Build and Implemented Learning Package for Prolog Programming Language Using Visual Basic.Net 2010

Dr. Isra M. Abdulla[*]   **Dr. Afaf B. Al-Kaddo**[**]

[*]University of Baghdad - College of Science for Women - Computer Science Dept.
[**]University of Baghdad - College of Education for Women - Computer Science Dept.

dr-israa19@yahoo.com   afafbad@yahoo.com

Abstract

E-Learning packages are content and instructional methods delivered on a computer (whether on the Internet, or an intranet), and designed to build knowledge and skills related to individual or organizational goals. This definition addresses: **The what:** Training delivered in digital form. **The how:** By content and instructional methods, to help learn the content. **The why:** Improve organizational performance by building job-relevant knowledge and skills in workers.

This paper has been designed and implemented a learning package for Prolog Programming Language. This is done by using Visual Basic.Net programming language 2010 in conjunction with the Microsoft Office Access 2007. Also this package introduces several facilities. Those facilities are represented in video lessons and their related websites via internet as well as Google website, tests and administrator part for database manipulation.

Keywords: Prolog, e-learning, database, Prolog's syntax, Microsoft access database.

بناء وتنفيذ حزمة التعلم للغة البرمجة برولوج عن طريق Visual Basic.Net 2010

د. اسراء مؤيد عبد الله[*]   **د. عفاف بديع القدو**[**]

[*]جامعة بغداد/كلية العلوم للبنات/قسم الحاسبات
[**]جامعة بغداد/كلية التربية للبنات/قسم الحاسبات

afafbad@yahoo.com   dr-israa19@yahoo.com

المستخلص

حزم التعليم الالكتروني هي المحتوى وأساليب التدريس ترسل على جهاز كمبيوتر (سواء على شبكة الإنترنت أو الإنترانت)، وتسعى إلى بناء المعرفة والمهارات المتعلقة الأهداف الفردية أو التنظيمية. يتناول هذا التعريف: **ما**: التدريب ترسل على شكل رقمي. **وكيف**: من خلال المحتوى وأساليب التدريس، للمساعدة في تعلم المحتوى. **لماذا**: تحسين الأداء التنظيمي من خلال بناء المعرفة والمهارات الوظيفية ذات الصلة في العمال.

هذه الورقة هي حول تصميم وتنفيذها التعلم للغة البرمجة برولوج. ويتم ذلك باستخدام لغة البرمجة VisualBasic.Net عام ٢٠١٠، مع ربط إلى Microsoft Office Access ٢٠٠٧ . أيضا الحزمة كبرنامج، تقدم العديد من التسهيلات. وتتمثل هذه التسهيلات في دروس الفيديو والمواقع ذات الصلة بها عبر الإنترنت، وكذلك موقع جوجل، الاختبارات وجزء المسؤول عن تغيير في قاعدة البيانات.

1. Introduction

Electronic learning (EL) is a new tool which has the potential to enhance and support the traditional learning system, to achieve its goals and be used by every educational organization. E-learning became a hot topic after the spread of the internet. The majority of the universities adopted some kind of e-learning within its learning system. It can occur in or out of the classroom. It can be self-paced, asynchronous learning or may be instructor-led,

synchronous learning. E-learning is suited to distance learning and flexible learning, but it can also be used in conjunction with face-to-face teaching, in which case the term blended learning is commonly used. It is commonly thought that new technologies make a big difference in education. Many proponents of e-learning believe that everyone must be equipped with basic knowledge of technology, as well as how to use it as a medium to reach educational goals.
By electronic learning, skills can update quickly, and use the new skills straight away. Electronic learning is very effective. There are dynamic case studies, exercises, documents that can complete and reuse [1].

   Unlike classroom training, electronic learning is very visible. While much of the classroom experience is packaged in the pedagogue, and in fact varies from class to class, you can easily see and hear all elements of e-learning packages. Everything from screen color to content accuracy to the types of practices is readily available for scanning. There is a distinction among three important elements of an e-lesson: the instructional methods, the instructional media, and media elements. In spite of optimistic projections of the positive impact of technology on learning, the reality has not lived up to expectations [1, 2]. Developments in internet and multimedia technologies are the basic enabler of e-learning, with consulting, content, technologies, services and support being identified as the five key sectors of the e-learning industry. Information and Communication Technologies (ICT) are used extensively by young people [3] .

2. Prolog programming language
    Prolog (PROgramming in LOGic) is one of the most widely used programming languages in artificial intelligence research. As opposed to imperative languages such as C or Java (which also happens to be object-oriented) it is a declarative programming language. That means, when implementing the solution to a problem, instead of specifying how to achieve a certain goal in a certain situation, we specify what the situation (rules and facts) and the goal (query) are and let the Prolog interpreter derive the solution for us. Prolog is very useful in some problem areas, such as artificial intelligence, natural language processing, databases, but pretty useless in others, such as graphics or numerical algorithms [4].

2.1 Syntax of Prolog
    Syntax looks at the rules of a language, particularly how the various parts of sentences go together. Syntax examines how fully formed words fit together to create complete and understandable sentences. Understanding a language's syntax is important for understanding what makes a sentence grammatically correct [4]. The syntax of the Prolog programming language is the set of rules that defines how a Prolog program is written and how it is interpreted. The following are parts of syntax of the Prolog [5]:
Clauses: Prolog program consists of clauses. A Prolog clause is a Horn clause terminates with a full stop. Clauses are of three types: rules, facts, and questions [5].

Procedures: Group of clauses which the head of each clause are the same is called a procedure [5].

