

# A Review of Arithmetic Competitions on Cell Phones in Basic School with Particular Emphasis on Arabic/Hindi Numerals

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## ABSTRACT

Teaching mathematics and the associated processes numerical calculations requires a research in a way that can make the whole procedure easier to perform. Doing so, the researcher observes that taking the assistance of new technologies of the cell phone and the internet can contribute to the ease and conciseness of proceeding math introductory applications. We shall investigate ways to help 1st, 2nd and 3rd grade basic schools to learn arithmetic operations in an enjoyable and social way. Developing a helpful tool using mobile applications to explore what aspects of learners' characteristics influence pupils learning in an environment of arithmetic competitions especially that using Arabic Hindi Numerals, and this literature review is in support of that investigation. The process is based on a competition of a model uses Arabic/Hindi Numerals in tasks that is expected to be shared by the whole group's members. In addition, the process involves the teacher and the population samples who are pupils of the 1<sup>st</sup> and 2<sup>nd</sup> levels of basic school who are supposed to have training on the competition bases on cell phone networks: Bluetooth, Wireless, etc. At length, the researcher uses a cell phone application to do math tasks basically on interpersonal group via emails. This is expected to increase the obtaining information and enables pupils to compete being monitored by their teacher.

**Keywords:** - eXtensible Messaging and Presence Protocol (XMPP), Short Message Service (SMS), General packet radio service (GPRS), SMS on cell phones (MXit), HessApp Numerals Model(HNM).

## I. INTRODUCTION

In order to succeed and progress in mathematics and in most areas of life, people need to know some basic arithmetic skills such as addition and subtraction between two numbers. That implies they must be able to get the result. This is the basis of simple arithmetic operations at the beginning of understanding of mathematics. This will lead to the advancement and progress to understanding algebra and mathematical equations and advanced mathematics deeply in the future (Figure1).

There are fundamental reasons for the problem of lack of understanding of mathematics for pupils and students in advanced classes in Sudan and the Arab world. Most of the methods and curriculum focus on teaching Arabic Hindi numerals to students from the

beginning of the first basic class until third grade secondary education. Arabic Hindi numerals that indicate numerals which look like ١٢٣٤٥٦٧٨٩٠. Later, at university level, teaching of mathematics is done in Arabic numerals. Arabic numerals which indicate numerals that looks like 1234567890.

The teaching of beginning mathematics curricula in Sudan tends to memorization of some arithmetic operations such as multiplication tables as seen in Figure 2. This makes the pupil memorize the result of two numerals multiplication. However, he or she does not actually know how this operates between the two numerals [1].

