

**INTERACTIVE AUGMENTED REALITY FOR**

**PRESCHOOL**



**ATION**

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## **ABSTRACT**

This project is about a mobile learning application using Augmented Reality as the medium. This apps is made for preschool student age 4-6. This project will use a physical book and android apps to interact with the AR technology. This book consist of 4 chapter that's is Anggota Badan, Haiwan, Kenderaan and Planet. This project can be used as a learning tool to replace the traditional method of teaching. A marker will be placed in the book as a platform for the apps to interact. User need to load the apps and place the camera view on the marker to interact with the AR technology.

## **ABSTRAK**

Projek ini adalah mengenai aplikasi mudah alih menggunakan “Augmented Reality” sebagai pengantara. Aplikasi ini dicipta untuk kanak-kanak prasekolah berumur 4-6 tahun. Projek ini akan menggunakan buku fizikal dan aplikasi android untuk berinteraksi dengan teknologi AR. Buku ini mengandungi 4 bab iaitu Anggota Badan, Haiwan, Kenderaan dan Planet. Projek ini boleh digunakan sebagai alat bantuan mengajar bagi menggantikan cara tradisional untuk mengajar. Penanda akan diletakkan di dalam buku sebagai tapak untuk aplikasi berinteraksi dengan buku. Pengguna perlu memulakan aplikasi dan menghalakan pandangan kamera di penanda untuk berinteraksi dengan teknologi AR.

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# **1. BACKGROUND OF STUDY**

## **1.1. INTRODUCTION**

Early childcare and education (ECCE) is identified as one of the prioritised segments in Malaysian's Education National Key Economic Area (NKEA). Under the government Transformation Programme (GTP), the Ministry of Education (MoE), in collaboration with the private sector, aim to increase preschool (4+ and 5+ years in age) enrolment to 87% in 2012 and 97% by 2020.

World today are emerging with many technologies in every scope of area. Kids learning today also have evolved from textbook and pencil to computer and many sort of multimedia tools as their guideline in learning process. For these young children, science is the process of becoming aware of and understanding of themselves, other living things, and environment through the senses and personal exploration. Research has shown that these children require actions on objects for development of reasoning. Therefore, it is important to provide these children at an early age, a variety of hands-on activities, where they can manipulate objects, are guided to see relationships, and draw conclusions. (Piaget, 1953)

The traditional methods in teaching science in preschool science education are using books, A3 posters, flash cards and science experiment. The teacher will explain about the concept of any science topics to the student, and they will works on the science experiment together. The learning by doing approach used in preschool will enhance their ability to learn and understand more about the topic that they had learned. Thus, it is very important to provide active learning environment to the student by implementing Augmented Reality (AR) into their teaching and learning process.



Abbreviated as AR, Augmented Reality is a type of virtual reality that aims to duplicate the world's environment in a computer. An augmented reality system generates a composite view for the user that is the combination of the real scene viewed by the user and a virtual scene generated by the computer that augments the scene with additional information. The virtual scene generated by the computer is designed to enhance the user's sensory perception of the virtual world they are seeing or interacting with. By applying this concept to AR book, the physical book (the real world) will be enhanced by augmenting the virtual object (3D models, animation, video and audio).

Using augmented reality based on learning interaction paradigms for teaching children is becoming increasingly popular because children are moving towards a new level of interaction with technology and there is a need to children to educational contents through the use of AR. Instead of developing a computer program using traditional input techniques (mouse and keyboard), this project presents an interactive user interface for learning kindergarten subjects. The motivation is essentially to bring something from the real world and couple that with virtual reality elements, accomplishing the interaction using our own hands. It's a symbiosis of traditional learning with digital technology.

## **1.2. PROBLEM STATEMENT**

Traditional method of teaching science by using non-interactive tools in learning have raising a lot of issue such as the limitation of information. When children learn about new things in science, teacher always teach them by using only 2D learning such as using books, flash card or A3 posters. This approach will limit the learning activity such as the experience of exploration.

One way communication also being a problem in traditional learning method. Usually the teacher will show the demonstration of an experiment rather than let the children do because of the safety issue. This makes the children cannot experience the study material and thus making the learning process incomplete.

Traditional ways of learning science in preschool always involve non interactive tool. This tools lacks of reality due to its dimension. Such as books, flash card and other traditional tools. This tools only help children learn some part because the tools only can be seen, nothing to interact with. The interaction between materials of study is important for children because they learn by experiencing not just by looking only.

Time also become a major problem in traditional method. When teacher using only 1 way communication, the learning process have to be continue at home. This have cost time for the children to learn about the science things. Children is fast learner, the more time the children spent in learning something, the less things they will discover due to focusing too much on learning about 1 things.

### **1.3. AIM**

To develop an AR application for preschool children in learning science by using AR book. This project will enhance the limitation in learning science by creating a virtual reality so that the children will experience more about what they learn in science.

### **1.4. OBJECTIVE**

- To design and develop an educational augmented reality application for preschool student.
- To design and develop interactive physical book interface of augmented reality book.
- To study the effectiveness of AR technology in kids learning.