Rules: A Rule is a clause with one or more conditions. For a rule to be true, all of its conditions must also be true. Right-hand side of the rule is a condition and the left-hand side of the rule is the conclusion. ":-" sign means "if". Left-hand side is called the head of the rule and the right-hand side is called the body of the rule. The body of a rule is a list of goals separated by commas [5].

Facts: Are always unconditionally true. It only has a head part (the conclusion) with an empty body [5].

Questions: Are queries for retrieving facts through rules. It only has the body (the goals) [5].

Arguments: Can be an atom, a number, a variable, or a structure [5].

Atoms: Are concrete objects (but numbers are NOT atoms). Strings of letters: tom, nil, x25, x 25AB, x, x y, top part. Strings of special characters: <|>, ===>,...,.:. with caution. Quoted strings: 'Tom', 'South America' [5].

Numbers: The syntax of integers is simple except one must remember that the range of integers is limited to an interval [5].

Variables: Are general objects. Variables can be substituted by another object (becomes instantiated) [5].

Predicates: Predicate does not returns value but a true or false statement. Built-in predicates come with the system, which do not need to be compiled or consulted before it is used [5].

Recursive: Running procedure calls itself and for the purpose of solving some subset of the original problem. Recursive is one of the fundamental principles of programming in Prolog [5].

3. Microsoft Office Access 2007

Microsoft Office Access is a powerful tool used to create and format databases. Databases allow information to be organized in rows and tables, where queries can be formed to pool data together. Access is a relatively unknown program of the Microsoft Office Suite, but can be one of the most powerful programs, because of its work with other Office programs, especially Word and Excel, as well as servers outside of Microsoft, such as SQL (Structured Query Language)[6].

Microsoft Office Access 2007 application uses as storage to save and organize the tests data inside the package. This application works as a security key for these data, give the administrator or other allowed browsers the ability to edit (adding or deleting) or changing the form of the database. This application produces how the tests will be represented to the users [6].

3.1 Microsoft Access Database

Data Base (DB) this is main file that encompasses the entire database and that is saved to the hard-drive or floppy disk. As sample of DB, has the following structure [6]:-

Table:- A collection of data about a specific topic. Typically, there are several tables within a database.

Field:- Different categories within the table.

Data type:- Properties of each field. There is only one data type per field.

Query:- A database object that stores criteria for selecting records from one or more tables based on conditions that are specified.

Report:- A database object that presents the information from one or more database tables or queries in a printed format.

Primary Key:- A field or combination of fields that creates a unique value in each record in a table.

Foreign Key:- The common field in the related table between two tables that share a relationship.

Relational database:- A database that contains tables related through fields that contain identical data, also known as common fields. Access is a relational database, where as Excel is a flat database.

4. Visual Basic.Net

  VB.Net programming language:- Is used to program the package for the following reasons:-

- Provide us with appropriate environment to create the required parts of the package.
- The nature of this language, give the package's parts the independence by the separated forms and tools.
- By its programming nature, give both comfort and ease to program.

Link label in toolbox:- By this tool from the toolbox, the package has ability (by using Visual Basic.net) to connect a specified video with internet and browse at the same time.

Windows Media Player:- By this tool also from the toolbox, the package has ability (by using Visual Basic.net) to open a particular video from the package interface itself.

5. Design of the Package

  This stage is referred to as analysis step. It means analysis the tasks to determine the external requirements. These requirements are:

Inputs:- Are set of elements to create an object either inside the computing world or outside it. We used *VB.Net programming language*, *Link label in toolbox*, *Windows Media Player* (as described in the previous section).

Output:-
- Correct and incorrect answers of the tests and the total score of each test.
- The information which should be shown to the user before each test with new information, if it does exist.

Concerning the objectives of this Prolog learning package, most prominent as the following:-
- To facilitate the process of reading.
- To create an interaction between the user or browser and filmed lessons.
- To taking advantage of manifold websites.
- To making the user more enthusiastic to get the information and taking advantage from it, by the tests in the package.

5.1 Identifications Step

  This involves task analysis that will determine the outer requirements including the formula of the input and output, setting where the program will be used. Problems, objectives resources and costs frame will be identified. The knowledge base is collected before starting with design and even before collecting the package's resources (videos, questions to the tests and the theory) because starting without having a general knowledge base, the package becomes with a weak foundation.
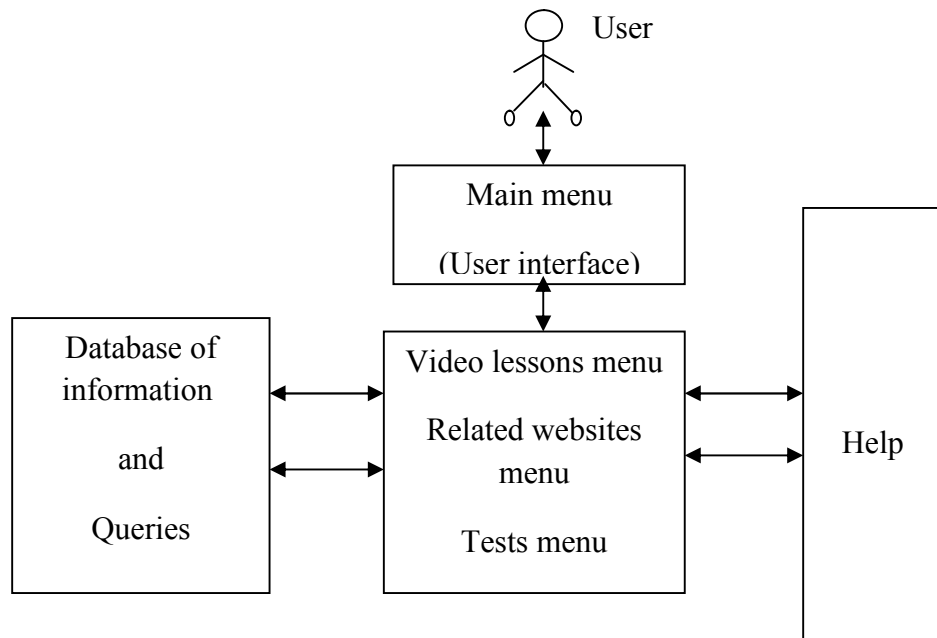
Figure1: Relations Among the Parts of the Package

