USING ACTIONSCRIPT 3.00 TO DEVELOP AN ANDROID APPLICATION FOR MATHEMATICS COURSE

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Abstract: *This study aims at designing an android application for mathematics course in primary schools. This application is mainly designed to help learners to learn and examine their cognitive and performance skills in mathematics. It also provides them with a chance to compete with their classmates. Through this application, learning mathematics will be available anytime and everywhere. This research is built on a case study to show how an android application can be helpful. Actioscript 3.00 code snippets by adobe for air is used to build the application. This research represents a case study that shows how this application was used effectively to support the activities in undergraduate level classes. Results indicate the effectiveness of using this current application in developing cognitive and performance skills in mathematics for students.*

Key Words*: Android, Actionscript 3.00, Mathematics Course, M-learning, Primary school.*

1. Introduction

The communication and information technology has recently witnessed rapid developments and direct impact of the digital revolution. Moreover, it has contributed in developing many fields effectively. Education is not standing in isolation from this development and it is affected influenced significantly by these developments [14][3].

Technology has many forms as computer web technology, and educational communication technology, which affect the education field. Consequently, the innovation of the technology has been used widely in education. The education technology is an integrated process involving educational theories, ideas and applications, which help in using new technological methods [9].

The education technology plays the role of the guide who helps in explaining the content to the students instead of the traditional method for learning. Furthermore, both the teacher and the learner consider it as a rich resource for the information, which is needed [6].

M-learning aims is intended for the student, not the teacher, the center of the educational process. It helps students to learn effectively and efficiently because it depends on self learning. Moreover,it makes communication with the teacher easy at any time and this helps in accomplishing many educational tasks [4]. Mobile learing (M-learning) allows the teacher to control the student at any time through GPS technology, as he can specify their location through receiving signals to locate students [11].

Smart devices can be used in education effectively. We can use them to surf the internet. They can also use the materials presented on the smart board. Free SMS applications and programs are effective in establishing chart rooms or sharing educational videos with others. There are also many programs and applications that help learners organize their work and remind them of urgent tasks [15] [17].
Android system is considered the most prevalent in the world because it has an open source system based on three object oriented programming language C, C++ and JAVA [5].

Android operating system is based on Linux kernel. It has been designed for the devices with the touch screen as smart phones and tablets. Therefore, Google bought it from the developer in 2005. This system has become the most common one an mobile market as there are more than billion android devices that are used now by 64% according to statistics of 2013 [12].

Therefore, the schools and universities start using the smart devices, which are based on the android platform in educational systems seeking to achieve educational goals as: [7] [8]
- Defining the abstract theoritical concepts.
- Developing the mental skills for students.
- Creating positive environements which stimulate students to discover the curriculum on their own.

Moreover, the use of tablet devices that are using an android operating system offers a lot of potential, which will help the teacher to broadcast lectures and discussions to students regardless of the place of the students. The students can interact with each other's and with the teacher by using an android applications [16][2].

In this research, we try to develop an E- learning application for primary school pupils using Android platform using Actionscript 3.00 code (is the object oriented programming language for Adobe AIR runtime environments) . This application is a touch-based application that helps students to learn subject and getting to compete with classmate. It helps students to learn anytime and anywhere in or outside of the classroom. The system will be constructed using (Actionscript 3.00) code snappiest using Adobe for Air Application.

2. Problem Definition

The scientific progress and the technological development transfer the world to a mobile era where the technological devices move with the individual as they can be carried or put in the pockets. As a result of this transmission, the smart phones have been employed in education and the governments have tried to use this technology in their educational systems.

Although many schools already use some mobile applications to teach math. The teachers have used the application that is run using screen capture technology. It is used in preparing the lessons as a method for clarifying and explaining on android devices some example for this application are explain UTGREAT, EXPLAIN EVERYTHING, LENSOO and QUIZLET application .These applications are similar to the smart board and there is no mentioned difference between them, but these applications couldn't achieve the interaction between the learner and the teacher.

