Design of a Multimedia System for Early Child Learning

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---*ABSTRACT*---
A Multimedia System forEarly Child Learning is an online system for assisting children during their early learning stage. It provides an opportunity for a child to get acquainted to a Computer system early in life. The teacher and also the parents can login, use the system to teach a child how to recognize alphabets and numbers for children between ages 1 to 3 years. How to spell words and listen to pronunciations were also developed for children under the age of 4 to 9 years. Animations were used to show when they fail or pass the exercise. The system comprises of various GUIs (Graphical User Interfaces) for various modules of the system and also separated according to age brackets. The GUIs were implemented using the HTML, CSS, JavaScript, C# razor view engine and Bootstrap template for making the website responsive. At the backend, C#, Asp.Net MVC5 was used while Entity framework was used for interfacing with the database. MSSQL was used for the database as it has high security features.
Keywords: Multimedia, Aid, MySQL, CSS, JavaScript, Asp.Net MVC5, C# razor view engine.

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I. INTRODUCTION:

Early childhood is a time of significant discovery and development in all realms of life. It begins with a child's cognitive worlds, and stretch as far as their physical and emotional world. Children are growing and advancing at an exponential rate. At this age, they begin to increase their communication skills and acquire language rapidly. All of this emergent knowledge is joined through their sense during the exploration of their environment. The design of their learning environments greatly effects their education. Although development occurs at a different pace for each individual child, the sooner they are exposed to a stimulating learning environment such as the computer and other technological aids or tools, the more successful they will become. According to Cynthia Chiong (2012) [1] picture books to a child has been found out by researchers to be one of the common interaction between parents and children. Therefore the proposed design of a multimedia system to aid in early child learning has advantages over the existing system, from providing a deep understanding of the subject, improved problem solving, increased positive emotion and access to variety of information[2] than the existing system that give room to distractions, inability to encourage exercises at home and sometimes teachers lack of ability to disseminate information well.

II. LITERATURE REVIEW:

Haward Gardner has shown that young children exhibit a diversity of learning styles, and that the optimum way for many children to learn is not the traditional teacher-directed, verbal approach Gardner (2012) [3]. Clearly, many of these developmental needs match up well with appropriate use of computers in the classroom, especially exploration, manipulation of symbolic representation, matching alternative learning styles and quickly changing learning modalities that individual students can control and pace to meet their individual needs. According to Haugland (2013)[4] today, computer has helped in solving most of our problems, and incorporating it in a child learning process will help increase academic skills, reduce dropout rates, eliminate the racial divide in academic performance, as well as make things easier for the same rate, and can also be influenced by how computers are incorporatedinto the early childhood curriculum. In November 2014 an Interactive Digital Learning materials for Kindergarten Students in Bangladesh was designed by Md. BaharulIslan[5] where he designed an interactive system using A-Z and Bangledesh numbers 0 – 9. Therefore the system proposed was able to separate the children based on age brackets 1-3 years and 4 – 9 years. The interactive system not only stopped at alphabets and numbers but moved on to spelling and listening of words.

A.   Virtual Classroom

Virtual Learning Environments (VLE), also known as learning platforms, utilizes virtual classrooms and meetings which often use a mix of communication technologies. One example of web conferencing software that enables students and instructors to communicate with each other via webcam, microphone, and real-time chatting in group setting, are Go To Training, webEx Training or Adobe Connect, which are

sometimes used for meetings and presentations. Participants in a virtual classroom can raise hands, answer polls or take tests. Students are able to 'write on the board' and even share their desktop, when given rights by the teacher. Other communication technologies available in a virtual classroom include text notes, microphone rights and mouse control Hiltz (1990) [6]. The virtual classroom also provides the opportunity for students to receive direct instruction from a qualified teacher in an interactive environment. Students have direct and immediate access to their instructor for instant feedback and direction. The virtual classroom also provides a structured schedule of classes, which can be helpful for students who may find the freedom of asynchronous learning to be overwhelming Easterman (2007) [7]. In addition, the virtual classroom provides a social learning environment that replicates the traditional "brick and mortar" classroom. Most virtual classroom applications provide a recording feature. Each class is recorded and stored on a server, which allows for instant playback of any class over the course of the school year. This can be extremely useful for students to review material and concepts for an upcoming exam. This also provides student with the opportunity to watch any class that they may have missed, so that they do not fall behind. It also gives parents the ability to monitor any classroom work to ensure that they are satisfied with the education their child is receiving.

