Go-Brainous: An AI based Educational App for Kids

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***Abstract*—Children's growth is crucial during the preschool years. It could be challenging for parents to meet their children's educational demands in today's competitive world. They are not up to date on technical developments and lack time. This paper looks into how to help today's preschoolers support their own learning. The Kids Training e-Learning System (KTeLs) is a tool that encourages preschoolers to learn independently. The primary objective of this app is to create Educational games for children between the age group of 3 to 7 years that will help them to develop the visual and logical capabilities of their brain. This app consists of 6 games namely alphabet training, colour matching, maths quiz, memory game, drawing and music.**

***Index Terms*—Educational App, KTels, E-learning Games, Learn with Fun, Learn will Playing.**

I. Introduction

Children have been heavily influenced by technology over the past few decades; mobile apps in the education sector simplify many processes. Children need a solid educational foundation because it can mould their life and this may be readily provided through technology. Today, we define game-based learning (GBL) as merely incorporating games or gaming elements into the learning process. Because of their interactivity, ability for teamwork and built-in reward system, games are excellent for learning. The current craze in education for kids is learning via play. While teaching their children, parents, teachers, and others must keep this idea in mind. There are various ways to execute the concept of "learning via fun" [1]. E-learning games offer a different method of achieving this goal [2]. They can be used to promote learning that goes beyond only reading from literature. User experience design (UXD), Learning experience design is a branch of learning science that blends learning science, human-computer interaction, and design thinking [4]. Through the use of learning experience design, the students become the centre of the learning design process. E-learning is meant to be able to give users the greatest experience possible these days and make learning enjoyable. To create an instructional design, it was necessary to take into account students' opinions and their intended levels of achievement. [5].

There are currently a lot of instructional games available online. These games may be played on a number of different platforms, including the OS and Mobile. Thailand has a large selection of games that were created by universities, games software companies or regular people. This study provides a prototype and tries to investigate the attributes of online learning games.

The Kids Training e-Learning System (KTeLs) is a tool that encourages preschoolers to learn independently. It is theoretically sound and enables kids to acquire cognitive and psycho-motor skills like drawing, writing, number identification, the basic shape and colour recognition, and logical thought. It includes a unique algorithm to recognize and direct the child to write a letter correctly without parental help. There is kid-friendly navigation available. The tool underwent focus group testing before being created as an Android tablet application. The scenarios, sounds, and colours have been specifically chosen to keep children's attention. E-learning is a popular method of education, but as society has progressed, traditional E-learning methods have revealed several flaws, such as a monotonous method of instruction, making it challenging to get pupils excited about learning and pay attention in class. Educational games used in e-learning can effectively address these issues and raise the standard of instruction. There are two primary factors to keep in mind when using educational games for online learning: educational objectives and game design. This project is about an educational gaming application in which students build a range of connections with the content and can form good learning memories as games capture students' attention and actively involve them.

II. Objectives

Project implementation to meet the following objectives

- To develop an app with instructional games using Tensorflow Lite Model.
- To create games activities based on math quizzes, alphabet training, drawing book, different sections on fruits, animals, vegetables, numbering, vehicles, shapes, colours, days, months and body parts should be developed in order to avoid burnout.
- To include a curriculum integration feature within the app.
- To develop an app that would assist students in concentrating on their academics.

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- To create a User-friendly layout using XML

III. LITERATURE SURVEY

From these papers learned to implement drag and draw functionality which is implemented in alphabet training and drawing book. Also learned the logic to implementing a memory game

According to V. Siddoo, D. Binla, K. Jaineawnaekuson and O. Yommana, E-learning games have become a potentially advantageous option for educational instruction. This type of technology could help the learner to comprehend an academic setting clearly, especially in the case of children who prefer activities above study. Play-based education gives kids the opportunity to learn while having fun. The purpose of this research is to examine the qualities that make e-learning games suitable for young children. A faculty of education early childhood education major conducted interviews with lecturers and students. Qualitative content analysis was used to examine the data that had been gathered. The results painted a picture of suitable e-learning activities for young children. In addition, created a prototype for a different e-learning game and presented the concept. We suggest getting information from more early childhood education professionals in the future to expand the prototype with more metaphors. [1]