Figure (1) shows the relation among the package's parts (i.e. user interface, database (knowledge base), the menus of (video lessons, websites and tests) that are used in the package and finally the help). Detailed explanation should be included in the questions asked by the tests to make the user full understanding of the output. This is included in the following points [7]:-

- The most formulas of the questions inspired by the videos themselves. It's possible to say that the answer's amount at the questions in both of the tests depends on how much information that is accessible by the user.

- In addition to the previous point, another feature of the formulas of the questions is that they are general questions. It means that the user have no difficulties in answering the questions.

- The nature of the educational material which exists in the videos is represented in detail so that the user has the ability to answer the questions.

- By this nature, even if the user can't answer a question, can back to main menu and browse back to the particular video of this question.

5.2 Input Information
Includes the educational material for the Prolog Programming Language in the videos. The user (tester) should enter its name to start testing then specify particular answers of the test questions.

5.3 Output Information
This includes the total score inside the test's menu. The package has the capability to go back to main menu for browsing with remaining the tester's total score when go back to tests menu again.

5.4 Utilization
   The package can be used in any educational institution that needs it. Also the students can use it to help them in their study to learn Prolog programming language.

5.5 User
   The package caters for the inexperienced people in programming (for example by any student in high schools and universities of computer science or any user) therefore the package's interfaces are user friendly as much as possible.

5.6 Objectives
   The target of this package is to make Prolog Programming Language easier to learn and more transparent for the user in order to try to change the people idea about the Programming Languages as being difficult.

6. Package's Facilities
   The package has the following facilities:-
   1- Watching educational videos about Prolog Programming language, this is done by the Video lessons menu as well as a specified help for the menu.
   2- Browsing web pages of related videos and more via Google web page, this is done by the related websites menu as well as a specified help for the menu.
   3- Making tests (multiple choice & True/False tests) for the user. Each test has its own menu. This is done by the tests menu as well as a specified help for both of tests.

7. Implementation and Testing
   The user has three choices, choose the answer, move to another test or next questions. If the answer is true 10 scores will be added to the total score otherwise no scores. Figure (2) shows the package's test steps:
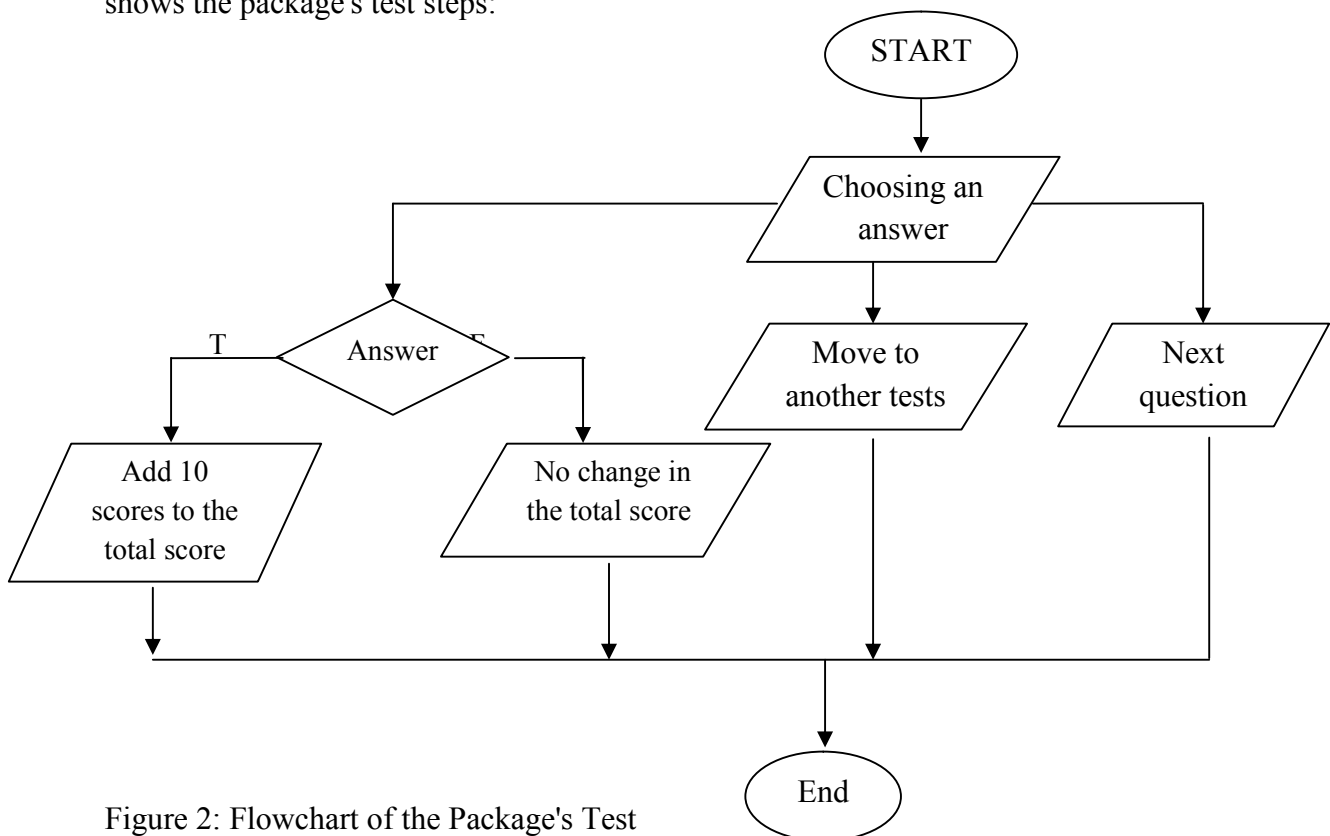
Figure 2: Flowchart of the Package's Test