III. DESIGN OF THE SYSTEM:

The hierarchical chart of Fig.1 presents the architecture of the Multimedia System for early child learning. Teachers and parents can log into the system.
There are also three other modules which are Home Page, Teacher/Parent and Age Category as shown in figure 3.1.
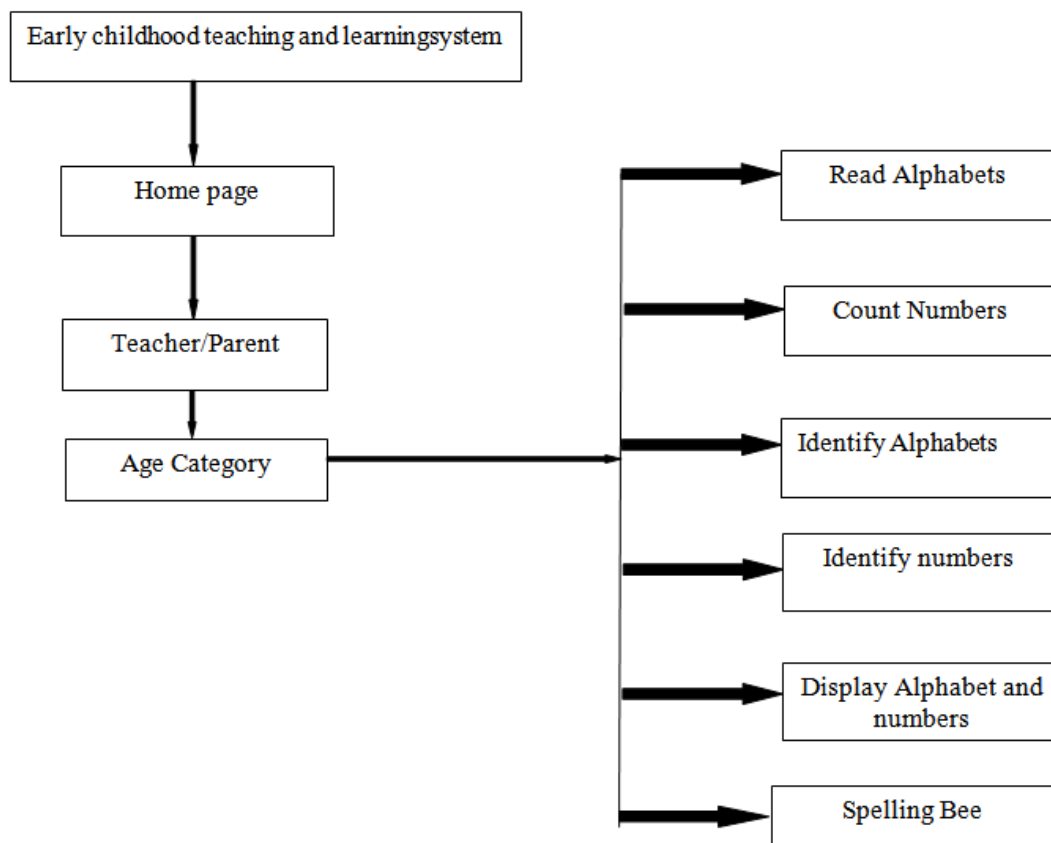

