

# M-Learning App (HessApp) to Enhance Pupils with particular emphasis on Arabic/Hindi Numerals

Mohammed Elbasheir<sup>1</sup>, Dr. Laurie Butgereit<sup>2</sup>

<sup>1</sup> Computer Science, Sudan University of Science and Technology, Computer Science and Information Technology, Khartoum, Khartoum, Sudan

<sup>2</sup> Computer Science, Nelson Mandela University / SIR Meraka / Cape-town, South Africa

## Abstract

The current paper discusses a scientific thesis that deals with how to design an application the promising HessApp which is technically complemented via smart cell phones. This program is expected to assist pupils of basic stage of first, second and third levels in working on counting's of simple Math process that use numbers between zero and nine. Combination process is used for instance. The study bases on an observation that Mathematical lessons especially its counting workings require somehow an easy way-out or a facility. The application notion implies establishing a competition among target pupils. It involves one selected counting process. Those target students are of the early classes of basic school: first, second and third year. This paper focuses on how the application HessApp is designed. Steps of programming it as a phone are illustrated explicitly. Even, the researcher features how pupils work on it. Exploring out why such a contributinal assistance the application HessApp is prepared, is the aim of this scientific paper. It is to create a helping device that is easy, accessible on phone for pupils. Communication service and internet spread support the idea. Seeking to find some solutions to those problems that allow supporting teaching through traditional ways; this is another influential reason. Beside, sticking to the student's mother tongue copes with their curriculum nature: habits, symbols, numbers, and Arabic language itself. The application content is used actually in Sudanese schools. It is out of point to use foreign numbers in an application that is expected to help pupils whom are only taught in Arabic. The significance of using such a beneficial app is that the pupils' teachers and their families can use and help in the whole procedure.

Keywords: *Learning, Education, Mobile learning, Mobile Applications, HessApp, Arabic Hindi Numerals, Sudan, Mobile.*

## 1. Introduction

### 1.1 E-learning and contemporary challenges of mobile applications

Throughout globalization time synchronizing with technological advancement that is rapped and progressing being experienced over the world recently, Arab peoples should know where there are amidst these industrial and

scientific accelerations especially in the fields of mobile applications. Thus, the traditional teaching approaches have been the followed way that is reliable in the Arab world which does not go with student/pupil's thinking as well as his teacher and in turn does not come with contemporary live in the time of knowledge and smart technologies.

Education through those old methods has not added any new educational value to the expected generations only because these ways cannot cope with the new ideology. Now that Arab World needs a raise in qualitatively and quantitatively for 20th-1st pupils and students. Since the educational level has been observed to be lowered comparing with the advanced nations. This is not only turned for Sudan but involves several Arab countries. Therefore, the researcher finds that the approach to applying supporting educational mechanisms for old educational methods such as smart education via exploiting cell phone applications which have been proved to have the ability to improve, support and build a perfect generation which represent the most important challenges that we must work on. Especially in the field of teaching mathematics in Arabic Hindi numerals. Arabic Hindi numerals that indicate numerals which look like{١٢٣٤٥٦٧٨٩٠} [1].

### 1.2 Electronic Education

There are two terms that are implicitly different: education and learning: with learning one can think, research, collaborate and interact with his milieu. Doing so, one can find needs whether with his teacher or males instead of that, environ where the only one sound that is heard is the teacher's voice; in traditional education where pupils listen often and the teacher speaks. So, in order to come out of our shell and mound above traditional education, a pupil should use the electronic education via supportive techniques as an inherent important part of the educational process.

Electronic education is exploitation of modern technical and technological devices in supporting learning and

making it available for educating pupils and students individually and in groups. First the techniques as mass media players and electronic sets that can be used in-class. It is coming out of education materials as virtual classes where educational process holders interact through as internet and the techniques of visual and interactive education. It is to claim that electronic education is done among three different environs: supportive web education, direct web education and mix-some web education [2].

It is always the case to use the label: electronic education instead of virtual education label. It is so because the electronic education type is similar to habitual education but it depends on electronic media devices. Therefore, electronic education is real not virtual. Dobbs and Philip argued, "Electronic education is a genuine one but he/she learns in an electronic environment" [3].

