AUGMENTED REALITY APPS FOR CHILDREN TO LEARN APHABET THROUGH STORYTELLING

By

TANG CHOO KOCK
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Bandar Seri Iskandar,
31750 Tronoh
Perak Darul Ridzuan

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ABSTRACT

Everybody deserves a proper education. However, there are parents out there struggling to teach their kids to read and write due to their inability to teach them properly. Therefore, this project is going to explore the possibility of using augmented reality combined with storytelling as a medium to teach children to learn alphabet. With the existence of variety of students around us, problems tend to occurs when the teaching and learning process are going on. Students tend to have different learning curve. Sometimes they just refuse to learn altogether. These problems support the designation of this project which is to overcome the cause of illiterate among adults by starting early in terms of learning alphabet using augmented reality and storytelling. Exploring further into the project, analysis, planning, design, testing and implementation are going to be carried out to support the progress of this project. As a result, an android application that is able to support the learning of alphabet through storytelling is going to be built

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INTRODUCTION

1.1 BACKGROUND OF STUDY

Augmented reality is defined as a live, direct or indirect, view of a physical, real-world environment whose elements are altered by computer-generated sensory such as sound, video, graphic or GPS data. Simply said, augmented reality is another world created by human being to assist in the daily routine, allowing a better learning environment for each and every one of us.

Augmented reality has unknowingly become part and parcel of our life. A lot of us might not realize it but majority of us are already being exposed to augmented reality for a few times. Of course, the most common way to be exposed to augmented reality would be the exposure to an android or IOS smart phone augmented reality application. Smart phones can be owned easily with cheap price by anyone all around the world. So we can conclude that augmented reality applications are now easily available with cheap price to every customer who can afford it.

The project that the author is working on is technically about a software that is able to help people especially kids to learn alphabet and words about the item that are being projected by the software. Some might find it surprising but 1 out of 7 Americans are illiterate and cannot read. While in Malaysia, statistic has been carried out for SPM leaver and out of 468,808 candidates, 37,504 of them cannot read which about 7.9% of SPM leavers are illiterate. This shows that they are still a lot of us out there who can still improve when it comes to reading.

We cannot deny that education has somehow become one of the most important elements carrying heavy marks in the eye of parents all across the country. Basic for studying is very important before kids are able to learn continuously independently. At the same time, the advancement of technology in the recent period of time had substantially changed the course of learning among all of us. Augmented reality is among the latest streams that are popular in the recent world of technology.

Kids from all around the world are using smart phones to play popular games such as angry birds, draw something, temple run, chicken ninja, fruit slasher and ninjump. Those kind of games are addictive those kids will not stop playing until they had reach the target that they had wanted to reach. For those teenager and mid-adult categories, the time spent on smart phones are usually for social networking server such as facebook, twitter, tumblr, foursquare, linkedln and pinterest. On March 2012, statistic has shown that smart phone has beat computer for facebookers time on site.

Selected Social Networking Properties (Mobile Browser and App Audience Combined)
March 2012
Total U.S. Smartphone Subscribers Age 18+ on iOS, Android and RIM Platforms
Source: comScore Mobile Metrix 2.0

	Total Unique Visitors (000)	% Reach	Average Minutes per Visitor
Facebook	78,002	80.4%	441.3
Twitter	25,593	26.4%	114.4
LinkedIn	7,624	7.9%	12.9
Pinterest	7,493	7.7%	52.9
Foursquare	5,495	5.7%	145.6
Tumblr	4,454	4.6%	68.4

Table 1.1: Statistic that shows the number of online networking site by smart phone users

The statistic above shows the number of people that are on the networking site using smart phones. Simple example, in March 2012, average visitor per minutes for facebook user using smart phone is 441, while for computer the average per minute is only 391. It shows that smart phones are now overtaking computer as a medium for consumer to interact in social networking site and also taking up most of the time of the consumer.

The simple statistic above has proven 2 very important elements in my project. First of all, it shows that smart phone users are everywhere and my project can be used by any smart phone user that own smart phone no matter where they are. It is just the matter of whether to use the application or not. Secondly, the statistic shows that smart phone is a more preferable medium to interact now, rather than computer.

Augmented which mean added to or made greater in amount of number or strength while reality which means the state where it actually exist. Together, augmented reality is a live, direct or indirect view of a physical, real-world environment whose elements are augmented by computer – generated sensory input such as sound, video, graphic, or GPS data.

In my project, the screen of the camera is going to project an item, object or animals that will be accompanied by words that describe the item. For example, if there is a picture of Tiger on the screen, the word tiger will also appear next to the tiger so that children will be able to know what the tiger is and how to spell it.

Figure 1.1: Figure shows how children are more attracted when story telling is involved

In addition to what they augmented reality apps can do, there will be a story line on the projected object on screen. The story will be the pulling point where children will be attracted and learn about the story of the animal at the same time when they are learning the new words and alphabet. Accompanying the augmented reality animal coming on and off from the screen, there are going to be audio, movement, and video that will be added into the segment. For future reference, the virtual buttons are going to be added into the image target so that children can actually interact with the augmented reality.

1.2 PROBLEM STATEMENT

The statistic of illiterate of people in the world is **14%** without taking account of those people living in country that had high statistic of poverty. It means that out of 7 peoples, one of them cannot read. In Malaysia, 8% of SPM leaver are unable to read properly despite that they all had finish the SPM test.

Kids nowadays are having a different learning curve. Some kids are able to learn very fast but not all of them are able to do so. So for those that are unable to learn as fast as other smart kids, it is harder for them to understand what are being thought. How are they going to be able to learn how to read if they are unable to recognize the 26 alphabets? Are we just going to ignore them and focus on those that are able to read only? The problems that parents are facing has to be solved by providing the kids with interactive and fun ways to learn especially in the early stage of learning, which is about memorizing alphabet and learning some simple words that are on it.

Kids also have a very low span of attention in learning if they are not interested in studying. Majority of the kids are eager to learn, but there are certain kids that refuse to do it altogether. When given a book to read, often the books will end up somewhere below the bed or untouched on the table. Their attentions are more focused on things that they are interested in, which might develop into their career path, but take notes that early education is still important regardless of what career they are going to pursue in the future.

Kids nowadays are spending more time on the games rather spending their time doing some other healthier activities such as sports, reading, music and so forth. They spend a lot of their time playing games with the touch screen technologies that are easily available in the market. It has sometimes come to a point where they are addicted to the games and played non-stop. It's good that they are playing games to widen up their imagination but

when it comes to the point where they are addicted to it, thus will bring a negative effect to the kids in the early childhood learning process and parents are going to have a hard time trying to teach them new things.

At the same time, **Kids sometimes refuse to learn in school or home**. This is because the old and traditional way of teaching might sometimes bring down the kids mood and since some of them can already speak when they attend the school, they thought that they are already a very good student and don't have to study hard in school. This immature way of thinking might cause a lot of problems in the future because if they didn't master the basic of alphabet, they are going to have a lot of problems reading in the future.

1.3 OBJECTIVES:

The objectives of my project is to

1. To explore the use of storytelling and augmented reality for learning the alphabet
2. To create an android application that could motivate and engage children to learn the alphabet using storytelling and augmented reality
3. To conduct an observation study among potential target users

1.4 SCOPE OF STUDY AND LIMITATIONS

The project will be on operating on Android operated device only. As long as the device is running android operating system, tablet, smart phones, and pad are all able to run the software. The project will be done in UTP. The lab will be used as the place for me to carry out the development of the project. I will be receiving assistant from other people who are more experienced than me. Open source software will be used to develop this application. Some common hardware that are going to be used are laptop, computer, printer and Android mobile device (Samsung Ace Plus). The used software will be Unity3D, Vuforia AR SDK, blender and Google Sketchup.

1.5 RELEVEANCY OF THE PROJECT

The project is relevance because as of now, there are still no apps for kids to learn alphabet in augmented reality in the market. Currently available apps are only those that are used to learn mathematics, English, science, and some other subjects thought in school, and not all of it is in the augmented reality state. Some are just simple game apps that allow kids to play and learn at the same time. In the states, there are already IOS program for children to learn alphabet in augmented reality, but IOS is not the platform where my project is going to be developed because of the price of the devices which is not really affordable by mass public. Therefore, it is more relevant to develop this project in Android platform rather than IOS.

1.6 FEASIBILITY OF THE PROJECT

The project will take time around 8 months depending on the date that are given by the UTP to allow me to finish this project. The time frame of 6 months includes the assignments, test and project of some of the courses that I had to take. In these 6 months, the prototype of the end product has to be completed. The first few weeks will be used to familiarize myself with the proper software to be used to develop the program. Some of the existing apps will be used as the benchmark to develop the software properly. This is also an open source apps that is going to be developed with the combine knowledge that the author has gain from the programming language that had been taught before.

CHAPTER 2

LITERATURE REVIEW

To learn how to read, one must memorize all the alphabets at first. If the first step is not being fulfilled properly, one will not be able to read properly for the rest of his life. It will be an unfortunate event as inability to read will restrict a major portion of the self-development of the individual physically or mentally. An early exposure for the infants to learn the alphabets once they started to learn how to speak and recognize thing is important as it is the first step that should be taken by all the individuals to continue living their live without literature problems. This literature review section will discuss about the current learning method for alphabet, the android platform, the augmented reality and some of the existing augmented reality applications. The aim is to find a proper mixture of all the elements to produce augmented reality software that will be able to teach children on alphabets.

2.1: CURRENT LEARNING METHOD

The Free Dictionary define alphabet as the letter of language, arranged in the order fixed by the custom. It is a system of characters or symbols representing sounds or things. Learning is defined as the act and process of gaining knowledge or skills. Together, alphabet learning means the act of learning the system of language in a way that will enable a particular human being to be able to read, write and understand a language in the most proficient way. Alphabet is being thought at the early stage of the age either when the kids are still at home or when they are being brought to kindergartens.

Figure 2.1: Figure shows the method used to learn alphabet

[1]Lisa Powers claims that the best way to get started to learn alphabet is by using letters and sounds. Most people learned the alphabet through the "alphabet song". For those who found it uncomfortable learning alphabet in singing mode, the other alternatives will be sandpaper letters and alphabet magnet. Sandpaper letters method are used by closing the eye and feel the sandpaper letter and repeat the name of the letter and then the sound. In the same journal, a few games and activities to assist kids in learning alphabet has been introduced such as alphabet war, alphabet on the move, bingo, go fish, and alphabet art puzzle. Lisa Powers also highlighted the importance of recognizing the consonant and vowel from the beginning stage of learning so that the kids won't be confused when they proceed to higher level of learning. That's why, learning alphabet through alphabet song is also one of the best option for kids to learn efficiently.

[2]In an article by Sarah K Major, was written the reason why must we include visual and kinesthetic elements in the process of teaching children alphabets. Young children learn most easily when materials are presented in a way that it is closely tied to the movement and visual objects that they are familiar with. Children are learning in their own way. Imagine kids that had just begun to learn how to walk. Their only way of learning how to walk is by looking at how adults are doing it and tested it out themselves. Therefore, it has been stated that kids are learning faster and better if they have the desire to learn and have a sample that they can follow through before they are asked to build up things using their own imagination. This method of learning suggested by Sarah K Major is by using the movement of hand for kids to learn. For example, the alphabet “B” can be strongly related to a figure bear as shown in the figure below.