Fig 3.1 Diagram of the proposed system

A.   Architectural Design of the Proposed System

The below above shows the general architecture of the proposed Multimedia System for Early Child Learning, it identifies the user and the eight main operations that user can perform (read alphabet, count number, identify alphabet, identify number, quantitative reasoning, verbal reasoning, spelling bee and make sentence). The solid lines are used to depict sending information to the system while the broken lines depict display of information by the system for the user. The Microphone is also needed which will be used to capture the voice of the parent that will be used to teach the child.
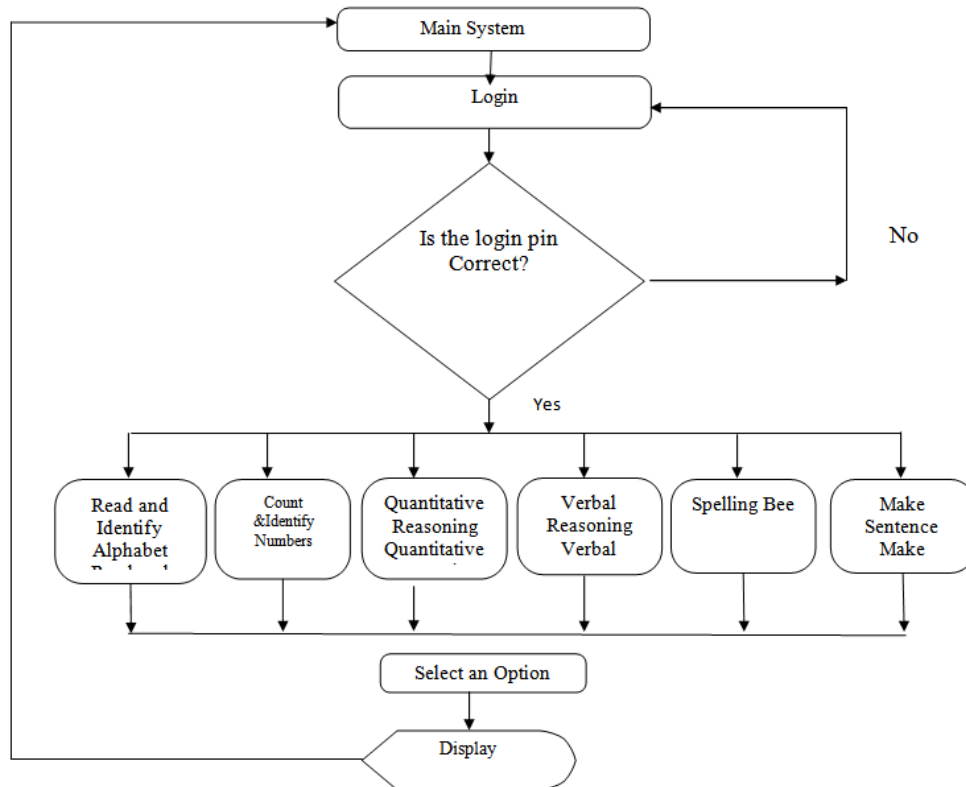
Fig 3.2: Architectural Design of the system