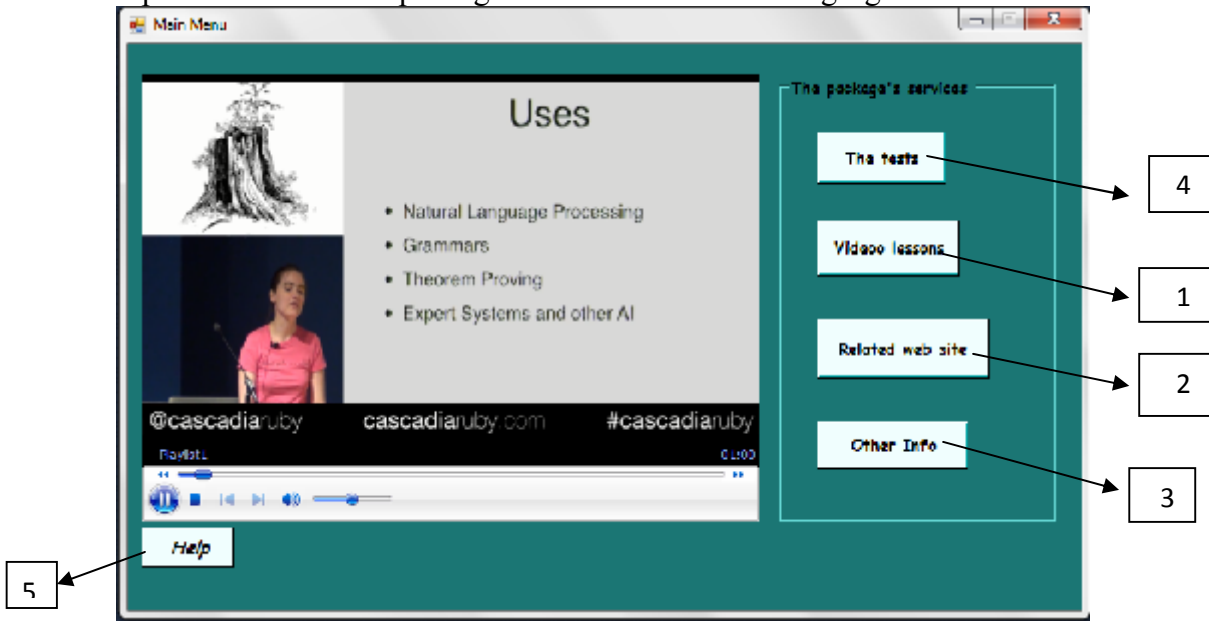The implementation of the package is shown in the following figures:

Figure 3: Package's Main Menu

Figure 3 shows the package's main menu which gives the user many options. These options are:-

(1)- Video lessons menu. By clicking this button, the user has the ability to learn Prolog through videos.

(2)- Browsing related websites menu. By clicking this button, the user is capable to browse the internet in general by Google website or in particular by video lessons websites themselves.

(3)- Other info menu. By clicking this button, the user is provided with the reading this package facility. Furthermore, this button also allows the administrator to modify in the tests database.

4- The test menu. This package enables the user to test him/her. There are two types of tests (multiple Choice & True/False tests). By clicking on this button, this leads the user to start testing.

5- Help enables the user to get help about how to use the package if he or she is a new user.
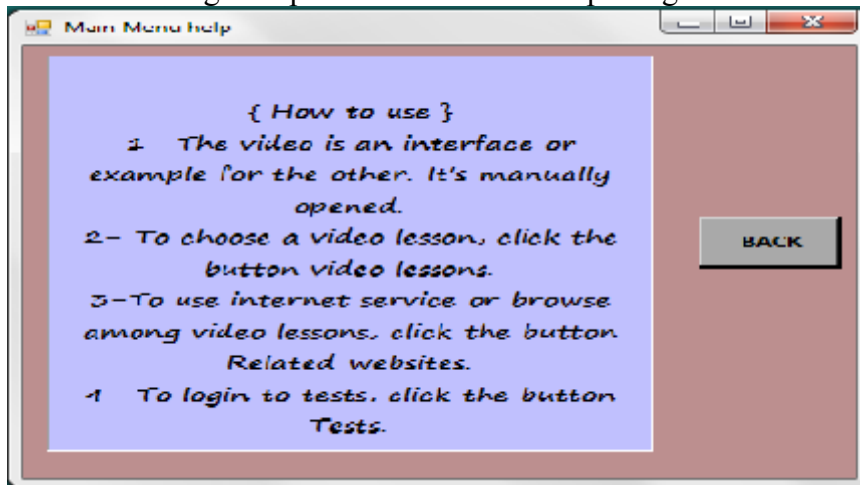
Figure 4: The Main Menu's Help