### 1.3 Why building, promoting and developing pupils' thinking using electronic education

Thinking is considered power base that a pupil grows-up with. Parents encourage their children to think. The same case is the teachers who ask students to think also so as to solve problems from childhood. During life, many problems spring out which require a one of several strategic devices and skills to solve and face such problems smartly and flexibly coping with time, environment that he live in [4].

There are two types of thinking: everyday habitual thinking. A pupil obtains it naturally during growth and maturity. It does not need any training or learning. The other type is the class-room's one. The skilful thinking, it needs training and learning. It does not happen but through daily contacts with experiences. It is similar to learning of swimming and mountain climbing. It leads and increases experiences and knowledge of pupils. It reflects a deep vision of our life phenomena. As well, it gives us fresh findings out and proofs, in turns, it provides with precise evaluation, and it produces ideas for wise decision-making[5].

## 2 Related Works

### 2.1 Dr Math: Electronic educate via mobile

Where the mobile technology is accessible everywhere and every time, the digital hub has been changing to be a characteristic concept, that is this alternative position fountaining heavy loads of data and services opens a lot of chances: Using mobile in learning has been lead to positive effect in developing countries' economics as in Africa. Dr Math comes as a web pedagogical service. It is from CSIR Meraka in South Africa. It aims to help learners of secondary schools study math. Services of this application are only accessible via cellphones in a social network known as (Mxit). Since 2007, the students of engineering college and those of technological information college in Pretoria have been studying this application as a

compulsory subject for undergraduates. 28000 users interact through Mxit speeches. This paper aims to shed light on Dr.Math environ as an example of permanent learning through cellphone. The objectives this application: 1) access to experts materials at universities. 2) Sustainability for presenting application of educational content. 3) Public participation available to all students. 4) Guarantee the adjust of educational material. The challenge for the application is how to provide students with educational services that are objective which are by students and worked it until the application can reduce the barriers across useful substantive participation of others in the lists of the application [6].

### 2.2 Development and training of educational toys phone network

The aim of this study to provide a comprehensive solution to accelerate educational games via phone and implementing that and control, it was noted that (101) million students have studied in German private lessons and so at the age of schools (almost 17 years). This paper examines the unremitting development on smart touch phones and their games education through a single network. Emphasis was placed on communicating the exact screen based on the fact that research indicates in year (2014) that more than 87% of teenagers in Germany have a smart phone based on input haptic, and as well the potential to engage them in a short learning experiences during their free time in hours, for example, their need for the calculate. Containing this network games a framework include default games includes five models contain a telephone educational competitions. Technical partial depends on the united game hub, offers a window reflecting the gaming models and accessories of the default window. Also provides basic service models covering requirements in games such as admission, and successful management of the game, and integrate social media. Prepare development 'steady and in ring shape as each game promoting the general networking framework which speeds up the corresponding finding and developing subsequent games. Add to that the games themselves are developed and treated together upon consider increasingly used and the experience of its users and transported to the corresponding models. This special education is sometimes called Education shadow. And grew up on the base from facts of research where that success synchronizes with the presence of the foundations of knowledge of the student. It also failure creates concern leads to the collapse of emotion and positive self-efficiency. Thus it was developed strategies to avoid the negative emotion and therefore the future success of the school has become a little approximately. The newly parents looking commonly for professional help for their children on the issue of performance culture. Perhaps using knowledge-based digital games such as to meet the

above points. It is clear that students need training repeated that fits gaming performance like facts and figures, methods and concepts contained in the curriculum such as math and language lessons for example. Must be the games content clear until reassure parents that these games a certain way for their children. For a child, in this clearly, and although directed learning it as an alternative my refuge compared to education from other sources. Perhaps these games contribute to breaking the cycle of failure and lack of self-efficacy and avoid teaching methods that result in a renewal of failure. It creates moments motivate the success of self-efficacy with content dedicated, and that the aspirations of the researcher of the study in the current provision his thesis [7].