The results of the survey confirm that those ready applications (UTGREAT, EXPLAIN EVERYTHING, LENSOO, and QUIZLET) don't increase the motivation of the student toward learning. According to the explanation above the current research, aims to develop an E- learning application for primary school pupils using Android platform using Actionscript 3.00 code to resolves the problems.

3. Research Hypotheses

- Using an Actionscript 3.00 for building an Android application is effective in providing mathematic courses for the students.
- There is a significant statistical difference at a significance level (>0.05) between the mean scores of the (experimental group) and the (control group) in the cognitive achievement after teaching mathematics course using an android application.
- There is a significant statistical difference at a significance level (>0.05) between the mean scores of the (experimental group) and the (control group) in the skillful performance in mathematics after teaching course using an android application.

4. Proposed System Design And Methodology

In this researcher, we used the experimental method in the design of the two quasi-experimental groups of study to assess the impact of the independent variable, a method of teaching-learning using the mobile on the two variables, namely: academic achievement and practical skills in the mathematics course and the achievement of the primary school students. *Fig. 1* shows the android applications using basic component.
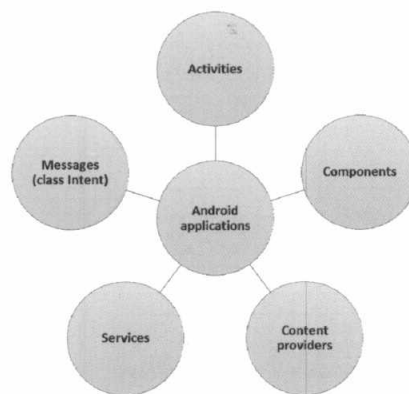

Figure.1 Android applications using basic components

4.1 System Design

4.1.1 Configuring the Android SDK

The integrated development environment (IDE) should be uploaded out of eclipse program. Eclipse IDE for java developers has been downloaded and windows operating system has been chosen from http://developer.android.com. Emulator simulator has been downloaded out of android SDK (Software Development Kit) and AVD (Android Video Download) manager. To run an android application and APK file. It must be download development package from android SDK from http://developer.android.com/SDK and it must extracted files from the package after download SDK. Through the folder SDK, run AVD manager and open SDK run DDMS (Dalvik Debug Monitor Server) it helps to run an android application on your desktop and on play store. The next step before you even get to installation is to ensure that you have the latest Java Developer Kit (JDK).

4.1.2 Install AIR Application

Adobe AIR provides developers with an environment that allows them to program software and Web applications running on the desktop and out of the web browser. It is a multi-platform application and AIR application is very important to design and deploy Android applications deployed across the Google Store. *Fig. 2* shows the steps of system design and installation.
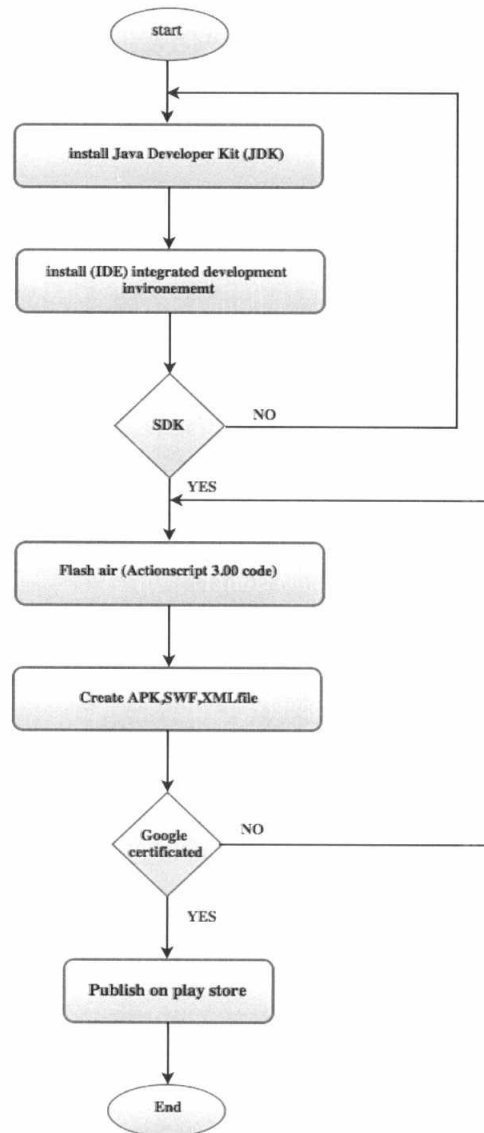
Figure. 2 Android system design.

