Computer Gate to Kids Computer Literacy

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Abstract

The ubiquity of the computer science field has made of the computer an important tool for which knowledge and skills are required during studies and work as well. Knowing how to use computers is a necessity in all fields such as science, art, industry, commerce, etc.. Computer literacy is transforming every field, and no single field is unaffected by it. The question is how software tools can be used to enhance teaching and learning of digital literacy for young children and even adults? What are the ways that promote the full involvement and enjoyment of users currently under represented in many computer-related activities. The aim of this project is to develop a software that offers a support to computer literacy learners, particularly, children aged 7-12 years old. The proposed software "Computer Gate" for digital literacy will provide an easy and interactive learning that captures the attraction of the child and keep the user enjoying the learning process. This is accomplished through the extensive use of multimedia and creative tools. It will cover four main computer topics which are Computer Basics, Networking, Internet, and Multimedia

Keywords: Computer; kids; education; literacy

1. Introduction

Information Technology is a real revolution that affects our lives and makes every day tasks easier. It has great impacts on our lives in different aspects. It impacts the way people live, the way people learn, and the way people do things [1]. In the field of learning and education, technology has made big and noticeable changes in the way people are educated and learn things. Technology makes the process of acquiring knowledge and gathering information easier and simpler than the traditional way [2]. For example, gathering information from the internet is faster and easier than looking and searching the libraries. Technology is not designed for adults only or for a specific age but it is for all ages including children who can be involved in using it effectively.

It is preferable and is becoming important for students to learn how to use and deal with a variety of technology tools from their early years when they are children, because if they have the foundation knowledge from the beginning, it will help them in their later life as the technology tools for learning continue developing and upgrading [3].

A variety of learning technology tools is available now. However, the biggest revolution of technology tool which has its own impact in the field of learning and in the general life is the computer [4] Through the computer, many technologies can be applied by using the computer. For example, computers can be used to access the internet. Moreover, computers help a lot in the field of education as they added new features to the education which were not there before [5]. In addition, computers help in making the process of teaching easier and simpler and also help the students in doing their work in a faster and more efficient way[6].

In the past, teachers used to not use any of the new teaching technologies that are available. They used to teach in the traditional way as they write the lecture on board and let the students submit their work in a hand writing format. In contrast, now they can use the power point presentation to lecture. Also, there is now a new technology which replaced the board and the projectors, this technology called "smart board" which is directly connected to the computer and function as a board. Moreover, students can submit their work digitally using

a variety of technologies such as E-mail, Digital drop box in Blackboard, and CDs [7,8]..

However, there are different types of educational technology that is available and being used in these days. Web based learning or E-Learning is one of the educational technologies that are provided through the computer [9]. It is one of the technology tools that have the ability to deliver the knowledge in a different way and become an alternative to the traditional classroom learning [10-12]. The E-Learning education occurs as the subjects of the studying fields are conveyed to the learner who is in a different area location from the school or the learning institution through the computer network and the internet must be used for enabling this process.

Educational software is a computer software whose main purpose is teaching or self-learning support.Thus in this work proposes a development of educational software that helps normal children (or who suffer from light disabilities), and even adults with no computer literacy to gain a valuable digital literacy with a maximum fun using interactive multimedia and less reading work.

2. Software Design

2.1 Architecture Design

The architecture design of this software can be seen in Figure1. The software is divided into four main modules: computer basics, Internet, multimedia, and networks. The computer basics module includes the two components of computer which are hardware and software. In the software sub module, Operating System (OS) concepts will be covered in a simple way to allow children understand what is OS and its role. On the other hand, the hardware sub module will define two subcomponents that are the external (visible) and internal (invisible) components. The external parts include keyboard, mouse, case, and monitor, while examples of the internal parts are Random Access Memory (RAM), Read Only Memory (ROM), Control Processing Unit (CPU), Cards, …etc.

Useful and practical principles of the Internet will be discussed in the second module such as search engines and communication tools. Moreover, communication methods like e-mailing and chatting will be introduced to teach the children how to be in touch with their friends and relatives (especially for those abroad).

Multimedia is a wide topic, but we will pick the most interesting fields in it. In this module Animation and the way of making animated pictures will be presented as well as one of these two topics: Digital camera or Audio for which a final choice will be made later.

The last module is networking. The first part of this topic will show how to connect two computers, the benefits of this connection, and the need of protocols. The second part will explain the areas of network.