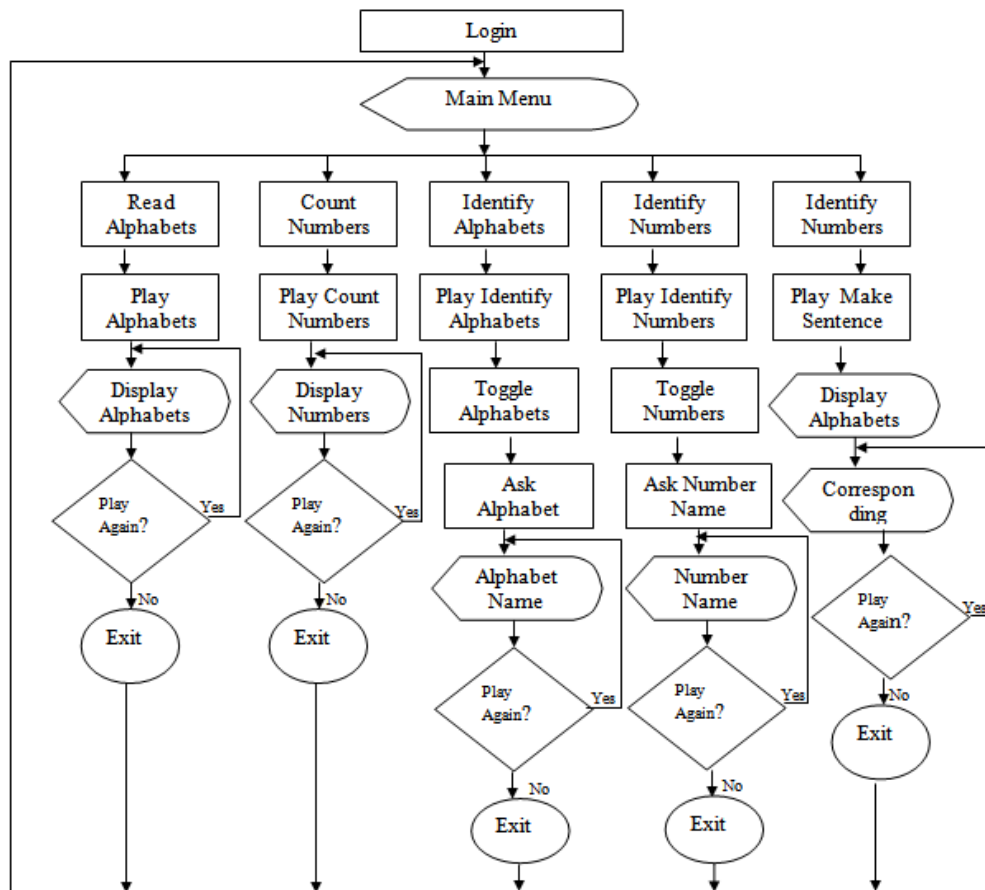**B. Activities of detailed design of each sub system**

Fig: 3.3 Activities of detailed design of each sub system

IV. CODING

The system was implemented using C#, Asp.Net MVC 5 and MySQL relational database management system. MVC (Model-View-Controller) was the pattern followed in implementing the front end and business logic of the website. The Modules are C# classes used in communicating with the views and the database, The Views are the front ends visible to clients while the controllers are C# classes which takes care of all the logic and flow of data, sending the right module to the right view and using the right module to retrieve data from the database. The View, being the front end, was implemented using C# Razor View engine which incorporates Html, CSS, JavaScript, jQuery and some C# codes.

A controller class (C#) was created for each user/module to handle all the actions available for the particular user and various Views (Web Pages) were created for the various modules in the system. The teacher or parent logs into the system to select age after which he selects the particular activity to perform.

A. The Backend (Database)

Table 1 showsthe structure of the Teacherr database

TeacherId is an auto-number, field for identifying the teacher or parent used as a foreign key in relations; this is the primary key in this table. *EmailAddress* is used for storing the parents or teacher's email. *FirstName* is to store teacher's firstname, *LastName*serves to store teacher or parent's lastname while *Phone* stores their phone number. Also stored are *Username and Password* for authenticating parents or teacher's login.

Table 4.1 User Table:

Name	Data type	Description
Full name	Varchar	User full name
Username	Varchar	User username for login
Password	Varchar	User Password for login
Phone	Varchar	User Phone Number
Email	Varchar	User Email
Category	Varchar	User Category either as teacher or parent