### 2.3 Education via mobile as an opportunity to promote education in developing countries - Ghana model

Education has become in Ghana a one of the largest public institutions as it represents (11%) in the development programmed in Ghana. This accommodates in schools and educational services quarter of the population. Has been a big challenge is the need for content, The needs of young people(pupils) and the required material for self-learning and the little and small percentage of teachers of the scarcity of trained teachers in rural schools equipment. Technical progress has been expanded and the spread of mobile phone prospects for education in developing countries. And like application of the concept of learning via cell-phone optimum solution to these problems. It has developed into considering the influence of factors in the experience of Ghana. And the application was built to a number of teachers to support developed a concept of teaching, which highlights its importance as a change in teaching practice integrates in the process of learning via cell-phone in the vehicle and that each school day. It was noted that the process of learning experience via cell-phone in the vehicle groups of students in secondary schools addresses the infrastructure problems. Of poverty, geography and kind of student that negatively affect attendance and attendance in schools. The applications described as the ability to access remote students from schools and without libraries or school personnel. Proven by experience of students take advantage of these remote areas from media and applications of smart phones. This paper describes the process of exploring learning opportunities via cell-phone, especially in the area of Ghana. Whereas the previous successful research not exhaustive, this study aimed to comprehensiveness learning via cell-phone [8].

### 2.4 Prevent inappropriate dialogues in the application Dr. Math

This application considers in order to facilitate students in the two phases of the primary and secondary where they can be used to resolve the duties of mathematics through their smart phones. However, there is what is traded through the application contexts, which is irrelevant in the basis of the intent of application. This paper presents some conversations over Dr. Math for two reasons: One is that in determining the number of students who are in need of this application. The second is that it determines the extent to which the talks can be found not relevant to the application goes against the aim of education. And noted that wrote a lot about mathematics education in South Africa especially a universities in the first year where students need support in math exercises solutions in their homework's. In addition to students in high schools and who can seek the assistance of these undergraduates via application solutions to exercises in mathematics at the secondary level. This is what the application is doing: connect these students in their stages to cooperation to solve their math homework's. The reason for testing the conversations in Dr. Math that security and confidentiality of the talks which can no longer be control in all of chats in the application. Besides that, to the reason of learning where the teacher repeat the same answer for many of the students at the same time. Then this study describes what the words that are focused in the content of the educational program and performs the requirements of the application and not go out it, And vice what words are ignored it. These appropriate words can be limitations in math or more specifically in the chapter in math and so on [9].

### 2.5 Theoretical model proposed to do the education via cell-phone in developing countries

This study deals with the possibility of the use of wireless technology in education with a focus on the possibility of the use of smart phones in the process of learning in developing countries. This possibility was retrieved from the reports of a number of learning research via smart phone, which came theorem on the existence of the benefits of these wireless devices used in education. Starting the theory idea to learning via cell-phone from the fact that the use of wireless technology in education has real advantages. It benefits covers the difficulties that occur when enter the wireless technologies in education. However, some issues must be taken into consideration such as the limitations of the hardware, and the problems of teaching, safety, and security issues, and training and support as well as costs. However, after examining the recommendations in developing countries it found that it is possible to adopt and the establishment of wireless technologies in the countries concerned in the education sector. These recommendations include the creation of confrontations and rules to ensure the appropriate use of

these wireless technologies, and design tools bearing in mind the user (the student) as well as server’s network. And confirms the adoption and the establishment of mobile-learning model via cell-phone in a developing country on the importance of taking a vision of the systems in all the elements that its need to learn putting in an environment cell-phone. This includes the employers and helpful elements such as telecommunications infrastructure, mobile devices, students and teachers. All this to ensure adoptions good use of wireless technology in education. This model includes the basic issues related to learning via cell-phone, as well as critical success factors necessary to ensure proper use. It was clear from the study results that wireless technologies used in learning via cell-phone as a portable solution can engage students in collaborative and interactive educational activities successful solution [10].

### 3 HessApp Numerals Model

HessApp Numerals Models for using Arabic Hindi Numerals in Arithmetic Competitions in operation Addition (+) On Smart-phones which support Android mobile applications.

#### 3.1 Data used

Data used in this study is a text of Arabic Hindi Numerals which indicates as (١٢٣٤٥٦٧٨٩٠), and some illustrations, and sound effects that make it an attractive application for pupils such as applause and motivational songs.