According to A. A.Yunanto, D. Herumurti, I. Kuswadayan, R. R. Hariadi and S. Rochimah, Currently, a game is an entertainment application for a user or a child. In addition to desktops, games can also be downloaded and played on mobile devices, particularly those using the Android operating system. However, many games available today have an addictive mechanism but no instructional component. For a user to receive both knowledge and fun, the educational game is crucial. In this paper, a game uses a technique to determine a level automatically, and the game and educational material attributes are both modified. According to experiments, the user interface, system performance and instructional lesson of the game were well received. Considering this outcome, we can say that the game is enjoyable and simple for kids to play. The children who have played this game can increase their level of calculation speed and increase the accuracy of their answers during an arithmetic lesson. [2]

According to R. Toasa, E. Burbano, A. Constante, L. Hidalgo and F. Morales, Given that kids have a tendency to lose focus rapidly, learning is now a challenging activity for kids. It can often be challenging for the teacher to tell whether the students understood what was being covered in class. As a result, the primary goal of this work is to enhance English language acquisition through a fun game. An entertaining educational game that focuses on gamification was created just for this purpose. The game's outcome was satisfactory; kids could hear and see the fruits and colours on the screen while playing. In the first test of teaching fruits and colours using the traditional "teacher-student" method, 17 out of a total of 24 children were able to comprehend their teacher. On the other hand, the "Game - Student" test revealed the effectiveness of the game with 21 kids who improved their rating and showed that they comprehended what the game depicted, as suggested in this study. [3]

According to A. Dinimaharawati, A. I. Wuryandari and H. A. Aziiz, E-learning is being pushed harder in education as a teaching and learning alternative. For implementing e-learning in the classroom, there are various open-source platforms available. Although some users only use it to create quizzes and upload materials, it is a form of a learning management system that supports multimedia for the learning process. Despite the fact that educational games are a common kind of multimedia to aid with learning. By incorporating educational games into e-learning, Learning Experience Design provides a solution for the increasingly challenging development learning experience. The goal of the study is to create an educational game for online learning using the System of Linear Equations in Three Variables and to assess the educational game's user experience using a questionnaire. Our study's findings support the notion that instructional games are appropriate for e-learning environments. The group's attractiveness, perspective, effectiveness, reliability, excitement, and novelty are all superbly conveyed by instructional games, according to research. This indicates that learning experiences were designed using educational games to interest students. [4]

According to H. B. Ram´ırez Moreno, M. R. Ram´ırez, E. M. Rojas and M. Del Consuelo Salgado Soto, The society we live in has changed as a result of the advancement of digital technology and the rapid expansion of mobile devices and the educational sector is no exception. With regard to children, the use of applications in mobile technology was revolutionary, providing a new horizon for them. Every day, we witness an increase in the frequency with which teachers incorporate mobile applications into the teaching-learning process in their classrooms. In light of the foregoing, we provide a portion of the findings of a descriptive, quantitative study that was carried out in Tijuana, California and Mexico to evaluate three mobile applications in private primary schools where teachers use information technology in their teaching methods. [5]

According to Q. Ni and Y. Yu, The growth of a child's linguistic skills, critical thinking skills, emotional development, intelligence and imagination can all be promoted and increased by playing educational mobile games. As a result, it is possible to consider that educational games are crucial to a child's growth. This essay provides a thorough examination of the effects of educational mobile apps, their use both domestically and internationally, and the studies on preschoolers' cognitive growth. This analysis summarizes the

notion that the design of interactive games has a significant guiding role in children's cognitive development using Piaget's theory of cognitive development as its base. [6]

IV. MOTIVATION

A. Early age Childhood Education Development

Early childhood education is crucial. The growth of children is influenced by parenting and education. Even finding effective ways to teach children of age 3 to 7 years is difficult, let alone finding ways to keep them engaged and happy while learning. Children learn quickly and in a more effective manner if they start at a very early age. An efficient alternate method for assisting with children's education in computer technology. Children who use computers think more systematically and creatively. For instance, in Tanzania, game-based language for young children is employed in the classroom. In Sri Lanka, preschoolers used the Kids Training e-Learning System for self-learning. [1]

B. B. E-learning Games

E-learning games for preschoolers are designed to help kids grow in a variety of ways, including physically, emotionally, mentally, socially, and intellectually. The strategy used in these games places more emphasis on the children's active learning than on the learning content. One kind of electronic learning game is the educational game. The educational game can be used for instruction or training. Playing a game like this could make learning more effective. Our study focuses on creating a kid-friendly educational game. E-learning games have the potential to improve curriculum effectiveness, give teachers new teaching strategies, and spark students' interest in the subject matter. Websites with educational games abound. Despite the restrictions of a child's language development, the games are frequently not free.