Figure 4 shows the main menu's help. By clicking the Back button, the user will go back to the main menu of the package.
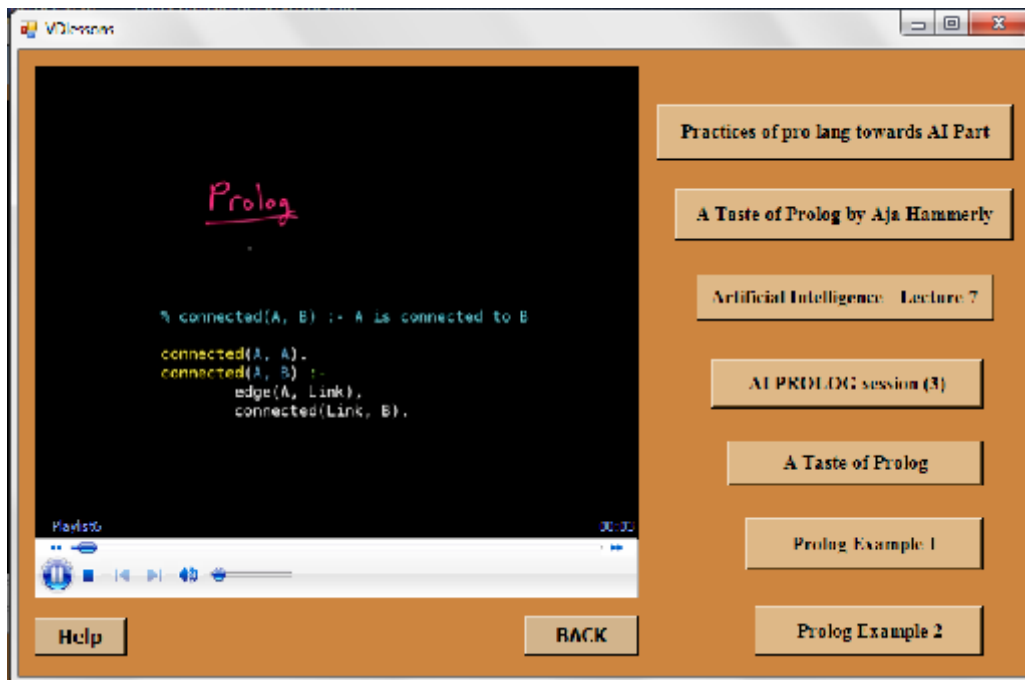
Figure 5: Video Lesson's Menu

The video database consists of videos that are considered basic videos for learning Prolog Programming Language. These videos are shown in the video lessons menu as in figure 5.

-To select a video, click on the corresponding button and this will display the video.
- Clicking the Help button, display the help of the video lesson's menu.
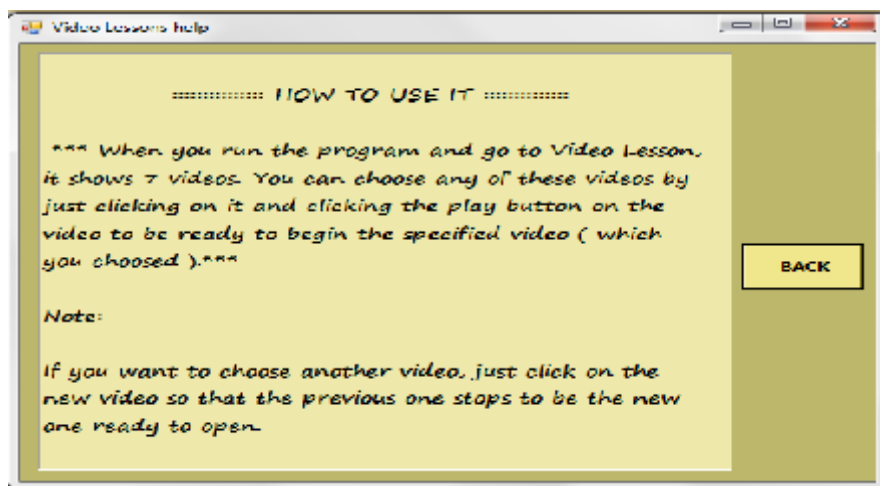- Click on the BACK button to go back to the Main Menu.

Figure 6: Video Lessons' Help Menu

Figure 6 shows help menu which enables the user of how to use video lessons. By clicking on the Back button, the user will go back to the main menu.

Figure 7: Related Websites' Menu

The related websites DB consists of the websites for the video lessons that are considered via internet. These websites are shown in figure 7.
- By clicking one of the websites, this will display the website screen.
- Click on the BACK button to go back to the Main Menu.
- Clicking the Help button, display the help of the Video lesson's menu.
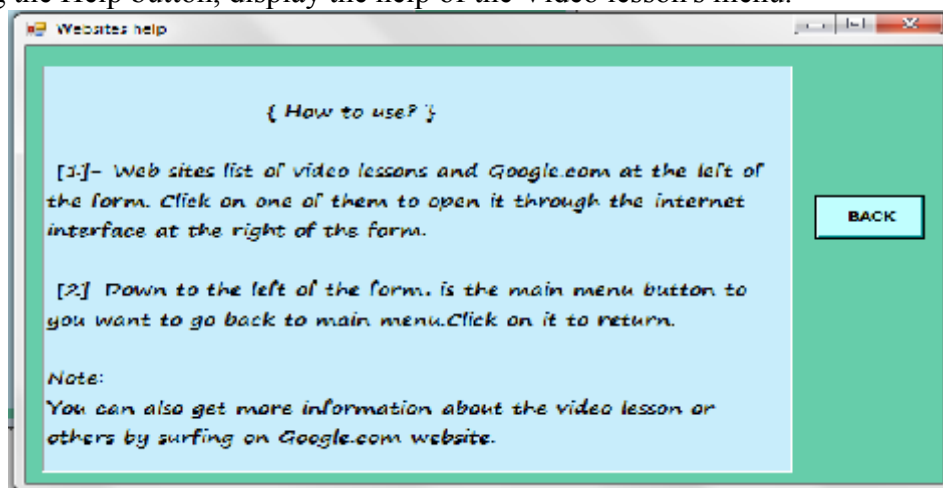
Figure 8: Websites' Help Menu