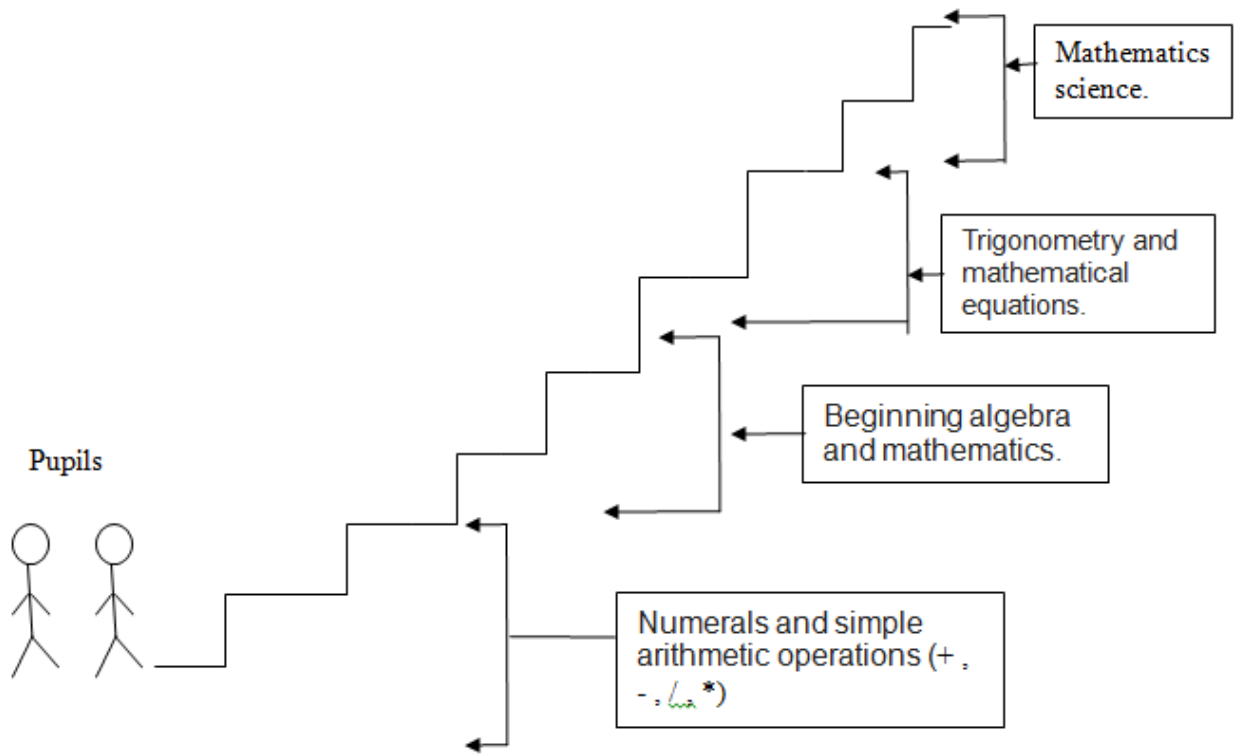


Figure1: Stages of learning (teaching) mathematics.

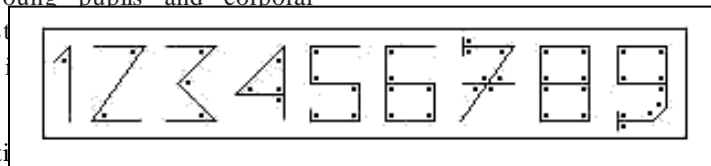
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٥٠ = ١٠ × ٥	٤٠ = ١٠ × ٤	٣٠ = ١٠ × ٣	٢٠ = ١٠ × ٢	١٠ = ١٠ × ١

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٣٠ = ٣ × ١٠	٢٧ = ٣ × ٩	٢٤ = ٣ × ٨	٢١ = ٣ × ٧	١٨ = ٣ × ٦
٤٠ = ٤ × ١٠	٣٦ = ٤ × ٩	٣٢ = ٤ × ٨	٢٨ = ٤ × ٧	٢٤ = ٤ × ٦
٥٠ = ٥ × ١٠	٤٥ = ٥ × ٩	٤٠ = ٥ × ٨	٣٥ = ٥ × ٧	٣٠ = ٥ × ٦
٦٠ = ٦ × ١٠	٥٤ = ٦ × ٩	٤٨ = ٦ × ٨	٤٢ = ٦ × ٧	٣٦ = ٦ × ٦
٧٠ = ٧ × ١٠	٦٣ = ٧ × ٩	٥٦ = ٧ × ٨	٤٩ = ٧ × ٧	٤٢ = ٧ × ٦
٨٠ = ٨ × ١٠	٧٢ = ٨ × ٩	٦٤ = ٨ × ٨	٥٧ = ٨ × ٧	٤٨ = ٨ × ٦
٩٠ = ٩ × ١٠	٨١ = ٩ × ٩	٧٢ = ٩ × ٨	٦٣ = ٩ × ٧	٥٤ = ٩ × ٦
١٠٠ = ١٠ × ١٠	٩٠ = ١٠ × ٩	٨٠ = ١٠ × ٨	٧٠ = ١٠ × ٧	٦٠ = ١٠ × ٦

Figure2: Multiplication table in Hindi Numerals

Sometimes memorization of arithmetic operations happens by force for young pupils and corporal discipline is common in first basic schools, often results altogether.



Dust numerals (Ghubar)

Introductions of scientific 'problems' in rural areas of Africa have reported mixed results. A range of reasons is offered as hampering local adoption of technology [2]. In order to understand the problems of rural areas. History of Arabic Hindi Numerals and Arabic Numerals must be included in this review paper.

point at each corner.