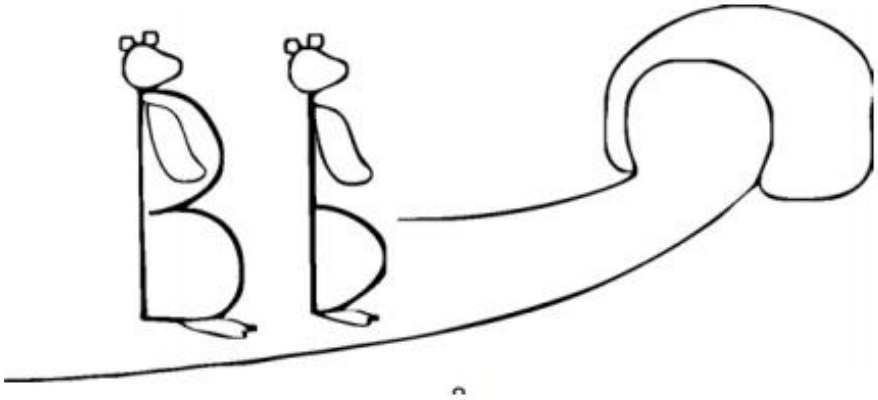

Figure 2.2: Figure shows the alphabet “B” presented in a Bear form

Flash card has always been one of the most efficient methods in teaching children alphabet. [3]Alphabetic Knowledge and Alphabetic Principles journal revealed a few methods of using flash card for children to learn alphabet. Some of the methods are giving the children a few flash cards with figures on it. After a few minutes, repeat the same thing and after a few repetitions, the students will be shown a different flash card and students have to name the figures that are related to the alphabet shown. This is one of the activities to enhance the memory, used by most kindergarten teacher and tutors. It is also be advised that teacher should encourage in aspects such as the name of the letter, the way the letter looks, the sound the letter makes, the feel of the letter in the mouth, the movement of the letter as it is written, and most importantly, a word associated with the letter. Kids can also be thought on how to recognize letter by providing them with clay for them to build up their own version of the letter, and correct it afterwards. The article also mentioned that research has indicated that a good reader read the word in a chunk as a single entity as they attach sounds to a group of letters.

Figure 2.3: Figure shows some flash card being used as a medium to teach children alphabets

Figure 2.4: Figure shows the ABC Learning Pad App

Besides the traditional world of learning alphabet, technology had brought up notation of learning alphabet by introducing a few existing and functional alphabet learning application that are already in the market. Some of them are already established a stable market and are being used worldwide as a platform to learn alphabet by little kids.

ABC learning pad is an alphabet learning app that teaches children to learn alphabet by audio and image in the process. ABC learning app allows kids to choose the alphabet that they are interested in and learn on how to spell an object that started with that alphabet. It function just the ABC board, the only differences is that it operate in smartphone.

The feedbacks that were received by this application is that the animation cannot move, and there are a little bit of choices of animal that can be learnt by kids. It took around 10 minutes to finish the whole app and there are nothing left to venture when everything had been explored.

What makes this application different from my application is that there is no exposure of it in terms of storytelling. The kids are only exposed to the alphabet, sort of like the old school teaching way just that this one is more portable and are able to be used in smartphone. Another decent different of this application from my application is that there are no augmented reality involved and there is only image that are used to teach the children alphabet. Lastly, this application is only available in iphone platform, and so far, they are still no working android version of it yet.

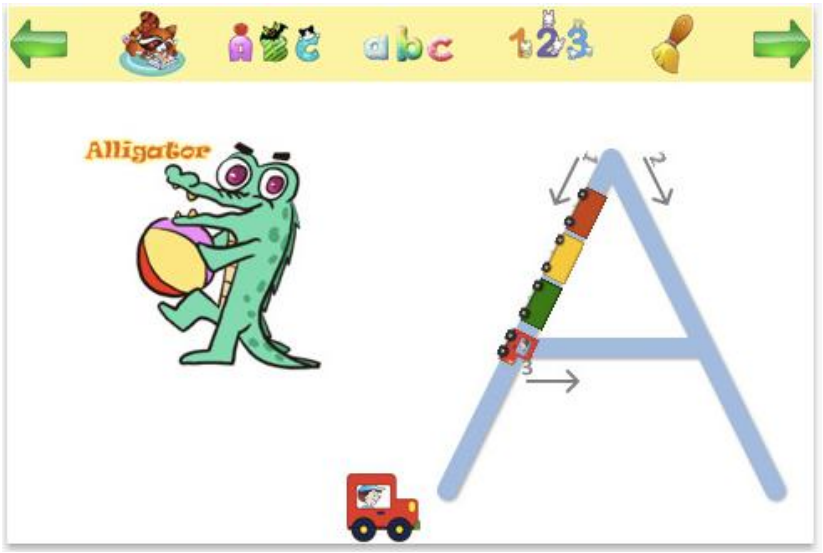

Figure 2.5: Figure shows the Alphabet Tracing app

Alphabet tracing is another application that is used to teach children alphabet. This application allows children to learn alphabet which they might already know yet, the add-on of this application is it shows the children the proper way to write the alphabet and numbers. At the same time, users can create a worksheet in PDF format and print it out as exercise for them to

enhance and revise what they had learn from the application. Through the exercise, it's certain that kids are going to be able to learn faster.

What makes this application different from other app is that users can add in their own pictures, numbers and words into the app as a way to customize and make their own exercise. To prevent the kids from accidently purchasing anything from the application, a parental control screen built is being created and applied into the application. The difference of this application from my project is that again, it is only available in iOS platform, and it is not available in Android yet, and it does not involved audio and augmented reality which will enhance they process of learning alphabet in the children.

Figure 2.6: Figure shows the iLearn – Alphabet and Numbers app

iLearn Alphabet and Numbers is an application that allows children to interact with the content in the process of learning. The emcee of this application Toby, a cute little puppy allows children to learn not only alphabet, but also shapes, numbers, sequencing and so forth. There are also a lot of stimulation activities that allow children to practice what they had learnt from the application.

The selling point of this application is that it comes together with an interesting augmented reality feature for parents that enable combining app object with real world settings. One of the examples is children are able to hold Toby on the hand or having Toby to accompany children to the classroom when they are in school. The maximum numbers of user for this application is 8 and this application comes with a guideline on suggested activities that will be able to keep the children to continue learning. What makes this application different from my app is that it does not involve the storytelling element which I think is a crucial learning environment that will be able to further enhance the kids' interest in learning alphabet.

2.2 AUGMENTED REALITY

Augmented reality (AR) is defined as the technology of combining real word images, video, etc. with computer-generated information or image. It can be live, direct or indirect view of physical world whose elements are augmented or changed by the CGI sensory input. However, in my project, augmented reality is being attached to mobile devices. Mobile Augmented Reality is defined the mobile technology that combines the augmentation of physical object and its environment to create a computer-generated graphic or image.

Figure 2.7: Figure shows a sample of augmented reality application being used

The technology being used behind augmented reality is easily available. To display AR, the hardware components needed are a processor, display, sensors and input device, where in this case is the camera that is able to capture the moment shown in the environment. These hardwares are often always present in a modern smart phone. So it is not hard to acquire such device. The software requirements for AR mostly related to video tracking. In other word, the camera that is used to capture the moment must be able to seize and determine certain interest points so that the processor is able to process the image captured. Most commonly used methods are corner detection, blob detection and edge detection. Software that is able to detect the point of interest is able to produce and input to be processed as AR.

Research on augmented has started since decades ago. Ronald R. Azuma had carried out a research explaining the specific characteristic and definition of augmented reality [4]. Ronald has also explained on how augmented reality helps the work in medical, annotation and visualization, robot, entertainment, military, and some other fields to improve their works. Ronald also states the portability issue of augmented reality has been generally improved when the technology advanced in the 21st century. In the journal also, Ronald has suggested that augmented reality itself is a very interactive way for the person that learn using AR. They are attracted to the AR features thus it allows the students to learn better as they stick to the features of the device all the time. Those are the issue that will be able to support augmented reality as a platform to learning in the future.

Wendy E. Mackay from University De Paris-Sud, in her research has stated about a few ways we augment the reality using augmented reality software [5]. Wendy stated that there are 3 main elements, which is augment the *user, physical object and the environment* surrounding the user and the object. The user here of course mean the person who are using the augmented reality, where they are the main medium and the end user of channeling the information. The Physical Object is the main subject that are correlated to the things that are trying to be perceived by the user such as name of building, information about the devices or so forth. The Environment is all the other structure that are captured by the devices regardless it is being augmented or not. Therefore, the combination of the entire augmented element will create an interactive connection between the user and the augmented reality. Wendy also stated some example of the augmented reality that had been achieved by other researcher all around the world which had already been applied in different field such as medical, instrumental, military strategy development and of course, in education.

A similar research has also been done by James R Vallino [6]. James studies about how augmented reality is so interactive that everyone that is using it will be attracted to it. He also compared the Augmented Reality with Virtual reality in his paper, he mentioned that the biggest difference between AR and VR is that in VR, the user is completely immersed in an artificial world and becomes divorced from the real environment. Compared to Augmented reality, only part of the environment is being altered by the Computer graphic, while the other remains the same. In the paper, he stated that augmented reality can be a part of consumer applications which involves engineering design, military training, Robotic and Telerobotic, entertainment, housing apps, beauty apps and the most foremost field which is the education apps. In regards to the research that had been done by James, he stated the augmented reality performance remains an issue that is trying to be solved by the current technology team. 2 main elements that need to be solved is the update rate for generating the augmenting image, and the accuracy of the registration of the real and virtual image. Despite all the improvement need to be made, James stated that augmented reality will become the medium for all sort of field in the future.

A research has also been carried out by Mark Billinghurst [7]. Mark mentioned that the seamless interaction when using augmented reality will let the students to learn better as they are more focused on a common workspace. The currently used learning phase appear when students use computer to learn, but take note that each computer has a different phase that they are using. Each computer displays different figures in different sizes and space. Augmented reality defeat the issue when students are using augmented reality, they are able to all work in a same area with same object that are in sight at the same time. Mark Billinghurst mentioned that augmented reality can be used to enhance collaborative tasks. It has been proven when augmented reality is used in the 3D models of scientific data superimposed on the real world as shown in the figure below. In the last part of the paper, the author mentioned the transitional interfaces that are involved in the augmented reality. He mentioned that by using

the interface changes shown in augmented reality, the user has the freedom to move around compared to virtual reality where they have limited space to learn. In the end, Mark concluded that augmented reality has high potential in education as it is just beginning to be explored. Unlike some other technologies, augmented reality is able to interact, provide tangible interface metaphor and a means for transitioning between real and virtual worlds.

Figure 2.8: The student project in 3D. Collaborative AR interface

In a different case, F. Liarokapis has researched on augmented reality scenarios for guitar learning [8]. In the research, the author develops a self-teaching system that is capable of superimposing audio-visual information to support the process of learning to play the guitar. The apps work by the user or the learner place the device with the camera pointing at several markers, where the chords are printed there. Then, the device will show how to press the chord in computer generated graphic. The audio are included in the process of learning and the presentation of the augmented reality focus solely on learning environment that are suitable for the user. In this project, F. Liarokapis highlight the importance of having a good content to make sure that the learning process

can be carried out effectively. The main target is to transfer the appropriate knowledge to the person who is learning it in the most effective manners. It shows that augmented reality is gaining popularity in the education field regardless what form of education.