## **1.5. SCOPE OF PROJECT**

This project created for mobile using Android platform. The apps consist of VR (Virtual Reality) as the main technology and using physical book as the main interaction between the apps. The target user for this project is preschool student age 4-6 that learning science subject. The study case is preschool student in TADIKA PERPADUAN located in TAMAN TUNAS MAHKOTA.

## **1.6 EXISTING SYSTEM**

Many AR learning application have been produced now days. Here is 3 example of existing application that use Augmented Reality as their tools to teach kid. The 1<sup>st</sup> system is learning physics through play in an augmented reality environment (LPP). This system teach physic by using AR environment. 2<sup>nd</sup> is Augmented Reality Children Storybook (ARCS). This system using AR as their tool in creating a real live scene of a story book. The last example is an Augmented Reality 3D Pop-Up Book. This system focus more on English language teaching.

### **1.6.1 EXISTING SYSTEM DESCRIPTION**

#### **1.6.1.1 Learning Physics Through Play Project (LPP)**

The Learning Physics Through Play Project (LPP) aiming for 6-8 year old students in a several experiment regarding Newton Law in an AR environment. There are three design principles behind the LPP curriculum:

- The use of play and participatory modelling.
- Progressive symbolization within rich semiotic ecologies.
- Cycles of activity.

After that student need to present their understanding of net forces in two dimensions using the LPP environment.

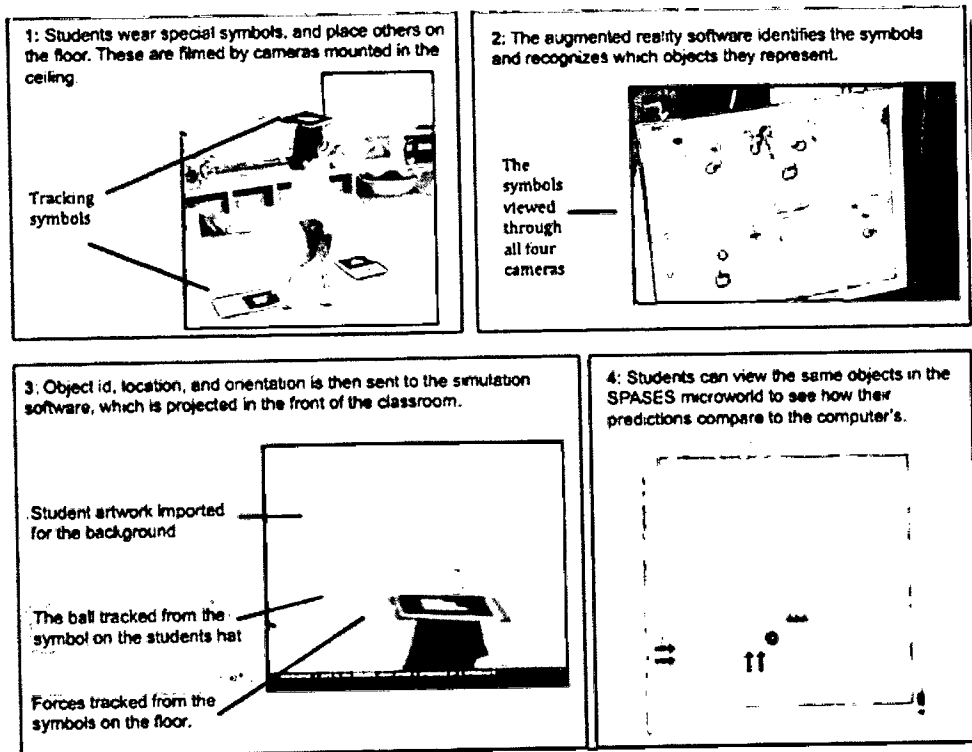


Figure 1.6.1.1: The process of transforming data to LPP environment.