#### 3.2 Software used

Here are the software’s which used in designing HessApp Numerals Models:

Table 1: Software used

ADT (Android Development Tools)– Eclipse
JDK (Java Development Kit)
JRE (Java Runtime Environment)
JVM (Java Virtual Machine)
AVD (Android Virtual Device)
SDK (Software Development Kit)
XML ( Extensible Markup Language)

#### 3.3 Steps of the Application Test (HessApp)

The test of this study(HessApp Numerals Model) in three phases:

- Phase I: Arabic Hindi Numerals was put in numeric buttons, and the generation of Arabic Hindi Numerals in two “TextVeiw” boxes as the shape of a vertical question . It was did several different mathematical operations such as converting the text of the Arabic Hindi numerals

to an integer numbers, because the Java language considered Arabic Hindi numerals as a text. Then did the additions between numerals to doing comparing with the Arabic Hindi Numerals which will enter from pupil in the empty "PlainText" after he/she answer the addition among two "TextView" Arabic Hindi numerals.

- Phase II: The design of the model (HessApp) for using Arabic Hindu Numerals in Arithmetic Competitions in operation Addition (+) in its final form Figure 3.
- Phase III: The model (HNM) tested to doing the purpose and effectiveness of the overall performance at a number of pupils(first basic school grade), and it worked from 15 November till now in a good and excellent ways by the pupils and their families .Which the experiments have not taken the final results because to remain the pupils to be trained and know more about HNM application in their smart phone.

#### 3.4 The Model Design (HessApp Numerals Model) in Details

##### 3.4.1 The First screen (Figure 1)

The program icon and the word (HessApp) and a picture explaining, also there are welcome words in the beginning screen, beside, text boxes(“TextView”) which clarify the application. Also, this screen contains three images: (1) the image of the researcher as Mohammed-E. (2) Another image Supervisor Dr.Laurie Butgereit. (3) The third image HessApp icon. And, also screen contain command button (دخول) --Enter--to enter and continue running HessApp application. This command button (دخول) have explanatory text box below (للبدء أضغط هذا الزر) -- (to start Press this button) and the image below contain a hand finger pointing to start.

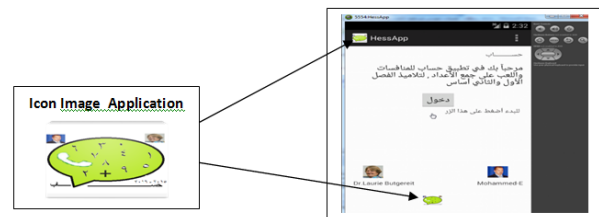


Figure 1

When pressing button (دخول) --Enter-- the first screen will close, and then move and opening the second screen Figure 2:



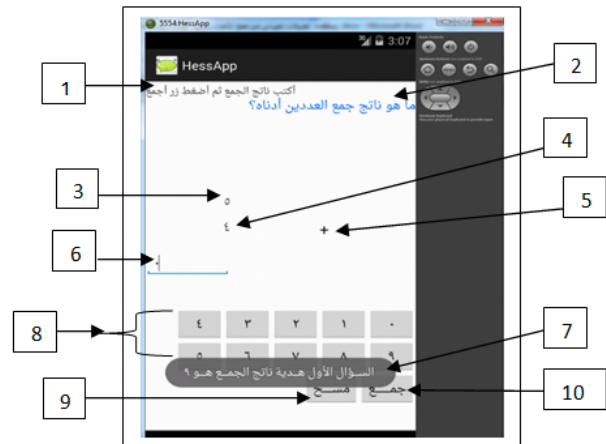
**Figure 2**

### 3.4.2 The Second Screen (Figure 2)

This contain three text views ("TextView"). Which the first one contain ( هذا التطبيق للتمارين والتدريب في رياضيات الأساس ) --This application of competitions and training in mathematics of basic schools , and it work on the addition of Arabic Hindi numerals according to the basic stage curriculum in Sudan. The second text box ("TextView") clarify the ( إسم التلميذ ) -- student's name. The third ("TextView") contains ( على التلميذ أن يجيب على عشرة أسئلة متتالية ثم نعرف بعد كل ) --Pupils should answer the ten consecutive questions then know after all ten questions what is the degree achieved by the pupil of the total ten degrees. And there in the screen input text box("EditText") within which to enter the student's name. Also there are three images in this screen: two of them with two kids carrying a mobile phone devices and opening HessApp application , and a third image of the hand finger icon of the screen appears. There is also two command buttons : The first button (حفظ)--save--, and the other button (بدء المنافسات الحسابية) -- Start of HessApp competition when pressed this button the screen closed and moves to the third screen Figure 3.