Figure 2.9: Figure shows the use of augmented reality in learning guitar

Another registered journal by Hannes Kaufman discussed about the collaboration of Augmented Reality in the field of Education itself [9]. Hannes Kauffman has collaboratively explained how augmented reality can be used in so many different fields especially in education. At first he mentioned that Virtual Reality is indeed a better choice as a learning platform for students, but it is not practical yet and still being explored by the designer and evaluators for this learning technology. Hannes comes to a conclusion that augmented reality is a more realistic approach of becoming an efficient learning platform for students. Hannes Kaufman also mentioned that one of the most important purposes of an educational environment is to promote the integration of the user with the physical space. This will enhance the communication between the user and the information that are trying to be gained by the user. Safety issue is also a concern when augmented reality is able to provide the user with the freedom of

sigh around that are needed to move around. In his paper, Hannes provides a few learning mode that can be applied using augmented reality. Some of the modes suggested are teacher mode, normal tutorial, auto-tutorial and exam mode. Hannes describe that we the user are to not question that augmented reality is to enhance the learning process, but the most important matter is how the user perceive it and grab the chance to exploits the potential of augmented reality.

Lastly, letter alive is a working version of alphabet learning mobile augmented reality that are available in Orlando. It is now a helping program for children to learn alphabet in Orlando primary schools. Some of the feedbacks they receive from the teachers are that Letter alive is able to produce the greatest result even from the toughest students and that the applications just grabbed the student attention. It has been proven that letter alive is able to sustain the kids learning span because kids are more focused on the device and learn at the same time. Therefore, it shows that augmented reality in learning alphabet is able to enhance the learning ability in kids in a major perspective.

2.3 ANDROID PLATFORM

Figure 2.10: Android Logo

Android is chosen as the main operating system for me to carry out my project because as we all know android is now the largest operating system in smart phones that are used by the users all over the world.

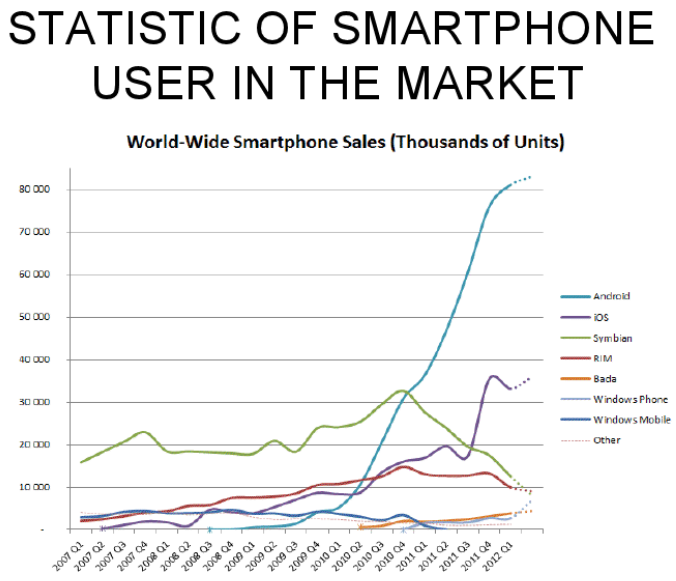

Figure 2.11: Figure shows the statistic of operating system used by different users all over the world.

The graph above has shown that android in the year of 2012 still manage to sell around 80,000 units of smart phones compared to other phones operating system. It proves that android is now holding the largest market share for customers who are using smartphone, and it is also the main reason why I choose android as my platform the develop my project.

Since android has become one of the most widely used operating system in smart phones, tablet and pad all around the world. [10]Hafizul Fahri Hanafi has stated that mobile world has created an environment that can be capitalized to further enrich the teaching and learning process in classrooms. A study has been conducted and it supports the claims that the use of mobile technology, in particular the android technology has offer many educational opportunity to the students, instructors, and the administrators. Hafizul Fahri Hanafi had also mentioned that Mobile Learning or M-Learning is a type of learning platform that allows the student to gain source from the vast medium of information called the internet, through wireless communication device. By collaborating the system of learning using mobile phone, especially android technology, a person is able to communicate with anyone anywhere anytime. In the journal, Hafizul also mentioned the growth of technology and the existing application helps to further enhance the ability for the students that are studying in the same area to share information through application such as dropbox and Gmail. The journal also supported android as the good learning platform because the android itself is more interactive and simple to interact with.

Study has been carried out by the United States Distance Learning Association [11]. The result has developed a new studying method with the next generation of the Adaptive Mobile Learning (AMOL) that supports classroom and online instruction on mobile devices (android supported). AMOL is a mobile form of e-learning where students are given the freedom to download the details about the course into their mobile device. By using AMOL, students can learn better in

class as the related course or subject are all uploaded in AMOL. It also has the room where students can chat and discuss about the topic related to the course. AMOL also provide a detailed statistic reports on class and individual learning performance and outcomes. This is an example of android as a perfect platform for education to take place.

Figure 2.12: Figure shows the AMOL learning platform.

A research has been carried out to confirm that Android and iOS are now, by increasing the user base, might hasten the integration of mobile technology into the learning experience and it will be able to provide the students with a new method to interact with the content [12]. The tools that are available in the mobile devices are very suitable for data gathering and learning purposes. It can also integrate with laptop that runs windows and iOS which gives it flexibility to operate more vastly as a learning platform. The journal mentioned that android can be easily set up to recognize due to it availability as an open source, compared to iOs which cost a lot more than android.

Celso Juarez and Pedro C Santana had written an article that augmented reality is to support the basic education in Mexico. The paper suggested that an android augmented reality application that recognize the regular topic in text book and shows the content of it in multimedia graphic. The paper stated that augmented reality in education is a way for them to understand the students even more. They made an interview of 30 students and 100% of the men and 78% of girls has cell phone. It shows that android has a big potential in the market as the leading operating system for the development of augmented reality to support the education field.

In China, Lu Wang had developed a game-based mobile learning system for Campus on Android Platform [13]. It includes the System and Learning Activity Design that are attractive to all the users, made from the blending of interactive colorful characters that will attract the users. The characters development is integrated with the content of the subject that they had taken in the university as a way for them to enhance their learning curve. Client Server architecture are used for the games that require login as the attempt to play the games. Android was the main platform used for this program. As we can see, android has been growing ever since as the platform for learning in regardless in augmented reality or not. This has shown that there are a lot of potential in augmented reality that are yet to be explored in education field. Below are some of the figures that show android augmented reality as a platform for students to learn in the classroom.

Figure 2.13: Figure shows the apps for learning in class and apps for getting feedback from students

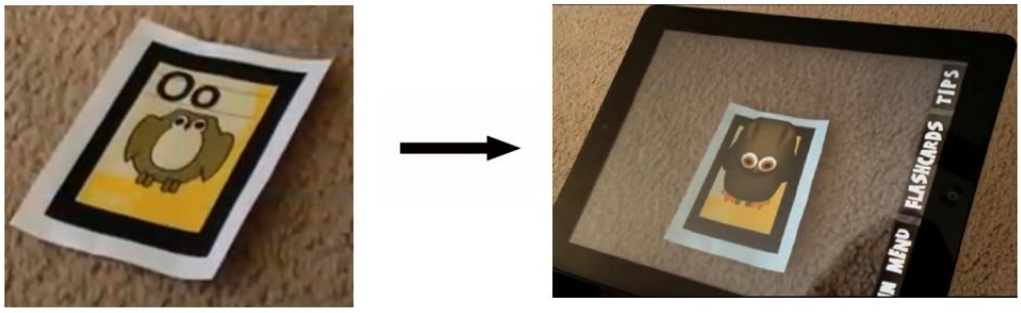

Figure 2.14: Figure shows the apps for learning alphabet. A figure of owl appear when the device is brought pointing at the marker shown

2.4 AUGMENTED REALITY DEVELOPMENT

Figure 2.15: Figure shows Gerhart Reidmayr and his team in the development team while discussing about the augmented reality interface

2004 in Wien, Austria, Gerhart Reidmayr had written an article about augmented reality that had just started to get noticed that time[14]. He mentioned about a few important features that are needed when one is trying to develop an augmented reality. With the absence of android at the period of time, among the most important features are sensor technology, advanced computer graphic, mobile applications with a focus on location-based information and collaborative applications. All of this elements has to come as one in order for augmented reality to work. Gerhard Reitmayr had also finished the article with some of the required framework, application design, and user interface that are possible to be used in the current world of augmented reality.

Figure 2.16: Figure shows the logo of National Science Foundation, where Lawrence J.Rosenblum wrote the article

Lawrence J.Rosenblum from the National Science Foundation had also written an article about the overview of fifteen years of augmented reality research that was sponsored by the U.S. Office of Naval Research[15]. Mr.Rosenblum had carried out an intense research that had been carried on with pressure about the integration of component-based system and its prediction on the future of augmented reality which we can see today. It has been used in the GPS system by where the satellite are using real life location tracker implemented with augmented reality to assist the car driver in getting into the right location. In the article the author mentioned that few people had yet to see the real potential of augmented reality and the advantages that can be brought upon having it in one possession.

Figure 2.17: Figure shows how augmented reality can assist the urban development as mentioned by M.Allen from New Zealand

Despite having the advantage of using augmented reality in various fields, the progress in urban planning can also be navigated by using augmented reality. M.Allen from University of Otago Dunedin, New Zealand mentioned that smartphone based augmented reality architecture as a tool for aiding public participation in urban training[15]. Smart phone prototype is able to display the whole features that are desired by the architect within scalable and measureable figures. In this article, M Allen mentioned the 3 major efforts to develop outdoor augmented reality urban planning systems, which is the Tinmith-Metro (displaying the architecture in augmented reality for better sketch understanding), Urban Sketcher (using augmented reality display to satisfy and allow the client to understand the architecture better) and Vidente (a simulation tool that allow the user to simulate the growth of for example paddy in an area according to the type of soil and method of planting).

2.5 LEARNING THROUGH STORYTELLING

Figure 2.18: Figure shows 3 kids sharing after a basketball game

Why is it that we are able to stay focused for hours when we are discussing or having a conversation with our friends? Why is it when we are in a classroom where there are lecturer giving lecture, we are not able to stay focus for even 10 minutes. Study have shown that in a lecture, the maximum time a human can stay focus on what the lecturer had been talking about is 14 minutes. After 14 minutes, the mind will start to wander somewhere else about something else. Angela Tomkins from university of Gloucestershire, UK wrote a paper about the exploratory case study allow learning through storytelling which is more efficient than normal read and tell teaching method[17]. It's the same genre with storytelling, just that when it comes to sharing, Angela Tomkins mentioned that people remember more clearly when they heard something that other people share with them. Her article also mentioned about the link between learning and

storytelling. Rather than calling it storytelling, she addresses the method as sharing from experience, thus allowing those who listen to the experience to learn faster and better. Her article also mentioned about the reflective learning where learner paused and applies the learned stuff into their daily routine to try and solve the problems. Angela mentioned the 5 stages of learning using story learning which includes noticing, making sense making meaning, story processing and finally becoming a transformative learning.