Figure 8 shows the help menu which enables the user to take advantages of the video lessons websites by helping how to use them. By clicking on the Back button, the user will go back to the main menu.
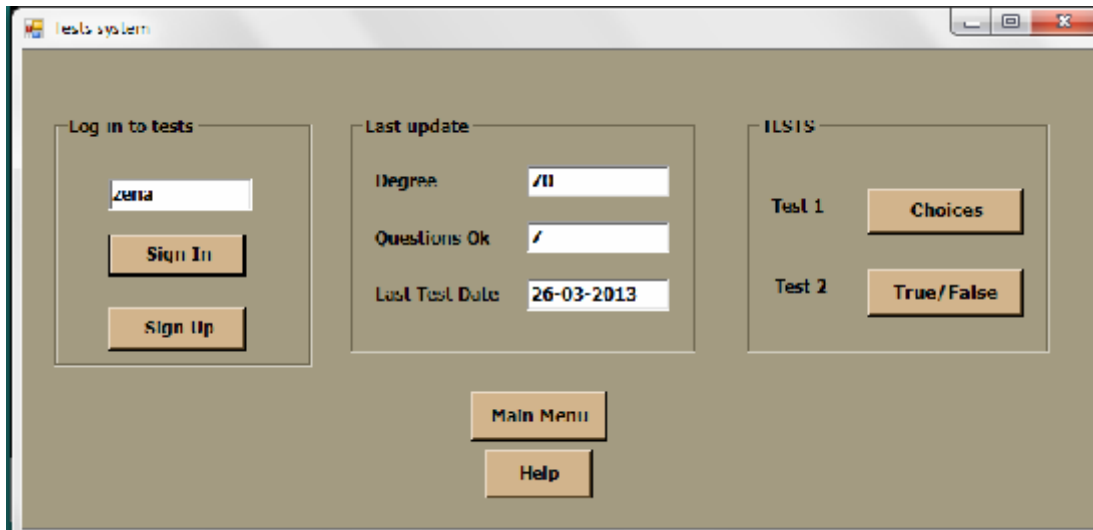
Figure 9: Tests System's Form

Test DB consists of two types of tests that are considered, tests questions about the video lessons and their educational material about Prolog Programming language. This package provides with facility of recording the tester's or user's information as shown in figure 9.

- To start testing, the user must enter the first name. If the user name already exists in the user's information database, the user click directly on the Sign In button so the user information will appear in the menu. If the user is new, click on the Sign Up button and can start the testing.
- To go back to the main menu, the user clicks on the Main Menu button.
- Help button includes detailed explanation about how to use the package.
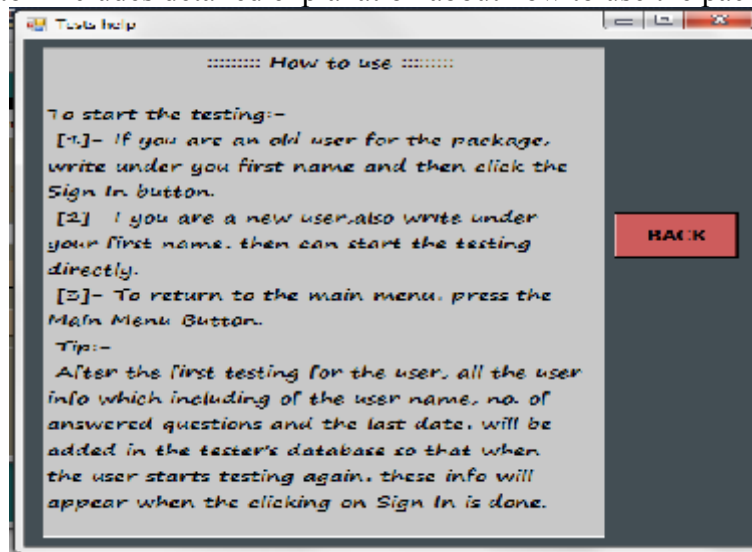
Figure 10: Tests' Help Menu