Later these shapes were amended to their current forms. The most important inventions of Alkharizmi is the addition numeral zero to Arabic numerals which is formed as a circle where there is no angle. The first recording of Arab zero was due 873 AC. However the first Indian zero back to 876 AD [6].

## II. NUMERALS OVERVIEW

### 2-1-1 Alkharizmi Numerals

The word Alkharizmi echoes back to the Arab world and the Persian Muslim Abu Abdullah Muhammad Ibn Musa al-Kharizmi. The nickname and the name of Abu Jaafar al-Kharizmi was born about 164 e 781 AD and died after 232 AH after 847 AD. He was one of the first Muslim mathematicians and contributed to the advancement of mathematics. The most important achievements of Alkharizmi arithmetic was the insertion of Arabic numerals on the basis of the numbering system of the Indian Arab developer in Indian mathematics, to the Western world, and was called Dixit algorizmi or Algoritmi de numero Indorum (Indian art in the calculation of Khwarizmi). The term "algorithm" is derived from the aljawrim, the method of calculation of Hindi numerals and Arabic numerals developed by Khwarizmi. Both the word "algorithm" and "aljawrim" shapes drawn from the Latin name for Khwarizmi which are Algoritmi and Algorismi respectively [3].

### 2-2 Arithmetic Competitions

Model for Arithmetic Competitions in Arabic/Hindi numerals is: 1)The activity or condition of competing through the branch of mathematics concerned with the properties and manipulation of numbers 2) Are the interactions between pupils to compete at adding or subtracting two integers numerals together [7] [8].

### 2-1-2 Ghubar Numerals (Dust numerals)

Ghubar numerals (dust numerals) echo back to an Arabic word for sand (or dust), which means Western Arabic numerals (the decimal digits 0–9). These are derived from the style of digits written on ghubar tablets in North-West Africa and Iberia. As well, they are described as the 'West Arabic' or 'gubar' style [4] [5].

### 2-3 HessApp Numerals Model

This paper is a Literature Review in support of research into using Arabic/Hindi numerals in competition, and it should be simple arithmetic competition among pupils. This model supports the possibility of every pupil playing against every other pupil. After the completion of the game, the model arranges and decides who the winner of the pupils is. Thus, this model encourages every pupil to compete with other pupils in arithmetic completions. The model is intended to assist pupils in the first and second grades understand and recognize simple calculations such as addition and multiplication of two integers. In other words, this model is prepared to enhance pupils' understanding of primary classes in basic schools especially in Sudan and the Arab world and that it will be done in Arabic/Hindi numerals.

Another author (Ibnamin) points that Alkharizmi designed Arabic numerals in terms of the number of angles (acute or existing) comprising the whole number. The numeral one (1) includes an only one angle whereas numeral two (2) includes two angles. For the numeral three (3), it includes three angles and so on. The following figure shows how the original shapes of Arabic numerals written on a "dust board" were drawn with a

## III. BACKGROUND

Due to the need for easiness and preciseness of math drills and tasks, the researcher investigates the past proposed ways that can help pupils succeed in such a hard change. Cell phone networks are one possible solution. Much effort has been done towards the current study field; however, the uniqueness here is that a competition is held on Arabic and Hindi Numerals among virtual class's cell phone.

Many studies have been done used similar axes such as " Namsoo Shin, Cathleen Norris and Elliot Soloway

2006", "Dr Math", "Cooper and Phadiela2010", and so on. They all use cell phone and computer intranet groups to exchange the math materials and drills. Fortunately, these strategies despite their modernity and complicated requirements have proved their benefits and fruits in overcoming math processes difficulties.

For (Namsoo Shin, Cathleen Norris and Elliot Soloway (2006)) the proposed games are held on doing simple processes of math on portable sets as cell phone, I pads, I pods, etc. It is done to esteem the role of such new teaching aids in education and student environment.

For the second attempt of Dr math, the samples are expected to respond and answer some questions of Math. They are asked separately, but of course the whole members are targeted. Results and scores are handheld synchronously.

For the (Cooper and Phadiela2010), it depends on holding an activity of mathematic gridlocks between two or more learners who are proved weak in such tasks.