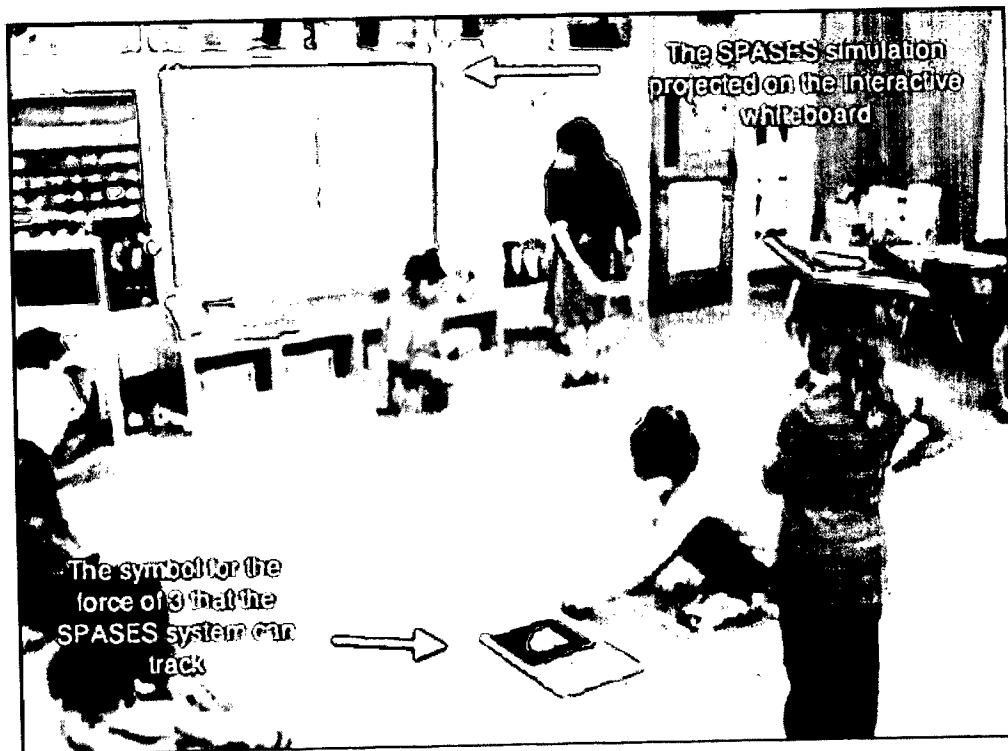


Figure 1.6.1.2: Show how kid interact and use the classroom as the LPP environment.

### **1.6.1.3 Augmented Reality Children Storybook (ARCS)**

This is a system is an alternative to make kid now days attract to book rather than just playing games by using their smartphone. As the technologies grow faster and faster, it can help parent and teacher to make their kid learn by themselves by using this interactive technology. Furthermore, kids now days interact with technologies more than comparing out time. In order to promote the reading habit to the children nowadays, this AR Storybook not only provides knowledge but entertainment at the same time. With so many successful examples of how computer technologies were applied in education, this AR Storybook will be one of it as well. Since the children prefer audio and graphics, the AR Storybook will provide not only these but allow interaction so that children can learn and play a role in the story at the same time.

### **1.6.2 Augmented Reality 3D Pop-Up Book.**

This system aiming on creating a real live book for kids learning and increase their innovation and understanding. The scope is the 3<sup>rd</sup> grade student. By using AR, A story book become alive when kids can see the character from the book come alive in front of their eyes. This process will help and increase their focus and let them feel real live scene of the story. Kids also can play games that already implemented inside the book. The only things that the kid have to do is place the marker and just have fun listening and playing the 3D book.

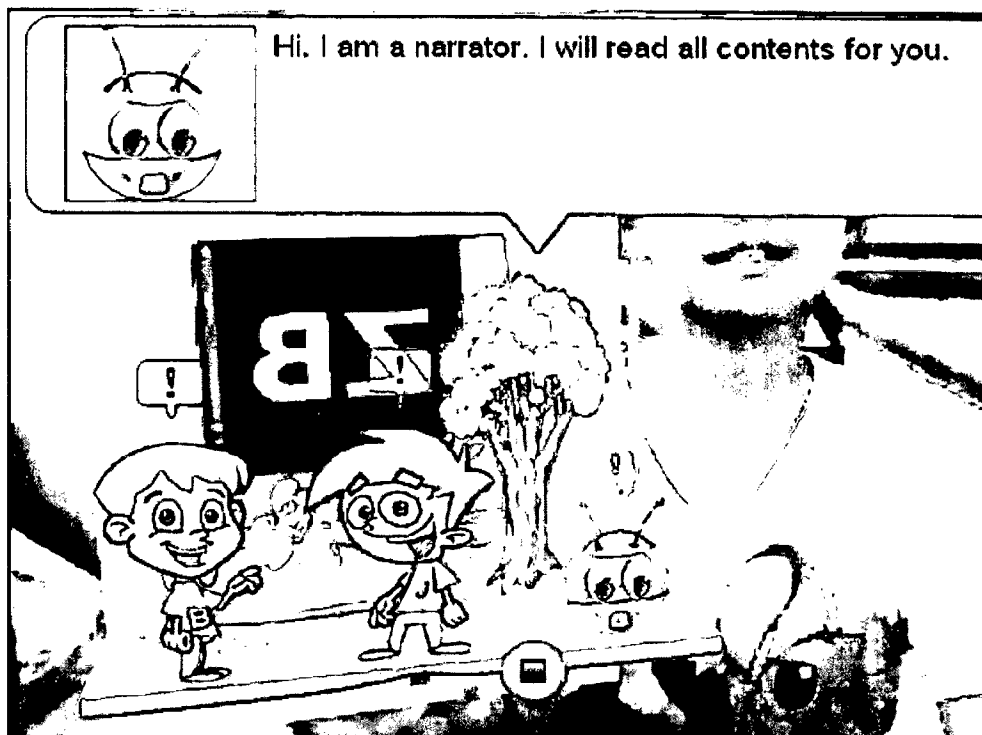


Figure 1.6.2.1 The book narrating the story.

