Mobile Math learning application

For children (Fun Math)

By

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Final Report submitted in partial fulfillment of

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CERTIFICATION OF APPROVAL

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A project dissertation submitted to the

Information Communication Technology Programme

Universiti Teknologi PETRONAS

in partial fulfillment of the requirement for the

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Approved by,

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(Mr. Mohammad Noor Bin Ibrahim)

UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

May 2012

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

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MYRAT DURDYYEV

ABSTRACT

This project is about evolving Android Application that will carry the board of mobile learning inside, throughout implementing math learning or math practicing theories and methods with proper usability.

First of all the author of project has carried out research about math learning and practicing strategies and identified some common-used methods that are used in learning simple math for kids. It was decided that the most appropriate method to be integrated into mobile learning is Inductive and Deductive Methods, which will provide fast learning and efficient time react skills. Far ahead, research continued on mobile learning. How learning ideas and strategies could be implemented in mobile application.

Afterward with a humble success, the research part was finished, author switched to learning Google AppInventor web application, which aids to develop software application for running on Android based OS platform.

Application has been developed and graphical interface was implemented. After downloading apk file into the phone's memory, software ran successfully.

Surveys were conducted to find out satisfaction of user in using developed app and 9/10 people reported satisfactory functionality of the system, 10/10 reported good usability features, 7/10 reported good design of the interface.

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CHAPTER 1: INTRODCUTION

1.1. Background

As we know since kinder garden, math already being introduce. Without our realization, math involve in every aspects in our life. It can be in our daily life of transactions or for manager to make decision on billions values of projects. Its all include numbers. Having a strong basic in math will help a person to deal with things in their life easier.

Math is everywhere, even in the wind or air. For example, math can help a person to decide either he can buy 2 shirts or 4 shirts that still under his budget using a coupon with additional discount. People may think math is not important but actually it s around us. Even to calculate speed of wind, the weather forecasts are using math equations. So basically, we are surviving in this world based on mathematical equation and knowledge.

Math actually is an interesting subject that can catches the eyes of every child from the early years of study. It's just the matter on how the teachers approach to their student. You may not believe math can help the police to trace where the bad guys will be based on their crimes history like shows in the drama series titled NUMBERS. It's interesting to watch how the mathematicians help the police by playing with the numbers and manipulating them to get the answers. Numbers are the main key players in math, without numbers math would be sound empty and useless.

So don't you wonder what is it NUMBERS? Most of us were never interested in numbers as they never realize how really numbers affect our life. Would it be just a symbol or something bigger?

A **number** is a mathematical object used to count and measure. A notational symbol that represents a number is called a numeral but in common use, the word number can mean the abstract object, the symbol, or the word for the number.

Reference :(http://en.wikipedia.org/wiki/Number)

1.2. Problem Statement

Math is all about books, books and books. Well especially math books are heavy and really uncomfortable to carry it whole day from home to school then at the end of the day, from school to home. This is a really big problem for kids, since heavy books can damage kids back. They will be struggling to carry it and suffer from the pain on their backs.

Another problem is one subject requires more than two books: Main math book, exercise book and homework book. Well as we can notice, these two problems are related. After some research has been done by me, I came to know that in the exercise book there is a lack of space, or lines for correction to fix the exercise that has been done with error, so that kid could notice his mistakes and never make that mistake again.

Now a day's most of the people and basically children are intend to think that math is not that important in their life. Families, especially parent makes a big mistake by accepting that math is not important to young children's cognitive development and future academic success.

Confirmation shows, however, that math learning is fatal for children's early childhood years and for future success in mathematics as well as improving overall academic outcomes in such areas as literacy, science, and technology.

Most of us I believe had problems of understanding math in secondary school or primary schools. Let's get back to past! I am sure mostly children had this feeling that we had! Such as in my past for math in elementary school it was either I am right or wrong. As an outcome I found math very boring and confusing. So it means I was never math learner by nature.

This is wrong idea and behavior. So it must vanish from people mind so that every single child has to enjoy math learning.

1.3. Project Objectives

To change traditionally heavy books to a small pocket books.

The object of this project is to clear the idea from young minds that “math is boring to learn”. Project will show that math is fun to learn and it should attract children to want to learn math more and more and get interested in it.

The objective is not only to let the children to have fun in learning math but also to solve parents’ problem in: “how should I tech my child to math” by teaching math with object visualization.

1.4. Project Scopes

This application is to make children form secondary school to understand math easily and inspire them to be good in mathematics.

Expected functionality of proposed system will include:

- Basic math equations
- Subtracting
- Adding
- Division
- Geometry

PROJECT RELEVANCY, FEASIBILITY AND TIME FRAME

These days on current market mobile devices are being operated by several operating systems in a row, depending on which devices they are running. Among the most popular are Android, Symbian, Apple, RIM, Bada and Microsoft. According to the Gartner [13], as shown in Figure 1, for the Q2 2011 Android OS reached 43% of Global market share.

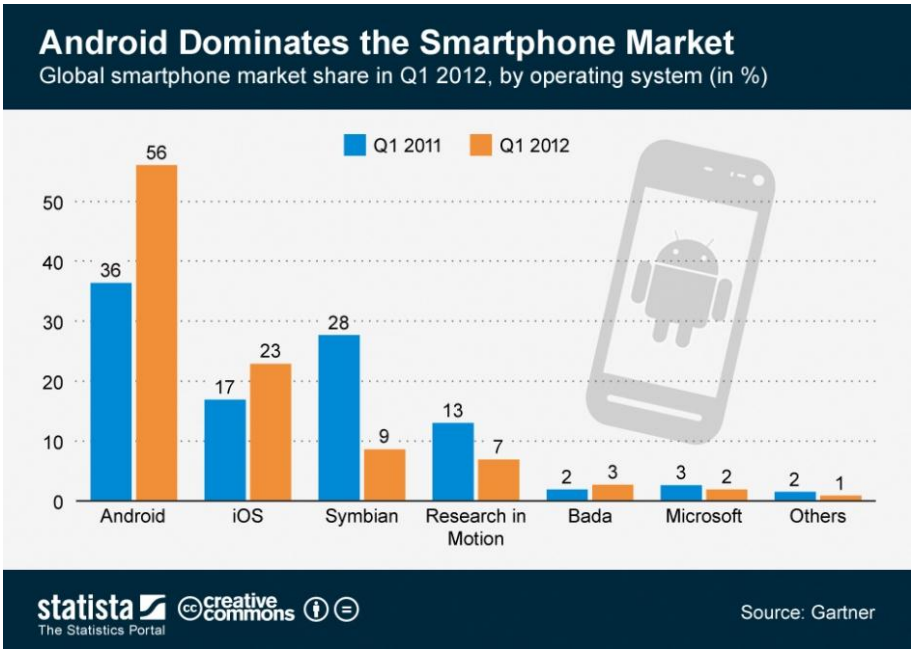


Figure 1: Graph showing global smartphone market share forQ1 2012

Hence PDA-s, smartphones and other mobile devices running on Android Operating System are really popular these days there is a big demand for various Android applications.

Research author's background of studies were held in Information and Communication Technology, where he have already obtained courses in programming such as Java and C++, which are crucial in developing Android application. During his studies, author him and in collaboration with other students have developed several software applications on Java and C++. All the previous projects were successful, thus giving an author brilliant experience in developing application. Time frame devoted to project is equal 32 weeks, where half of them – 16 weeks will be spend on research about mobile language learning strategies and second half will be occupied by developing an application on Android OS.

1.5. Expected Project Outcomes

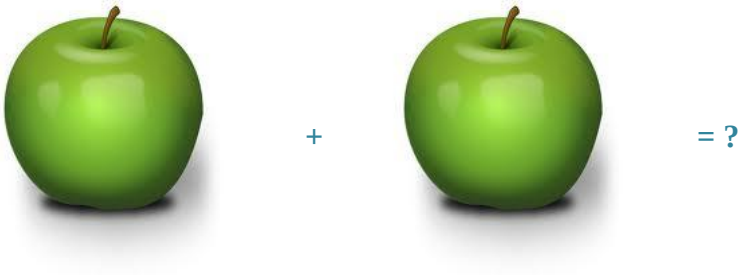
The expected outcome would be android math teaching application which will give to end user simple math exercises so that user must solve it. The application will be producing visual outcome such as object to be added or subtracted, multiplied or divided. Is will also include in it geometric functions such as finding angles of the square, are of square.

Basically we do already have mobile math teaching, learning application such as: math workout pro, kids numbers add math, talking kids add math, mental math preview, arithmetic's for kids, what I want to do is to analyze those applications and come out with different additional features such as: students score statistics-this feature is for parent to monitor, be aware of their kids score, social networking- so that kids could communicate with friends and share/monitor the results. Also to make it interesting and different I am intending to build in it video tutorials. So that it would be easier to a kid understand example of how to do exercises.

Activities included:

- Learning numbers
- Chose max/min numbers
- Addition
- Subtraction
- Find a match
- Advanced exercises

1.5.1. Exercise:



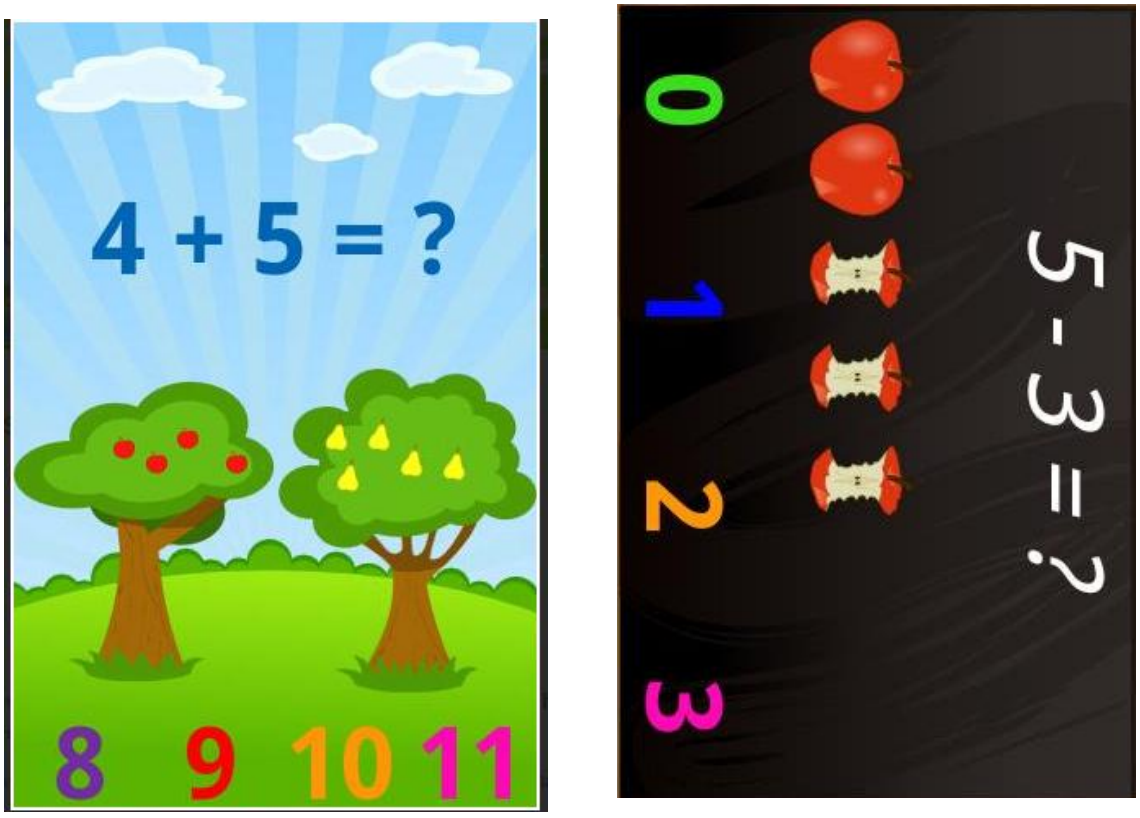


Figure 2: Expected Project outcome

1.5.2. Student statistics:

This feature displays result of the student how he/she perform the exercise. This should work as a reward for the kid to inspire him/her to do better work or improve his/her work.