V. METHODOLOGY

A. Use Case Diagram

Use-case diagrams describe the high-level functions and scope of a system. These diagrams also identify the interactions between the system and its actors. The use cases and actors in use-case diagrams describe what the system does and how the actors use it, but not how the system operates internally. The actor in this use case diagram is the user. First the splash screen will appear after that it will go to the main /dashboard from where he can select the game from the list of different games. Afterwards, Two options will be there if the user is new to that game then he can learn how to play through the guide or else can directly start with the game. Once the game is over again the user has two options to play the game again or back to the home page it can redirect to the game page else he can exit from the game. if use want to play different game so follow the process on that game. The user has also the option to go forward to the next level of the game. After he finishes his game he can exit.

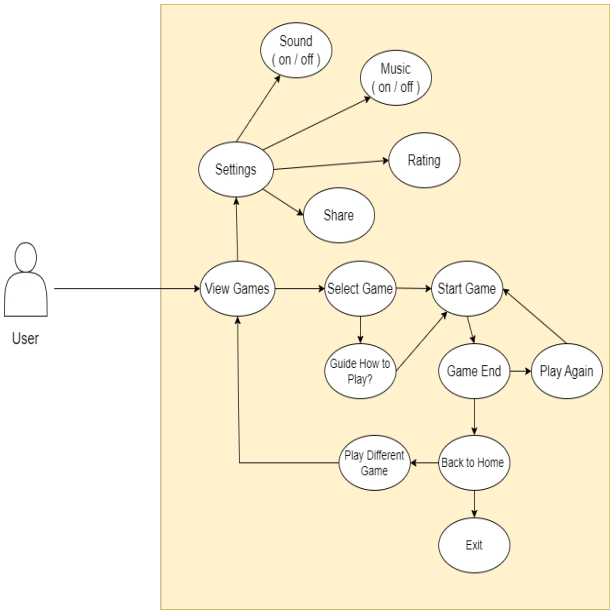

Fig. 1. Use Case Diagram

B. State Chart Diagram

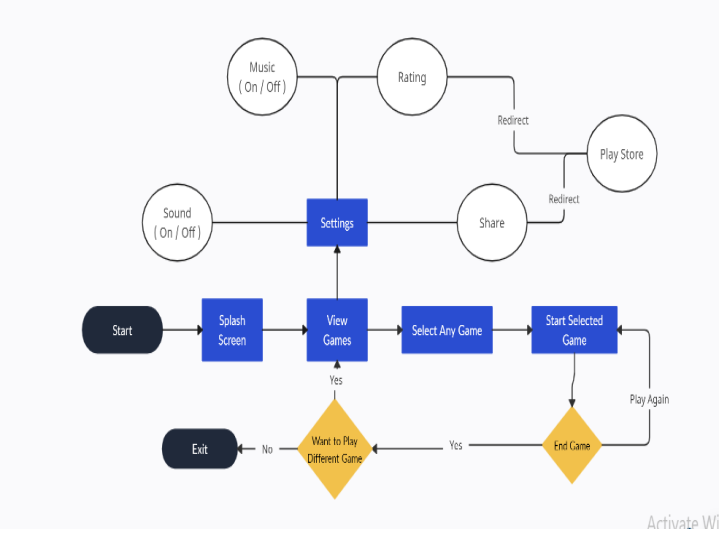

Fig. 2. State Chart Diagram

It captures the software system's behaviour. It models the behaviour of a class, a subsystem, a package, and a complete system. In the User State diagram, the first splash screen will be appear then all the games will be shown. Then afterwards user can select which game he wants to play and can directly start the game. After he finishes the game he can play the same game again or else he can also choose a different game from the games list. On the game page the setting button is also their their are some options like sound and music on and off button, rating button for rating the app on play store and the share button for share the game with friends and family so on clicking the share button it can redirect to the play store.