### 3.4.2 The Third Screen (Figure 3)

This screen contains the following:



**Figure 3**

- 1) Text box ("TextView1") contain: explanatory text for the pupil ( أكتب ناتج الجمع ثم أضغط زر الجمع ) - Write the result then click the addition button .
- 2) Text box ("TextView2") contain: the explanatory text of the pupil ( ما هو ناتج جمع العددين أدناه؟ )-- What is the sum of the two numbers below?.
- 3) Text box ("TextView3") contain some procedures : And there are choose one item and that is a random text from a text string {"٠", "١", "٢", "٣", "٤", "٥", "٦", "٧", "٨", "٩"} because Java Programming language treated Arabic Hindi numerals are as text or as a character [11].
- 4) Text box ("TextView4") also contain some procedures : And there are choose one item and that is a random text from a text string {"٠", "١", "٢", "٣", "٤", "٥", "٦", "٧", "٨", "٩"} because Java Programming language treated Arabic Hindi numerals are as text or as a character [11].
- 5) Text box ("TextView5") contains the plus sign (+).
- 6) An input text box ("EditText"): This allows the student to enter the answer of sum two numbers, which appear in the screen and select any number from Arabic Hindi numerals that appear in the commands buttons below the display of HessApp application.
- 7) Show the text message at the beginning of HessApp application by using "Toast.makeText" ( السؤال الأول هدية ناتج الجمع هو ٩ ) -- The first question is gift for pupils :addition of two numbers is 9) to clarify the answer to the question.
- 8) Arabic Hindi numerals commands buttons: Here each button has been developed software code in Java, where declared a variable (Src) which is to save any number of Arabic Hindi Numerals which put the pupil when he press one of the buttons. For example, if a pupil wanted to

answer (٧ + ٧) which equal (١٤), the pupil presses the button in which the text (١) First, when pupil press the button in which the text (١), the process is carried out to save the text (١) in the variable (Src) and processed concatenate [12] between variable (Src) and text (١) from the left to the right as follows :

```
// for Button Numeral ٦ Numeral 6

six.setOnClickListener(new
View.OnClickListener(){
@Override
public void onClick(View v6) {
final EditText pupilsval =
(EditText)findViewById(R.id.pupilval);
Src =
pupilsval.getText().toString();
pupilsval.setText( Src + "٦" );
concatenate Src and "٦" to be ("١٦")
}
});
```

If the entrance of three numerals for example (“٢٧٣”), will pressed command button (٧) and then pressing the command button (٧) the concatenate shall be (“٢٧”) and then pressing the command button (٣), the concatenation should become between (“٣”) and (“٢٧”) from the left to the right to be the entrance text (“٢٧٣”).

- 9) Command Button delete (مسح) : On this button pupil can delete and undo for any numeral if he/she wants to undo numerals entered in the place of answer .
- 10) Command Button addition (جمع) : When press this command button there are some processes will done which are as follows:

a) By the method offered in Java programming language provides us a method called “Math.random()” way, which is it “Math.random(), which returns a randomly chosen double in the range 0.0 <= Math.random() < 1.0. (The computer actually calculates so-called “pseudorandom” numbers, which are not truly random but are random enough for most purposes” [11].

Used this method (“Math.random()”) here :

```
final String[] Numerals ={"٠", "١",
"٢", "٣", "٤", "٥", "٦", "٧", "٨",
"٩"};
int rando =(int) (Math.random()*10);
numOne.setText(Numerals[rando]);
```

This method (“Math.random()”) enabled us to select an item (text) random number from ten text string elements , which in the text string {"٠", "١", "٢", "٣", "٤", "٥", "٦", "٧", "٨", "٩"} , where the selected item appears in Text box (“TextView3”) .

Also, the method (“Math.random()”) enabled to select an item (text) random number from ten text string elements , which in the text string {"٠", "١", "٢", "٣", "٤", "٥", "٦", "٧", "٨", "٩"} , where the selected item appears in Text box (“TextView4”) which :

```
final String[] Numerals2 ={"٠", "١", "٢", "٣",
"٤", "٥", "٦", "٧", "٨", "٩"};
int rando2 = (int) (Math.random()*10);
```

```
numTwo.setText(Numerals2[rando2]);
```

- b) Also, by the method offered in Java programming language provides us a method called “Integer.parseInt(str)” (David J. Eck, 2006) Working to convert the text Arabic Hindi numerals to Arabic numerals (David J. Eck, 2006), which it is “Integer.parseInt(str) is a function call that attempts to convert the value of str into a value of type int.”