Figure 10 shows the help menu which enables the user to take advantages from the information of the test questions. By clicking on the Back button, the user will go back to the main menu.
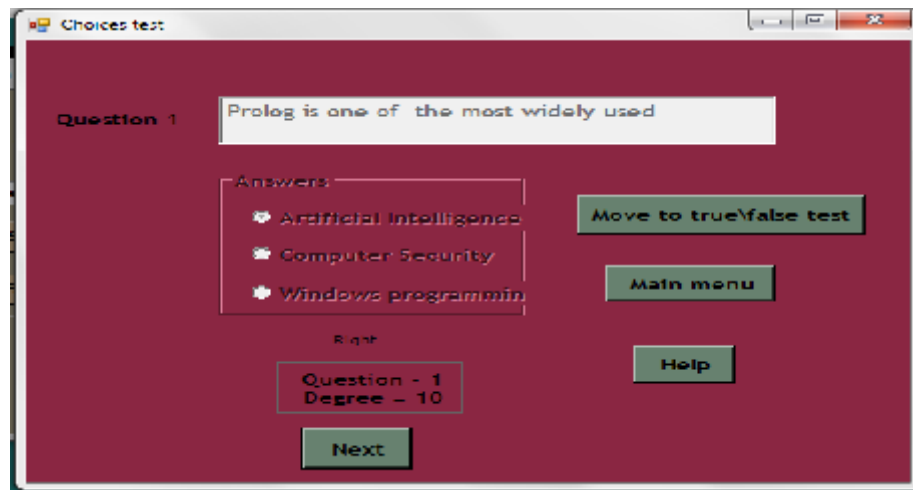
Figure 11: Multiple Choices' Test Menu

Figure 11 shows the multiple choice tests menu. This learning package enables the user to test him/her by multiple choice tests which are one of these types:

-   To answer a question, click on one of them.
-   To answer another question, click on the Next button.
-   To move to true/false test, click on the Move to True/False tests button.
-   To go back to the tests menu, click on the Main Menu button.
-   To get help about how to use, click on Help button.
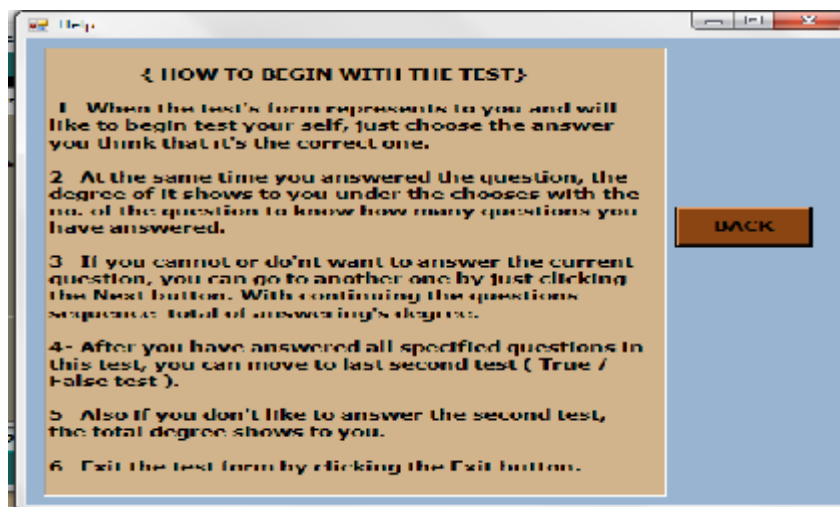
Figure 12: Test's Multiple Choice's Help Menu

Figure 12 shows the help for the multiple choice tests. This help enables the user of how to use the test. By clicking on the Back button, the user will go back to the main menu.
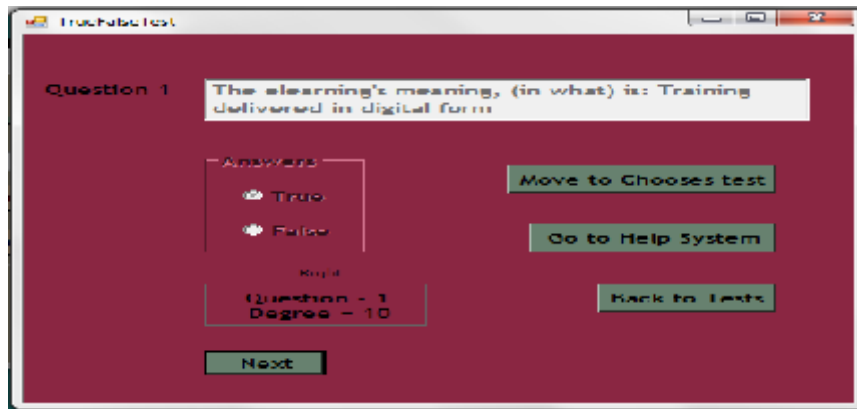
Figure 13: True/False Test's Menu

Figure 13 shows true/false test menu which is one of these types:
-   To answer a question, click on one of them.
-   To answer another question, click on the Next button.
-   To move to true/false test, click on the Move to Choices test button.
-   To go back to the tests menu, click on the Main Menu button.
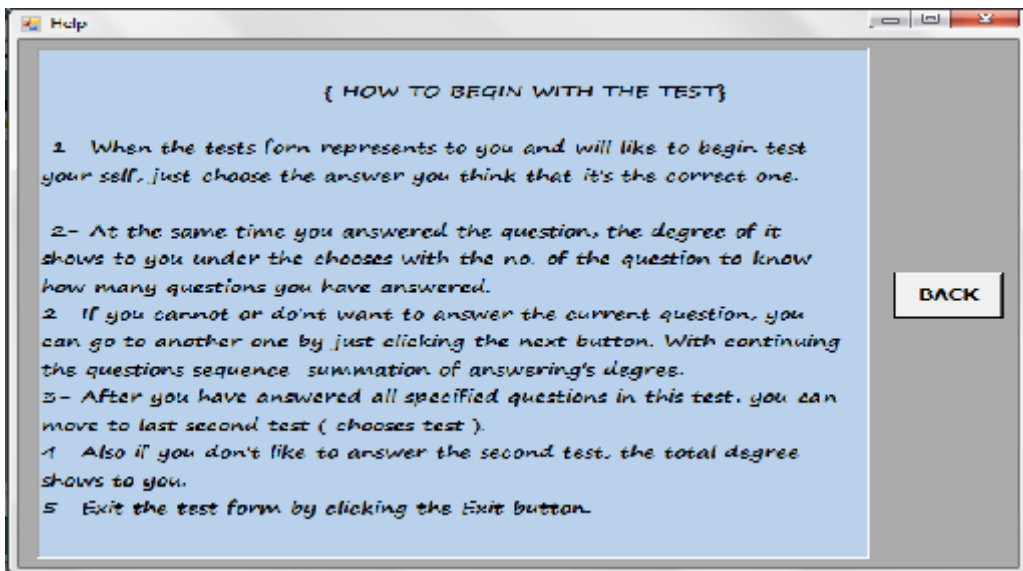-   To get help about how to use, click on Help button.