Figure 2.19: Figure shows how it is human nature to share and tell story

Alterio, Maxine and McDrury, Janice mentioned that storytelling is part of natural human behavior [18], an oral tradition that has been passed down through our history. They also mentioned that storytelling enhance students by giving them a better retention of vocabulary, content, and key ideas. This article mention about how you can make other people stories your own through a few steps. This will improve the delivery skills of the students who share other people stories as if it is their own story.

Another article written by Maxine Alterio mentioned that storytelling will be able to enhance student learning no matter how it is used in the class of learning [19]. Maxine promotes the culture of students and educators to work together in the process of storytelling in order to learn from each other. Through educator storytelling, students are able to learn about the subject more clearly and concise. Through the storytelling of student, educator can know more about the student background and allow them to know each other more. At the same time, to be able to tell story to each other in a class, students are picking up their bravery to share the story. This method will build up students' confidence which will definitely be useful for them in the future.

Figure 2.20: Figure shows a mom reading bedtime stories to their children to enhance their learning

Since the early days, parents have been teaching their children moral value through the fantasy stories such as Cinderella, Snow Whites, Pocahontas, and so forth. Franca Garzotto, Paolo Paolini and Amalia Sabiescu mentioned in

an article about the benefits of storytelling for children [20]. Not only that this will allow the children to learn faster and better, they are exposed to the usage of alphabet since the early age, thus the reasons why some kids are able to read faster and better compared to some other kids. This shows that the kid Storytelling is a meant for parents to teach the children about the environment, the world, animals, humans, buildings, places and so forth. In the process of telling them the stories, the kids learnt about alphabet at the same time, thus explained the important of using storytelling to learn alphabet.

Figure 2.21: Figure shows the use of storytelling in school

Mr. Sc. Mauro Dujmovix[21] from Pula had mentioned in his article Storytelling as a method of EFL teaching, that storytelling is one of the oldest form of teaching method that had been used since the prehistoric times, since the land before times had been created. He mentioned that the most important element in the process of storytelling is the selection and delivery. If you have a good story to tell, it doesn't mean that you are going to be able to tell it well. It all depends on how good is the delivery of the story is being given. Mr. Sc. Mauro

Dujmovix also mentioned in his article the importance of letting children to learn and create their mother language from the process of telling story. One way or another, there are a big possibilities that the kids are going to learn the delivery skills of the parents and used it in their future. That's why sometimes when we observe some of our friends and their parent, there are a big similarities in terms of their way of communication, speaking and attitude, as the word goes, like father like son.

The author mentioned that children will not be able to learn and create a mother tongue just by sitting in front of the desk and read the whole time. There must be a manipulating variable that are going trigger their learning activities, in this case, storytelling. In fact, mastering reading skills using traditional method are said to be difficult and painful for children. The only reason they are able to continue to use the traditional ways is because they are forced to do so by their parent. The author also mentioned that in children daily life, they heard story all the time. When their parent are communication, when they look at television program, when they talk to their friend, when their teacher gave them homework, when they are listening to song, these are all the activities where they listen to stories that lead them further to the process of learning. Education system in school also involves a lot of storytelling especially when it comes to pre-school children.

CHAPTER 3

METHODOLOGY

3.1 RESEARCH METHODOLOGY

In completing this project, I have to create my own methodology. The methodology that I refer to is the Rapid Application Development (RAD). This methodology does not exist until 1991, introduced by James Martin. Due to time constraints as a student, and my other commitment on other courses, I had limited time, capability and resources that I can use to finish up my project. RAD is a software development methodology which involves iterative development and the construction of prototype. Some of the basic principles in applying RAD is the key objectives is for fast development and delivery of a high quality system at a relatively low investment cost, attempts to reduce inherent project risk by breaking a project into smaller segments and providing more ease-of-change during the development process. However, RAD is a method that is being to develop software. The project that I am developing is related to mobile application. Therefore, it is not that suitable for me to use RAD. Regardless, there are some steps in RAD that I can use as my methodology to

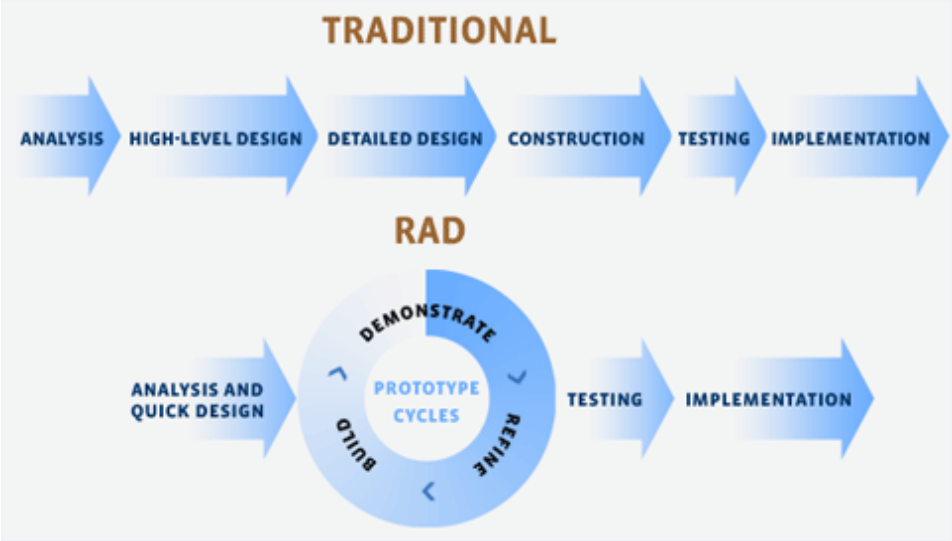

Figure 3.1: Traditional and RAD method of software development methodology.

Figure above shows the difference between the traditional software development method and RAD software development method. Traditional way is implementing the events once only and before any of the event is being carried out, other events cannot be done. For RAD development, after a careful planning and analysis, there is a prototype cycle that enables the user to build, demonstrate and refine the prototype until it has been perfected. If after refining, there are still something wrong, the author can once again rebuild the prototype until all the refinement has been perfected. After the prototype has been done, it will then be tested and implemented in real life, resulting in the completion of the end product.

The methodology that I used will be as follow;

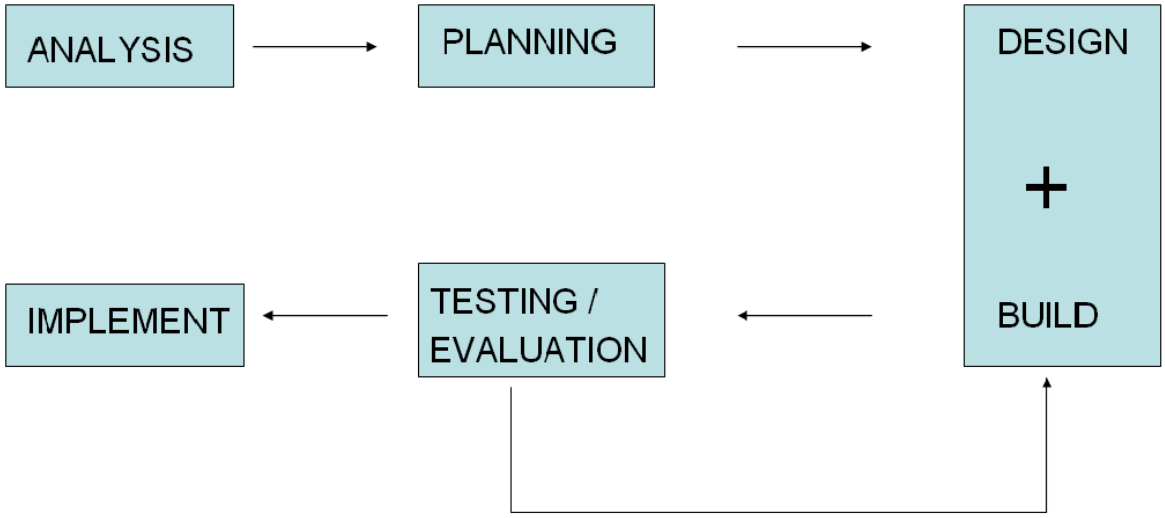

Figure 3.2: My methodology

Analysis: During the analysis phase, I will be undergoing research and analysis regarding this project. Whether the project is feasible or not will become my mission for the whole project. A detailed analysis will be done during the whole phase.

Planning: During the planning phase, I will be doing a lot of thinking regarding the project. It includes the target market, the functionality expected, interface wanted, project scope and so forth.

Design + Build: During this phase, I will be designing the project according to the way it is to be easily implemented by small kids. After the design is done, I will be building the project according to the design. This is the part where all the programming is done and all the planning is being executed.

Testing / Evaluation: During this period, a few tests will be carried out on my prototype. *Function test* is carried out to make sure that the desired application work as it planned. *Crash test* is carried out to determine at which point at the apps it will crash*. Multiple input test* is carried out by using more than 1 marker as an input to see the result. *Compatibility test* is carried out to determine whether the apps work on other android device or not. Those are the tests that are going to be carried out. If the prototype failed at any type of test, I will return to the design + build phase again.

Implementing: If everything works out well during the testing / evaluating phase, I will proceed to the implementing phase. This is the part where the project itself can be implemented already.

3.1.1: ANALYSIS AND PLANNING

For the past few weeks, i have been researching on how to develop augmented reality apps in Microsoft operating system as a start for me to understand augmented reality apps. I discovered a software called buildAR which developed an augmented reality for Microsoft operating system. It became a good platform for me to understand augmented reality more and i started working more towards my FYP. However since BuildAr is only compatible with Microsoft Operating System, it is not feasible to be implemented in my project.

Figure 3.3: Figure shows the BuildAr software that is used to build augmented reality software in OS

Technically, what i have to do for this project is to develop an augmented reality apps that will be able to read the marker given to a children and at the same time, the apps will be able to display an animated 3D object that will teach the children on the alphabet that are shown in the marker. The apps are supposed to show the children on the alphabet and object that started with the initial of the shown alphabet. The application must be working in Android form in order for it to be more portable and flexible for users to use. To come out with such an application, it took quite some effort and time.

3.1.2 DESIGN AND BUILD

For the first part of my project, i decided to research on how to develop the project within the given time. I found out that it will take me a lot of time and manpower to actually develop an android app that will be able to get the real life camera as an input and to be able to have a 3D object as an output in the screen of the camera as an augmented reality. Upon finding out about this depressing news, i discovered that there are already android apps that act as a software to help develop a simple augmented reality in android OS. Therefore i decided to work on this software to develop an app that will be able to achieve my objective in this project.

ANDAR (Android Augmented Reality) is an android app that develops simple augmented reality scenery according to what the user wanted to use. I will be using my own 3D object as an output for this project. However soon I realize that ANDAR is software that allow user to read default marker only. It became software that is not suitable to be used as a medium for my development.