4.1.3   Designing the Structure of the Program.

- **Determining the learning topics**:

with the help of the teacher and students results in the previous exams, the learning topic was specified the special unit was specified to be the learning topic, which will be used in this research.

- **Analyzing the subject content**:

the study unit content was organized after consulting the professionals in this field to express their opinions in determining the content. The contents were divided into simple points expressing a related idea; the language of the content should be clear and simple for all ages.

- **Determining the educational objectives of the program**:

the educational goals represent the basic start for designing the lesson, so it has a connection with the content and its organizing style. They also helps in making evaluation continuously. The educational goals were sorted and divided into three departments:
- The cognitive goals, which deal with the information and the facts.
- The psychomotor goals, which deal with the manual skills.
- The sentimental goals, which deal with the values and the attitudes.

- **Writing the content of the program**:

writing the scientific content for the program. The scientific content of the program comprises of an introduction, homepage and the main, the subpages for the program. It grew into account making links between the main topics, and subtopics, some information and explanation about the program were provided.

- **Writing the codes of the program**:

writing the programing code after the scientific content of the program had been written and putting the appropriate scenario and consulting the arbitrators the code was written according to their opinions. Fig.3 Summarizes the main steps of Educational content design, which are used in this research. It includes the stages of the research procedure. The first stage is content analysis that deals with analysis and appreciating the learner's needs and goals. Second stage is design stage that deals with determining the educational features for the application. It comprises two stages, the development phase and the implementation phase, the former concerns with designing a flowchart to illustrate algorithm of solving the problem, and the later concerns with trying the application in the usage environment. Third stage is evaluation stage, it concerns with testing the application on the research sample to detect the errors and the problem has to deal with them before the starting of the final application for the research.
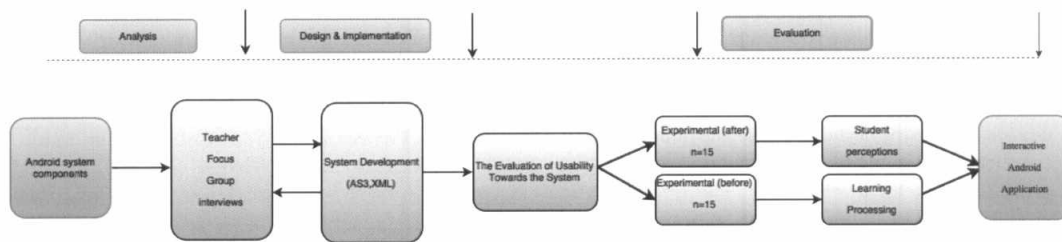

Figure.3 outline of the research procedure.