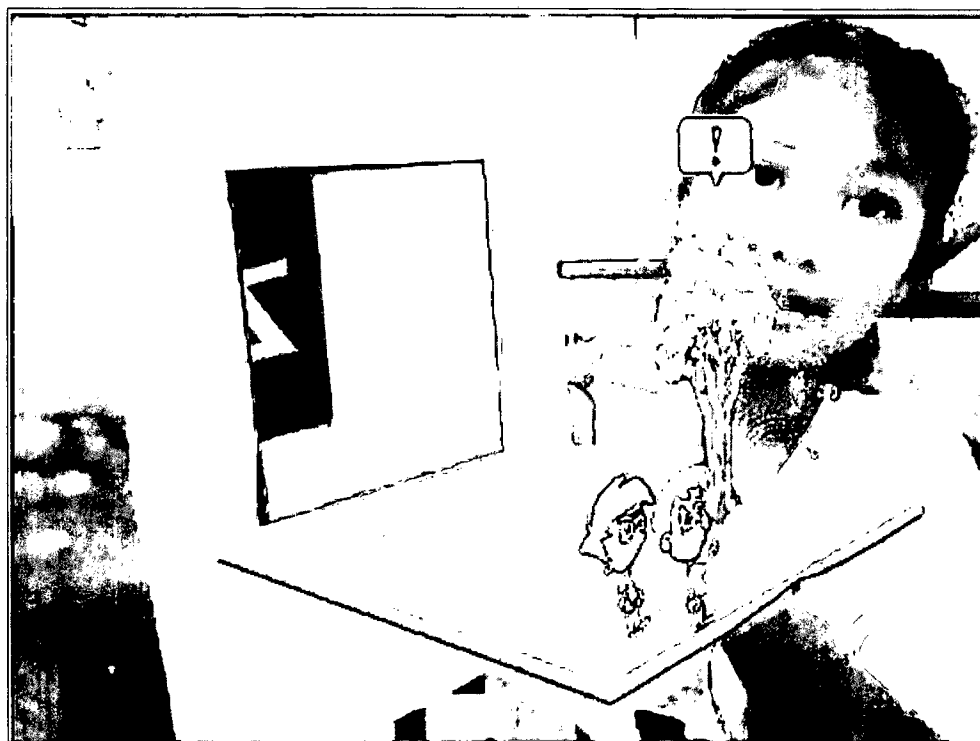


Figure 1.6.2.2 In front marker orientation.



Figure 1.6.2.3 Learning process with teacher and help from the system guidance.

### 1.6.3 COMPARISON

	LPP	ACRS	3D POP-UP BOOK
Environment scale	Classroom size	Custom book with marker	Custom book with marker
Subject Related	Physic	Language	Language
Target Scope	Student 6-8 years old	Preschool	3 <sup>rd</sup> Grade student
Marker based	Moving marker	Static marker	Interactive marker
Objective	Newton calculation experiment	Understanding story telling	Real live scene experience

#### **1.6.4 PROBLEM IN EXISTING SYSTEM**

From comparison above we can see that the system have certain flaws due to it technologies. As you can see the existing system basically focus more on higher level of student. Most of the system made are focusing on language learning because it's the easiest and most preferable subject to implement the AR. The existing system also required a large scale environment. Some of existing system also only can be used when in class. The system cannot be brought home. Teachers guidance also needed to make sure the system will be used properly due to its new technology. The existing system also use less interactivity due to the thing that they want to teach or analyse.

## **2. USER REQUIREMENT**

### **2.1. INTRODUCTION**

The method that will be used to conduct the research for Augmented Reality is by using survey. This research will be divided into three parts which are information about participant, data collection method and data analysis.

- Respondent:

50 questionnaire will be given to the kids' parent and also to the teacher to know how far they know about the AR technology in their life.

- Data Collection Method:

The data collection method that been used in this project is to observe any try to implement the new technology. The type of data collection that will be used is survey.



- Data Analysis :

The data obtain from the survey will be saved in google doc. The questionnaire responses data will be presenting in percentages and graphs.

## 2.2. QUESTIONNAIRE RESULT

50 parents have been participate in the survey regarding this project. A total of 25 male and 25 women have been respondent for this survey. Based on the data collected show that most of parent now days have been following the stream of technology. Below are the question and result for the questionnaire.

### Question 1: Do you have Smartphone / Tablet or Ipad ?

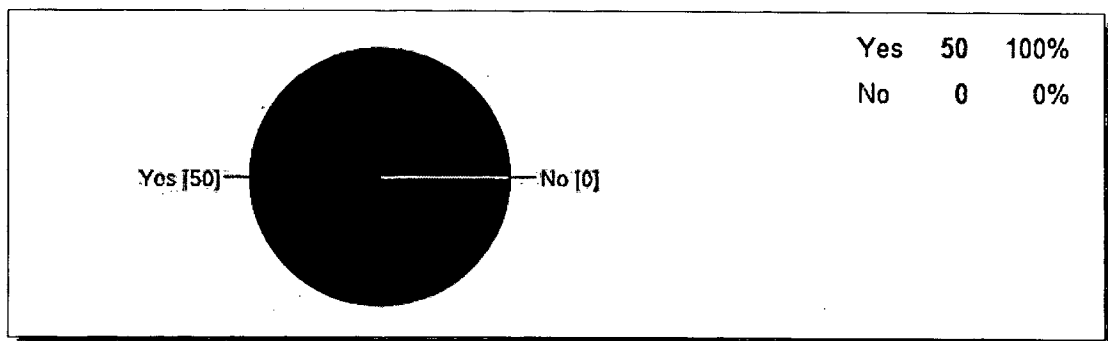


Figure 2.2.1: Show that everybody have smartphone now days with 100% percentage.

This result may occur due the technology now days that even a kid can have smartphone. Smartphone is a needed gadget in our life not like the old days where who have a phone are only the rich people.

