Course

CMP-5072-2

Creating a Database

Computer Science

INTRODUCTION

The goal of the *Creating a Database* course is to provide adult learners with the means to use their analytical skills and logic to create a relational database.

In this course, adult learners deal with various learning situations that help them acquire practical knowledge about database design and creation. While creating databases, adults act prudently in order to prevent design errors. Throughout the learning process, they evaluate their work while making sure they have met the standards that have been set.

By the end of this course, adult learners will be able to produce a normalized database using unnormalized data. They will also be able to create a relational database to meet a specific need. They will be familiar with the factors to consider prior to designing a database, as well as the creation and modification of a database and its main objects (tables, relationships, queries, forms, reports).

SUBJECT-SPECIFIC COMPETENCIES

This course targets the following subject-specific competencies:

- *Produces computerized documents*
- *Adopts behaviours that reflect a concern for ethics, safety and critical thinking*

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 software resources and discover what computers can do. As they carefully plan their work and adapt their plan, they act ethically and prudently. When they analyze information, they make sure it is relevant and take the time to validate it by checking 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 *Creating a Database* course, the suggested approach is the production process.

Production process	
• 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	- 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 *Creating a Database* course. Two are considered particularly relevant to this course: *Solves problems* and *Adopts effective work methods*.

- **Intellectual Competency**

When adult learners standardize a database, they learn to *solve problems* by respecting various constraints, such as avoiding redundant information, optimizing database performance, taking into account certain practical aspects, and protecting the integrity of data at all times.

- **Methodological Competency**

To plan and create a database, adult learners need to *adopt effective work methods*. In fact, database creation requires having an overall vision of the work involved and following certain steps: needs must first be analyzed; tables and their relationships must then be built; and finally,

forms, queries and reports must be created. By adopting effective work methods, adult learners reduce the number of corrections they may have to make later on.

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

- ***Main objects of a database***
  - Table
    - Data
    - Record, field
    - Primary key
  - Query
  - Form
  - Report
- ***Concepts associated with relational databases***
  - Relationships between tables
    - One-to-one relationship
    - One-to-many relationship
  - Normalization
    - Principle of non-redundancy of information
    - Distribution of information in the tables
    - Definition of the appropriate primary keys
  - Modeling
    - Types of data
    - Normalized relational schema
- ***Standard terminology associated with relational databases***
- ***Prior needs analysis***
  - Collecting data
  - Identifying types of data
  - Identifying data redundancy (unnormalized)

- Designing a normalized relational schema (without data redundancy within and between tables)

- ***Creating a relational database using a prior analysis***
  - Creating a table and choosing the field properties
    - Types of data
    - Size
    - Default values
    - Format
    - Input mask
    - List box
    - Primary key
  - Creating a select query (sorting, without criteria)
  - Creating forms
    - Form and sub-forms
    - Adding objects
    - Properties and layout of objects
    - Activation
    - Tabulation order
    - Arranging and aligning objects
    - Adding graphic elements (e.g. lines, boxes, images)
  - Creating a report

- ***Designing a relational schema using a needs analysis***

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***
  - Centralization of computer data and Y2K
  - Computerized ticketing system
  - Computer-assisted medical diagnosis
  - Canadian Geographical Names Data Base (CGNDB)

- ***Heritage objects***
  - Microfiches and other obsolete computerized media
  - DBase documentation and other obsolete databases
  - Colour-coded medical files
- ***Regional or national references***
  - Employers, material resources, inventory, payroll management
  - Anecdotes
  - School-related elements

FAMILIES OF LEARNING SITUATIONS

The goal of the *Creating a Database* course is to provide adult learners with the means to use their analytical skills and their logic to create a relational database. This course gives adult learners the opportunity to perform actions that will enable them to produce quality computerized documents and adopt 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

During the learning situations, adult learners create databases by correctly using the appropriate functions and thus work more efficiently. They evaluate their work by setting quality standards, or by taking into account those that have been set for them, in order to make the necessary corrections. They make sure they act prudently by adopting safe behaviours in order

to avoid errors, and validate information by using criteria to put the information in context, among other things.

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 introduces adult learners to the use of business data 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 makes adult learners aware of the importance of databases in telemarketing 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 a learning situation and highlights those selected for 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	• Environmental Awareness and Consumer Rights and Responsibilities
Subject-specific competencies (prescribed) - Are developed in action and require the active participation of adult learners	• Produces computerized documents • Adopts behaviours that reflect a concern for ethics, safety and critical thinking
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** o Creates by correctly using the appropriate functions o Acts prudently by adopting safe behaviours • **Critical thinking** o Evaluates his/her work by setting quality standards o Validates information by using validation criteria
Cross-curricular competencies (targeted) - Are developed in context together with the subject-specific competencies	• Solves problems • Adopts effective work methods
Knowledge (prescribed) - Includes computer knowledge and skills that adult learners must acquire in the course	• Prior needs analysis

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

Equipment depot

Task: The equipment depot at the adult education centre lends out laptops, video cameras and MP3 players to students for certain courses. The depot could therefore use a database to keep track of the equipment that is lent out and returned.

To start off the activity, the teacher explains what the depot needs and hands out a list of available equipment, a list of information that users could provide, and a list of courses offered at the adult education centre. Adult learners are then asked to prepare a relational schema for a database.

To carry out the activity, adult learners divide up the equipment into different categories and identify common characteristics in order to define the first table. Then, they determine common information about users in order to define the second table. The third table consists of the list of courses. Using this information, adult learners create the relational schema while avoiding data redundancy within and between the tables.

At the end of the activity, together with the teacher, the adult learners evaluate their schema based on the needs expressed and the lists provided. They make the necessary corrections and determine how they can create a relational database based on their schema—a task that could be done in another learning situation.

END-OF-COURSE OUTCOMES

To deal with situations related to database design and creation, adult learners analyze a need, design a relational schema and create a database (including tables, queries, forms and reports). To do this, they use the following subject-specific competencies: *Produces computerized documents* and *Adopts behaviours that reflect a concern for ethics, safety and critical thinking*.

Thus, when adult learners *create,* they consider all aspects of a task, plan it and evaluate its complexity. They then create the schema or the database itself, while respecting the constraints of normalized relational databases.

When adult learners *act prudently*, they begin by analyzing a prior need and take into account the risk associated with the use of a database under construction. They determine the best way to proceed. This means they adopt a flexible approach by identifying successful strategies and by reviewing the steps followed and the results obtained.

When adult learners *evaluate their production,* they check whether they have achieved their objective and the quality standards that have been set; they review the steps followed, and they test their database. This gives them an accurate sense of the results of their efforts. They make the necessary corrections and imagine 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 analyze a need while taking into account certain conditions, and use a prior analysis to create a database while making sure the data is not redundant. In addition, adult learners do not hesitate to consult various resources to obtain help when difficulties arise.

EVALUATION CRITERIA

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

Adopts behaviours that reflect a concern for ethics, safety and critical thinking

- Appropriate adoption of ethical and safe behaviours
- Judicious integration of information in accordance with the constraints identified