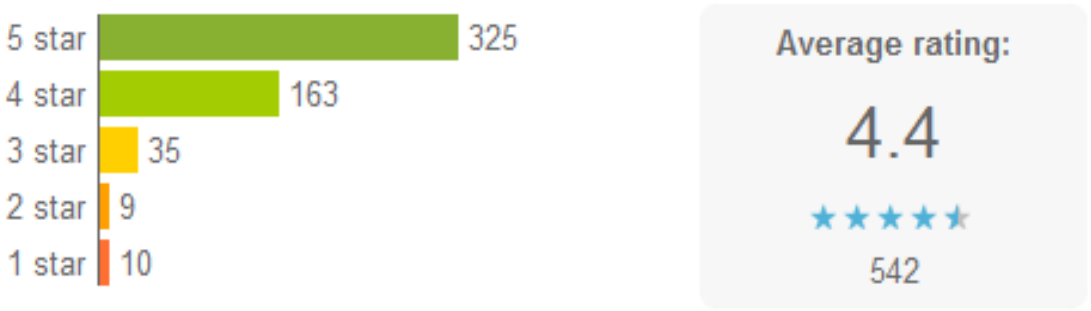


Figure 3: Student Statistics

1.5.3. Video tutorial

This feature will allow to user/kid to understand the example of the exercise. As we all know kids loves to do or repeat what they have seen. So this method is called inductive. It will attract kid's attention.

Figure 4: Video Tutorial

1.6. Project Timeline

The timeline for this particular project is in between January 2011 until September 2011.

The project duration is illustrated by the Gantt chart in Figure 1.2 below.

ID	Task Name	Duration	Start	Finish
1	**Research on Mobile Math Learning**	**56 days**	**Wed 05.10.11**	**Wed 21.12.11**
2	Project title selection	6 days	Wed 05.10.11	Wed 12.10.11
3	Literature review	14 days	Thu 13.10.11	Tue 01.11.11
4	Extended proposal submission	1 day	Wed 02.11.11	Wed 02.11.11
5	Preparation for proposal defence	6 days	Tue 15.11.11	Tue 22.11.11
6	Proposal defence	1 day	Wed 23.11.11	Wed 23.11.11
7	Interim report preparation	8 days	Fri 25.11.11	Tue 06.12.11
8	Submission of Interim report	1 day	Wed 07.12.11	Wed 07.12.11
9	Interim report preparation	9 days	Thu 08.12.11	Tue 20.12.11
10	Submission of Interim report	1 day	Wed 21.12.11	Wed 21.12.11

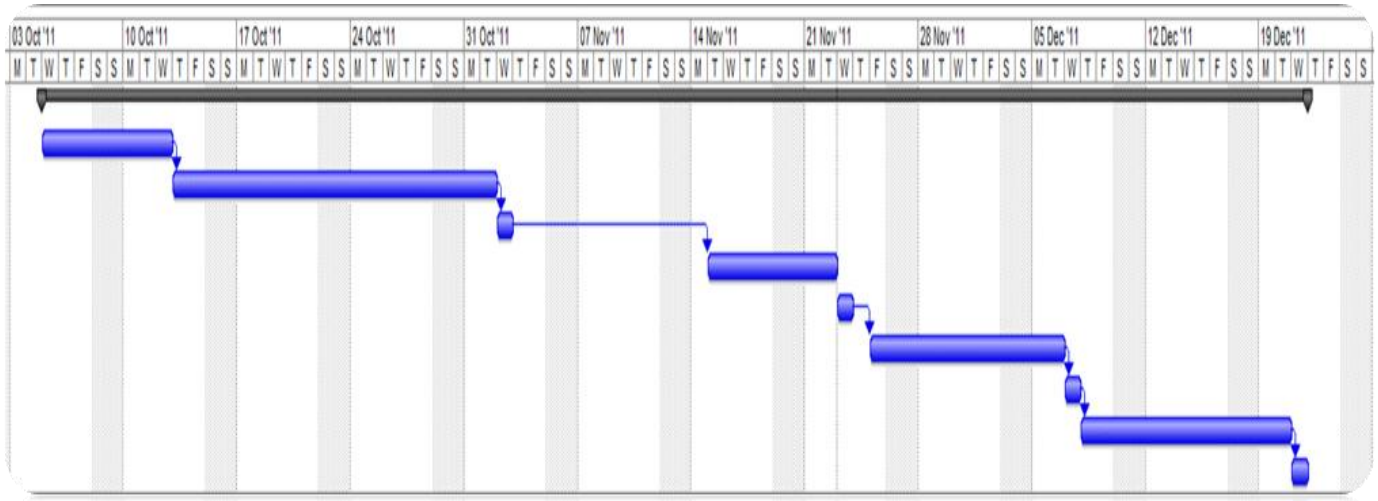


Figure 5: Project Timeline Gantt chart

1.7. Conclusion

As a conclusion, this chapter has conclude the 1) background; 2) problem statement; 3) project objective; 4)project scope; 5) expected project outcomes; and 6) project timeline. The main objective of making this Android math teaching application is to inspire young generation to study hard and improve academic performance

CHAPTER 2: LITERATURE REVIEW

1.8. Introduction

That question of "how to enable kids to learn math?" lies in front of every teacher or parents who are very strongly concerned about teaching math to their kids. In a few past decades this question was and still popular among educator. Many different kinds of theories and techniques have been created, invented toward to answer to the question above. Those methods for sure was tested and implemented by many teachers to make this work and get much better teaching strategies. It would be not appropriate for teacher use only one method to teach kids to mathematics.

Now we are living in binary world, where we are surrounded with a technology. This aspect is very useful to us, since kids love technology, fancy flashy games it is good to integrate this "binary world" technology world to achieve in gaining interest of kids to learn mathematics.

[9] "M-learning (or mobile learning) is seen as an extension of e-learning where the focus is on the use of mobile devices such as cell phones, PDAs, and iPODS (Brown, 2005). Laouris and Laouri (2006) describe the move from e-learning to m-learning as a revolution since it implies not only a change in terminology but a change of mindset when designing and planning learning environments and goals. Sharma and Kitchens (2004) assignthis unavoidable change in paradigm to the unique facilities provided by mobile technology such as the provision of communication facilities at any time or location and the provision of learning content dynamically dependent on the learner's location, context and device (Sharma and Kitchen, 2004). This necessarily implies a change in classroom culture. It is also clear that the exposure to a greater variety of media is causing a different kind of learner who gathers and process information differently. Mellow (2005) describes this new generation of learners as the media generation whereas Prensky (2001) uses the metaphor of "digital natives" to get a better understanding of the kind of learner educators are dealing with. Mobile technology is part of the "digital natives'" lives and it seems logical that educators should explore the possibilities of applying these technologies in educational settings (Mellow, 2005). The situation in developing countries are of course somewhat different and quite a few researchers have asked probing questions on the role of technology enhanced learning (if any) in such settings (Brown, 2005; Masters, 2005, Laouris and Laouri, 2006)"

1.9. Current Teaching methods

1.9.1. Inductive method

Inductive method as it is stated in [1], where the children in the age of 4 to 5 have different intellectual abilities and learning styles that favor or delay knowledge growth. As a result, the teachers will find suitable ways to teach their students. Using the right materials and way of approaching is important for better understanding.

[11] ***Inductive learners*** prefer to learn a body of material by seeing specific cases first (observations, experimental results, numerical examples) and working up to governing principles and theories by inference

Inductive teaching method or process is all about going from specific matter to general and if possibly to be based on specific experimental learning exercises that will able to train the brain to adapt to the new environment

As an example let's see demonstration of inductive method:

Ask the kids to draw a few sets of parallel lines with two lines in each set. Let them build and measure the matching and another angles in each instance.

He or she will find them equal in all cases. This example shows that it enables him/her to generalize that "corresponding angles are equal; alternate angles are equal." This is also a case where equality of corresponding and alternate angles in a positive set of parallel lines (specific) helps us to generalize the conclusion. Thus this is an example of inductive method. To make it more clear and easy lets refer to [2]

Example 2 says

Ask a child to find a sum of two odd numbers 5+7=12, 11+13=24. Then he/she will conclude that, the sum of two odd numbers is an even number.

1.9.2. Deductive method

Deductive method is deriving form general concept to specific use or application. Saying in other way, referring to [2] Deductive reasoning moves from general to particular.

In deductive method everything must have a "valid" value. Such as all dogs have flies. That is a dog. There for it have flies.

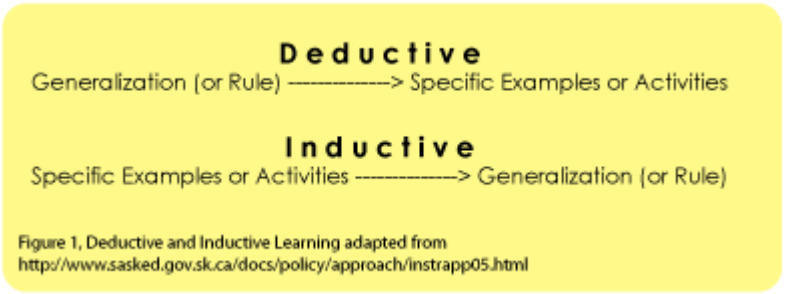


Figure 6: Deductive and Inductive methods

Children learning way is natural, they do what they see. So that means we should educate children in a natural way, so they could learn thorough out playing games by experiencing it.

1.9.3. Home activities (Parental Involvement)

[3] There are many methods by which parents can easily get involve in educating their children to math. Many activities were developed for that purpose. Children in that young age are more interested on colorful objects such we call visual illustrations. Several resources provide parents with interesting math teaching games that will engage children to pay full attention on that. An example one of that sources is book" Helping Your Child Learn Math". Book consists of 26 activities for children aged 5-13.

This method is a good example for my project. Strategy of this book will be implemented in my Android application that children will go through all education time with their parents. It also will help to integrate relationship between parents and children.

1.10. Proposed Solution

1.10.1. Teaching with cell phones

This is era of technology. Where ever we go we find that everything is connected to technology, to the internet to Network. This particular issue is highly concerned with teaching kids through technology (mobile).

[10] "Of all the possible uses for mobile phones, the use that will have the greatest impact on the world in the long run, I predict, is just emerging – using mobile phones for worldwide teaching and learning. Cell phones are not just communications devices sparking new modalities of interaction between people; they are also particularly useful computers that fit in your pocket, are always with you, and are nearly always."

We all know that all computing devices and communication, cell phones can be used to learn. Well instead of fighting the trend of kids coming to school carrying their own powerful learning devices - which they have already paid for - why not use the opportunity to their educational advantage?

[10] "I have written elsewhere of the ways we might use the various modalities of the mobile phone for learning. What is most important though, *is that we enlist the learners*, particularly the younger learners, in this process. The people I call today's "Digital Natives" are inventing and moving to new ways of doing things at breakneck speed. I predict they will invent new ways of learning via their phones, either with us or without us."

[4] By reading this article, I came to know an interesting fact. Dr.Math lecture in Johannesburg, South Africa allowed to his students to use cellphones in the class, so that they could communicate about class activities, solve math exercises and also what is important to improve their grammar throughout using social networking. Dr.Maths project connects students with live math and science tutors using MXIT, a wildly popular social networking application for mobile phones.

It is very thoughtful that lecture is allowing student to use cellphones and they have been using it to a good purpose.

1.10.2. Cell phones in the classrooms

As all we know that in most schools, cell phones are checked at the door or at best powered off during school hours in a silent "don't ask, don't tell" understanding between pupils and teachers. This wide-spread technology ban is a response to real concerns: if kids have unfettered instant access to the Internet at school, how do we keep them safe, how do we keep out inappropriate content, how do we prevent real-time cyberbullying, how do we even keep their attention in class when competing with messaging, gaming, and surfing?

[5] At the same time, though, there is a growing sense among education thought leaders and policy leaders that not only are cell phones here to stay but there seems to be interesting potential to use these small, connected computers that so many students already have. I've been insanely fortunate over the past year to work closely with Wireless Reach (Qualcomm's strategic social initiative) and real innovators in education who are finding that cell phones in classrooms don't have to be a danger or a distraction but, in fact, can help kids learn in some surprising ways.
During the 2007-2008 school year, Wireless Reach began funding Project K-Nect, a pilot project in rural North Carolina where high school students received supplemental algebra problem sets on smartphones (the phones were provided by the project). The outcomes are promising -- classes using the smartphones have consistently achieved significantly higher proficiency rates on their end of course exams.

1.11. Conclusion

To conclude this issue we must understand that children are our future and we must take good care of them. And also we have to educate our youngsters in a modern way, to make sure that they are stepping right behind technology world. My research based on “how to enable children learn math with a high interest” so that not only children will get a benefit from this but parent also, because they have to take a role, involve in educating their children.

CHAPTER 3: METHODOLOGY

2.1. Introduction

We can say that almost all things have a complete process from start to end. So, this goes the same with creating software or system based on the problem occurs. So in this research, the method that will be used to build android mobile application we will fallow Waterfall model.

