Augmented Reality For Education

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Abstract: *Augmented Reality is the technology that has proved to bring revolution in the field of Education. It also have shown to be relevant, useful and valuable in encouraging children in various learning activities at an early age as visualizing things can be very laborious for children using traditional methods of learning. Other issues with the present teaching system involves complexity in stimulating children's learning interest, lack of teaching situation and poor study effectiveness. In this paper we are aiming to develop an Android based Mobile Application using Augmented Reality for kids. Our idea is to make learning interactive, simplify learning process as well as ease the burden on children. This work mainly considers Pre-School children and presents an approach with associated AR cards with a purpose of providing a playful approach towards learning of alphabets and numbers..*

I.   Introduction

In this era, technology has led to many transformation of the teaching and learning approach among educators and learners, which help in decreasing the barriers or restrictions in education, and promote freedom in the teaching and learning process and also removing boundaries of time and location which is an important factor to provide lifelong learning.[2] Teachers in kindergarten usually make use of traditional teaching methods. Also availability of teachers to teach kindergarten-age children are less. Even though they may have strong professional Degree in early childhood teaching, they may be unable to attract children's attention and interact effectively with children. Study shows that at the pre-school stage, ranging from three to six years old, is the best period for learning.[1] Children in this stage are good at simulation and have a high enthusiasm for learning. Augmented Reality (AR) is a technology that augments the real physical world with computer-based 3D virtual objects, which the users can interact with on the screen of devices like smartphone/tablet with a camera.[7] The use of digital technology in the teaching and learning process is the new trend in education, and the outcomes are dominating the traditional teaching and learning practices. With the help of Augmented Reality, students will get better understanding and attention through eye-catching presentation. Lessons become interactive with increased level of audience participation. As we know that in today's era of digitalization there is at least one smartphone in every house, thus the influence of technology on kids is increasing day-by-day. The kids of today's generation can use Android smartphones in a way that adults can use. They know how to play a video, how to call, how to play games like Temple Run, Subway Surfers and in extreme cases they even know how to use camera.

In short, today's young generation is getting addicted to technology at an early age and there is a chance that it may have negative effect on them. So our idea is that if kids are getting addicted to this Android technology then why not use this addiction in a positive way, in building their knowledge, improving their learning and understanding ability as well as increase their memorizing skill. Visualized learning retains for a longer duration. Supporting pen and paper stuff with AR examples adds another dimension to the learning process - a process that will become a combination of traditional approach and innovative practical illustrations.

We are focusing on creating an Android based AR application. Our Android App will mainly focus on giving most basic knowledge to kindergarten children like A-Z alphabets, Numbers ranging from 1-10, Different basic colors learning and also learning of different shapes. With the help of Augmented Reality, students will get a whole different view of learning. Our AR based android app will enhance the visual and auditory learning of young children by the integration of pictures, videos and other media performances. It will make learning full of enthusiasm and help in engaging the learner in a way that has never been possible.

II. Proposed System/Methodologies

Technical Overview

An Application will be developed for Android supporting hand held devices. The development of this Application will be supported by usage of software like Unity3D. As far as modeling of 3D objects is concerned

we will be using open source software i.e Blender. Unity3D platform would be used for designing GUI associating Image Target with their respective 3D objects with integration of Vuforia SDK to provide Augmented Reality experience.

System Workflow

Figure 1:System Overfow Diagram
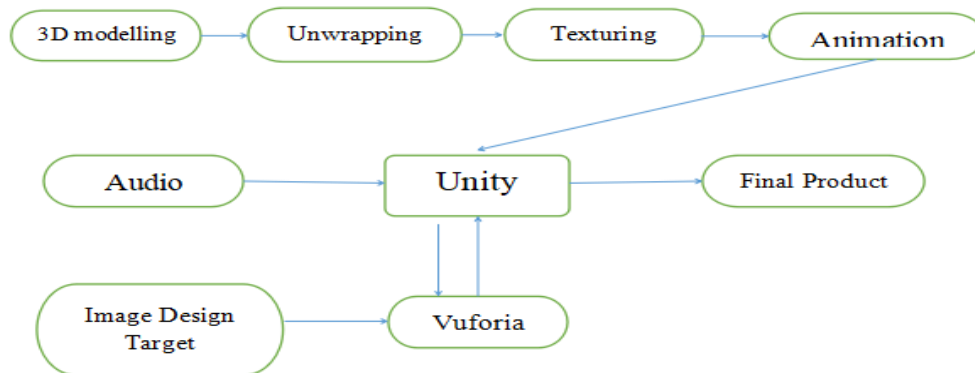
Flow of our system will begin with modelling of 3D objects using Blender which is an open source software. Textures, Materials to make these objects look real would also be done in Blender and then get imported into Unity3D. Unity3D is an efficacious multi-platform supporting engine which will support the creating of application. Models created would be imported into Unity3D, integration of models and their animation, creation of user-interface, memory-based game would result in complete building of application. Animation of objects would be implemented in Unity3D with C# programming language. Vuforia SDK supports creating Augmented Reality Experience, which will be used in our prototype.So image targets that is our AR cards would be uploaded in Vuforia   and database would be created which would be imported in Unity and final AR application will be developed by integrating everything in Unity.