**Question 2: Did you allow your kids to have smartphone / tablet / iPad ?**

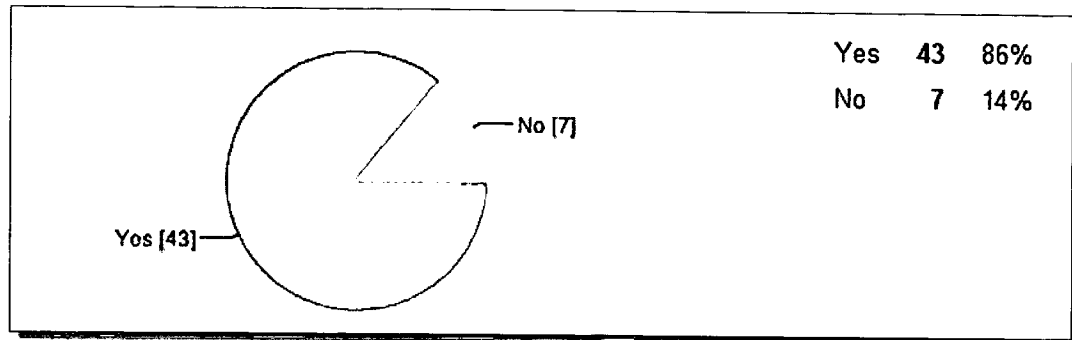


Figure 2.2.2: 90% of the parent are willing to allow their kid to own a smartphone. 10% are not willing to let their kid to have smartphone.

This result may happen due to today financial and need value. Parent often allow their kid to have phone so that they can keep track where the kid go or in case for emergency. Smartphone also let kid and parents share moments such as picture, video etc. This factor may be one of the reason why parent now days allowed their kid to have smartphone etc.

**Question 3: What type of application you install in your / kids smartphone / tab / ipad ?**

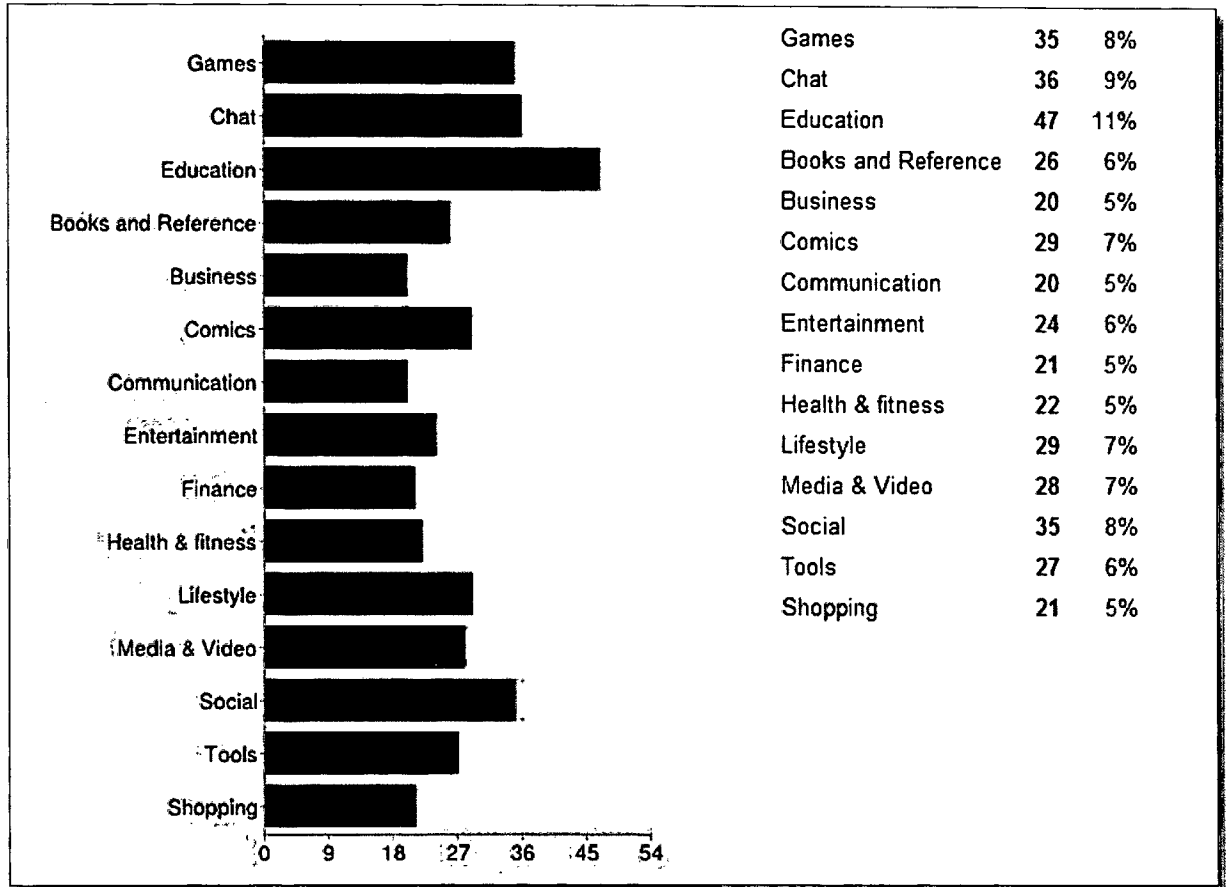


Figure 2.2.3: Data show that Education application get the highest percentage by 11%.