2.2. System Methodology

2.2.1. Waterfall Model

The waterfall model is a sequential software development process. It is a steady flowing progress from one stage to another stage downward. There will be 6 stages for this model, they are:

- Project Planning
- Requirements Design
- Design
- Development
- Integration and Testing
- Installation and Acceptance

The image below show the 6 stages that fall under the waterfall method:

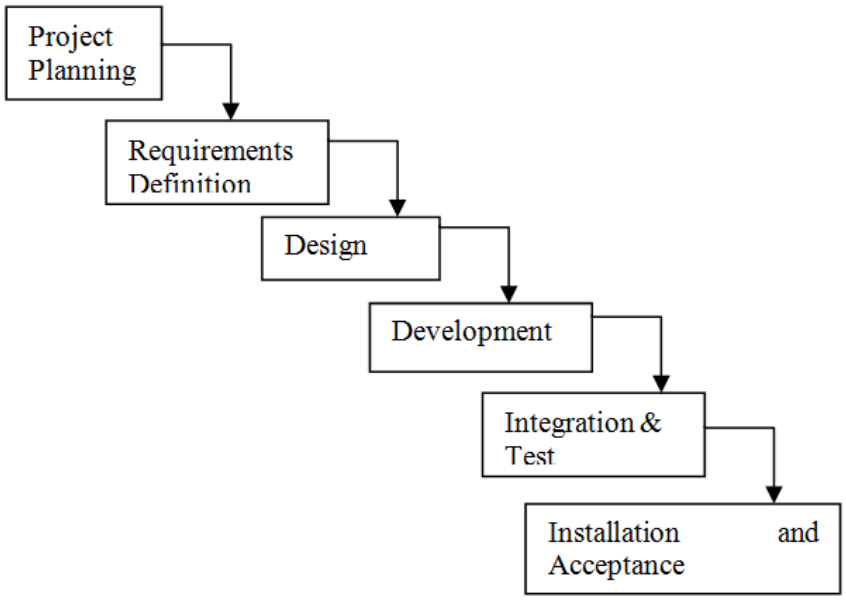


Figure 7: Waterfall model of Application development

So this mapping will help us to fallow the development tree of my android based application for children.

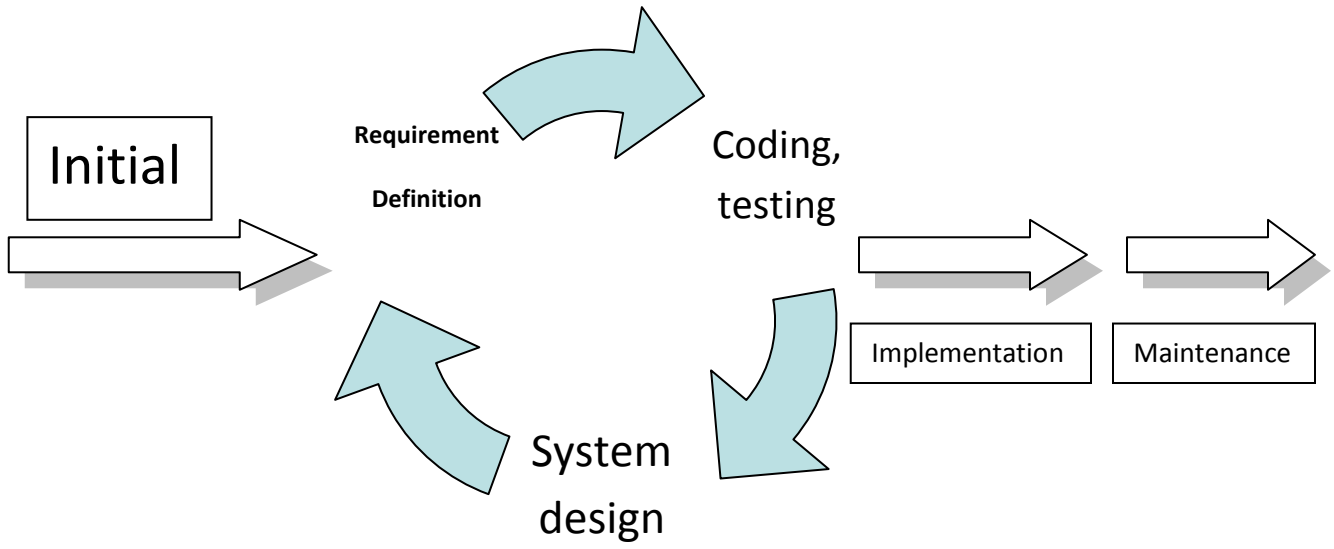


Figure 8: Development tree

In this part of the project basically we start to see the problem that we going to solve later by creating this software. As a system agents, 1st of all we need to see the problem and understand the nature of that problem. After analyzing existence of this problem which is "to enable children to learn math" we did our 1st step. It is INITIATED. Next step is to plan on how to resolve this issue!

3.2.2 System design

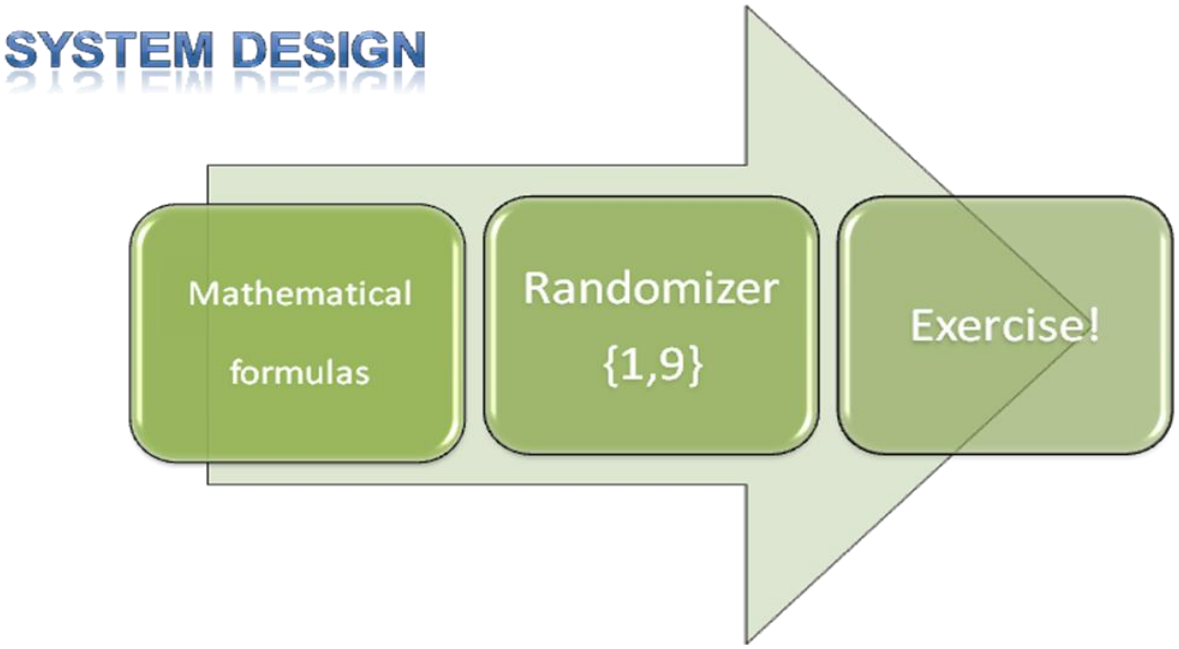


Figure 9: System Design

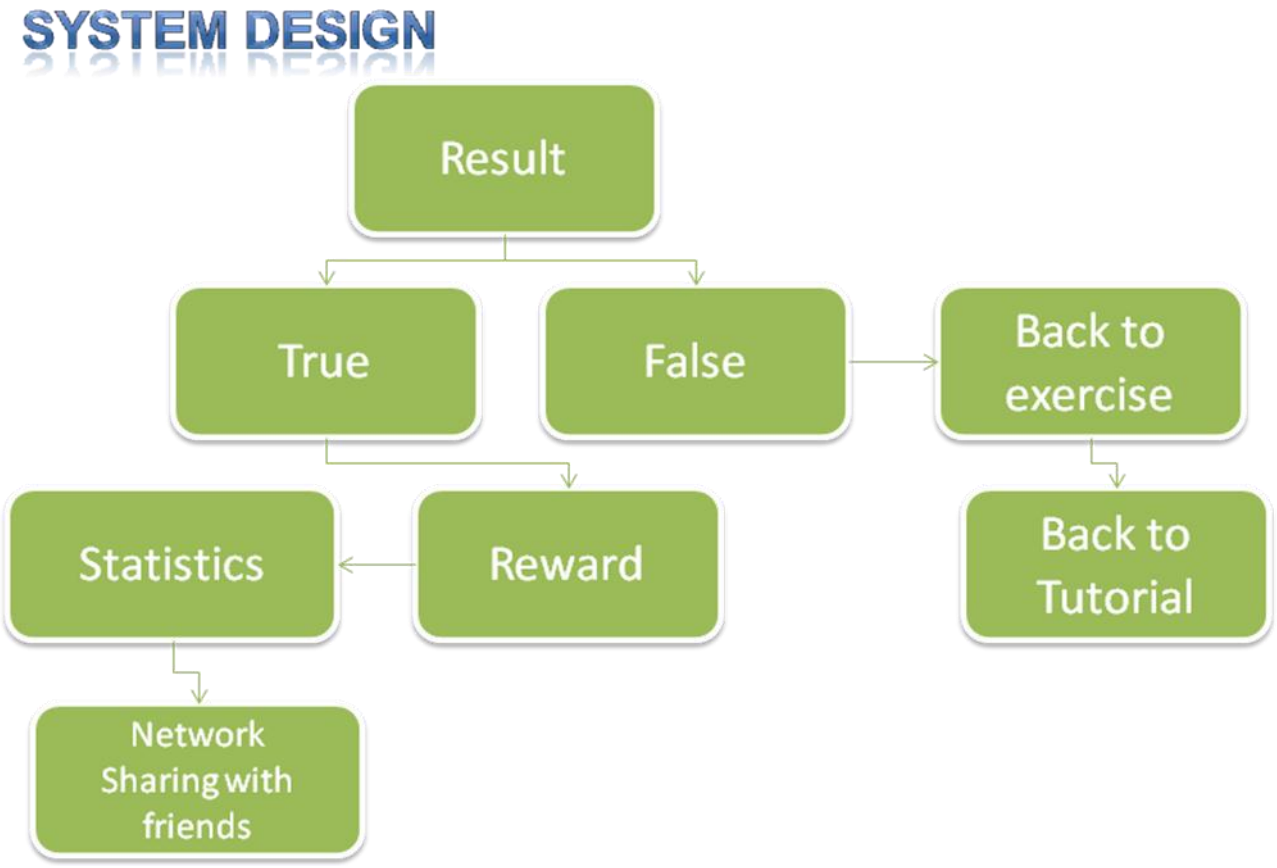


Figure 9.1: System Design

2.3. Research methodology

2.3.1. To collect Research Tools and Information

In this part of the research, information and data will be collected and it is required to take advice from:

- ✓ Supervisor
- ✓ Journals and articles

2.3.2. To collect Data and Information

Refer to statistics data that had been collected and analyzed by researches (tutors) to this particular issue. “Enable kids to learn math”

2.4. Tools to build android application

To build android application we will need this tools listed below:

- PC- running on: Windows, MAC, Linux platform.
- Android SDK (Windows, MAC, Linux)
- Smartphone with android OS built in

Figure 10: Samsung galaxy W

For my project it would be best to use this Samsung galaxy W smart phone with android OS in it for feather testing phase. The device ships with a system image that is fully compatible with Android 2.3. It is possible for one to flash any custom Android builds that will work with the unlocked boot loader. The device can be configured with system software not provided by or supported by Google or any other company. It is equipped with super AMOLED screen, capacitive touch screen, 16M colors and a good wireless connectivity. It's support java and email application. The color and brightness settings are strong enough which adds up for a reasonable outdoor performance.

4. Software

Android Froyo 2.2:

used for running application on the phone. Android is an operating system for mobile devices such as smartphones and tablet computers. It is developed by the Open Handset Alliance led by Google.

Google App Inventor Beta (Hosted on MIT servers):

used for designing, developing and testing application.

Adobe Photoshop CS 2:

used for designing graphical elements such as buttons, background images.

- Android SDK tools [7]
- **Android**

  Lets you manage AVDs, projects, and the installed components of the SDK.