Figure 14: True/False Test's Help Menu

Figure 14 shows help for the true/false tests. This help enables the user of how to use the true/false test. By clicking on the Back button, the user will go back to the main menu.
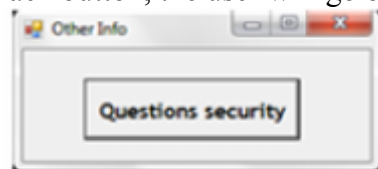

Figure 15: Other Information's Menu

Figure 15 shows the other information menu. This interface is specialized to administrator part of the package. For the administrator, Question's security button is used to make changes in the database of the tests (editing, deleting and adding).
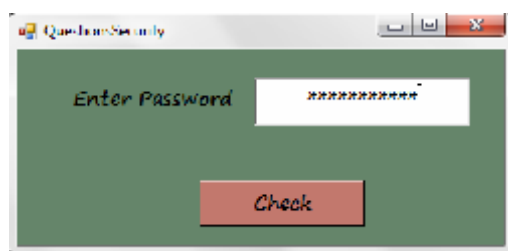
Figure 16: Question's Security's Menu

Figure 16 shows the question security's menu by entering the password and check it by Check button because the administrator can modify the package's database so we have to check about the authorization of the administrator.
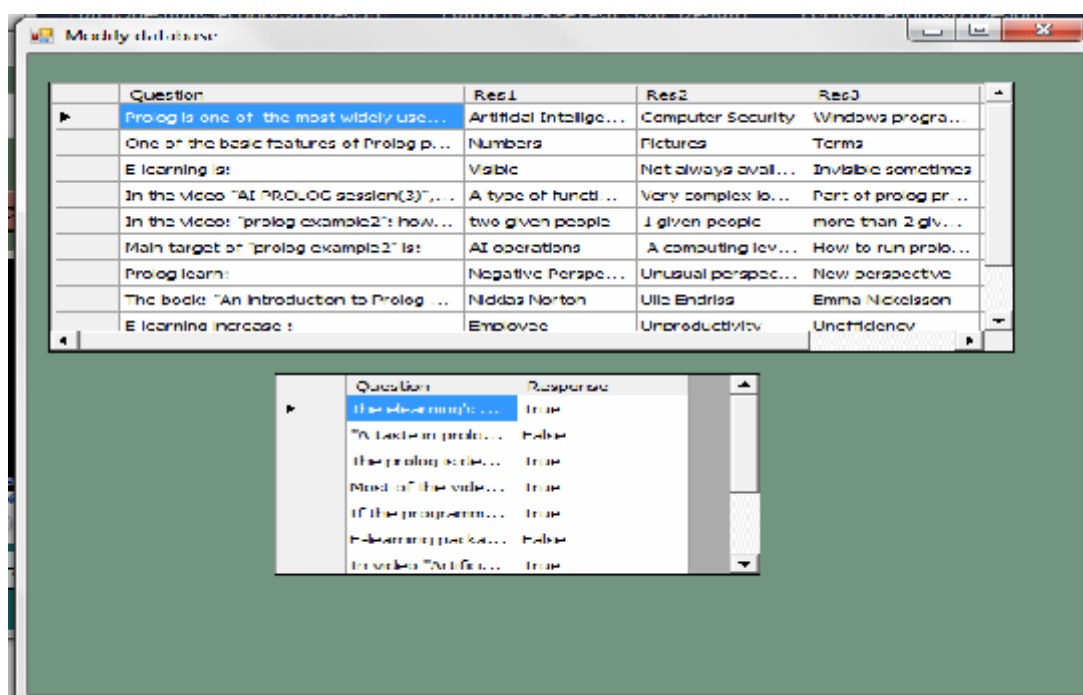

Figure 17: Database's Menu

Figure 17 shows the database's menu for the package which the administrator can modify it.

8. References

[1] http://en.wikipedia.org/wiki/E-learning
     Entry date 16-2-2013.

[2]   http://elearning.ppu.edu/file.php/1/eLearning/elearning.pdf
     Entry date 30-4-2013.

[3] Nagy, A., "*The Impact of E-Learning*", Technologies and Perspectives for the European Market. Berlin: Springer-Verlag, pp. 79–96, 2005.

[4]   http://www.wisegeek.org/what-is-syntax.htm.
     Entry date 15-4-2013.

[5] Ulle Endriss, "*An Introduction to Prolog Programming*", Language and Computation Lecture Notes, Institute for Logic, University of Amsterdam, 7 July 2007.

[6]   http://www.housing.wisc.edu/docs/tlc_quicktip_access.pdf
     Entry date 22-3-2013.

[7] Kyle jefcik, Linesh Joseph, Kris Kortokrax, Anderea Lemkelde, Keith Mcdonald, Zach Nemtiz, Jeremy Overesch, "*Expert systems: modeling and simulation*", 2003.