Finally, the field of doing math duties using cell phones or computer networks has been the interest of many experts. On other words, the current survey is going the same, track; however, the target materials are especially the Arabic Hindi Numerals that are exploited in establishing competitions among participant.

## **IV. REVIEW**

### **4-1 Basics of Mobile Learning**

Mobile learning is the ability of obtaining or providing educational content on mobile devices such as personal smart phones and mobile phones. Educational content is digital learning assets, which include any form of content or media available on a personal device. However, Mobile learning by mobile applications in arithmetic competition has more advantages. Mobile learning can be more attractive and fun and can make students very well in computational skills.

Most researchers and former teachers may offer mobile learning and immediate descendant of e-learning and others on (2003) for example e-learning means 'Learning by digital tools "electronic" media, and so that, mobile learning is 'e-learning that uses mobile devices and connectivity transmission'.

E-learning is a subset of technology-based training, because e-learning come to any expansion of educational knowledge over the Internet.

### **4-1-1 Objectives & Challenges in Mobile Learning:**

There is a number of objectives and challenges facing the e-learning through mobile phones today, -, which is:

**Objectives:** 1) Encourage 'anywhere, anytime' learning: Mobile devices allow pupils or students to gather, access, and process information outside the classroom. They can encourage learning in a real-world context, after school and home environments. 2) Reach under-served children: accessibility of their relatively low cost and in low-income communities. 3) Improve twenty-first century social interactions: power to promote and foster collaboration and communication obtainable in Mobile technologies. 4) Enable a personalized learning experience: Not all pupils and children are similar; instructions in mobile application should be adaptable to individual and various. There are important chances for enjoyable math competitions, that supporting autonomous, differentiated, and individualized learning through mobile applications.

**Challenges:** 1) Negative aspects of mobile learning are: social, traditional, cognitive, and physical challenges must be surmounted when mobile devices are incorporated into pupil's learning. However, the expansion and spread of technology development in the world of mobile devices and mobile applications, should have solved this challenge. 2) Cultural norms and attitudes: Many experts believe that mobile devices have significant possibility to transform pupils and children's learning, but parents and teachers apparently are not yet satisfied. However, in (Rida A. K Irani 1955) we find that the children have learned and benefited greatly from this study in South Africa, using e-learning. 3) Differentiated access and technology: The wide variety of mobile technologies is a challenge for teachers and pupils who want to speed up the academic results as well as producers of mobile applications who seek to facilitate such learning. However, the rapid technological advances - solved this challenge. 4) Limiting physical attributes: Some physical aspects of technical for mobile devices that may prevent optimal test the learning experience, which include: restrictions text, the small screen size, and battery life. Beside that, the technical development in mobile devices solved our problem of the small screen by touching the screen zoom through simple procedures on mobile screen [9].

### **4-2 Problem solving in a collaborative small group**

This study proposed that learning is enhanced in a small group setting since learners actively engage with

problems especially in the field of mathematics. The importance of problem solving in mathematics for the poor performance of learners in South Africa in international tests (TIMSS) in schools generally indicates that the focus should be on solving problems in the teaching and learning of mathematics. However, this study focuses geometry problem solving in collaborative small group settings. The researcher can consider arithmetic competition on cell phone environment that are between two of pupils like this type of study [10].

#### **4-3 Effects of Handheld Games on Students Learning in Mathematics**

Shin et al. studied the impacts of using handheld and portable games on student learning in math. The program proves that the application is useful and achieving its aims. It is especially beneficial to weak students in math overlooking their generic or ethnic differences.

In analysing results, the games activities contribute to increase chances in mathematic tasks and tests. It is observed that even low-level students of handheld gaming over perform their counterparts those who do not use the same program on the same test.

Two primary goals of this study: 1) To know which aspects of learner's characteristics impact student learning in handheld gaming environments. 2) Investigating the possibility of making use of handheld games in education and learning as an effective teaching aid.

Shin et al. use 50 samples of three classes at correlational analysis of the predictors of student's performance in math 50 students are used here. Another design states 37 students to be used for conducting data analysis. Only those who did the pre-test are allowed. It is a quasi-experimental control –group design with repeated measures. These are used to state gender variants.