- **Android Emulator (emulator)**

  A QEMU-based device-emulation tool that you can use to design, debug, and test your applications in an actual Android run-time environment.

- **layoutopt**

Lets you quickly analyze your application's layouts in order to optimize them for efficiency.

- **mksdcard**

  Helps you create a disk image that you can use with the emulator, to simulate the presence of an external storage card (such as an SD card).

- **Monkey**

  Runs on your emulator or device and generates pseudo-random streams of user events such as clicks, touches, or gestures, as well as a number of system-level events. You can use the Monkey to stress-test applications that you are developing, in a random yet repeatable manner.

- **monkeyrunner**

  Provides an API for writing programs that control an Android device or emulator from outside of Android code.

5. PROJECT ACTIVITIES

Before initiating the project, deep research was held over the math practicing- learning strategies that can be transformed into mobile learning though the critical analysis, reviewing previously done projects of similar knowledge area,. Though the research carried, author accomplished to express theoretical and philosophical structure of the application to be developed. After the research, studies on learning Android application and work with Android programming will be taken before the author can start application development. There will be many phases for author to deal with to develop software; also author will need to deal with many stages from planning until deploying the system.

As it came for us to know, the waterfall model is a sequential software development process. It is solid flowing progresses from one stage to another stage downward toward to the main goal- develop an android application. There will be 6 stages for this model, they are:

- Research on Project and Planning
- Requirements definition
- Designing in App Inventor Designer
- Development in App Inventor Blocks Editor
- Integration and Testing into Android Emulator and HTC Wildfire mobile phone
- Installation and Acceptance

5.1 Research on Project and Planning

Conferring to the result of research, author has identified that the fastest and easiest way to learn or practice math skills for kids would be implementing Visual- Inductive and Deductive methods in mobile application. That's why including visual representation of objects such as fruits will be effective for the kids to adapt to the system. Author also must admit that parental involvement is very crucial and effective in kid's cognitive development. Thus all the main functions interconnected with Inductive and Deductive methods should contain visual and graphical illustrations, while pressing on the buttons. During a planning process, author identified methodology of the research, project development, timeline and main milestones.

5.2 Requirements definition

The main page of mobile application that author is developing will be giving a choice of three: sections. Quiz For You, Make a Test, and Take a Test.

Quiz for You page will contain the sequence of question represented with objects (fruits, animals, toys) which requires to key in answers from the user.

Make a test and take a test pages is must be integration between parent and kids. In this two sections Parent can create their own set of questions where buy they will have to input the questions and answers in to database so that in the next page, test me the questions will appear for the user to be answered.

Being originally provided by Google and currently maintained by Massachusetts Institute of Technology, App Inventor is browser-based software that allows its clients to develop application running on Android OS. By using graphical interface, App Inventor lets people develop applications even though they don't have JAVA coding skills. With graphical interface of a great usability and drag-and-drop functionality, will allow to create application that can run on the Android system, which runs on many mobile devices. Creating App Inventor for Android, Google drew upon significant prior research in educational computing, and work done within Google on online development environments.

5.3 Building application in App Inventor

Building application in App Inventor consists from 2 phases:

1. Designing Application outlook in App Inventor Designer

2. Development in App Inventor Blocks Editor

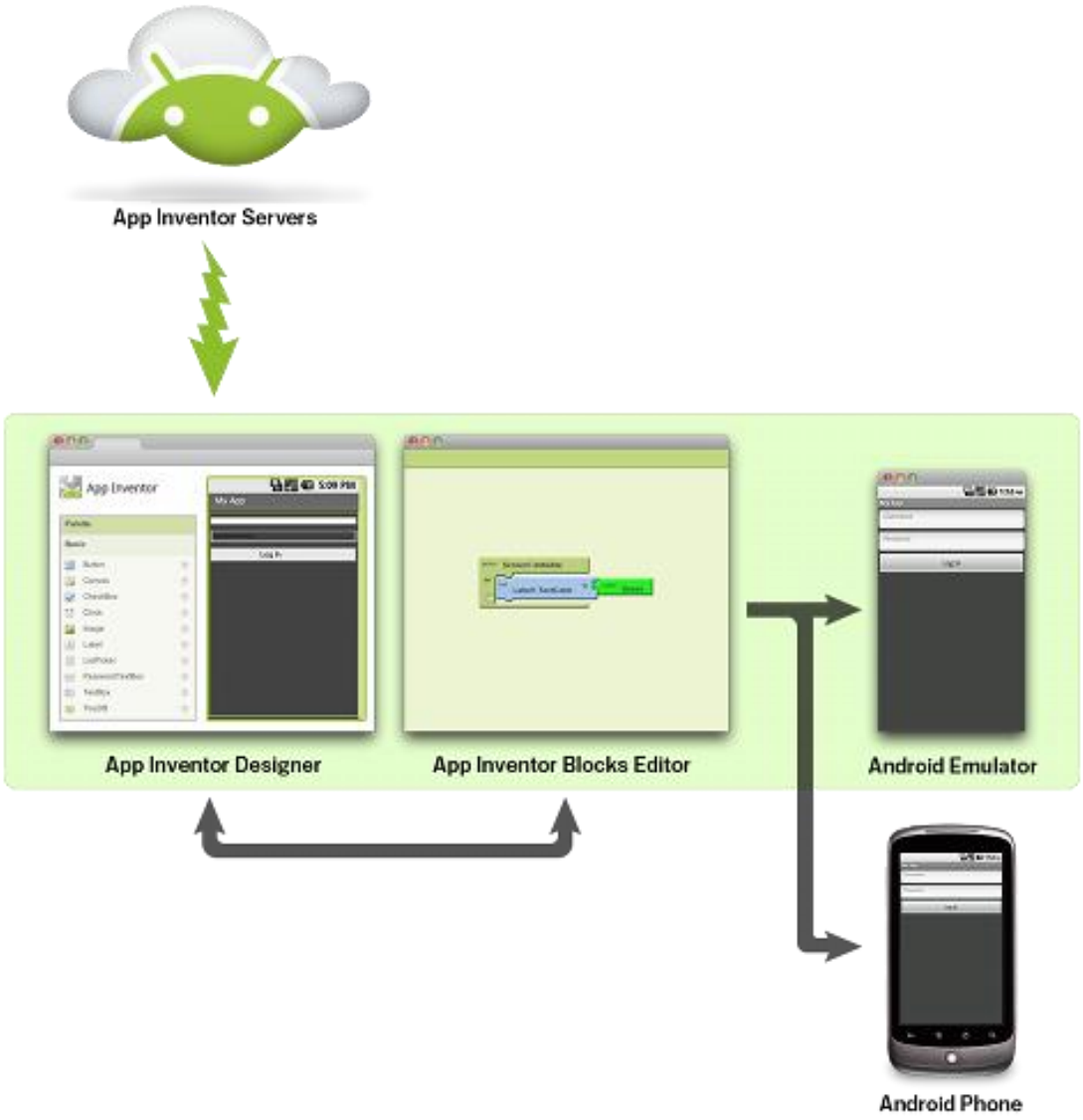


Figure 11: App Inventor development diagram

5.3.1 Designing in App Inventor Designer

App Inventor Designer is browser-based application, where you select the components of your application, which are separated into six categories. App Inventor components are located on the left hand side of the Designer screen under the title Palette. Components are the basic elements you use to make apps on the Android phone. Some components are very simple, like a Label component, which just shows text on the screen, or a Button component that you tap to initiate an action. Other components are more elaborate: a drawing Canvas that can hold still images or animations, an accelerometer (motion) sensor that works like a Wii controller and detects when you move or shake the phone, components that make or send text messages, components that play music and video, components that get information from Web sites, and so on.

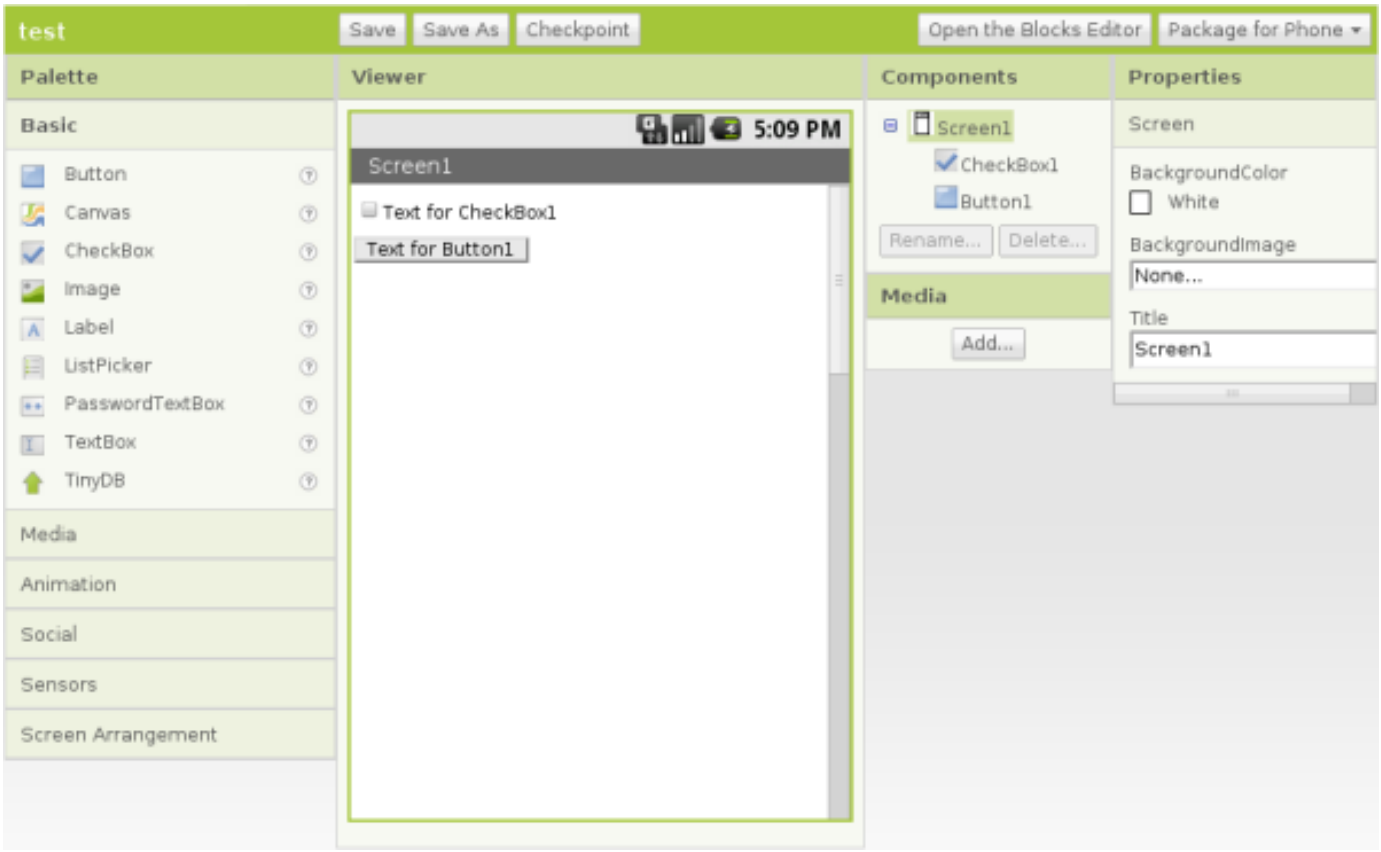


Figure 12: Interface of App Inventor

5.3.1.1 Phase 1: Designing in App Inventor Designer

In order to use a component in your future app, you need to click and drag needed component onto the viewer board in the middle of the Designer. When you add a component to the viewer board, it will also appear in the components list on the right hand side of the viewer board.

You can manipulate with components, since they have properties that can be adjusted to change the way the component appears within the app. To view and change the properties of a component, you must first select the desired component in your list of components.

As me mentioned before, App Inventor has different categories 1st of them is Basic category. Basic category holds several components such as buttons, image, canvas, checkbox, label, list picker, password text box, text box and tiny database. Other categories that might be useful in mobile application development are Media, Animation, Social, Sensors and Screen Arrangements. In App Inventor Designer developer needs to drag and drop elements from the given categories onto the screen, where they can be arranged vertically or horizontally, assignment label text or background image, component visibility, size or color. Settings for editing particular components vary from one to another.