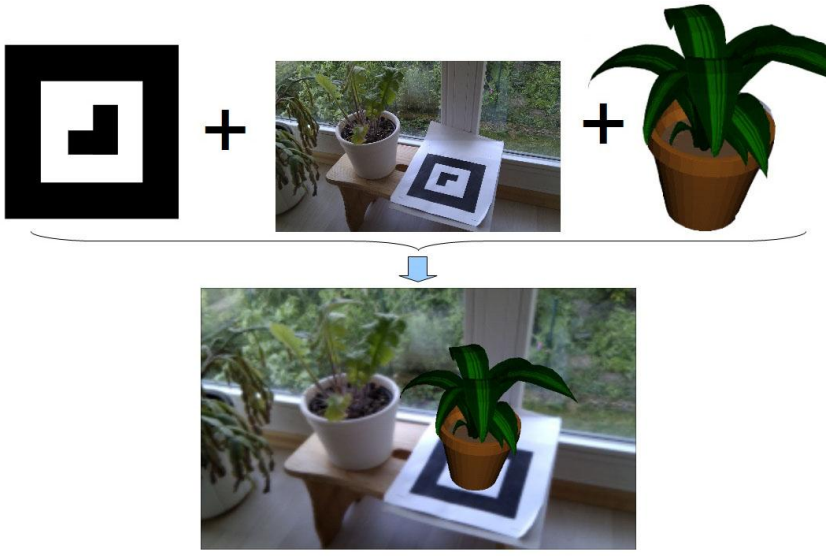

Figure 3.4: Figure shows the function that are built by using AndAr software

Carry on with my research, I found out about METAIO SDK. I found out that METAIO SDK allows the user to create their own augmented reality app and it is compatible with an android and iOS. I can use my own marker and design my own 3D object to be implemented on this system. Therefore, I decided to carry on and work by using this software. To properly use this METAIO SDK, I would have to install and abide to the requirement of the software.

Figure 3.5: Figure shows the logo of the METAIO software that provide the System Development tool for Android AR

In order to come out with a 3D object that is going to be displayed on the apps I would have to develop the object in .obj file format in order for the apps to work. I do some research and discover a software called blender version 2.64 that are able to create a wavefront object file to be used in the ANDAR apps. Therefore, i started developing some 3D object to be used in the project.

Figure 3.6: Figure shows the blender 2.64 that are used to develop 3D object in obj file.

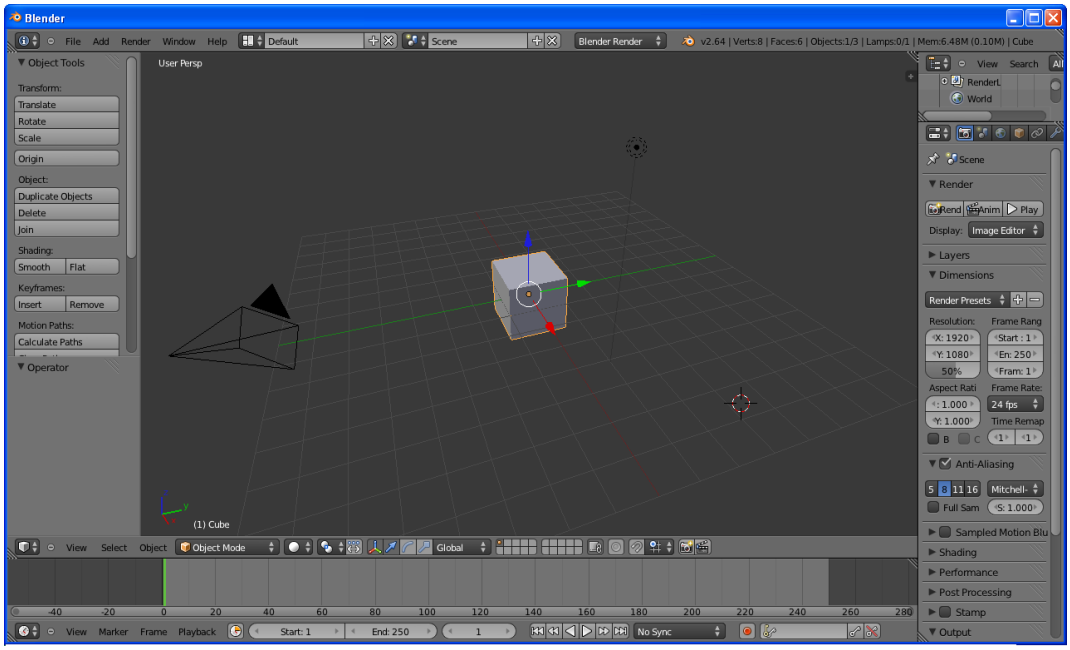

Figure 3.7: Figure shows the development of new 3D object file using blender

Figure 3.8: Figure shows Unity3D, a game engine used to develop 3D games

After so many development and research, under Dr.Dayang recommendation, I decided to use Unity3d for the development. At first, the software is hard to configure and develop but after a few tutorials, I manage to understand the software and use it smoothly. It has very complicated and detailed functions. Therefore, a lot of details have to be taken care of when using Unity3D.

Unity3D are divided into a few separate entities which is project, screen, inspector and hierarchy. Project is a folder to keep all the project scripts, image and objects used in the design. Screen is the platform for user to click and drag image, and develop the games itself. Hierarchy is the projector of all the object and item in the screen. Inspectors allow user to alter the value, size, rotation, mesh filter, and other elements of object involved in hierarchy for the designed app.

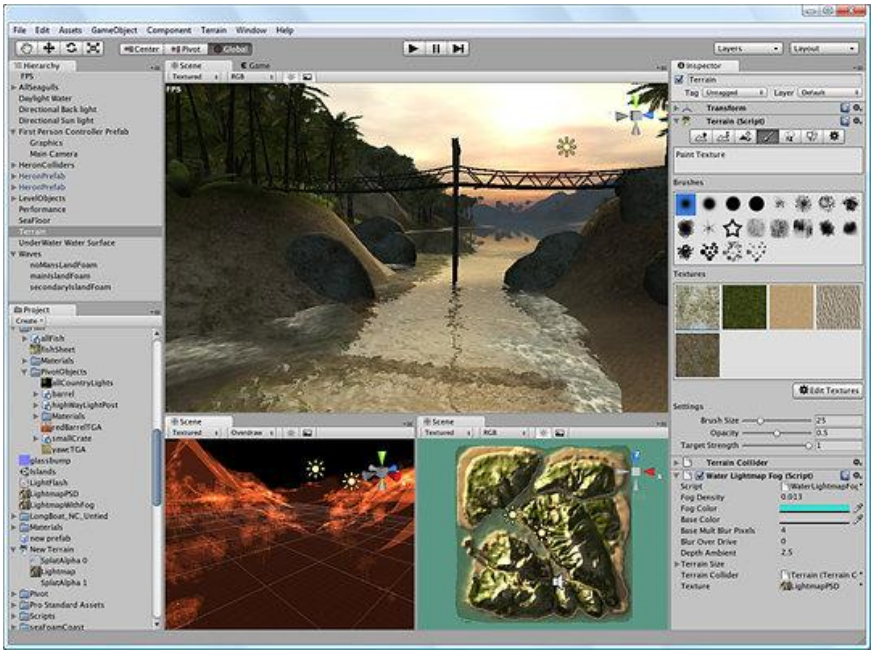

Figure 3.9: Figure shows the functions provided by Unity3D.

After much discussion and tutorials regarding unity, I expose myself to Qualcomm Vuforia AR SDK. Vuforia is a powerful tool that allow user to develop the augmented reality apps for android and some other platforms. In my case, I will be developing android.

Figure 3.10: Figure shows the Qualcomm Vuforia extension used to develop augmented reality application

Since the project is much related to the use of storytelling to induce the alphabet into children memory, it is crucial to have a medium for the children to be able to communicate with the augmented reality apps. I had spent some time to come out with a booklet of alphabet that are going to be used as a interaction medium for the children to have interaction with the augmented reality application. The booklet is going to have consist of a figure of animal where the animal appeared as augmented reality in the smartphone are going to do a series of move on the image target before showing the spelling of the animal. On the right side of the page, there are going to be areas where the children can write down the proper spelling of the animal depend on the figure that they see in the application itself.

With the existence of powerful software that can be downloaded easily from internet, it had made things easier for the development of this project. I am able to download those needed software from the internet and install it. However, the installation process is not easy as a lot of extensions were needed to be installed properly in order for the system to work. One simple mistake in the process of installing, then whole software will not be able to work and develop the desired project. It took me around 3 days itself to install the software properly. I had needed to install, uninstall, install again, configure and trouble shoot the problem that I faced during the process just to make sure that I will be able to develop the program that I wanted.

When I am trying to develop at 3D image, i downloaded and review a few samples from the internet as the reference for my product. The downloaded samples are built by professionals and every edge of the design is being altered without fail. They had made the outcome look so real in 3D motion. By following the tutorial provided from internet (YouTube), I am able to create my own 3D object and come out to use it in my project.

3.1.3 TESTING

Testing is indeed one of the most important parts for the project. As we all know, in the end, it all comes up to user acceptance of the project whether it can be marketable or not. For the testing, I would be dividing it into several sections.

Target User

The target user of my project is indeed no other that the pre-school children (age 2 – 5). Kids' from this age are cordially welcome to user my application. The target users are from middle class family where the parents are able to afford smartphone as a medium for them to use the application.

Target Market

Although the target user for my application is for little kids, the real target market is actually parents who are concerned with their kids' education. Kids will not be able to afford the smartphone and the application. Therefore, in the end, the parents will have to buy it and provide all the needed applications for their children.

Survey

A survey will be carried out to research on user acceptance on this product. I will be going around school in Tronoh and Ipoh to carry out some user acceptance test. After that, a set of questionnaire will be given to the user to answer. The questions can be seen in the appendix section of this report. Based on the result of the survey, further development is going to be carried out to suite the feedback that had been given by the volunteers for the survey. I will be choosing the users based on their age. As long as they are within the target user age range, then I will let them try out the product and collect feedback from them.

3.2: TOOLS

The tools that will be used are;

3.2.1 Hardware:

- An android smartphone (Samsung Galaxy Ace Plus), as a platform to develop and test the product,
- Computer: provided in the lab by Dr. Dayang Rohaya
- Printer: used to print the necessary materials for testing the application.

3.2.2 Software

- Metaio Software development Kit (SDK): Provides all the important features that are available in developing and android software
- Helios Eclipse: Main software used to develop the applications. Provide important platform for software testing and packaging
- Blender: A 3D developing software that enable user to develop object in wavefront (obj) type.
- Unity3D. Development platform for android application
- Vuforia AR SDK: Extension for Augmented Reality development
- Google Sketchup: Export and import of 3D image available.

3.3 GANTT CHARTS

Final Year Project I

Activities / Week	1	2	3	4	5	6	7	8	9	10	11	12
Selection of Project Topic & SV												
Submission of Proposal												
Extended Proposal Progress												
Research Activities												
Submission of Viva: Proposal Defense and Progress Evaluation												
Interim Report Process												

Table 3.1: Table shows the Gantt chart for the author to fulfill the requirements for FYPI

Final Year Project II

Activities/Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Programming Research														
Prototype Development														
Submission of Progress Report I														
Submission of Progress Report II														
Seminar														
Pre-SEDEX														
Submission of Final Report Draft														
SEDEX														
Oral Presentation														
Submission of Final Dissertation														

Table 3.2: Table shows the Gantt chart for the author to fulfill the requirements for FYP II

CHAPTER 4

Result and Discussion

4.1: Result

As the result of continuous development, the product is going to involved a booklet which involved the figure of image to be used during learning and an android application that are going to be used to view the booklet and produce image on the booklet.

The booklet is going to involve exercise that had to be filled by students so that they will be able to learn and practice at the same time. Figure below shows the content of the booklet that is going to be used by the users for the purpose of learning.