4.1.4 A lgorithm

For the algorithm, we have selected Actionscript 3.00 to be the language of problem solving. We have also used an application that presents a pattern, which uses external Actionscript 3.00 class files in flash and flex application. The algorithm has been built as shown in *fig.4* after the content is prepared and reviewed by a group of experts. *Fig 4* shows that content have been appears as a storyboard which explain the logical sequence of the steps. After the storyboard is examined, the application is ready for programing and writing the code. The main screen is designed as shown in *fig. 5*, subsequently, sub-screens are designed to show the explanation of the lessons which are comprised of (supplementary angle, adjacent angles, vertically angles, corresponding angles, alternate angles and interior angles) as shown in *fig. 6*. The main and the sub-screens are linked subsequently, by the way, which helps the student to navigate through the application. After linking the screen and testing them, the audio, video and animation files are processed and added to the content as shown in *fig. 7*. and *fig.8* The application is tested on desktop, published as APK file and uploaded on the playstore.

4.1.5 Publishing the Program on android devices.

We used flash CS6 to get a Google certificate to make the file and get air runtime from Google Android Market. The file was exported as APK file it must include SWF file and XML file. APK file had to be published into the computer desktop, copied on android devices and downloaded into android devices. *Fig. 9* shows steps, how to create APK file and publish it in play store.

5. Experimental Results

5.1 Participants

The study community is about 120 students from Alrass international school-Saudi Arabia, 40 of them were chosen randomly and were divided into two groups, the first (experimental) is also chosen randomly, The first group studied by using an android application. The second group (control group) studied by using the ready android application. Each group was 20 students.

After applying the proposed program on the research sample (20) students to test the hypotheses and the impact of the independent variable (the proposed program) on the dependent variable (student's cognitive achievement and skillful performance), *t-test* has been used to measure the level of the two groups before and after experimentation. The results indicate the following:

5.2 The first hypothesis

To verify the first hypothesis of the research, which provides for "Using an Actionscript 3.00 for building an Android application is effective in providing mathematic courses for the students". Descriptive analysis (M=mean, SD=standard deviation, Df = degrees of freedom) and *T-test* value was used to validate hypothesis and to assure the effectiveness .Table 1 show that:

The previous table clarifies a significant difference statistically between mean scores of the study group degree by using an android application this indicate that the second hypothesis of the study is confirmed, it confirm the effectiveness of the proposed program in knowledge' acquisition to the proposed unit for the students. The difference is essential as *t ((19,N=20)=24.33 p=0.05)*. This result is due to the ease of using the program for both the students and the teacher.
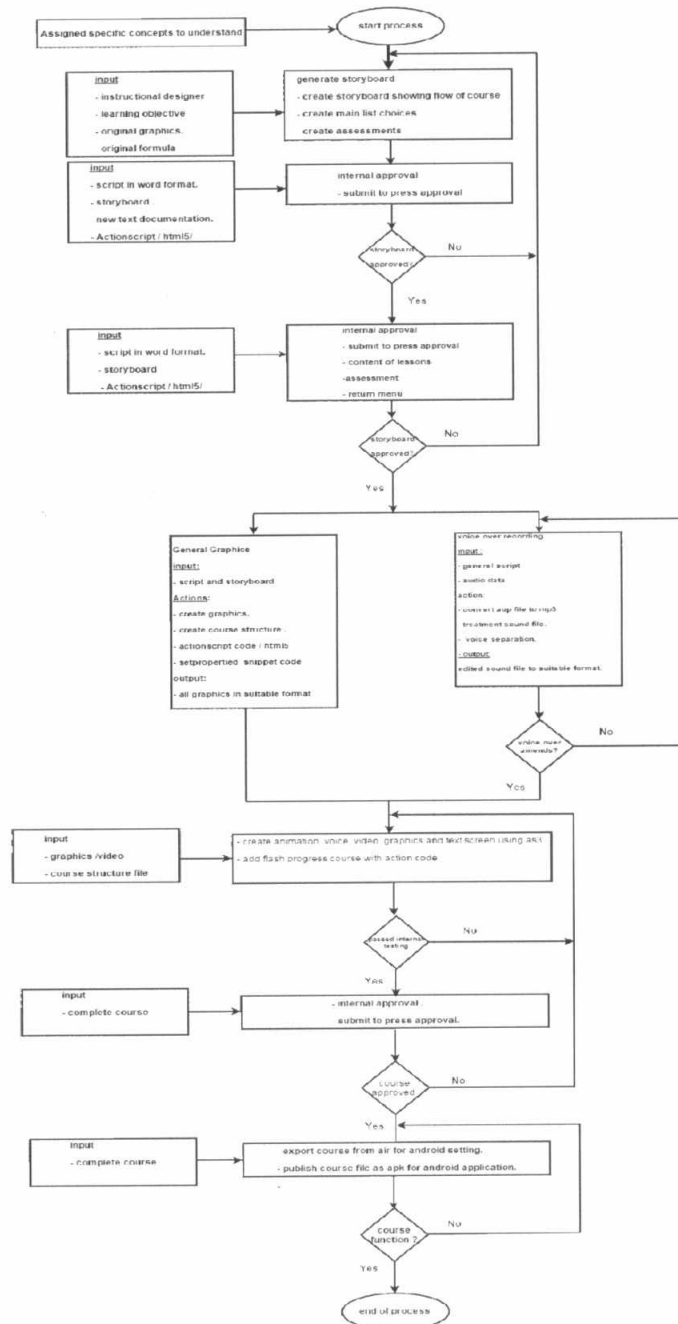
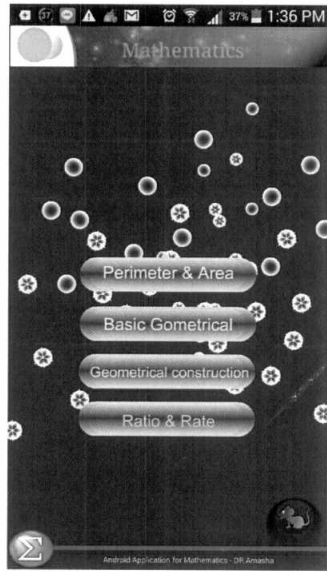Figure. 4 Overall flowchart of the proposed.