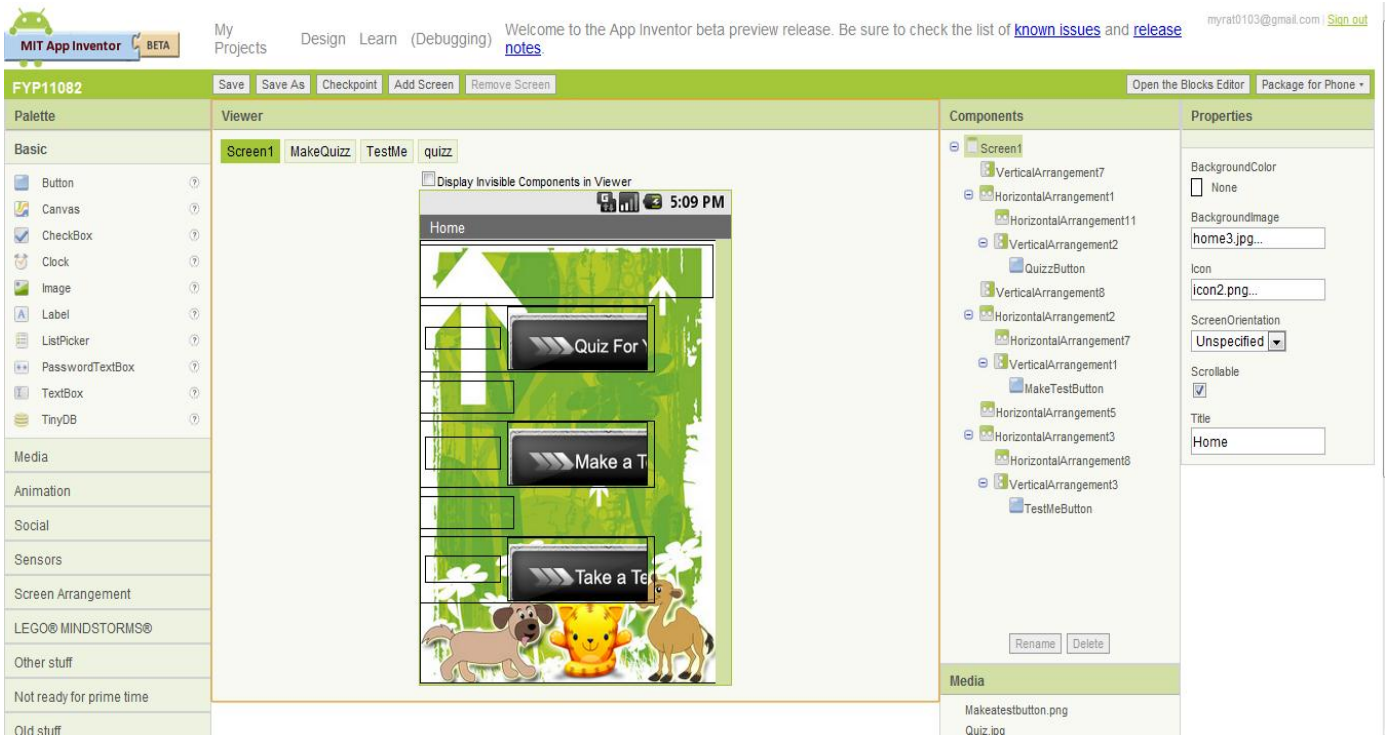


Figure 13: Application Designing App Inventor

5.3.2 Development in App Inventor Blocks Editor

The blocks editor uses the Open Blocks Java library for creating visual blocks programming languages. Open Blocks is distributed by the Massachusetts Institute of Technology's Scheller Teacher Education Program (STEP) and derives from master's thesis research by Ricarose Roque. Professor Eric Klopfer and Daniel Wendel of the Scheller Program supported the distribution of Open Blocks under the MIT License [14]. Open Blocks visual programming is closely related to the StarLogo TNG, a project of the Klopfer's STEP, and Scratch, a project of the MIT Media Laboratory's Lifelong Kindergarten Group. These projects are themselves informed by constructionist learning theories, which emphasizes that programming can be a vehicle for engaging powerful ideas through active learning.

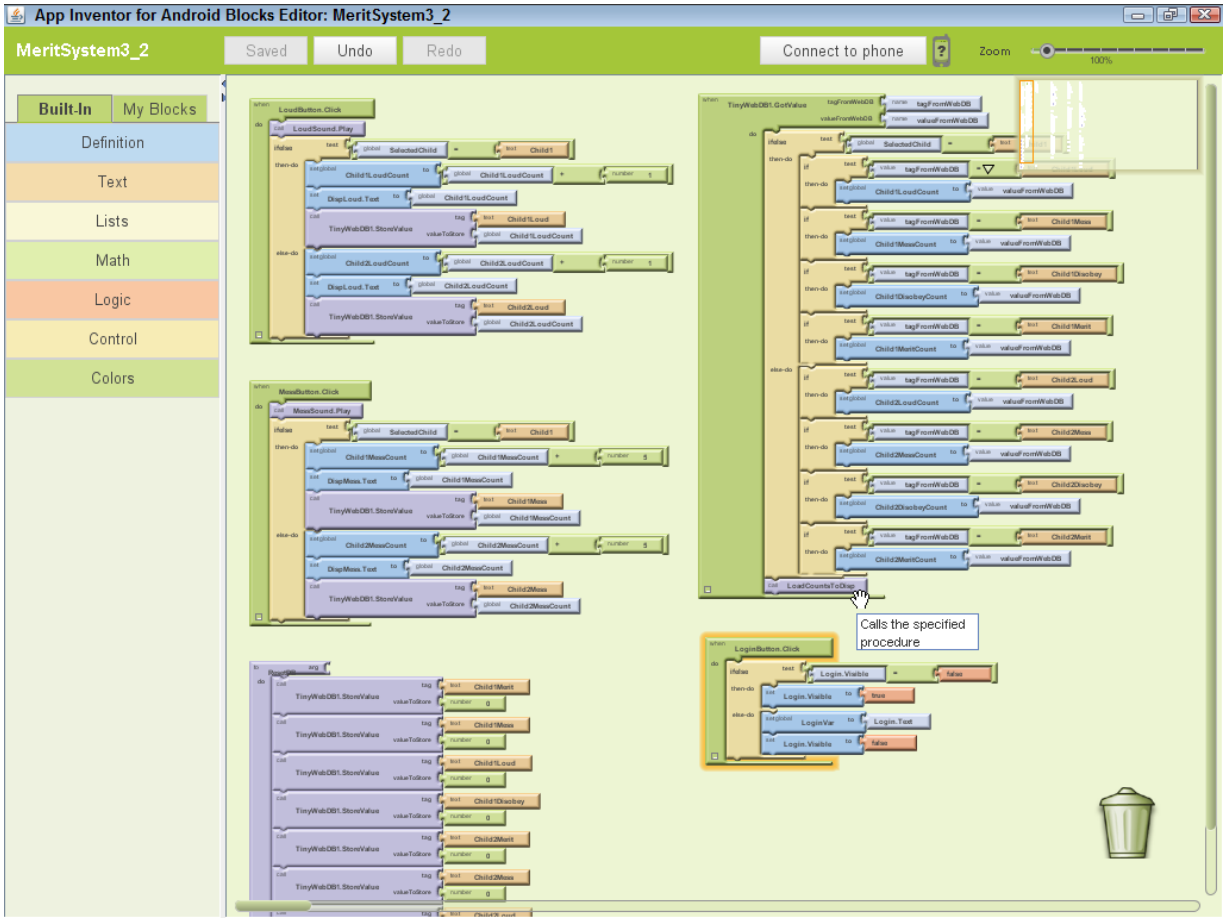


Figure 14: Interface of App Inventor's Block editor

The compiler that translates the visual blocks language for implementation on Android uses the Kawa language framework and Kawa's dialect of the Scheme programming language [15].

5.3.2.1 Phase 2: Assembling program blocks

In assembling program blocks the Designer is one of three key tools you'll use in creating android application. The second is the Blocks Editor. The third is the phone or emulator. Blocks Editor is used to assign behaviors to your components, such as what should happen when the user of your app taps a button or image.

The App Inventor Blocks Editor runs in a separate window, which is not opened in the browser. When you click Open the blocks editor from the Designer window, the Blocks Editor's Java program file should download and run.

It's advised to run emulator or connect phone to the PC after that click on "Connect to device" button, which will load your software onto the screen of your emulator or phone, where you will be able to test it simultaneously in the process of development. Your developing application will be appearing on the phone or emulator screen step-by-step as the pieces are added to it. When development is of application is finished producing a stand-alone application for installation is possible. Several options are available too, either to download to PC or send the application directly into the phone's memory and install there.

5.4 INTEGRATION AND TESTING

After Block in Block editor were assigned with its tasks, developer can review outlook of his application in the emulator and test it. In emulator you can test everything, including the tiny database, media player that plays sounds and music, button press, finger swipe and many others. However the only minor problem that author has encountered is switching between multiple screens, which currently lags and doesn't work in Emulator. But after installing software into the phone, everything works perfectly

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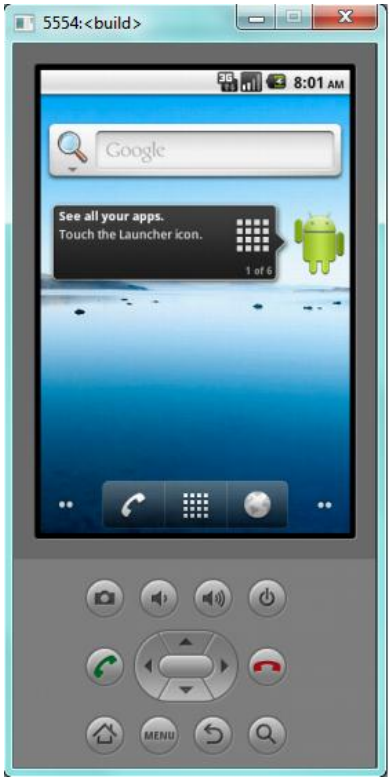


Figure 15: App Inventor's Android phone emulator

App Inventor lets you develop applications for Android phones using a web browser and either a connected phone or emulator. The App Inventor servers store your work and help you keep track of your projects.

5.5 INSTALLATION AND ACCEPTANCE

After the application was installed in to the phone, below are three screenshots of the main screen and the screen for choosing category of the "Quiz for You"

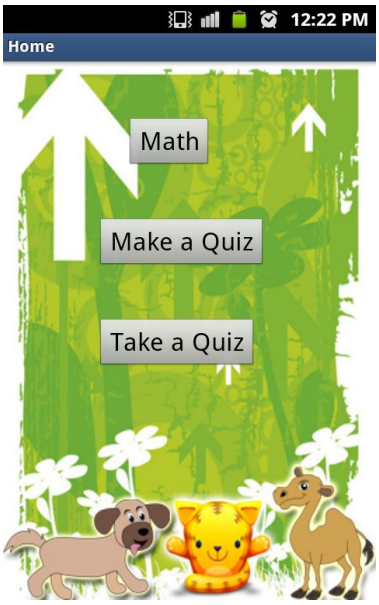


Figure 16: Main screen of the application

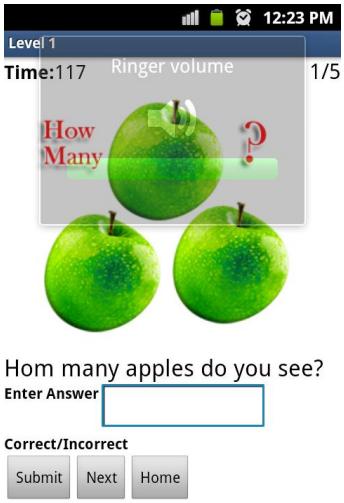


Figure 17: Screen for chosen category of the Quiz for You

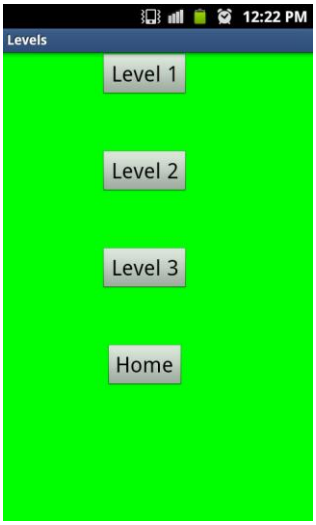


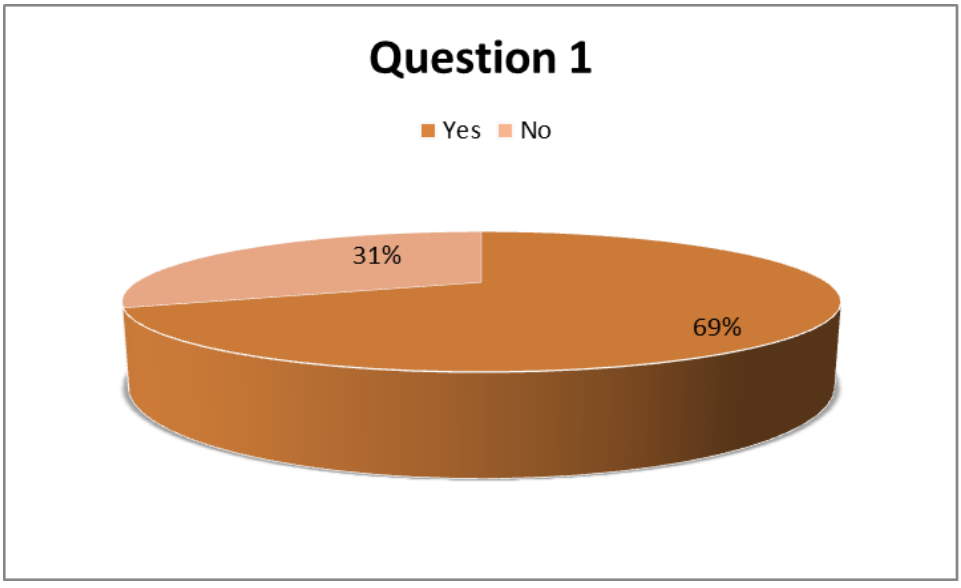
Figure 18: Screen for chosen category of the Levels