B. IMPLEMENTATION RESULT

B.1.Login Interface

Fig 4.1 Login interface

B.2. Home page : This is the interface of the landing page, when the software is been run on the computer system it displays the sub menu .
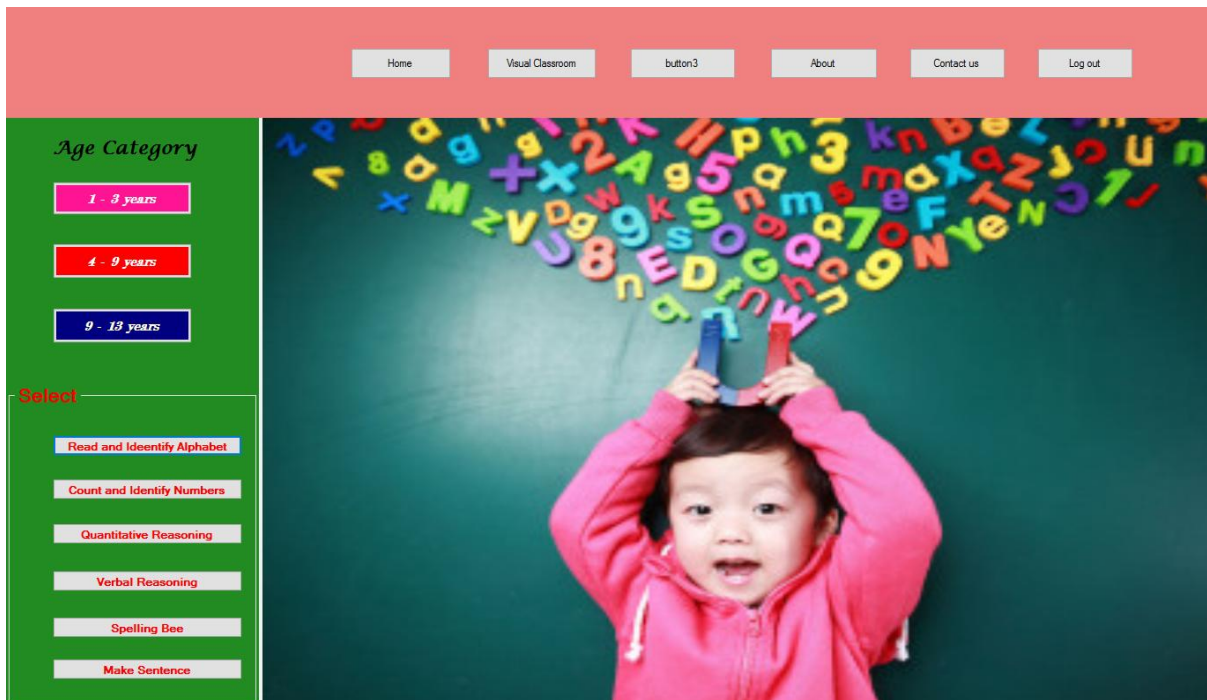
Fig 4.2 Home page of the System

B.3. Numbers Identification: The figure below is an interface where by the numbers is displaced for identification. This is usually for ages 1 to 3 years, here an animation is used to tell whether the child is correct or not.
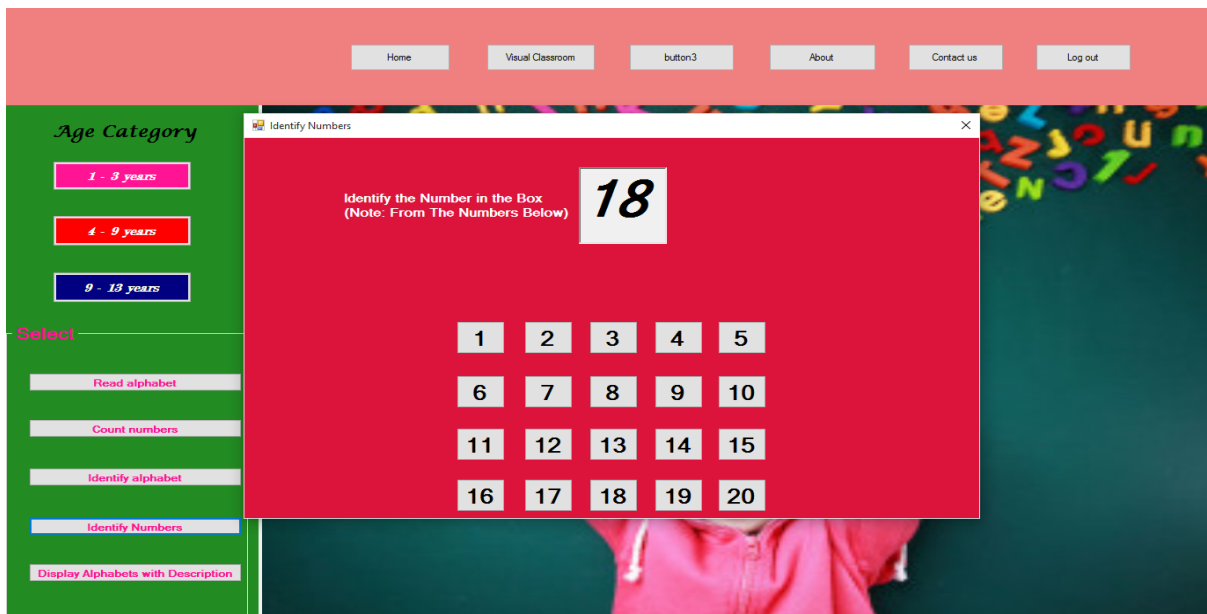