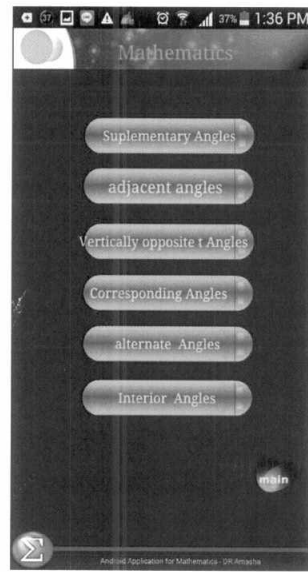Figure 5 Main components of program screen on an Android device
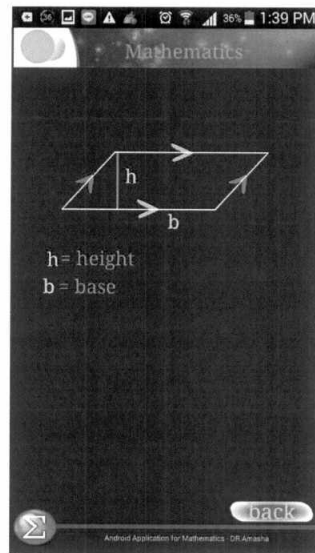

Figure 6 Types of angle on an Android device

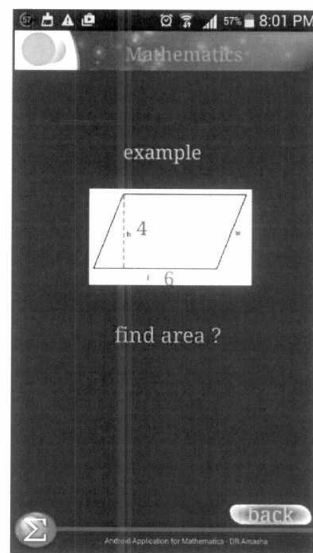Figure. 7 screen as shown on an Android device