5.6 QUESTIONNAIRE BASED SURVEY ANALYSIS

Questionnaire with questions below was distributed to the group of Kids who in the age of 4-5. Targeted group was kids of university stuff and those kids whose parents work at V5 shops and cafeterias. Total there were 14 interviewed children. Questions were simple and the answers were based only on "Yes" and "No"

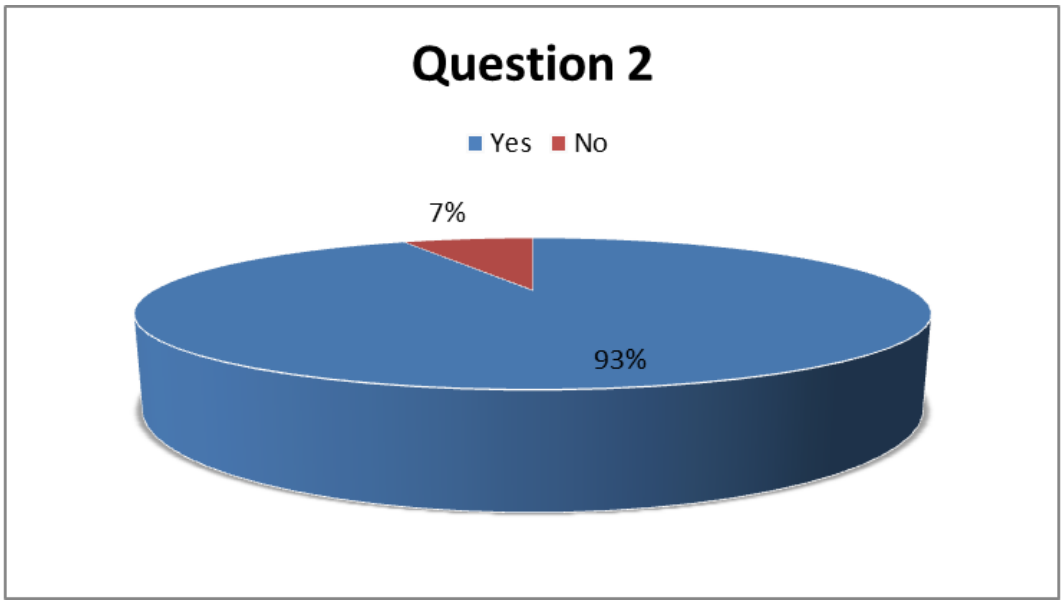
Questions of the interview:

1. Do you have mobile phone or your parents with Android OS or your parents? (such as HTC, Samsung, Motorola, and etc.)



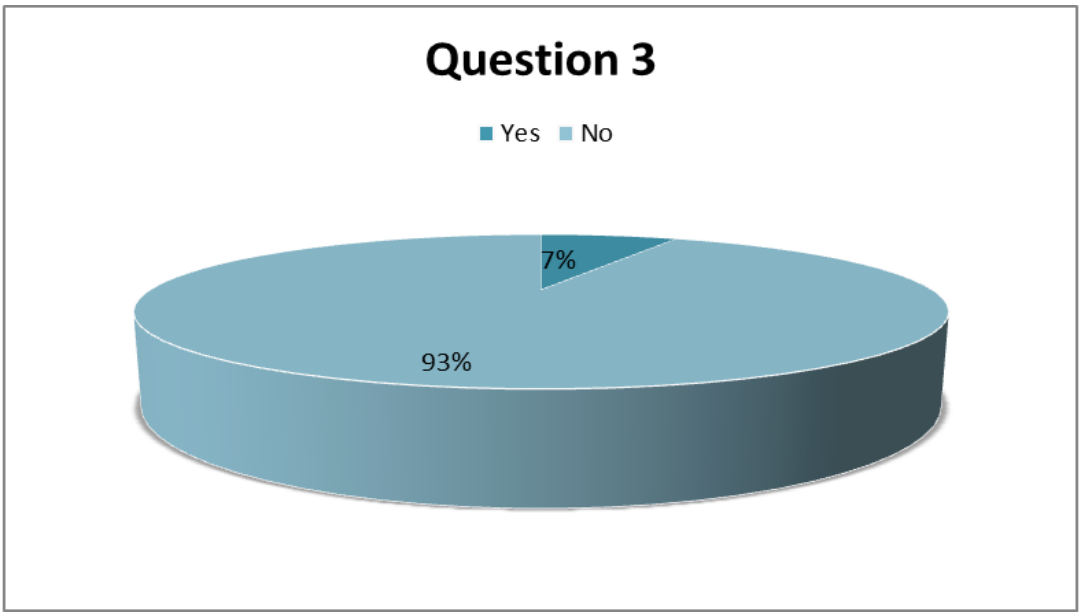
69% of the interviewed children are having or their parents have mobile phones with Android OS, while others are using phones such as Apple, Nokia running iOS, Symbian or Windows Mobile

2. Do you like learning math?



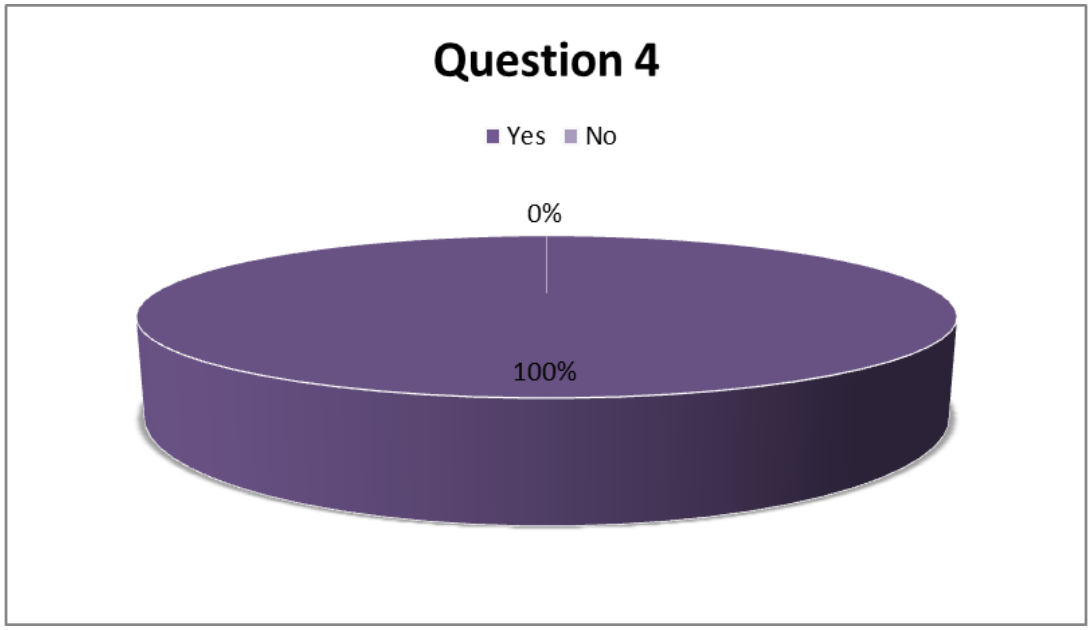
93% of the interviewed kids are really like to learn math at school and kinder gardens, because they think it's cool. Only one kid (7%) said he is boring and difficult.

3. Do you want to attend additional classes and pay for that?



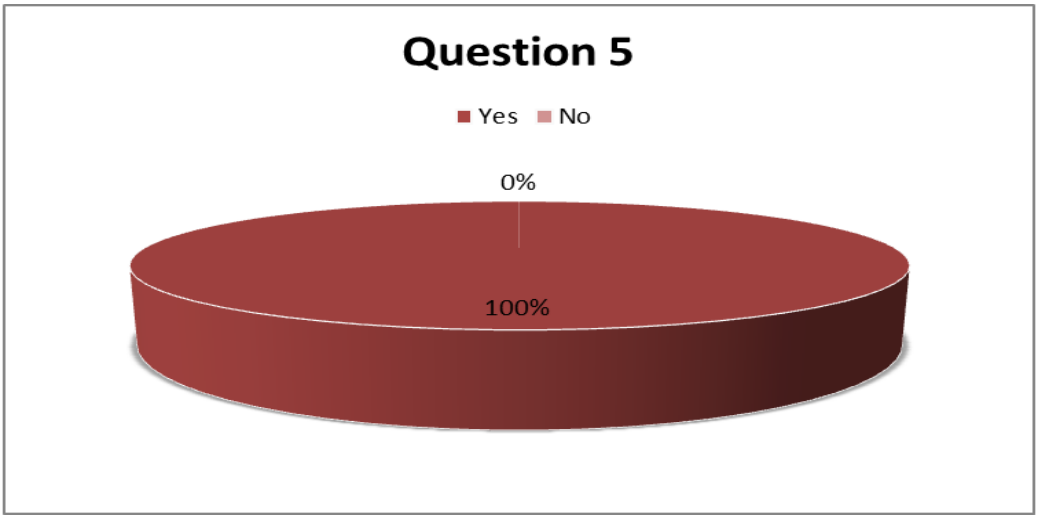
93% of the interviewed kids are not willing to go for extra classes learning math and don't have enough time for that, due to their childhood. They need to allocate more time on spending time with friends.

4. Will you use your mobile device for learning and practicing Math fast and free?



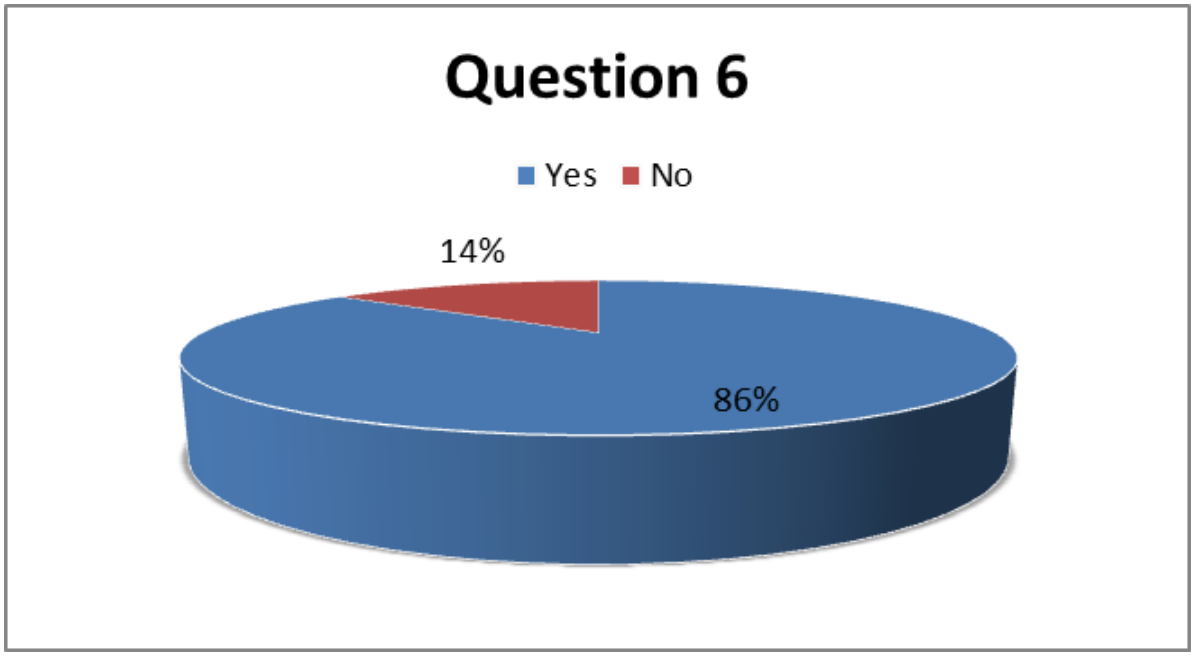
100% of the interviewed kids are willing learn and practice Math if it's based on mobile learning and free.