Fig 4.3 Number identification

B.4. Alphabets Identification: The figure below is an interface where by they alphabets is displaced for identification.
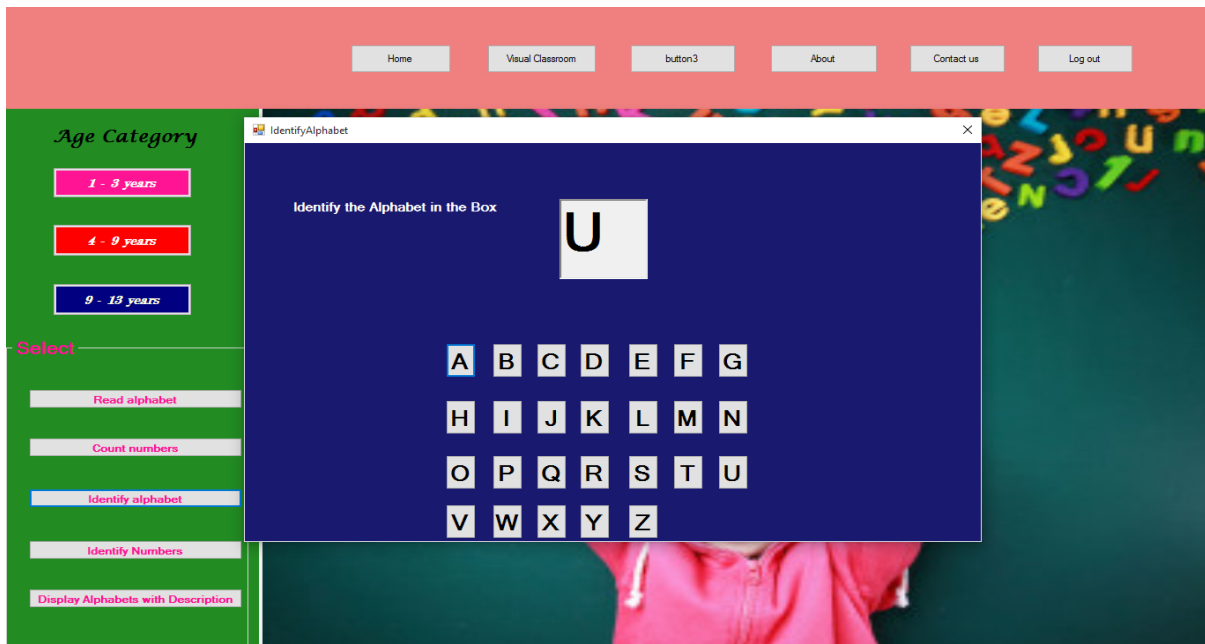