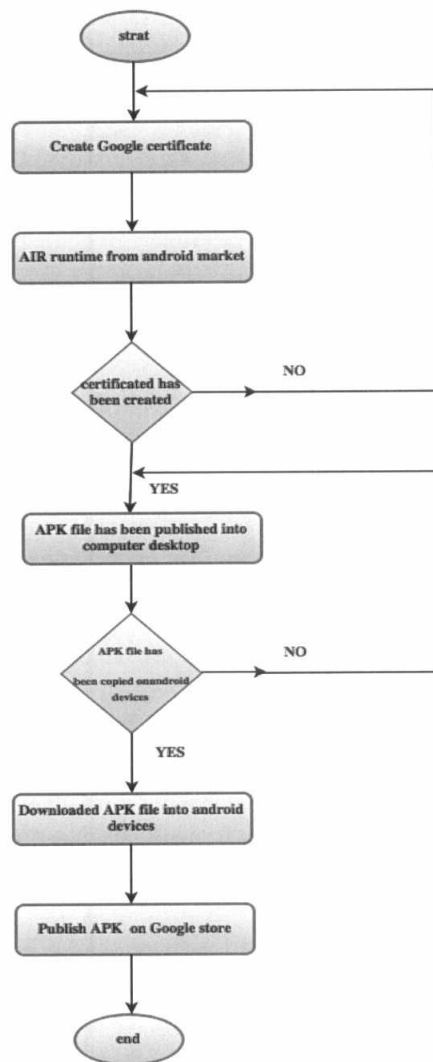Figure .8 Question screen as shown

Figure 9 the steps publishing the Program on android devices.

Table 1. The value of t-test for the statistical significance of means of the scores of the two groups.

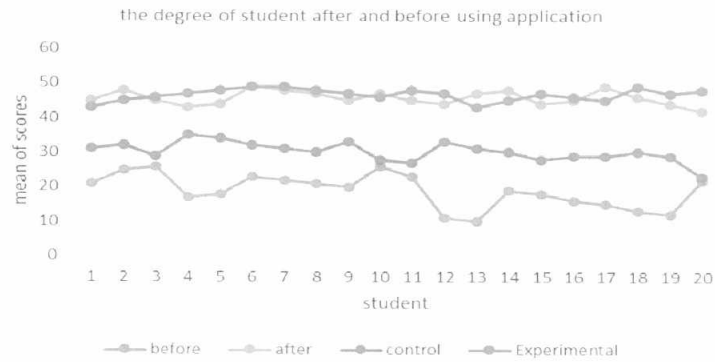| Group	M	SD	DF	t	Sig.
Experimental group (after)	45.75	2.03	19	24.33	0.000
Experimental group (before)	18.90	4.88			

*P <.05. **p<.01.

Figure.10   The degree of the experimental group after and before using the application

5.3 The second hypothesis

To verify the second hypothesis of the research, which provides for "There is a significant statistical difference at a significance level (> 0.05) between the mean scores of the experimental group and control group in the cognitive achievement after teaching mathematics course using an android application". *T-test* value was used to validate hypothesis and to assure the effectiveness .Table 2 show that:
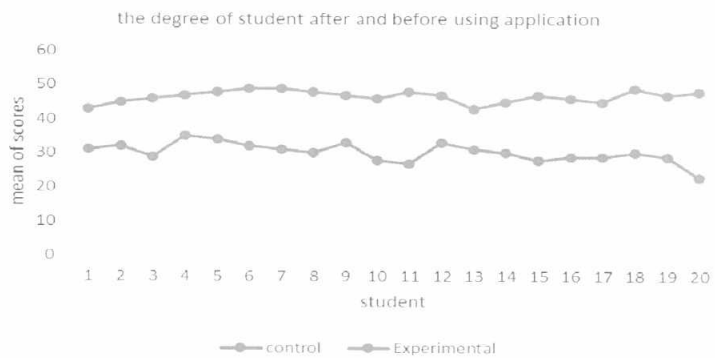

Table.2   The value of t-test for the statistical significance of means of the two groups

Group	M	SD	DF	t	Sig.
Experimental group	46.65	1.78			
group Control (traditional)	30.20	2.70	38	22.68	0.193

*P <.05. **p<.01.