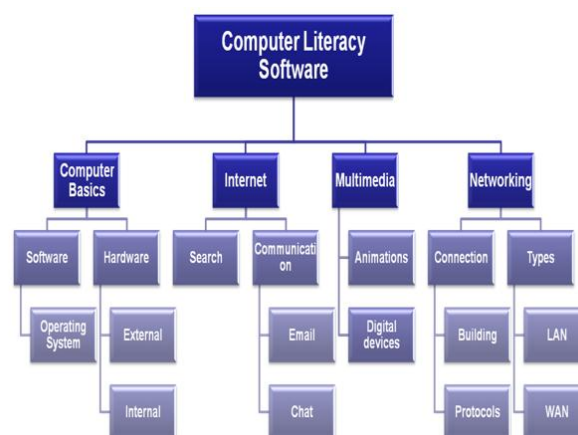Particularly, it will discuss Local Area Networks (LAN) and Wide Area Networks (WAN).

Figure 1: Software Architecture Design.

The methodology to present each topic is to divide the topic into two parts: Tutorials and Activities. Several numbers of tutorials and activities are assigned to each module. A tutorial is a brief definition or explanation of the different concepts. The text of the lessons will be supported by multimedia items, which can be animations and pictures that support the explanation of some concepts. In addition, multimedia can also include sounds to support easy learning and understanding.

Activities will also be divided into two sections quiz and game. Our proposal for the quiz is to be "Multiple Choices" or "True and False" questions that use either pictures, texts, or sound statement, so that the user can solve it. Then the correct answers will be provided, followed by the user scores. Quizzes were built using Authorware software, and integrated into the Visual basic environment. To fulfill our requirement one quiz was generated through the database. On the other hand, the game of each topic is an interactive game created in a simple way using Macromedia Flash, and they also integrated in the same manner.

The software will be bilingual (Arabic and English). The design for both languages will be exactly the same. The only difference is that the English version will be created using English text and sounds, and the Arabic version will be made with Arabic ones. The software has a 3-level hierarchy. The main areas covered by the software are the main modules of the software. The second level of hierarchy is built with the sub-modules corresponding to the topics, and the third level is constituted of sub-modules corresponding to the tutorials and activities. All the tutorials and activities use different instances of the same module structure. The structure of all topic is shown in Figure 2.
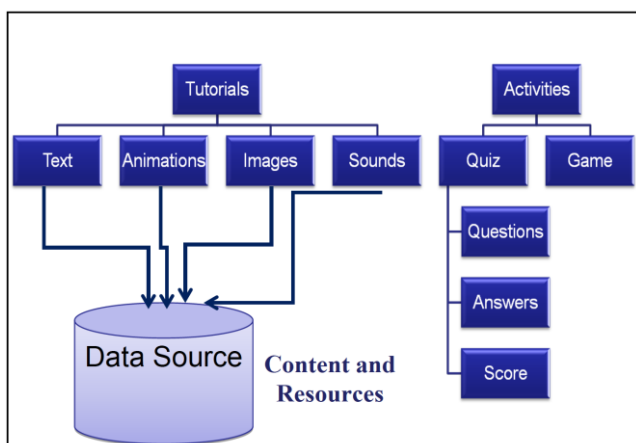
Figure 2: The Structure of Each Topic.

Figure 3: Relations between the Tables in the Database.

2.2 Data Model

The software is built using the hierarchy described above. It is composed of modules, each module is composed of topics, and a topic is composed of tutorials and activities. All these components are implemented using multimedia sources. In order to avoid loading all these multimedia sources when the program is loaded, we decided to use a database to store all the multimedia sources and load them only when needed because the user may never visit all the software components at every visit. This solution will optimize considerably the resources needed by the software.