C. Sequence Diagram

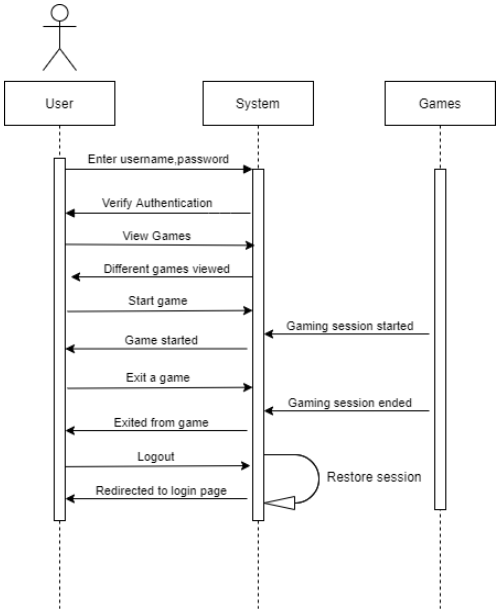

Fig. 3. Sequence Diagram

In this sequence diagram. The sequential flow of the activity is shown between the user system and games. First, the user will enter the username and password then the system will verify the details. After the authentication. The user can see the list of games that the system will display. After choosing the desired game, the user can start playing as the games will start the session after finishing playing the user can exit the game and the game session will be ended. The user then can log out and the system will redirect the user to the login page again.

RESULTS

After extensive development and testing, the Go-Brainous app has been successfully created, providing a fun and engaging way for kids to learn and improve their cognitive skills. The app includes various quizzes, games, and creative activities such as numbering, alphabet, alphabet training, math quiz, fruits, animals, vegetables, drawing books, vehicles, shapes, colours, days, months and body parts.

The use of the TensorFlow Lite model has enabled the app to provide accurate and reliable performance while maintaining optimal speed and responsiveness. The Java and XML platform used in its development has ensured a user-friendly interface and easy navigation for kids. The feedback received from users during the testing phase has been overwhelmingly positive, with many expressing satisfaction with the app's design, content, and effectiveness. Overall, the Go-Brainous app has met its objective of providing an enjoyable and effective educational tool for kids, promoting a positive attitude towards learning and mental development.

Fig. 4. Home Screen 1

The figure above illustrates the variety of games that are available on the app.

Fig. 5. Settings

The settings menu includes buttons for the sound and music, as well as buttons for rating and sharing with friends.

Fig. 6. Numbers

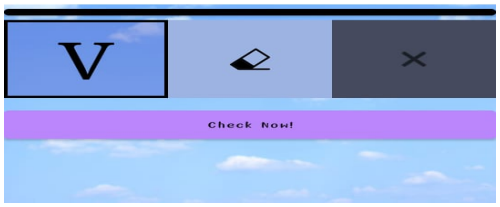

Fig. 7. Alphabet Training

As you can see above the alphabet V is shown now the user needs to draw the given alphabet. Users are given three chances to draw the correct alphabet at random. If they do, a pop-up message of congratulations will appear; otherwise, they can try again.

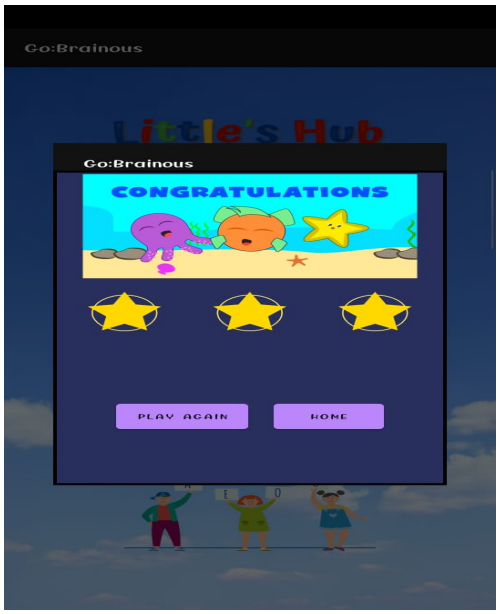

Fig. 8. Congratulations Pop-Up

The user's chances will determine how many stars they receive. If the user succeeds on their first attempt, a pop-up congratulations window will display 3 stars. If the user completes the task in two attempts, 2 stars will appear, whereas only 1 star will appear in three attempts.