As you can see in figure 2.3 is about what application in-stalled in their smartphone. Survey result shows that the highest application type being install is education. This may be occur because of now day's technology that use smartphone as a tools to let their kids learn about something.

**Question 4: What type of school that you send your kids for kindergarten?**

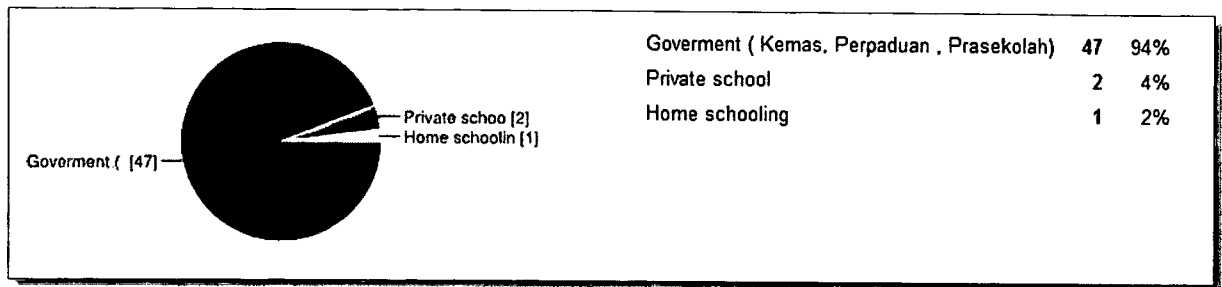


Figure 2.2.4: Data show that 94% parent send their kid to government type school, 4% to private school and 2% for home schooling.

The main reason for this result is because of financial and stability. Most government kindergarten offer low fees and standardise learning module rather than private or home schooling.

**Question 5: How frequent you assist your kids doing their homework?**

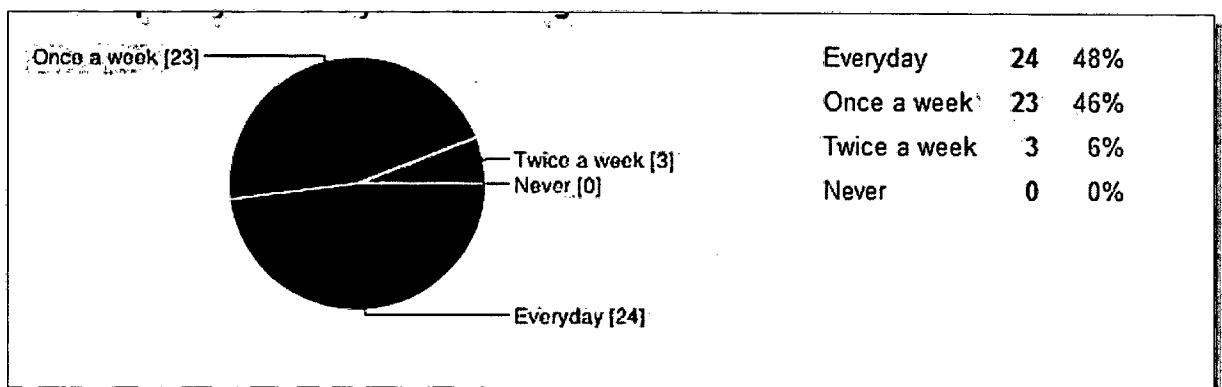


Figure 2.2.5: Data show that 48% parent check their kid homework every day, 46% check once a week and 6% check twice a week.

This shows that parent still care about how their kid performance although world now days show that most family have both parent working to support family financial.

**Question 6: What type of learning material used in your kids kindergarten?**

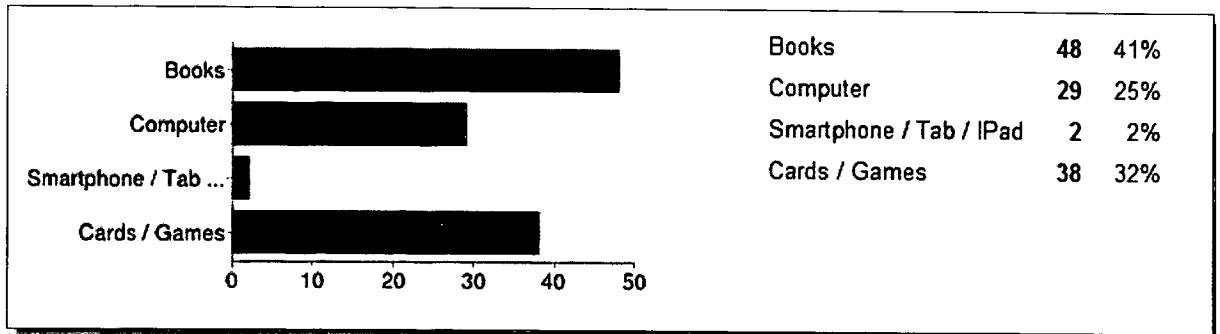


Figure 2.2.6: Data show that books have the highest percentage with 41% followed by cards / games with 32%, computer 25% and Smartphone/ Tab / IPad with 2%.