Figure 3 is presenting the data model and relations of these data for the tutorials' contents (multimedia (MM)) and the topic Id. For example, tutorial5 has a unique number, and can have 10 multimedia items. Each MM content is linked to the tutorial table, and this tutorial is also linked to the topic its belongs to it by topic Id. Likewise, The figure presents the data model and relations of the topic and activities contents (quizes). There is a table (Quiz) which contains the quizes Id that are linked to topics (each topic contains a quiz). This table stores the topic Id and the quizes Id. There is also table (Question) which keep track of all contents and scores of all the quizes, when needed these data comes to the interface and appear as a quiz content. For example, a quiz is linked to topic table by the topic Id (to which the quiz belongs), and a question is linked to quiz table by the quiz Id.
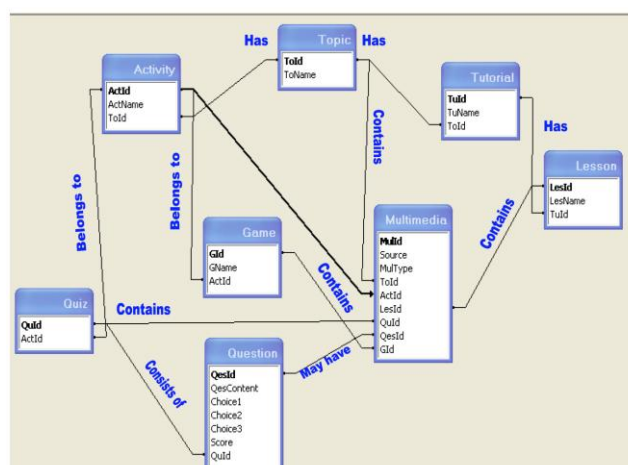
2.3 User Interface design

The first form is the splash form that introduces the software to the user. It contains mainly the logo of the software, the name of the software, and the copyright statement. This page remains loaded about 10 seconds then it disappears automatically and the next page appears. The second form is the login form it asks the user to choose the desired language (Arabic, English). This form is very simple, it contains two buttons for the selection and a statement to direct the user. The main form is considered to be the main page which shows the user the available topics. We are still thinking of the design of this page in a creative way, but in general, it will contains the logo, four windows or some way (will explain later) to choose the topics. When the user clicks on the buttons "that are presenting the topics" this will lead the user to enter the next page which is the topic form. It contains also four small buttons,at the bottom of the page, to navigate through the pages. About button introduces a small description of the software. The help button offers some guidelines and additional information to help the user in using the software.

3. Software Implementation

3.1 Tools

The following software tools were used to develop the Computer Gate software. The tools used were Microsoft Visual Studio, Visual Basic.NET, SQL Server, Adobe Photoshop 7.0, Macromedia Flash MX and Macromedia Authorware 6.0. During the development of the first phase, a functional prototype of the English version of Computer Gate was implemented in order to satisfy the software requirements to be able to meet the Microsoft competition's first presentation deadline. This was completed by using Visual Studio 2005. Adobe Photoshop 7.0 and Macromedia Flash MX were used to create and edit logo, images, and animations. The development procedures of the functional prototype were divided into four phases which are data collection, data

structure, user interface structure, and interface implementation

3.2 Data Structure

SQL server has been used to build the database. The database consists of eight tables which are; Topic, Tutorial, Lesson, Activity, Quiz, Question, Game, and Multimedia.

3.3 Interface Design Steps

User interface design phase consists of many phases: Logo design, graphical user interface design, and games design. Part one of the designing phase was about designing the logo of Computer Gate software, selecting and editing pictures, creating animations and creating buttons. Photoshop 7.0 and Macromedia Flash MX were the tools used for editing pictures and creating animated games and picture as mentioned previously.

Macromedia Flash MX was used to create animated games that appear under the activity part after designing the logo and animation, the graphical user interface had been constructed using Visual Studio 2005. For better management of the different screens, panels were used instead of independent multiple forms. Panels are also bound with the database for the access to the content.

The header contains the logo and the simple agent with the title. The footer contains five static buttons for navigation and help. The main display contains the current content as shown in Figure 4. Figure 5 shows the splash screen. Figure 6 shows the topic page. Figure 7 shows the quiz screen.

Figure 4: The Main Window

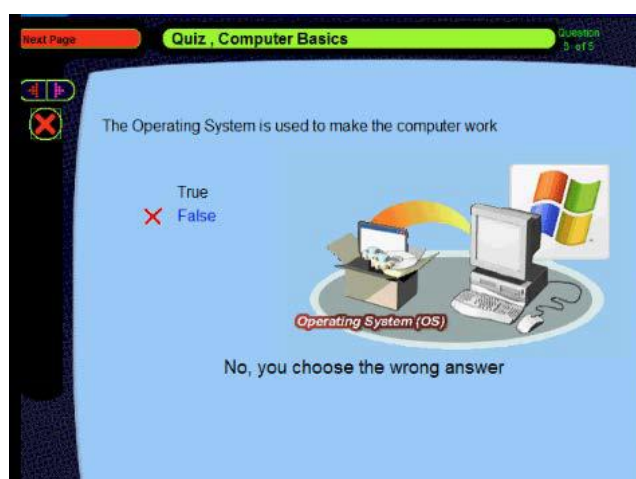
Figure 5: Splash screen

Figure 6: A Topic Page

Figure 7: Quiz screen

3.4 Interface Implementation

The main requirement for the interface was to be attractive, useful, and user friendly. The design process

went through many trials before reaching the final design. Different tools were used to design the interface components before the final integration. Photoshop was used to design the different components of the interface and then these were integrated into Visual Studio 2005 to implement the final user interface. Flash was used to design and implement the games and the output was alsointegrated in the Visual Basic project. Finally, Author ware was used to design and implement the quizzes.