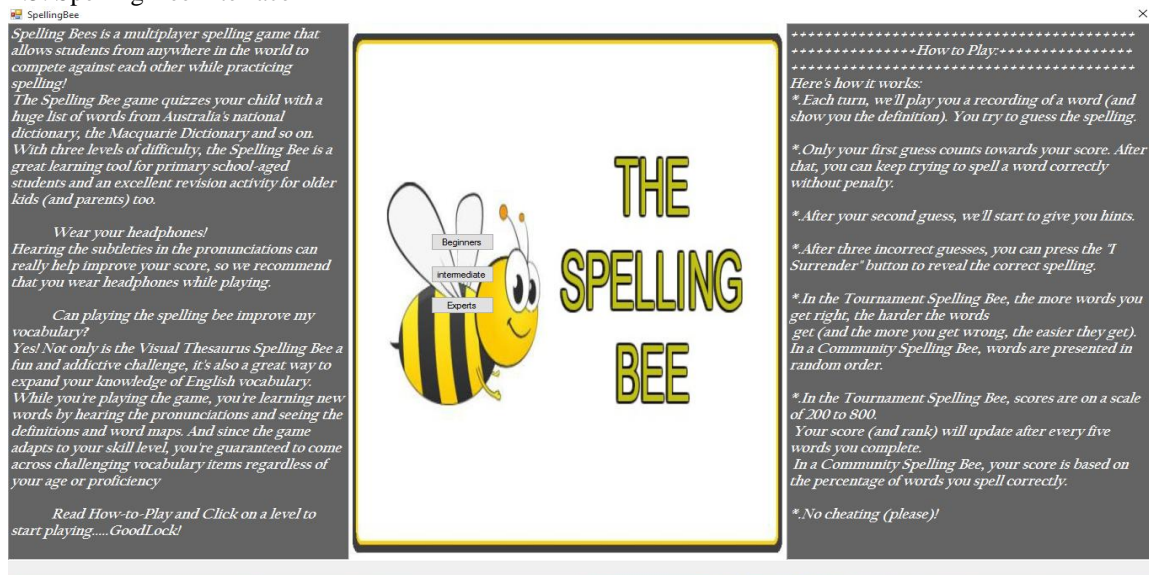**Fig 4.4 Alphabets identication**

B.5. Spelling Bee interface

Fig .4.5 Spelling Bee interface

B.6. Interface of reading and playing of alphabets; The figure below is an interface of paying and reading alphabets. E.g A is for apple B is boy C is for cat etc. Usually the ages between 4 to 9 years have a mark of *good,* when correct and a mark of bad when incorrect.
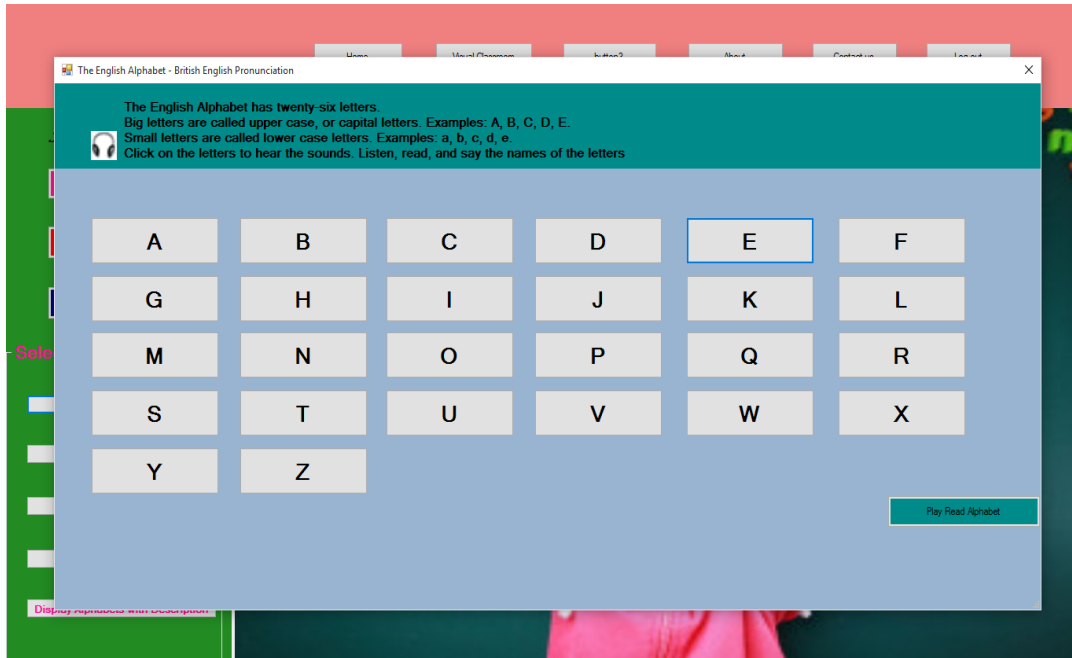
Fig 4.6 Reading and playing of alphabets