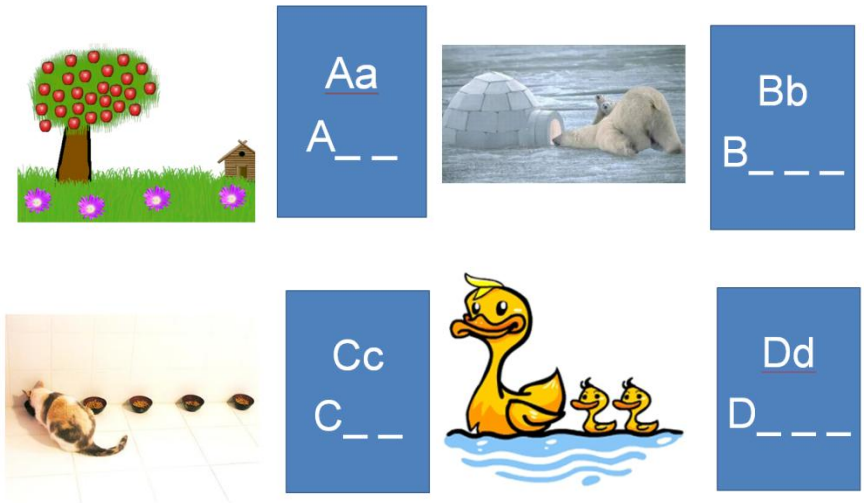

Figure 4.1: Figure shows the content available in the booklet

These content are going to be printed into becoming a booklet that are going to be used by the users during the learning process.

Figure 4.2: Figure shows the storytelling booklet that are being used as the medium for children to work with the project

After a series of testing and development, the figure below shows the prototype of the developed system. The application is able to display the developed augmented reality application. The working prototype is able to produce a 3D image with the wording on how the animal is being spelled as a way to teach children the spelling.

Figure 4.3: Figure shows the screenshot of splash screen of the project

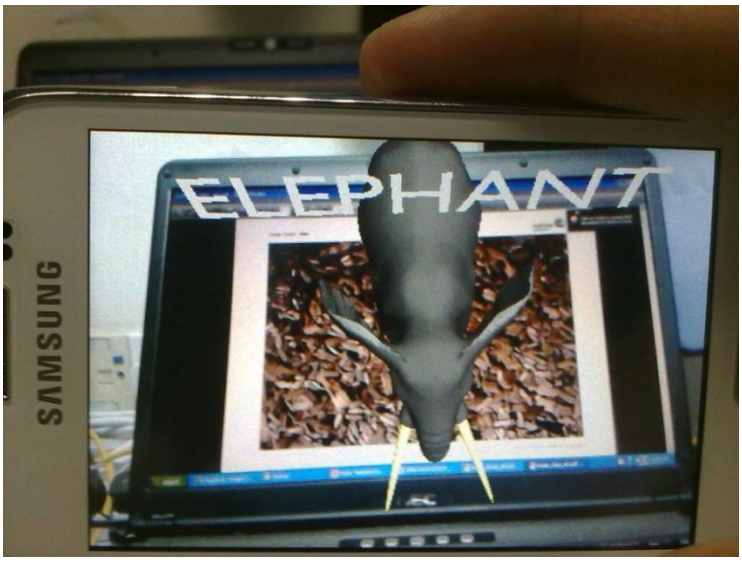

Figure 4.4: Figure show the working prototype of the project

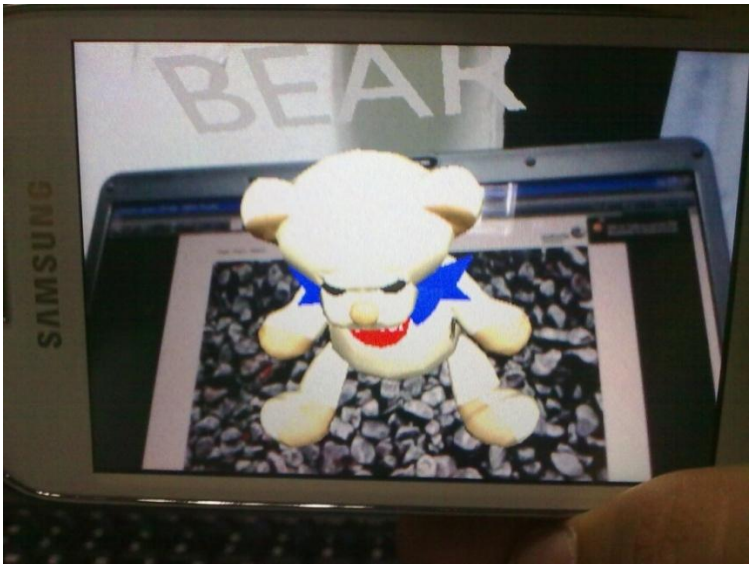

Figure 4.5: Figure shows the working prototype 2 of the product

Below are the figures of the system architecture for my project. Based on the project development, I had come out with a set of database, which includes all the animals figure and story that are going to be used in the storytelling. By using the database, combining the augmented reality, storytelling and android platform, the project is going to produce an end product that involved user interface which allow the users to communicate with the app. The children will be the main user for this application based on the feedback from the children further development is going to be carried out. Parents are going to be the support system that is going to assist the children in using this application.

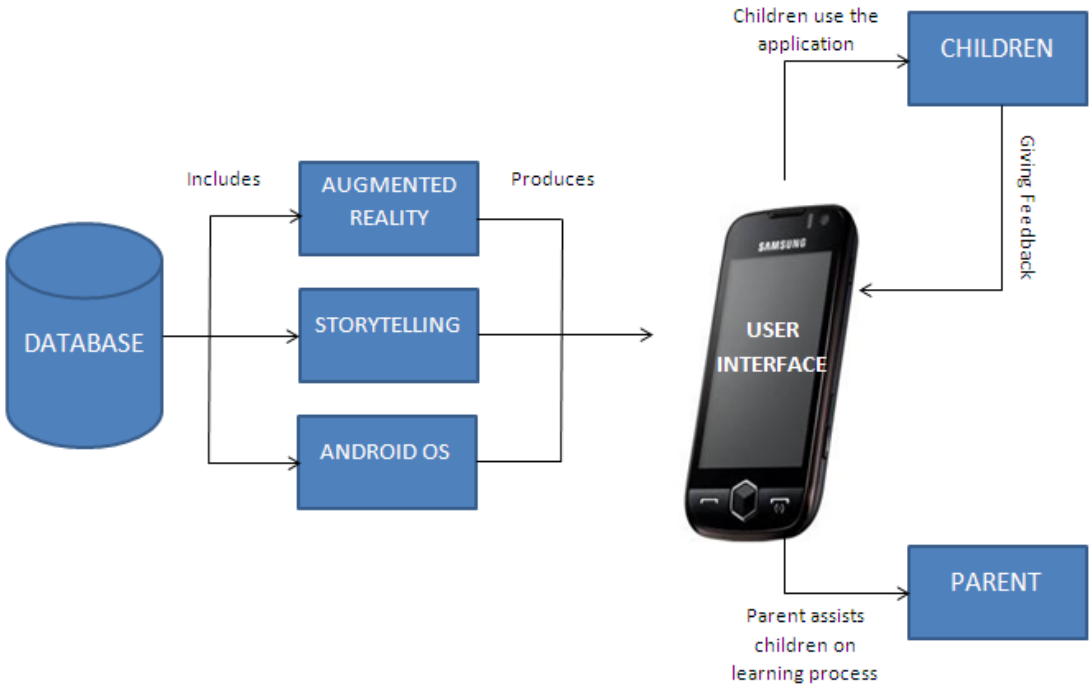

Figure 4.6: Figure shows the system architecture of the project

4.2: SURVEY ON THE MARKET

I had conducted a small survey on the market regarding this application. Since the project aims are for those pre-school and primary school children who are still unable to read properly, I had been going around trying out this project with them and get their feedback on;

1. The application's usefulness (effectiveness)
2. The application's attractiveness
3. (Parent) Will you let your children use the application?

Feedbacks:

(All the feedbacks are in Chinese language, I had translated it into English)

1. The application's usefulness
    - (Children) "I know how to spell the animal already"
    - (Children) "I don't know"
    - (Parent) "Is this available in the market now?"
    - (Parent) "We don't have smartphone for children"
    - (Parent) "I like the way this thing pop up on the paper"

2. The application's attractiveness
    - (Children) "This is an interesting game"
    - (Children) "Why can't it move?"
    - (Children) "I want my sister to try it out"
    - (Parent) "I like the way this thing pop up on the paper"

3. (Parent) Will you let your children use the application?
    - (Parent) “Of course, they are loving it now”
    - (Parent) “Let me know when you finish the whole thing, I will buy you a meal for the application”

Figure 4.7: Figure shows children using the app with their family members guiding them

Further survey has been carried out during my visit to a kindergarten in Tronoh during lunch time where the kids are waiting for their parents to pick them up. I was able to get hold of around 15 kids and carry out a short questionnaire for them while they use the application prototype. Below is the result of the question.

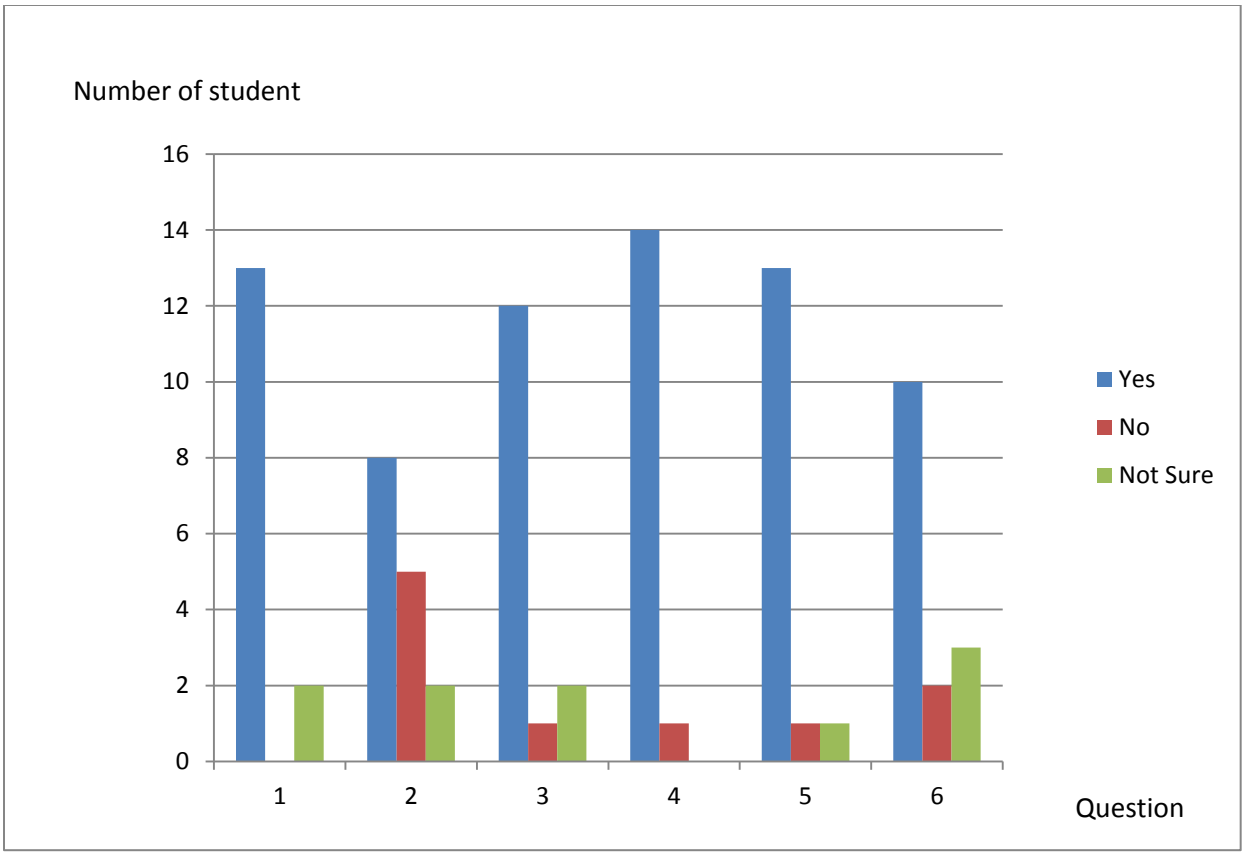

Figure 4.8: Figure shows the result of the survey

From the result of the survey, we analysis had been done regarding the acceptance of this product by the participants of this survey.