This may be happened due to facilities cost set by the government. Budget set for each facilities make the tools used are standardise according to government standard.

**Question 7: How long your kids spend their time with their mobile gadget in a day?**

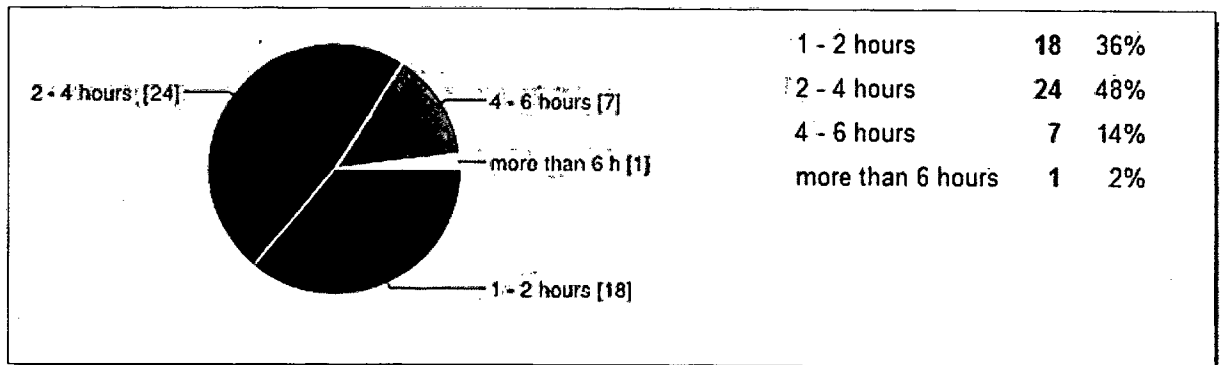


Figure 2.2.7: Data shows that most kids spent their time with their gadget for 2-4 hours where 48% respondent agree with that and followed by 1-2 hours with 36%, 4-6 hours with 14% and lastly more than 6 hours with 2%.

This result may occur because of the technology itself. Kids now days prefer to sit and enjoy everything in their phone rather than going out and do real thing.

**Question 8: Do you know about Augmented Reality?**

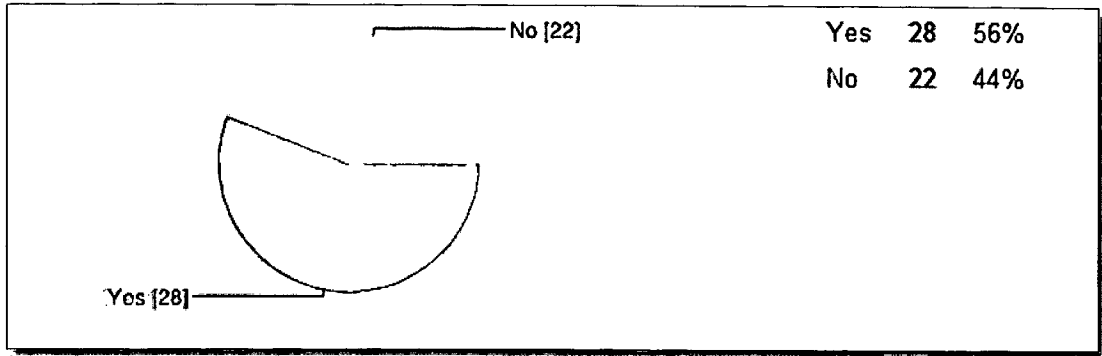


Figure 2.2.8: Data shows that 56 % parents know about AR and 44% don't know a thing about it.

This may occur because parent now days are living in moving technology. Most of them are up to date about anything that related to technology. This also happen by the effect of the technology itself that make any information in our finger tips.

Below are the survey using rating where 5 means totally agree and 1 means totally disagree.

**Question 9: Do you agree that smartphone can help your kids in learning process?**

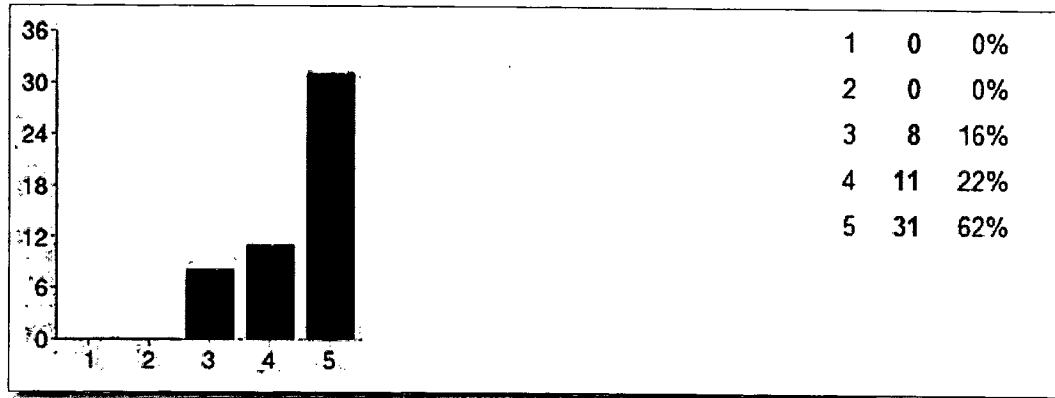


Figure 2.2.9: The data show that respondent choose 5 with 62% followed by 4 with 22% and 16% for 3.