The previous table clarifies a significant difference statistically between mean scores of the study group degree by using an android application this indicate that the second hypothesis of the study is confirmed, it confirm the effectiveness of the proposed program in knowledge' acquisition to the

proposed unit for the students. The difference is essential as t $((38,N=20)=22.68\ p=0.05)$. This result is due to the ease of using the program for both the students and the teacher.
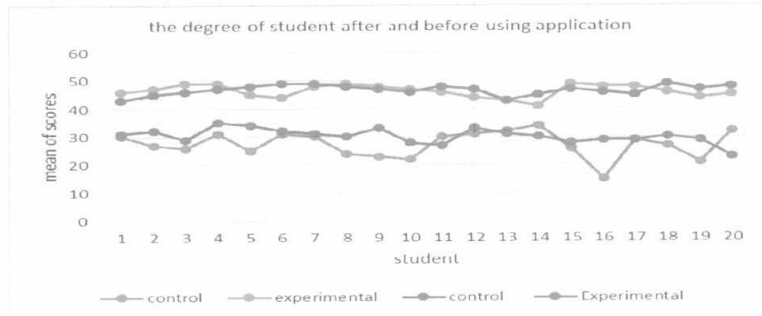

Figure. 11   the degree of students after and before using the android application (cognitive attainment).

5.4 The third hypothesis

To verify the third hypothesis of the research, which provides for "There is a significant statistical difference at a significance level (>0.05) between the mean scores of the experimental group and control group in the skillful performance in mathematics after teaching course using an android application". *T-test* value was used to validate hypothesis and to assure the effectiveness .Table 3 show that:

Table 3. The value of t-test for the statistical significance of means of the degree of the two groups.

Group	M	SD	DF	t	Sig.
Experimental group	46.30	2.29	38	16.36	0.000
group Control (traditional)	27.30	4.65			

*P <.05. **p<.01.

The previous table clarifies a significant difference statistically between mean scores of the study group degree by using an android application this indicate that the second hypothesis of the study is confirmed, it confirm the effectiveness of the proposed program in knowledge' acquisition to the proposed unit for the students. The difference is essential as t $((38,N=20)=\ 16.36\ p=0.05)$. This result is due to the ease of using the program for both the students and the teacher.
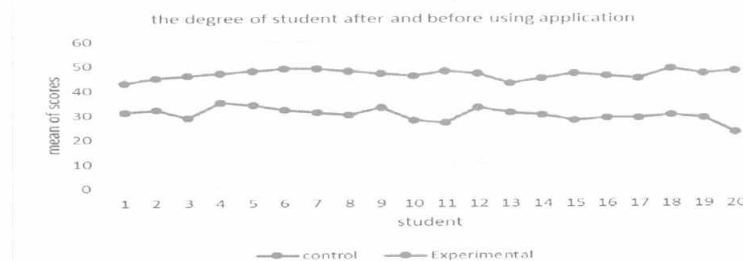

Figure. 12   the degree of students after and before using the application in cognitive achievement of skills.

6. Conclusion

The research aims developing an android application for primary school's student and then measuring its effectiveness on a sample of students in primary schools. This application helps students to identify the abstract theoretical concepts and create a positive environment which helps in conveying the information easily and simply this application also attract students to learn and develop their skill to learn and develop solving the complex mathematical problems and it helps in recognizing the 2D and 3D dimensions geometrical shapes easily. The results of the study indicate that there is an effectiveness for applying this program on students before and after the learning process, as it develops the cognitive and it develops the cognitive and the practical skills for the students. The study also observes the student's motivation toward learning even the weak students are attract to use application.