It was converted texts that appear in the figure3 (TextView(3)) and (TextView(4)) to integers to be added for comparison after addition with the answer introduced by the pupil in the text input box.

For example, if we assume that the pupils has to enter the answer which as shown in Figure 4:



Figure 4

In figure4 the texts that appeared during HessApp application is (“٧”) and (“٣”) . The answer entered in the text box(“EditText”) is (“١٠”). When press the button (جمع) the summation of texts (“٧”) and (“٣”) after converted these two

text numerals to an integer number to (7) and (3) , because the Java programming language does not support Arabic Hindi numerals . And Java programming language regarded these Arabic Hindi numerals as a text. Then put the answer of two numerals in the variable (Sum). Thereafter the text which is entered from pupil (“١٠”) as answer will converting also to an integer number (10). Java code as follow:

```
//convert(Textview3) to an integer
NumeralOne = Integer.parseInt(numOne.getText().toString());
//convert(Textview4) to an integer
NumeralTwo = Integer.parseInt(numTwo.getText().toString());
//convert an input text box("EditText") which pupil shall answer to an integer
PupilEnter = Integer.parseInt(src);
```

After converting to an integer numbers, done a comparison between the summation (Sum) and the answer entered from competitor. If the summation (Sum) is equal to the answer entered from competitor, there is a variable will an increase by one (1). If the answer is correct a motivational message appears (ممتاز إجابة صحيحة Excellent right answer) with applause sound effect. Which the Java codes are:

```
if(PupilEnter == Sum) {
    k++; // Variable that increases with the degree of one
    // (1) at each correct answer
    Toast.makeText(competitor.this, "ممتاز إجابة صحيحة", Toast.LENGTH_SHORT).show();
    final MediaPlayer appla = MediaPlayer.create(competitor.this, R.raw.applause);
    appla.start(); // Calling applause and running and implementing
```

If the answer entered from pupil is not equal to the summation (Sum) there is a message appears (Sorry wrong answer) with sound effect for the answer wrong. Which the Java codes are:

```
else {
    Toast.makeText(competitor.this, "عذراً خطأ إجابة", Toast.LENGTH_SHORT).show();
    // Variable that increases does not used here
    final MediaPlayer fails = MediaPlayer.create(competitor.this, R.raw.fail);
    fails.start(); // Calling the sound effect for the answer wrong here.
```

Thus, pupil continues to answer the questions one by one until it reaches the number of ten questions. If the correct answers more than or equal to the number (5) answers. Then the application directly closed the screen in figure 3 and figure 4 and opening the screen in Figure 5.

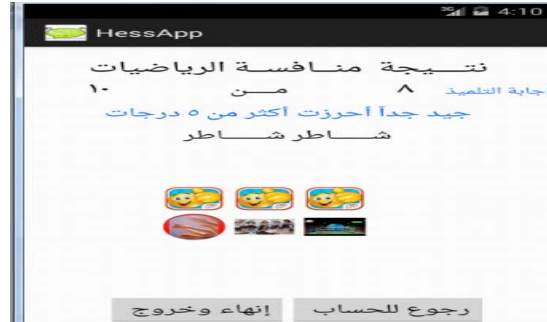


Figure 5

In this screen figure 5 appear the result of competition mathematics (نتيجة منافسة الرياضيات) clarify the answer achieved by more than or equal (5) , and here in the figure5 above the answer (“٨”) 8 from (“١٠”) 10. Stimulate the moral words as (very well you won more than 5 degrees (جيد جداً أحرزت أكثر من 5 درجات) ,and (Shater Shater) and influential audio heard motivational pupil automatically with the appearance of this screen. Also, shown in the screen two command button : First , ((رجوع للحساب))return Back) In the case of select this choice would return to the screen in Figure 4. Second, when select command button ((إنتهاء وخروج)) terminate and exit) the application will close definitively and get out of it. If the pupil answers less than 5 degrees, the screen in Figure 6 is shown with the result achieved by the student which is less than five degrees. For example, here (إجابة) (answer pupil 3 of 10) and some motivational words to try again.