4. Testing and Validation

The purpose of the validation test is to insure that the system meets the software requirements or not. To apply this test, black box testing approach has been used. The testing was done as shown in Table 1. The testing was done based on True or false. Thus based on Table 1, the developed software has functioned well.

Table 1: Software Test Output

Input	Event	Output	True/False
Splash Form			
Arabic Button	Click	Display the Arabic form.	True
English Button	Click	Not functioning yet.	-
English Version Home Form (Buttons)			
Exit Button	Click	Exit the software.	True
Next Button	Click	Display topic panel	True
Topic Panel			
Basics Text	Select	Display Computer basics panel.	True
Computer Basics Image Box	Select	Display Computer basics panel.	True
Computer Networking Text	Select	Not functioning yet.	-
Computer Networking Image Box	Select	Not functioning yet.	-
Home Button	Click	Display Home Form.	True
Exit Button	Click	Exit the software.	True
Help Button	Click	Display brief information about the software.	True
Next Button	Click	Disabled to not confuse the user	True

		through the software.	
Back Button	Click	Display previous form, which is the home.	True

5. Conclusion

The need for educational software that provides digital literacy in an interesting way is increasing too. The aim of our project was to develop a software that helps children (normal or with slight disabilities), and adults who are unfamiliar with computer technology, to gain a valuable digital literacy in an easy and enjoyable way.

References

[1]   Beniger, J. (2009). The control revolution: Technological and economic origins of the information society. Harvard university press.

[2]   Kolb, A. Y., & Kolb, D. A. (2005). Learning styles and learning spaces: Enhancing experiential learning in higher education. *Academy of management learning & education*, *4*(2), 193-212.

[3]   Boles, S. R. (2011). Using technology in the classroom. *Science Scope*, *34*(9), 39-43.

[4]   Fielstein, L., & Phelps, P. H. (2000). *Introduction to teaching: Rewards and realities*. Wadsworth Publishing Company.

[5]   Chittaro, L., & Ranon, R. (2007). Web3D technologies in learning, education and training: Motivations, issues, opportunities. *Computers & Education*, *49*(1), 3-18.

[6]   Sun, P. C., Tsai, R. J., Finger, G., Chen, Y. Y., & Yeh, D. (2008). What drives a successful e-Learning? An empirical investigation of the critical factors influencing learner satisfaction. *Computers & education*, *50*(4), 1183-1202.

[7]   Prey, J., Cohen, L. J., Reed, R. H., Dragović-Soso, J., &Berque, D. A. (Eds.). (2007). *The Impact of Tablet PCs and Pen-based Technology on Education 2007: Beyond the Tipping Point*. Purdue University Press.

[8]   Howell, S., & O'Donnell, B. (2017). *Digital trends and Initiatives in education*. Ontario Media Development Corporation.

[9]   Moore, J. L., Dickson-Deane, C., & Galyen, K. (2011). e-Learning, online learning, and distance learning environments: Are they the same?. *The Internet and Higher Education*, *14*(2), 129-135.

[10]   Sun, P. C., Tsai, R. J., Finger, G., Chen, Y. Y., & Yeh, D. (2008). What drives a successful e-Learning? An empirical investigation of the critical factors influencing learner satisfaction. *Computers & education*, *50*(4), 1183-1202.

[11]   Hussain, A., Mkpojiogu, E. O. C., Musa, J., Mortada, S., & Yue, W. S. (2018). Mobile experience evaluation of an e-reader app. *Journal of Telecommunication, Electronic and Computer Engineering*, *10*(1–10), 11–15

[12]   Hussain, A., Abdullah, A., Husni, H., & Mkpojiogu, E. O. C. (2016). Interaction design principles for edutainment systems: Enhancing the communication skills of children with autism spectrum disorder. *RevistaTecnica de La Facultad de Ingenieria Universidad Del Zulia*, *39*(8), 45–50