5. Do you think that graphical interface will help you in learning?



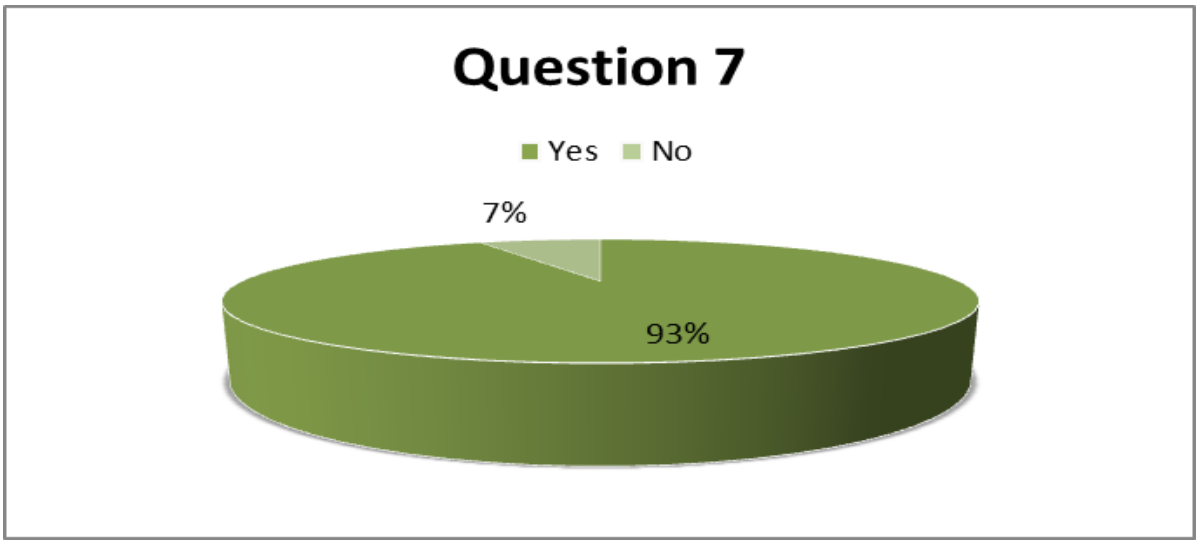
100% of the interviewed children think that clear graphics and image representation of some objects will add more usability and make math more fun compared to reading notes and books.

6. Do you think that exercises written in letters and used graphical objects will help you to understand Math?



86% of the interviewed students agreed that letters and used graphical objects will help you to understand Math. Kids think it's fun when they can visualize the objects and perform math on them.

7. Do you think similar application will be useful for you while traveling and exercising with other kids, to show them your knowledge and share it with them?



93% of the interviewed children think that it will be really helpful to have application with you while traveling. They think app will help them to enjoy the trip and make best use of it by practicing math home works. Also they can share achieved results with other kids.

CHAPTER 4: RESULTS AND DISCUSSIONS

1. Mobile-Math Learning/Practicing Theory

Mobile-Math Learning/Practicing theory was successfully implemented in the development application. Behaviorism includes the principles such as basic logic learning, acting, thinking, and feeling. So thinking and using basic logic is habit-formation, mistakes are bad and should be avoided, as they make bad habits, math skills are learned more effectively if they are presented with aid of objects first, then in written form for practicing purposes, analogy is a better foundation for math learning than analysis and the meanings of numbers or formulas can be learned only by practicing them more often.

Behaviorism- Behaviorism (or behaviourism), also called the learning perspective (where any physical action is a behavior), is a philosophy of psychology based on the proposition that all things that organisms do—including acting, thinking, and feeling—can and should be regarded as behaviors [17]

Analogy- is a cognitive process of transferring information or meaning from a particular subject (the analogue or source) to another particular subject (the target), and a linguistic expression corresponding to such a process. [16]

Typical procedure of math learning/practicing method through mobile technologies was implemented in the developed software, which carry outs followings:

- ✓ User (kid) sees and objects exercise
- ✓ User (kid) gets different exercises
- ✓ Exercises can be updated changed
- ✓ Mini timer is running in each exercise.
- ✓ Parents/Teachers can interact with kids

2. Deliverable application interfaces

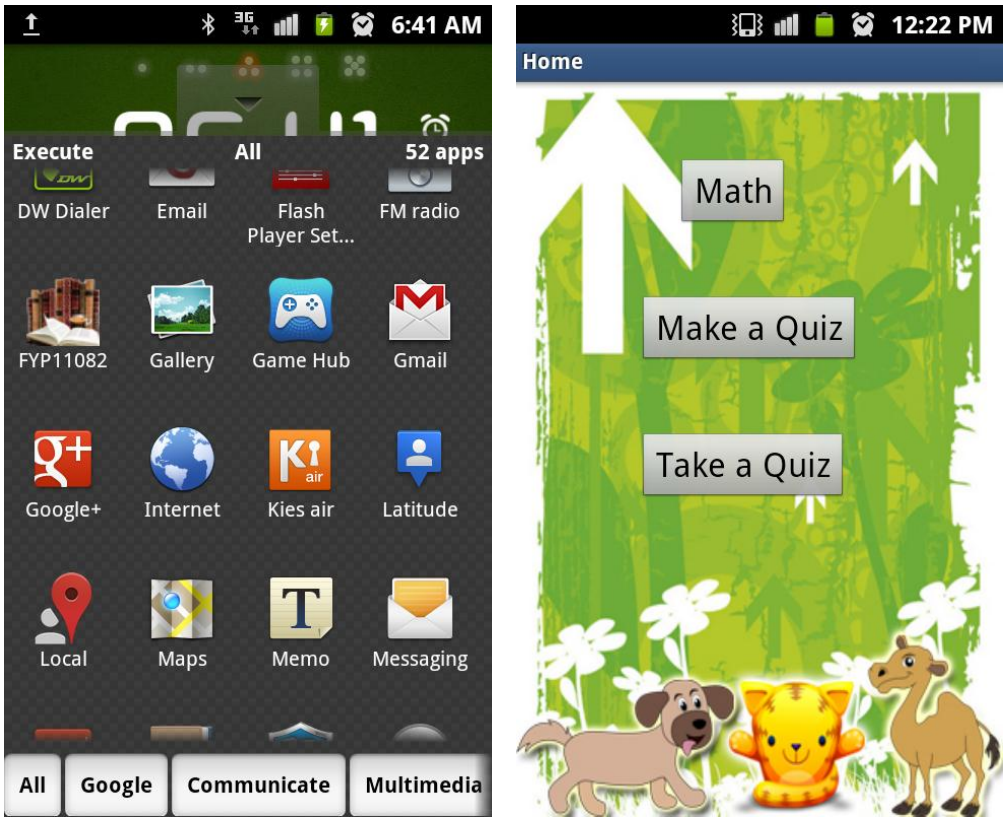


Figure 19: Main screen of the application

In this screen users (kid) can choose one of the any categories: Quiz for you or Take a Test.

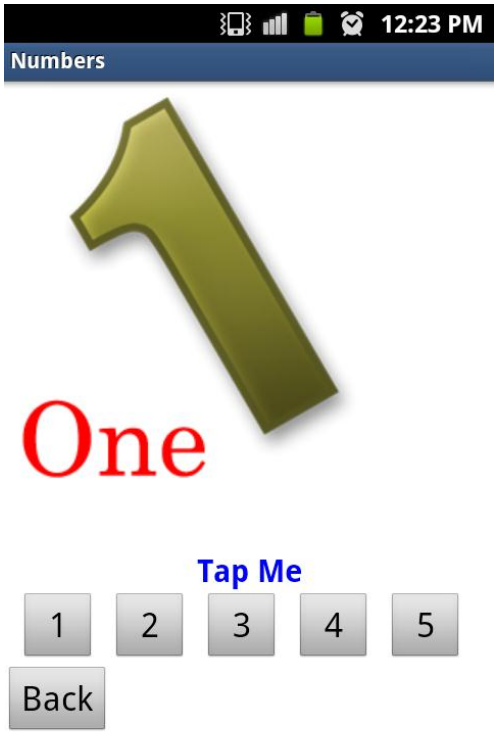


Figure 20: Learning of numbers by sound and written form

In this screen users (kid) can see given exercises and submit the answers for them

Figure 21: Screen with a popup (correct)

In this screen user (kid) will get popup message that tells the answer is (Correct)

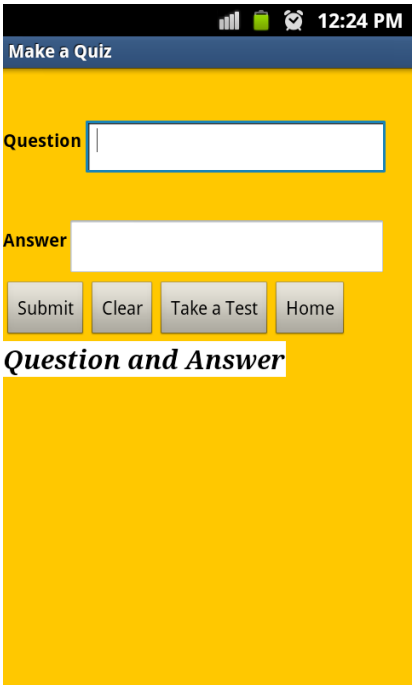


Figure 22: Screen of category 2 (Make a Test)

In this screen, user (parents, teachers, kid) can make his/her own set of question which will be submitted and stored in database.

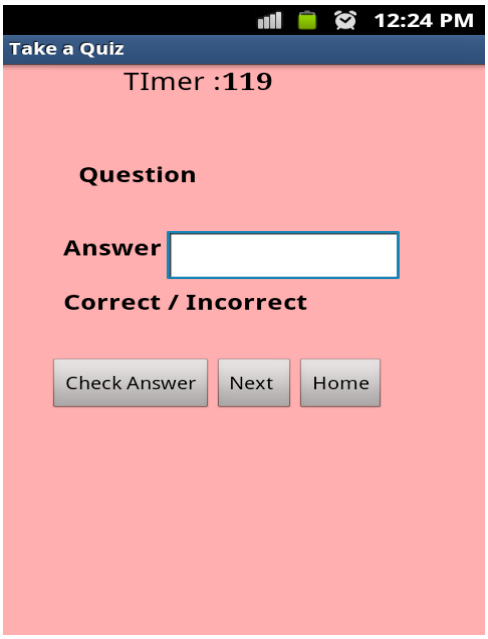


Figure 23: Screen of category 3 (Test Me)

In this screen user (Kid) can see the question that has been created by him/her or parents, teachers. Question will be retrieved from database.

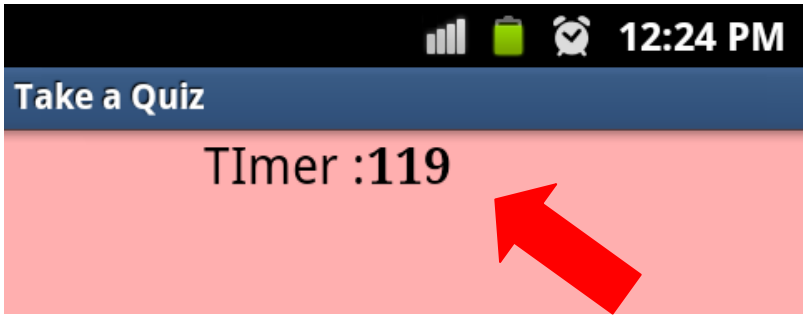


Figure 24: Screen indicates mini timer

In this screen user (Kid) can see the mini timer that gives to user 2 minutes (120 sek) to submit the answer.