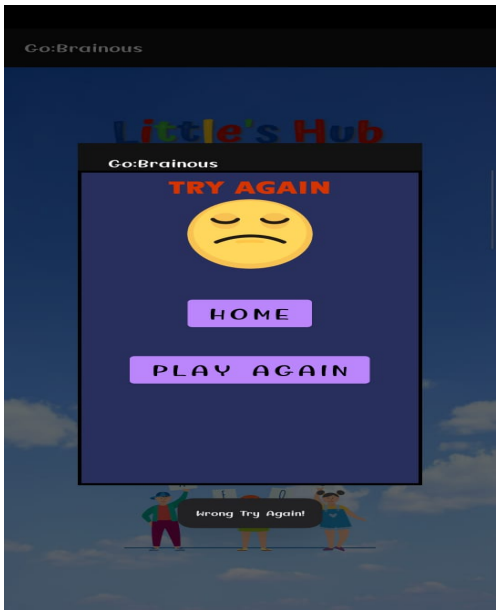

Fig. 9. Try Again Pop-Up

If the user is unable to draw the provided alphabet in three attempts, it will display: ”Try Again.” pop-up

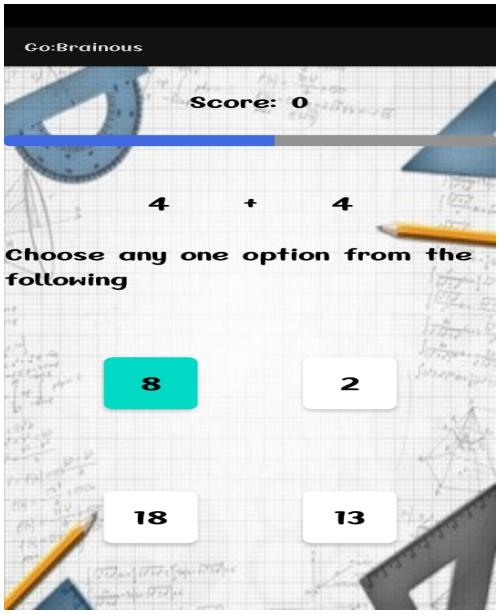

Fig. 10. Math Quiz

In the mathematics quiz also known as ”Math quiz” different mathematical operations will be shown and the user needs to choose the correct option. Four options will be shown among those one will be the correct option. After choosing the correct option, the user will move on to the next step.

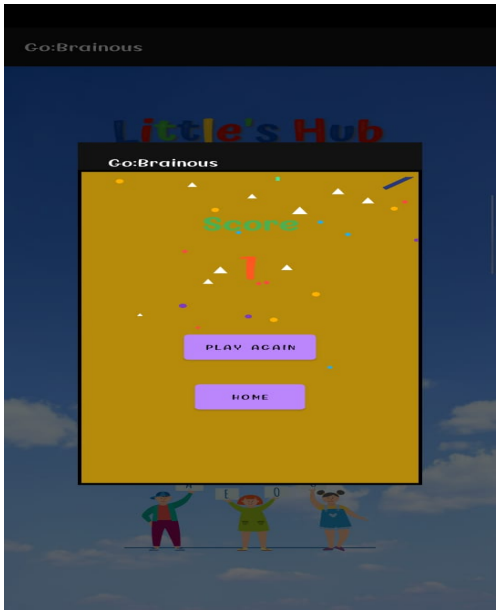

Fig. 11. Score Pop-Up

Each question has a timeout of 4000ms, if the user doesn’t answer within that time limit the game will end and the final score will be shown. The final score is the sum of all the scores till now.

- The positive feedback from the user testing phase has further validated the effectiveness and usability of the app.
- The app has shown promising results in improving children’s cognitive and educational skills, particularly in the areas of math, language, and memory.
- The incorporation of AI technology through TensorFlow lite model has enabled the app to adapt and personalize learning based on the individual user’s progress and needs.
- Future plans for the app include adding more features and content, such as interactive stories and foreign language learning modules.
- Overall, the development of Go-Brainous has provided a fun and engaging way for children to learn and has the potential to positively impact their educational development.

CONCLUSION

In this paper, the Goal of Go-Brainous is to develop an app for kids in which quizzes and games will be included like numbering, alphabet, alphabet training, math quiz, fruits, animals, vegetables, drawing books, vehicles, shapes, colours, days, months and body parts. The app will be developed using the TensorFlow lite Model. The proposed system will be developed on Java and XML where XML use for creating a layout. The goal of Go-Brainous is to provide an easy and interesting way of learning for kids. This project is about an educational gaming app through which students develop a variety of connections with the content and can form positive memories of learning as games grab students’ attention and actively engage them.

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