Learning modules of our Application
A. Learn Alphabets
A set of 26 AR cards each representing one of the alphabets. Viewing these cards through our application camera, 3D models will pop up with audio, text and animation.This will help kids to learn about alphabets in a more entertaining way.

B. Learn Numbers
A set of 1-10 numbered AR cards, along with animation and audio support for better understanding.

C. Learn Colours
To learn about colors, there would be buttons with different name of colours on it, clicking on one of these buttons a 3D object's colour will change with audio feedback.

D. Memory Based Game
AR game which will help in checking the learning of kids and for practising the above learned lessons.

Design of Interaction
For early childhood Learning, an AR-based interactive mode should not be too complicated. The simple operation of the operating the app is by clicking.. Clicking button is the first choice for making a selection. Interface will be designed with some cartoon based object so that it will help increasing the level of participation.

Final Application Case
All the Teachers or Parents need to do is install the app on mobile phones. In this app, we help children to learn alphabets, colours, shapes and numbers. By using the mobile camera to scan the AR cards, children can see 3D

scenes and 3D models in real world and hear the pronunciation of the names of objects through device.. Kids can also interact with the 3D models by clicking on the 3D objects
displayed.

III. Literature Review

According to the researches done in the teaching technology, we can see that the use of Augmented Reality is increasing in a rapid rate in the field of Education and based on its increasing impact, there are many systems and applications developed.

In order to use Augmented Reality as a medium of learning in Science Subject the authors Tigala Maijarern, Narong Chaiwut, Ratchanon Nobnop developed a web application for primary students.[10] They selected the topic of "Plant's life". The focus was to teach students of age 4 and help them understand various parts of plant, describe their functions and what is the importance of each part of the plant.[10]

Faima Abbasi, Ayesha Waseem, Erum Ashraf developed an Augmented Reality application using Marker based Approach. They combined augmented reality approach with the chemical hybridization of methane enabling the student to envision the abstract concept of hybridization at secondary level of schooling[4]

Yanyan Chen1, Dongbo Zhou1, Yu Wang1, Jie Yu2 says that AR technology enhances the visual and auditory learning of young children by the integration of pictures, videos and other media performances.[1] They developed an AR based Mobile Application that taught children English words. The application scans the AR cards and then renders 3D models and 3D scenes related to the words along with their pronunciation[1].

Lap-Kei Lee, Cheuk-Him Chau, Chun-Hin Chau, Chun-Tim Ng shows how to effectively use Augmented Reality to improve the learning experience of kindergarten students, while addressing the parents' concern on their child's health affected by using electronic devices[7] They developed an Application that taught English vocabulary to kindergarten students using Marker-less Approach. They introduced a minigame to make learning fun loving. In addition to all these they also included a Monitoring system in their application that helped parents in suspending the application usage as well as allow them to set time limit for the application usage by their child.[7]

Modafar Ati, Kamil Kabir, Hamis Abdullahi, Masud Ahmed proposed a framework that integrates available technologies with traditional school paper-based learning to help literacy development[9]. The developed application helped young children in learning and writing alphabets by providing them a writing activity on the paper which after completion would be uploaded to the cloud where the teachers as well as parents can review the progress of the child. They also induced a memory based game to make learning entertaining which would also help the children in retaining the things they learned.

IV. Conclusion

Diverse use of Augmented Reality proves potential of this technology in further advancements of learning procedures. Helps teachers to explain well and students to understand the concepts even if they are complex. To provide better learning experience to everyone involved in process there is need for identifying effective curricular and technological characteristics for implementation of Augmented Reality in day-to-day.

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