References

1. Aliff, N., Mohd Isa, H., & Azwin Arif, A. (2015). *Teachers acceptance of mobile learning for teaching and learning in islamic education: A Preliminary Study.* Turkish Online Journal of Distance Education (TOJDE)., *Vol. 16*(1), p184-192 . 9p.

2. Astra, I. Made (2015). *Development of an Android Application in the Form of a Simulation Lab as Learning Media for Senior High School Student,s* Eurasia Journal of Mathematics, Science & Technology Education, Vol. 11 Issue 5, p1081-1088. 8p.

3. David., R. (2013). *5 Solutions for Your Tablet Management Woes.* (cover story) . *T H E Journal, Vol. 40*(6), p14-20.

4. Dimitra , A., Dimitra , K., Anastasios , K., & Stavros , D. (2014). *Do your students get it? QuizIt the Android Classroom Response System.* IEEE Conference Publications (pp. 168 - 170). Athens: Advanced Learning Technologies (ICALT).

5. Dong, C. (2014). *Design and Implementation of Mobile Learning Terminal Platform of.* Advanced Materials Research Vols, 1044-1045, 1118-1121.

6. .Kuei-Ping, Shih; Hung-Chang, Chen; Chih-Yung, Chang; Tai-Chien, Kao;. (2010, may). The Development and Implementation of Scaffolding-Based Self-Regulated. *Educational Technology & Society, v13 n1*(1436-4522.), 80-93.

7. Goldsborough, R. (2014) . *android in the rise.* Tech Directions. May2014, Vol. 73 Issue 10, p12-12. 1p

8. Hsu, Yu-Chang (2012). *Empowering educators with Google's **Android** App Inventor: An online workshop in mobile app design,* British Journal of Educational Technology, Vol. 43 Issue 1, pE1-E5. 5p. 1

9. Orford, D., & Kefalidou, G. (2013). *Electronic lecturing and teaching aid using collaborative smart phones.* Science and Information Conference (SAI) (pp. 744 - 750). London: IEEE.

10. Linxandrou,r. & Maican,c.,(2014). *A model for comparative analysis of the similarity between android and ios operating systems* . Bulletin of the Transilvania University of Brasov. Series V: Economic Sciences, Vol. 7 Issue 2, p313-318. 6p.

11. Potts, J., Moore, N., & Sukittanon, S. (2011). *Developing mobile learning applications for electrical engineering courses.* IEEE (pp. 293 - 296). Nashville, TN: Southeastcon, 2011 Proceedings of IEEE .

12. Pacatilu, P.,(2011). *Developing Mobile Learning Applications for Android using Web,* ServicesInformatica Economica. Android (Operating System) ,Vol. 15 Issue 3, p163-171. 9p, 2011.

13. Shin, W. S., & Kang, M. (2015). *The Use of a Mobile Learning Management System at an Online University and Its Effect on Learning Satisfaction and Achievement.* International Review of Research in Open & Distance Learning, Vol. 16(3), p110-130. 21p.

14. SooHwan, K., HyeonCheol, K., & SeonKwan., H. (2013). *A development of learning widget on m-learning and e-learning environment*s. Behaviour & Information Technology, v32 n2, p190-202 .

15. Sue Byrd, S., Sarah Carver, W., & Joy Neal., S. (2010, May). Faculty Use of Tablet PCs in Teacher Education and K-12 Settings. *v54 n3* (8756-3894.), pp. p54-61 pp8.

16. Song Wei,(2013). *The Design and Implementation of a Mobile Learning Platform Based on Android*, Information Science and Cloud Computing Companion (ISCC-C), International Conference , Guangzhou , 7-8 Dec. 2013

17. Tom , C., Lindsay, B., & Sandra L., B. (2011, Sep). *Creating a Mobile Library Website. v31 n7* , p22-25.