
- ***Presenting data***
 - Number format
 - Font
 - Alignment
 - Borders and shading
 - Conditional formatting
 - Cell merge

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**
 - Evolution of calculation tools
 - History of spreadsheets
- **Heritage objects**
 - Accounting spreadsheet (hardcopy version)
 - Abacus, slide rule, Pascal's calculator, tabulating machine
 - Mechanical calculator, incandescent display calculator and other types of obsolete calculators
 - First modern electronic spreadsheet (VisiCalc)
- **Regional or national references**
 - Employers, accounting, administration, engineering, aerospace
 - Anecdotes
 - School-related elements

FAMILIES OF LEARNING SITUATIONS

The goal of the *Electronic Spreadsheets: Calculations and Data Presentation Basics* course is to help adult learners solve various problems using the formulas and calculation functions of a spreadsheet. This course gives adult learners the opportunity to perform actions that will enable them to interact in a computer environment and produce quality computerized documents.

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, adult learners discover what computers can do by consulting documentation and by experimenting. For example, they may determine what is feasible or consider new career possibilities.

Then, they create documents by correctly using the appropriate functions and thus become more versatile. They take the time to evaluate their work by setting quality standards in order, for example, 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: Career Planning and Entrepreneurship, and Environmental Awareness and Consumer Rights and Responsibilities.

▪ Career Planning and Entrepreneurship

By developing computer competencies, adult learners increase their overall employability. A learning situation that makes it easier to prepare a budget and make simple financial calculations for their business meets the educational aim of the BAL Career Planning and Entrepreneurship.

▪ Environmental Awareness and Consumer Rights and Responsibilities

Learning how to develop an active relationship with his or her surroundings while maintaining a critical attitude toward consumption and the exploitation of the environment is an essential part of an adult's education. A learning activity that requires that adult learners evaluate their needs as consumers, establish a personal budget and calculate the interest on a loan meets the educational aim of the BAL Environmental Awareness and Consumer Rights and Responsibilities.

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	<ul style="list-style-type: none"> • Environmental Awareness and Consumer Rights and Responsibilities
Subject-specific competencies (prescribed) - Are developed in action and require the active participation of adult learners	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Creation <ul style="list-style-type: none"> ○ Discovers what computers can do ○ Creates by correctly using the appropriate functions • Critical thinking <ul style="list-style-type: none"> ○ Evaluates his/her work by setting quality standards
Cross-curricular competencies (targeted) - Are developed in context together with the subject-specific competencies	<ul style="list-style-type: none"> • Solves problems • Adopts effective work methods
Knowledge (prescribed) - Includes computer knowledge and skills that adult learners must acquire in the course	<ul style="list-style-type: none"> • Solving a problem using a spreadsheet

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 previous table: 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 each step in the problem-solving process, the subject-specific or the cross-curricular competencies or the prescribed knowledge that adults must acquire.

EXAMPLE OF A LEARNING SITUATION

Calculations to suit all needs

Task: Modify a schedule in order to see how much time one has and how it can be divided it up among school, work and other activities.

To start off the activity, the teacher tells a few anecdotes about juggling work, school and family responsibilities. Adult learners are asked to look at how they divide up their own time and to adapt a schedule template to their needs.

To carry out the activity, adult learners record the duration of the various activities they engage in over the course of a day in order to define the context and identify the similarities with the template provided. They modify and complete the template so that it reflects their particular situation.

At the end of the activity, together with the teacher, adult learners evaluate the feasibility of their schedule as well as the accuracy of their calculations.

END-OF-COURSE OUTCOMES

To deal with situations related to the use of a worksheet, adult learners solve various mathematical problems using the formulas and calculation functions of a spreadsheet. 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 in order to define the context, and experiment in order to analyze the current situation. This helps them determine the steps involved in carrying out the work and draw up a work schedule.

When adult learners *create*, they plan their work by choosing the best method to follow. 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, perform the correct operations and calculations, and thus demonstrate their efficiency. They make adjustments to their plan, as needed.

When adult learners *evaluate their work*, they check whether they have attained the quality standards that have been set and analyze their results by identifying successful strategies and examining the difficulties encountered. They identify other contexts in which their approach could be applied.

Throughout the learning process, adult learners develop competence in the following computer knowledge and skills: they plan the setup of a worksheet; solve a problem using a spreadsheet; work with a workbook; and present data in the appropriate format. They develop the skills needed to create and modify a data table. In addition, adult learners do not hesitate to consult various resources to obtain help when difficulties arise.

EVALUATION CRITERIA

Interacts in a computer environment

- Use of appropriate strategies to interact and to troubleshoot

Produces computerized documents

- Thorough planning of the work
- Appropriate formatting based on document type
- Application of appropriate tools and functions
- Rigorous compliance with the constraints identified