Question 1
Do you like the application?

13 of the participant answered “yes”. It shows that this product can attract the users which include pre-schools children. 2 of the participants answered with “not sure” and none of the participant answered “no”. However we can still conclude that around 87% of the users had accepted and like the product.

Question 2
Do you understand the purpose of this application?

8 of the participant had answered “yes’. It shows that the users know why the product is being built, and based on the understanding of the application, the user is able to learn more and faster about alphabet, which clearly explain the whole reason of this project.5 had answered with “not sure” and 2 answered with “no”. However, this can be overcome when the user are being thought properly on the purpose of the products based on the user manual or tutorial provided.

Question 3
Do you think you can learn better with this application?

12 of the user answered with “yes” and 2 answered with “no, while 1 answered the questionnaire with “not sure”. This shows that 80% if the users agreed they can do better in learning when they use this application.

Question 4
Is this your first time seeing augmented reality?

14 answered “yes” while 1 answered “no” this shows that 93% of the participants had never experienced augmented reality as a platform for learning. They are exposed to android because android OS are now widely available, but they are not familiar with the apps that can be used together with android. Therefore, it is their first time seeing augmented reality.

Question 5
Do you want to own this application?

13 answered this question with “yes” while another 2 answered with “no”. Since most of the students come from middle class family, one of their parent had the ability to own android smartphone. Therefore, they had come to the desire of wanting to own the product. This shows that the application can have a market and some people are going to want to use it in the future.

Question 6
Do you agree with the usage of augmented reality as a learning platform?

10 of the participant answered with “yes”, 2 “not sure” and 3 “no”. The users had shown their interest in augmented reality, but not all of them agree that this will be a good learning platform as they had never tried it before.

From the survey, we can conclude that most of the students agree with the usages of augmented reality as a medium of learning, they like the fresh method of augmented reality, this is their first time being exposed to the usage of augmented reality, and they hope to own this application on their own after using it for a few times during the survey.

CHAPTER 5

CONCLUSION

In conclusion, coming from this semester, I had gathered and research on a lot of details that are important for the development of this project. Up to this minute, there are a lot of softwares that I had rejected as it is not suitable for the development of my project. In the meantime, the most suitable software that I should be using is Unity3D game engine, Qualcomm Vuforia AR SDK, Google Sketchup and blender to develop the 3D figure. There is a progress in the project as I had begun to experiment a few software and it seems to work out pretty well. However, the research stage is still in progress as it might become unsuitable for me to use certain software that I am using right now. The work is going to keep on progressing from this moment onwards and it is hope that it will produce some results in the nearest future.

The augmented reality is a very futuristic field, and I believe that in the future, there are going to be more software of program that implement the usage of augmented reality. Augmented reality alphabet learning is a very good start in getting allowing augmented reality to pierce through the daily usage of software among the smart phone users.

The progress report has clearly distinguish the problem statement, background of the project, methodology, objectives and literature review of the project the author is working with. The author proceeds with the hope that he will be able to finish the task within the time limit and be able to produce a good prototype that will be able to function properly.

For future recommendation, the project is going to be adapted into different platform such as iOS and also Microsoft platform. This is going to produce more users from different platform to ease the process of learning. To make the end product more interesting, audio and animation is going to be included into the project in the nearest future. Besides that, to make sure that the users are able to communicate and interact with the application, the application is designed so that the user will be able to play games with the developed 3D image. This will enhance the learning process to further develop the process of learning. Without jeopardizing the project, quizzes and exercise is going to be provided so that the users can revise on the learnt subject. After alphabet, numbers will also be included as a syllabus for this project as a future recommendation.

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APPENDIXES

Questionnaire

1. Do you like the application?
   Adakah kamu berminat dan suka dengan applikasi ini?
   - Yes , Ya
   - No, Tidak
   - Not sure, Tidak pasti

2. Do you understand the purpose of this application?
   Adakah anda faham dengan tujuan / matlamat applikasi ini?
   - Yes, Ya
   - No, Tidak
   - Not sure, Tidak pasti

3. Do you think you can learn better with this application?
   Dapatkah anda belajar lebih baik dengan menggunakan applikasi ini?
   - Yes, Ya
   - No, Tidak,
   - Not sure, Tidak pasti

4. Is this your first time seeing augmented reality?
   Adakah ini kali pertama kamu bermain dengan teknologi reality tambahan?
   - Yes, Ya
   - No, Tidak,
   - Not sure, Tidak pasti

5. Do you want to own this application?
   Adakah anda ingin memiliki applikasi ini?
   - Yes, Ya
   - No, Tidak

6. Do you agree with the usage of augmented reality as a medium to learn better?
   Adakah anda bersetuju dengan penggunaan teknologi reality tambahan sebagai cara pembelajaran yang lebih baik?
   - Yes, Ya
   - No, Tidak
   - Not sure, Tidak pasti

TECHNICAL PAPER

Augmented Reality Apps for Children to Learn Alphabet through Storytelling

Tang Choo Kock
Department of Computer and Information Sciences,
Universiti Teknologi PETRONAS
Bandar Seri Iskandar, Tronoh Perak, Malaysia
Bluewhale1990@gmail.com

Assoc. Prof. Dr. Dayang Rohaya Bt Awang Rambli
Department of Computer and Information Sciences,
Universiti Teknologi PETRONAS
Bandar Seri Iskandar, Tronoh Perak, Malaysia
roharam@petronas.com.my

***Abstract* — everybody deserves a proper education. However, there are parents out there struggling to teach their kids to read and write due to their inability to teach them properly. Therefore, this project is going to explore the possibility of using augmented reality combined with storytelling as a medium to teach children to learn alphabet. With the existence of variety of students around us, problems tend to occurs when the teaching and learning process are going on. Students tend to have different learning curve. Sometimes they just refuse to learn altogether. These problems support the designation of this project which is to overcome the cause of illiterate among adults by starting early in terms of learning alphabet using augmented reality and storytelling. Exploring further into the project, analysis, planning, design, testing and implementation are going to be carried out to support the progress of this project. As a result, an android application that is able to support the learning of alphabet through storytelling is going to be built.**

I. INTRODUCTION

Augmented reality has unknowingly become part and parcel of our life. A lot of us might not realize it but majority of us are already being exposed to augmented reality for a few times. Augmented reality is defined as a live, direct or indirect, view of a physical, real-world environment whose elements are altered by computer-generated sensory such as sound, video, graphic or GPS data. Simply said, augmented reality is another world created by human being to assist in the daily routine, allowing a better learning environment for each and every one of us.

Of course, the most common way to be exposed to augmented reality would be the exposure to an android or IOS smart phone augmented reality application. Smart phones can be owned easily with cheap price by anyone all around the world. So we can conclude that augmented reality applications are now easily available with cheap price to every customer who can afford it.

This project is technically about a software that is able to help people especially kids to learn alphabet and words about the item that are being projected by the software. It is undeniable that education has somehow become one of the most important elements carrying heavy marks in the eye of parents all across the country. Basic for studying is very important before kids are able to learn continuously independently. At the same time, the advancement of technology in the recent period of time had substantially changed the course of learning among all of us. Augmented reality is among the latest streams that are popular in the recent world of technology.

It is not to say that there are a lot of problems with the current learning system, but there is indeed a better way to learn alphabet and my project is going to explore the possibility of using the advancement in technology and culture to adapt in this 21st century for the method of learning alphabet.

Objectives

The aims of this project are:

4. To explore the use of storytelling and augmented reality for learning the alphabet
5. To create an android application that could motivate and engage children to learn the alphabet using storytelling and augmented reality
6. To conduct an observation study among potential target users

The scope of the project will only focuses on learning for pre-schools as it is feasible both in terms of time and money.

II. LITERATURE REVIEW

Current Learning Method

The Free Dictionary define alphabet as the letter of language, arranged in the order fixed by the custom. It is a system of characters or symbols representing sounds or things. Learning is defined as the act and process of gaining knowledge or skills. Together, alphabet learning means the act of learning the system of language in a way that will enable a particular human being to be able to read, write and understand a language in the most proficient way. Alphabet is being thought at the early stage of the age either when the kids are still at home or when they are being brought to kindergartens.

[1]Lisa Powers claims that the best way to get started to learn alphabet is by using letters and sounds. Most people learned the alphabet through the “alphabet song”. For those who found it uncomfortable learning alphabet in singing mode, the other alternatives will be sandpaper letters and alphabet magnet. Sandpaper letters method are used by closing the eye and feel the sandpaper letter and repeat the name of the letter and then the sound. In the same journal, a few games and activities to assist kids in learning alphabet has been introduced such as alphabet war, alphabet on the move, bingo, go fish, and

alphabet art puzzle. Lisa Powers also highlighted the importance of recognizing the consonant and vowel from the beginning stage of learning so that the kids won't be confused when they proceed to higher level of learning. That's why, learning alphabet through alphabet song is also one of the best option for kids to learn efficiently.

Figure 1: Figure shows the method used to learn alphabet

[2]In an article by Sarah K Major, was written the reason why must we include visual and kinesthetic elements in the process of teaching children alphabets. Young children learn most easily when materials are presented in a way that it is closely tied to the movement and visual objects that they are familiar with. Children are learning in their own way. Imagine kids that had just begun to learn how to walk. Their only way of learning how to walk is by looking at how adults are doing it and tested it out themselves. Therefore, it has been stated that kids are learning faster and better if they have the desire to learn and have a sample that they can follow through before they are asked to build up things using their own imagination. This method of learning suggested by Sarah K Major is by using the movement of hand for kids to learn.

Augmented Reality

Wendy E. Mackay from University De Paris-Sud, in her research has stated about a few ways we augment the reality using augmented reality software [5]. Wendy stated that there are 3 main elements, which is augment the *user, physical object and the environment* surrounding the user and the object. The user here of course mean the person who are using the augmented reality, where they are the main medium and the end user of channeling the information. The Physical Object is the main subject that are correlated to the things that are trying to be perceived by the user such as name of building, information about the devices or so forth. The Environment is all the other structure that are captured by the devices regardless it is being augmented or not. Therefore, the combination of the entire augmented element will create an interactive connection between the user and the augmented reality. Wendy also stated some example of the augmented reality that had been achieved by other researcher all around the world which had already been applied in different field such as medical, instrumental, military strategy development and of course, in education.