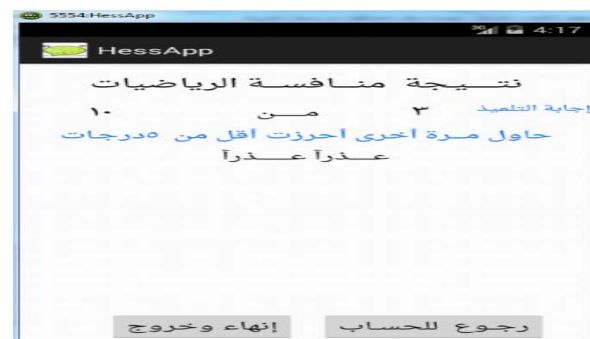


Figure 6

And also an influential audio motivational heard at the beginning of the screen. Beside, located on the screen two command buttons doing as the same work and procedures in two command buttons in figure 5.

#### 4. Conclusion

The application HessApp that presented in this paper it is step in order to facilitate one of the subjects that are not easy by nature it's mathematics in the initial operations(add, subtract,..etc). Application services via cell-phone which have an easy used and spread applications, and it was easy on the basis schools pupils deal with techniques with ease. Carry the application name from the procedure carried out by HessApp (calculation). The researcher presents this study which aims to create a mechanism between the pupils are cooperative and easy and social to use and available at anywhere and anytime. The researcher detail steps preparing the application electronically and then explained to the pupils by the image and representation. Then the researcher pointed the reasons for which he devised a smart way to solving math problems for students in the early grades. And, indicated that the advantages provided by the application: technical, material and scientific. Also, researcher attached to the problem for which the application in Arabic Hindi numerals and the meaningful.

High prevalence of telecommunications services and Internet and applications of smart phones, they had been the cause of the application (HessApp) success and the ease of use.

#### References

- [1] Mohammed Elbasheir, Dr Laurie Butgereit. "A Review of Arithmetic Competitions on Cell phones in basic school with particular emphasis on Arabic/Hindi Numerals". In the 4th Conference on Computer Science & Information Technology 19-20 Jan2015.
- [2] Asma-Al Agad, "e-learning and contemporary challenges". Birzeit University, College of Information Technology, Department of Computer Systems Engineering. 2010.
- [3] Prof. Dr. Ismail Diab and Dr. Fathi Aushieba. "Social Foundations of Education". 2003.
- [4] Alaa Ahmed Aljuvdi. "Effectiveness of the program by using the proposed model of learning in the constructivist collection and some of the thinking and the trend towards material with students with learning difficulties math skills first episode of basic education". Cairo University, 2012.
- [5] Hassan Zaitoon, "a form of teaching trip: a contemporary vision of the ways of teaching and learning in our schools", Cairo: the world of the book, (2003).

[6] Botha, Adele, and L.Butgereit. "Dr Math: A mobile scaffolding environment."International Journal of Mobile and Blended Learning (IJMBL) 4.2 (2012): 15-29.

[7] Busch C , ClaBnitz S, Selmanagic' A and Steinicke M. "Developing and Testing a Mobile Learning Games Framewor" The Electronic Journal of e-Learning Volume 13 Issue 3 2015, (pp151-166) available online at [www.ejel.org](http://www.ejel.org) .

[8] Grimus, Margarete, Martin Ebner, and Andreas Holzinger. "Mobile Learning as a Chance to Enhance Education in Developing Countries-on the Example of Ghana." mLearn. 2012.

[9] Butgereit, Laurie, and Reinhardt Botha. "Stop words for "Dr Math". IST-Africa Conference Proceedings, 2011. IEEE, 2011.

[10] Barker, Andrea, Greig Krull, and Brenda Mallinson. "A proposed theoretical model for m-learning adoption in developing countries." Proceedings of mLearn. Vol. 2005. 2005.

[11] Eck, David J. "Introduction to programming using Java". David J. Eck, 2006. DJ Eck - 2006 - win.tue.nl . . <http://math.hws.edu/javanotes>.

[12] Manna, Zohar. Mathematical theory of computation. Courier Corporation, 2012.