**Question 10: Do you agree that learning with smartphone is better than traditional method?**

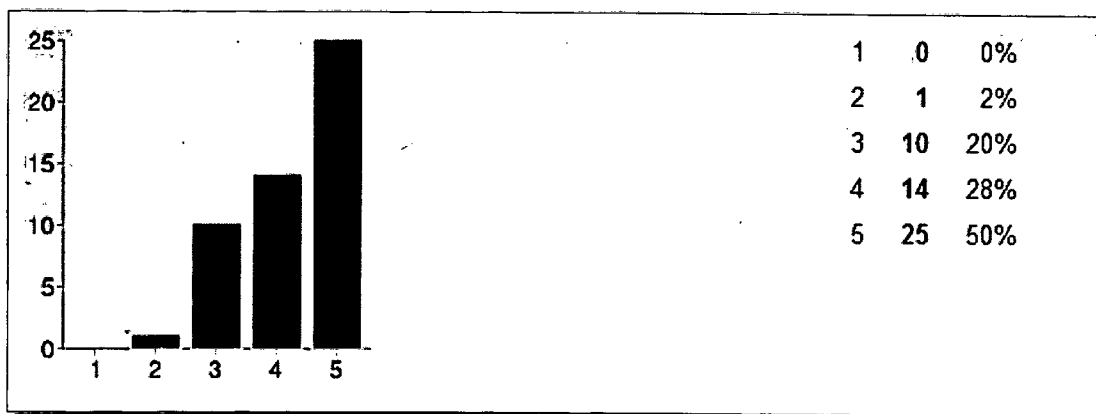


Figure 2.2.10: The data show that 50% respondent choose 5 followed by 4 with 28%, 20% for 3 and 2% for 2.

**Question 11: Do you agree if teacher use smartphone as teaching learning aid in kindergarten?**

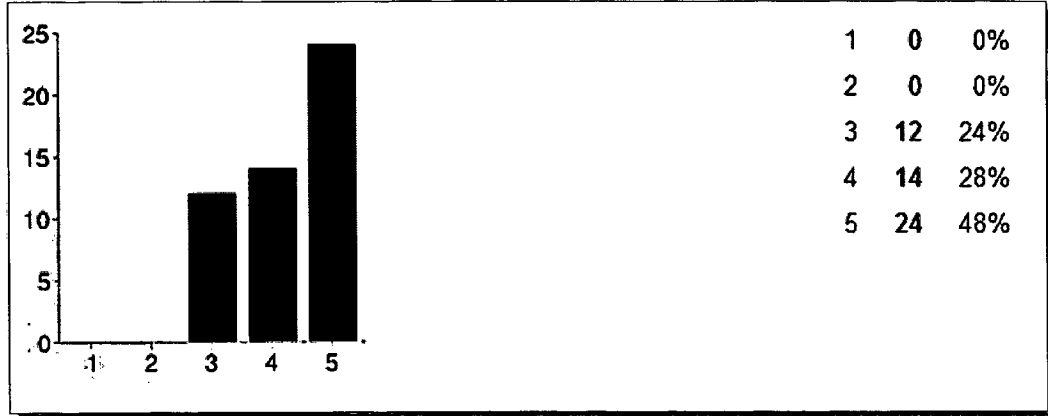


Figure 2.2.11: The data show that respondent choose 5 with 48% followed by 4 with 28% and 24% for 3.

**Question 12: Do you agree if your kids use your smartphone as tool to learn?**

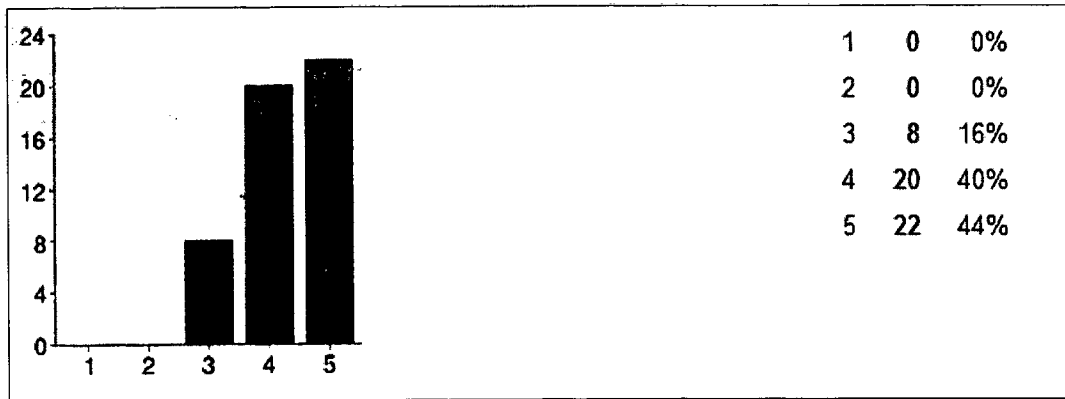


Figure 2.2.12: The data show that respondent choose 5 with 44% followed by 4 with 20% and 16% for 3.