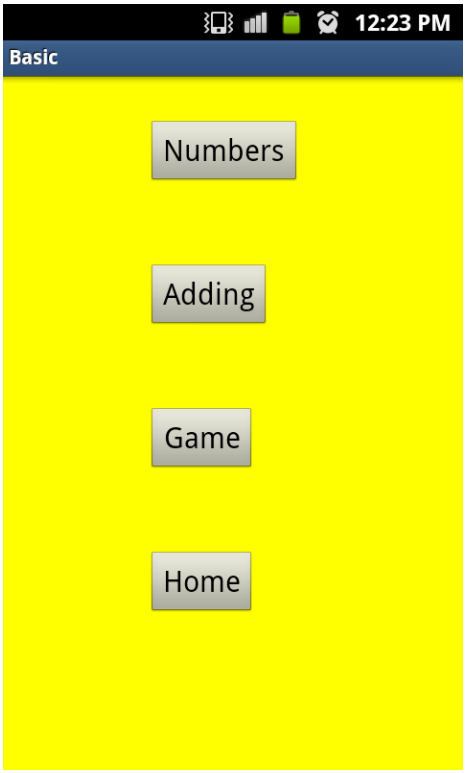
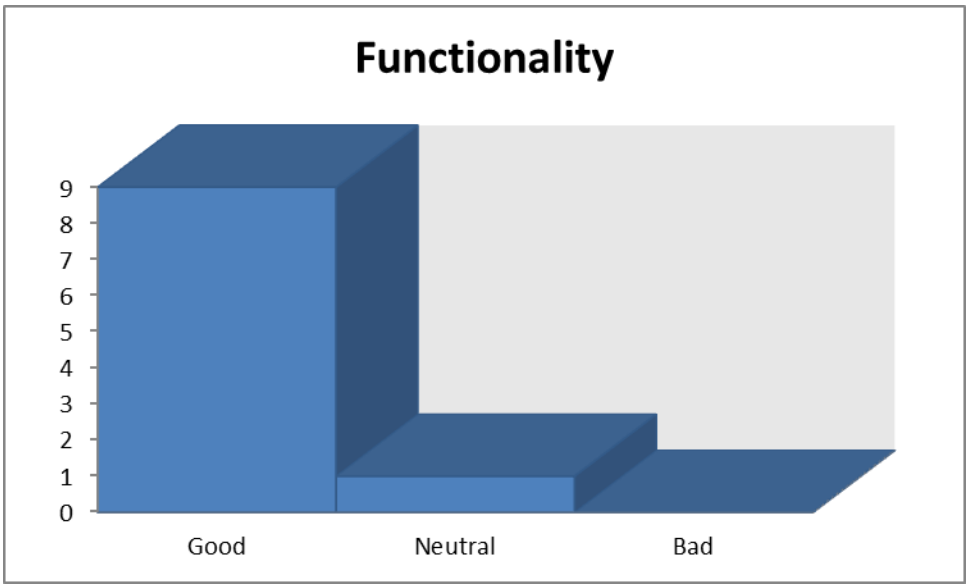


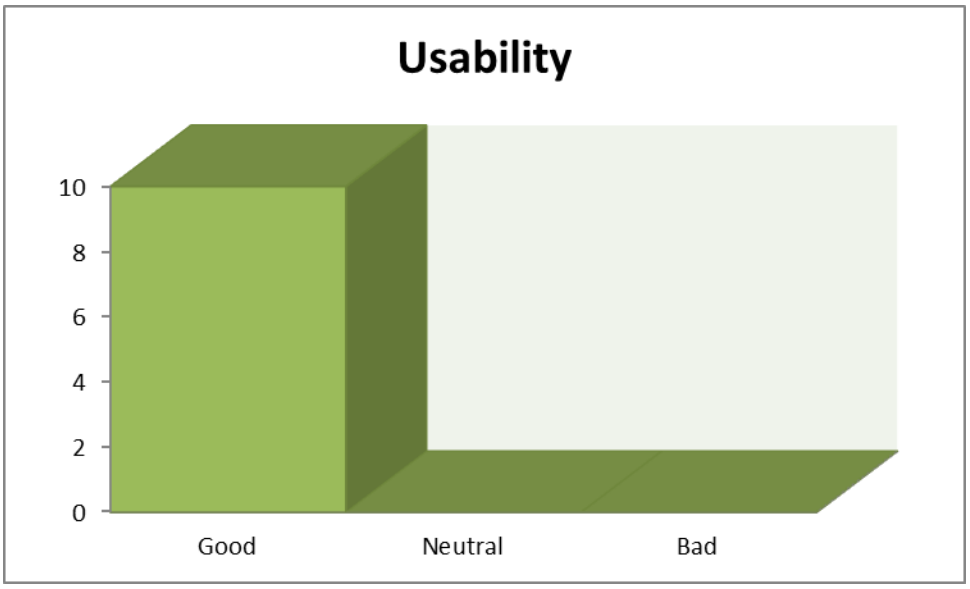
Figure 25: Level 1 (Basics)

3. User testing results

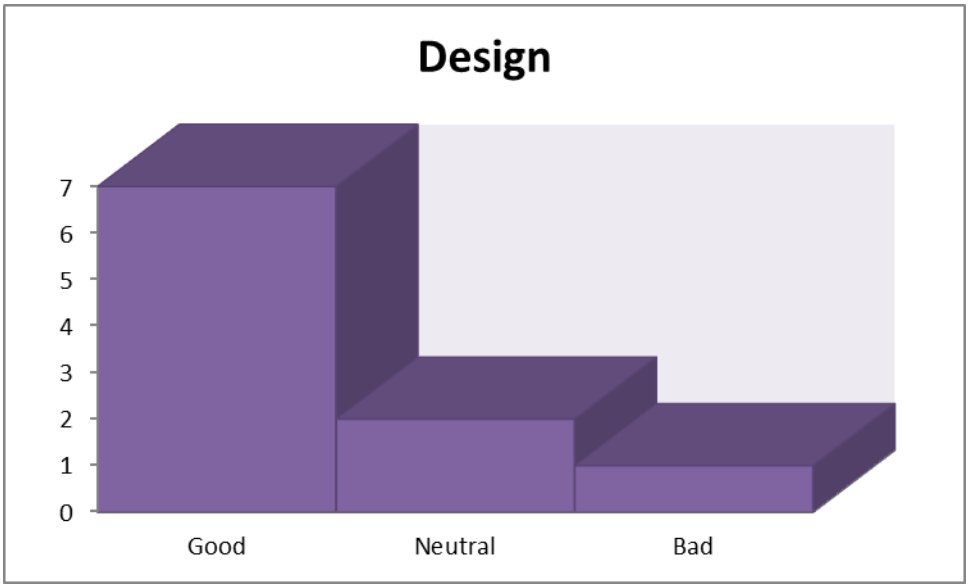
For testing purposes total 10 kids were involved.



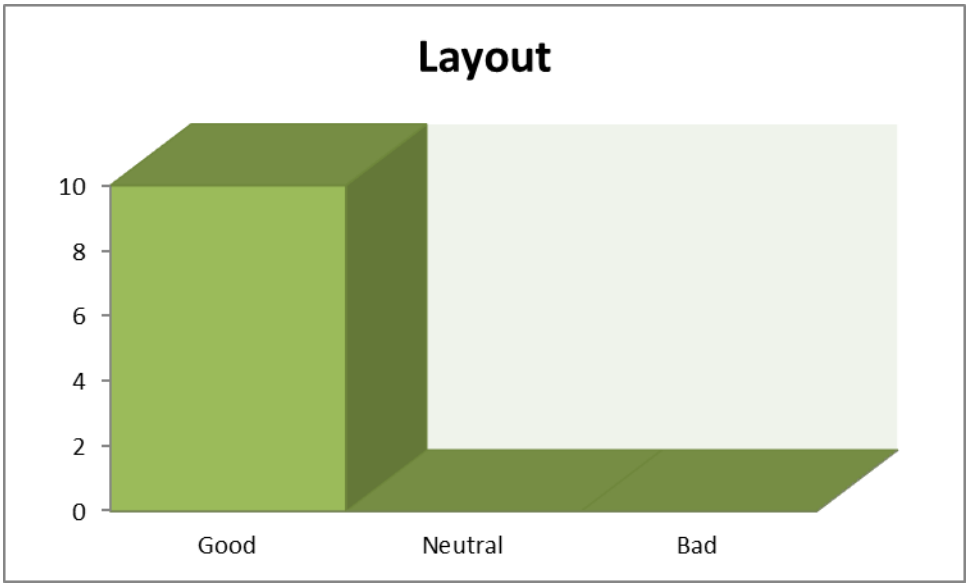
9 kids reported application's good functionality, while one of the kids was looking for more features, thus he voted as Neutral



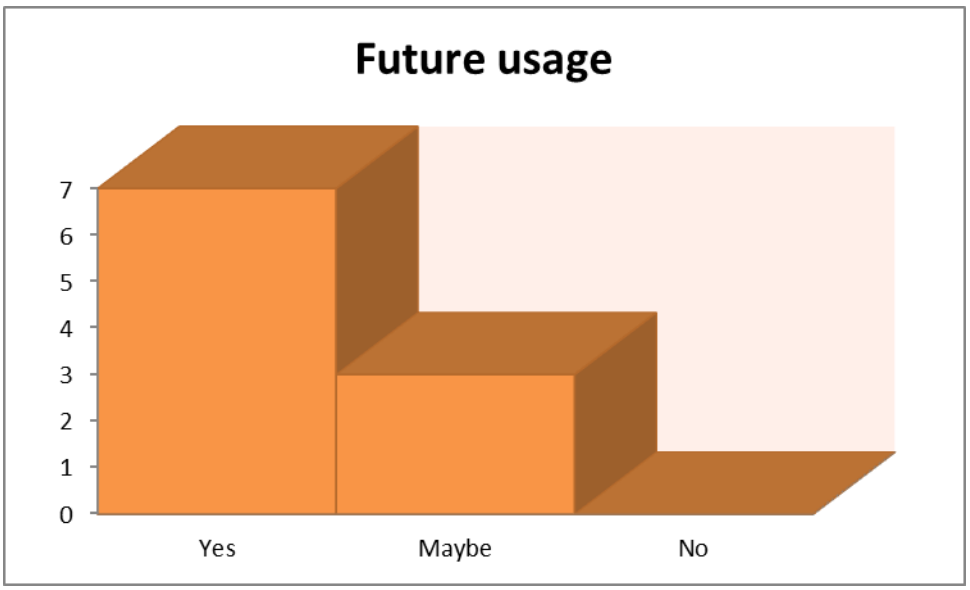
All 10 children reported good usability of the software with clearly drawn buttons and simple interface that can be understood intuitively.



7/10 kids reported good usability of the software, 2 people stayed neutral and only one didn't liked simple buttons of the Make a Test section. Comments were as follows: clearly drawn buttons, eye-pleasing interface, big sized buttons and easily seen writing.



10/10 children reported good layout of the software. All the buttons and sub-screens are designed consistently, simple to press and operate.



7 out of 10 kids reported that they will be using Mobile Math learning tool in the future for improving their knowledge in Math. 3 kids stood Neutral commenting as they are currently do not see any perspectives of learning math or paying much attention to that matter, but if in the future they might need it then they might change their minds.

According to the statistics above, 70% of the users will be using and 30% haven't made any "stable" decision yet.

CHAPTER 5: CONCLUSION AND RECOMMENDATION

1. Conclusion

Mobile- Math Learning/Practicing Tool that is using Deductive- Inductive methods and theories can definitely benefit the society, especially individuals that are willing to acquire to improve their math skills but do not have enough time or resources to provide their studies. With mobile learning and Android technologies, borders of inability were erased by chance of learning "on the go" with little time spent on learning process. This will more benefit people, who are travelling or don't have enough time to spend on math practices, and especially for those kids who thinks math is boring. As the testing successfully passed, Mobile-Math Learning/ Practicing Tool can be successfully launched into the Google Play (Android Market) totally for FREE.

2. Recommendations

Mobile-Math Learning/ Practicing Tool can be given some name or label that will be easy-remembering and sounding.

Another recommendation is more exercise categories can be added and current categories upgraded with more pictures. It would be useful for a learner who can include communicative-competence approach while practicing the Math. It would be the best if kid can communicate with his friends through this app such as posting results or comments in Twitter or Facebook.

If the technology will grow well enough and speech-recognizing synthesis will be properly developed speech-recognizing function will be useful. Especially when user tired of typing and instead of typing can actually speak to device and store the exercise question in database. The record will be played by the mobile phone and user repeats it, to make sure the question is sored correctly; synthesis will make sure that speech is clear for the devise to understand.

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