Storytelling

Angela Tomkins from university of Gloucestershire, UK wrote a paper about the exploratory case study allow learning through storytelling which is more efficient than normal read and tell teaching method[17]. It's the same genre with storytelling, just that when it comes to sharing, Angela Tomkins mentioned that people remember more clearly when they heard something that other people share with them. Her article also mentioned about the link between learning and storytelling. Rather than calling it storytelling, she addresses the method as sharing from experience, thus allowing those who listen to the experience to learn faster and better. Her article also mentioned about the reflective learning where learner paused and applies the learned stuff into their daily routine to try and solve the problems. Angela mentioned the 5 stages of learning using story learning which includes noticing, making sense making meaning, story processing and finally becoming a transformative learning.

Figure 2.19: Figure shows how it is human nature to share and tell story

Alterio, Maxine and McDrury, Janice mentioned that storytelling is part of natural human behavior [18], an oral tradition that has been passed down through our history. They also mentioned that storytelling enhance students by giving them a better retention of vocabulary, content, and key ideas. This article mention about how you can make other people stories your own through a few steps. This will improve the delivery skills of the students who share other people stories as if it is their own story.

Another article written by Maxine Alterio mentioned that storytelling will be able to enhance student learning no matter how it is used in the class of learning [19]. Maxine promotes the culture of students and educators to work together in the process of storytelling in order to learn from each other. Through educator storytelling, students are able to learn about the subject more clearly and concise. Through the storytelling of student, educator can know more about the student background and allow them to know each other more. At the same time, to be able to tell story to each other in a class, students are picking up their bravery to share the story. This method will build up students' confidence which will definitely be useful for them in the future.

Figure 3: Figure shows a mom reading bedtime stories to their children to enhance their learning

Since the early days, parents have been teaching their children moral value through the fantasy stories such as Cinderella, Snow Whites, Pocahontas, and so forth. Franca Garzotto, Paolo Paolini and Amalia Sabiescu mentioned in an article about the benefits of storytelling for children [20]. Not only that this will allow the children to learn faster and better, they are exposed to the usage of alphabet since the early age, thus the reasons why some kids are able to read faster and better compared to some

other kids. This shows that the kid Storytelling is a meant for parents to teach the children about the environment, the world, animals, humans, buildings, places and so forth. In the process of telling them the stories, the kids learnt about alphabet at the same time, thus explained the important of using storytelling to learn alphabet.

III. METHODOLOGY

Research Methodology

For this project, the author will have to create my own methodology. The methodology that refered is the Rapid Application Development (RAD). This methodology does not exist until 1991, introduced by James Martin. This method is suitable due to time constraints, other commitment on other courses and the limited time, capability and resources that the author can use to finish up this project. RAD is a software development methodology which involves iterative development and the construction of prototype. Some of the basic principles in applying RAD is the key objectives is for fast development and delivery of a high quality system at a relatively low investment cost, attempts to reduce inherent project risk by breaking a project into smaller segments and providing more ease-of-change during the development process. However, RAD is a method that is being to develop software. The project that the author is developing is related to mobile application. Therefore, it is not that suitable for me to use RAD. Regardless, there are some steps in RAD that can be used as the author's methodology.

1. Analysis
    a. Research
    b. Hardware & Software
2. Planning
    a. Information Collection
    b. Choosing Syllabus
3. Design + Build
    a. Create a system based on the syllabus
    b. Implement/Test the project
4. Testing / Evaluation
    a. Identify the conclusion
    b. Analyze the performance
5. Implement

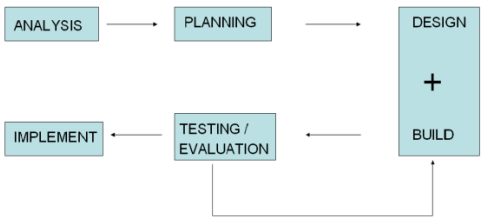

Figure shows the methodology used.

A. *Gantt Chart*

Activities / Week	1	2	3	4	5	6	7	8	9	10	11	12
Selection of Project Topic & SV	■	■										
Submission of Proposal			■									
Extended Proposal Progress			■	■	■	■						
Research Activities			■	■	■	■	■	■	■	■	■	■
Submission of Viva: Proposal Defense and Progress Evaluation									■			
Interim Report Process									■	■	■	■

B. *Gantt Chart FYP II*

Activities/Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Programming Research	■													
Prototype Development	■	■	■	■	■	■	■	■	■					
Submission of Progress Report I		■												
Submission of Progress Report II							■							
Seminar								■						
Pre-SEDEX										■				
Submission of Final Report Draft											■			
SEDEX												■		
Oral Presentation													■	
Submission of Final Dissertation														■

Figure 4: Figure shows the gantt chart for FYP I and FYP II

The system was developed according to the Gant Chart above. Each and every key milestone is marked in the Gant Chart to ensure the completion of project.

C. *Flow Chart*

Figure 6: Splash Screen

Figure 7: Prototype of 3D image

Figure 7: Booklet to use in storytelling

A. Tools

1. Smartphone

2. Laptop for development
3. Unity3D
4. Vuforia SDK

B. System Architecture

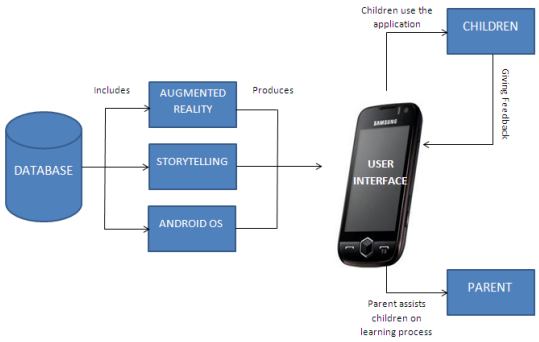

Figure 9: System Architecture

Based on the project development, the author had come out with a set of database, which includes all the animals figure and story that are going to be used in the storytelling. By using the database, combining the augmented reality, storytelling and android platform, the project is going to produce an end product that involved user interface which allow the users to communicate with the app. The children will be the main user for this application based on the feedback from the children further development is going to be carried out. Parents are going to be the support system that is going to assist the children in using this application.

IV. RESULT AND DISCUSSION

A survey had been carried out to research on user acceptance on this product. Survey done includes going around school in Tronoh and Ipoh to carry out some user acceptance test. After that, a set of questionnaire had been given to the user to answer. The questions can be seen in the appendix section of this report. Based on the result of the survey, further development is going to be carried out to suite the feedback that had been given by the volunteers for the survey. The user chosen are based on their age. As long as they are within the target user age range, then the survey will involve letting them trying out the product and collecting feedback from them. Criteria for selection are as follow.

Target User

The target user of my project is indeed no other that the pre-school children (age 2 – 5). Kids' from this age are cordially welcome to user my application. The target users are from middle class family where the parents are able to afford smartphone as a medium for them to use the application.

Target Market

Although the target user for my application is for little kids, the real target market is actually parents who are concerned with their kids' education. Kids will not be able to afford the smartphone and the application. Therefore, in the end, the parents will have to buy it and provide all the needed applications for their children.

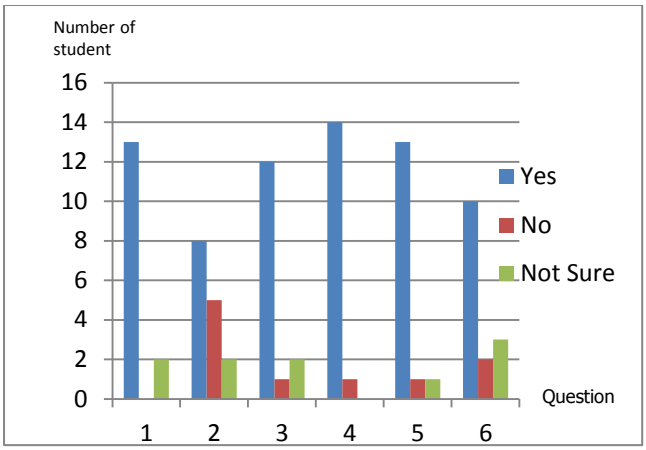

Figure 10: Figure shows the result of the survey

Question 1

Do you like the application?

13 of the participant answered "yes". It shows that this product can attract the users which include pre-schools children. 2 of the participants answered with "not sure" and none of the participant answered "no". However we can still conclude that around 87% of the users had accepted and like the product.

Question 2

Do you understand the purpose of this application?

8 of the participant had answered "yes'. It shows that the users know why the product is being built, and based on the understanding of the application, the user is able to learn more and faster about alphabet, which clearly explain the whole reason of this project.5 had answered with "not sure" and 2 answered with "no". However, this can be overcome when the user are being thought properly on the purpose of the products based on the user manual or tutorial provided.

Question 3

Do you think you can learn better with this application?

12 of the user answered with "yes" and 2 answered with "no, while 1 answered the questionnaire with "not sure". This shows that 80% if the users agreed they can do better in learning when they use this application.

Question 4

Is this your first time seeing augmented reality?

14 answered "yes" while 1 answered "no" this shows that 93% of the participants had never experienced augmented reality as a platform for learning. They are exposed to android because android OS are now widely available, but they are not familiar with the apps that can be used together with android. Therefore, it is their first time seeing augmented reality.

Question 5

Do you want to own this application?

13 answered this question with "yes" while another 2 answered with "no". Since most of the students come from middle class family, one of their parent had the ability to own android smartphone. Therefore, they had come to the desire of wanting to own the product. This shows that the application can have a market and some people are going to want to use it in the future.

Question 6

Do you agree with the usage of augmented reality as a learning platform?

10 of the participant answered with "yes", 2 "not sure" and 3 "no". The users had shown their interest in augmented reality, but not all of them agree that this will be a good learning platform as they had never tried it before.

V. CONCLUSION AND RECOMMENDATION

In conclusion, coming from this semester, the author had gathered and research on a lot of details that are important for the development of this project. Up to this minute, there are a lot of softwares that had rejected as it is not suitable for the development of my project. In the meantime, the most suitable software that had been used and should be used is Unity3D game engine, Qualcomm Vuforia AR SDK, Google Sketchup and blender to develop the 3D figure. However, the research stage is still in progress as it might become unsuitable for the developer to use certain software that are being using right now. The work is going to keep on progressing from this moment onwards and it is hope that it will produce some results in the nearest future.

The augmented reality is a very futuristic field, and it is believed that in the future, there are going to be more software of program that implements the usage of augmented reality. Augmented reality alphabet learning is a very good start in getting allowing augmented reality to pierce through the daily usage of software among the smart phone users.

The progress report has clearly distinguish the problem statement, background of the project, methodology, objectives and literature review of the project the author is working with. The author proceeds with the hope that he will be able to finish the task within the time limit and be able to produce a good prototype that will be able to function properly.

Future Work

There are definitely a lot of rooms for improvement in this project. In the future, there are going to be a more advance technology that are able to create a better learning environment for the children. Before that, for my project, the targeted improvement object will be importing the product into iOS Operating system, including audio into the system, producing more movement for the augmented reality, having interaction between the users and the application, and lastly to be able to create a complete syllabus of learning for the user to use it with the application.

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