B.7. Spelling interface for beginners: the figure below is they interface of learning of spellings for they beginner

Fig 4.7 Spelling bee for beginners

B.8. Making of sentences: The figure below is an interface were the sentence is been made in which the computer aided instructor will score the child's performance
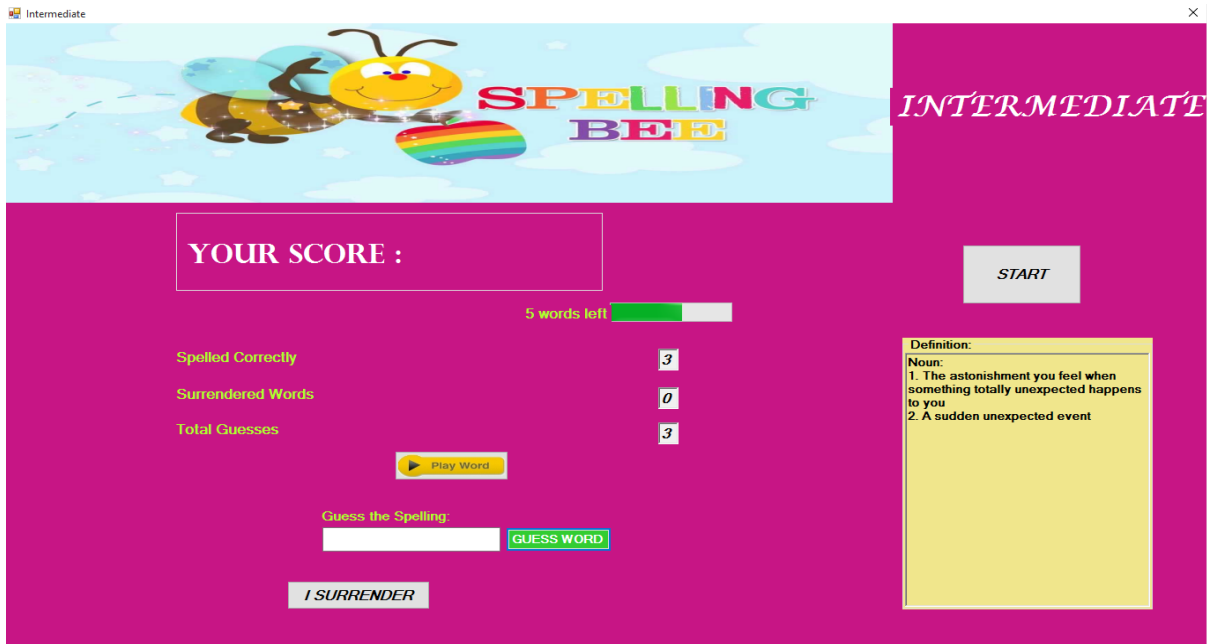
Fig. 4.8 Making of Sentence

B.9. Congratulation message

Fig .4.9 Congratulation message

V. CONCLUSION:

The objective of every good teacher and parent is to impact knowledge with the easiest means as possible without losing the quality of information. Computerizing early childhood education is really a jump start for the future [8]. However difficulties are experienced in the tutoring of children between the ages of 0 to 7 years old, because their minds are often distracted by many activities but now, the integration of animation in this work can really catch the attention of their young minds by the use of computer related tools alongside multimedia. This work design and implementation of a multimedia system for early child has been developed and implemented for children from ages 1 to 9 years. It can be used by schools, motherless babies home, churches and any other educational agency directly involved in the teaching and tutoring of young children. For further research children dictionary can be integrated into this system to help children understand words easily. Also mathematical and other science related courses equations can be integrated for older children.

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