Of the results, a statistically significant difference in the math scores' changed over time in the two groups (one and two). Even for the low-level games, there is a significant effect. For gender differences on the test, there is no significant result.

One of the implications is that the program is consistent with what other researches have confirmed i.e., it is an effective tool for facilitating student learning. As well, gender and ethnicity have not any impact on mathematics test. No bias in testing students who use handheld gaming.

Elementary schools in the Midwest of Cauca 28 students are male and 22 are female. The program materials are called skills Arena. It is a program of study that teaches students about basic skills of math. The program of gaming is based on handheld game group (HG) of 20 participants in class two and they play the game only during the time cut for it.

In class one; 21 students use card game group. They use flash cards on playing. The rest of the students: Delayed group represent class three. They are measured by using a pre-test to enhance their skills in the games. For the measures, the students' game score is the number of correctly solved programs in the skills Arena game. The study evaluates student attitude toward math and the handheld games.

The research procedures take four months in 2005. A pre-test and post-test are taken by the sample. Students have previous experience about playing games. They just rely on the game tips.

This study offered several keys found in it. 1) On receiving scores on the mathematic test, enhanced outperform for the students who used the handheld-based arithmetic game than who did not use it. 2) Students who played more than four times per a week the handheld game outperformed those who used the game only twice a week. Besides, on gain scores on the same mathematics test, enhanced outperformed for low-ability students who had used the handheld game than those low-ability students who had not used it. 3) There are numbers of problems solved correctly by the handheld game scores and the skills of students' toward mathematics significantly correlated to the students' scores on the mathematics final test. The handheld gaming environment prove that the impacts positively on students' learning in mathematics, especially for low-ability groups. However, this study was conducted on students and not pupils with young ages [11].

#### **4-4 Enabling mathematics teachers to create a resence on MXIT & other chat areas**

This study provided a model for the math teacher who feels uncomfortable with expressions such as  $\Theta$ ,  $\varphi$ ,  $\Sigma$  and  $\Delta$ . Although recent research has shown that primary and secondary school pupils are more willing to discuss mathematics on MXit and in environment chats. This model is C<sup>3</sup>TO that means a platform where (bona fida) – all teachers (mathematics teachers and other teachers), which allows easily set up definition lists, formulae lists, quizzes, games and tutoring facilities



which can be up to their pupils using Mxit in possession of cell phones. Mxit is a mobile chat based synchronous communication system which is extremely popular in South Africa.

What is Dr. Maths? Dr. Maths is a program designed for children to do mathematics learning for children in the age group of 5-12 years or classes.

What is C<sup>3</sup>TO – Chatter Call Centre/Tutoring Online? Is a web application allowing teachers to create environment in a tutoring which may be used with cell phones using Mxit. This tutoring environment allowed competitions, games and multiple choice quiz competitions in extra mathematically to keep participants busy during the periods of time when a tutor is not available [11].

There are some mathematical skills competitions which include:

- Addition – two integers can combine as a simple addition.
- Subtraction – two integers subtract as a simple subtraction with the difference remaining positive.
- Multiplication – two integers can combine as a simple multiplication.
- Division – simple division of two integers with positive, natural number quotients.
- Prime Factors – prime factors of a positive number.

A multiple choice questionnaire can be done after the multiple choice quiz competitions from the teacher. The participants can compete at answering the questions. This is ideal for testing definitions [11].

#### **4-5 How Dr Math reaches Pupils with Competitions and Computer Games by using Mxit**

It is a Mxit contact that persuades pupils to join the application user-group to trigger competitions and games that are made out of math processes. It is to say through what this app requires of math skills, a plot of figure is solved.

The current High School Generation: They are teenagers off, 8 years old and who are presently, in 2009, in Grade 12. Who are available in the Internet if any. In Africa, math teaching has been adopting innovative ideas of technology; Windows, Internet, Cell phones, etc. That is the generations.

Mxit: A cell phone application that has made up in South Africa. It is for free, or as for SMS (Short Message Service) cost. It has been used for the ages between 12 and 25.

Competitions: The first game was deployed in 2007. It was adding two integers together. The top score is given to the most correct and quicker who will work hard to keep the top status. Then, over some months, the other processes of math are applied one by one.

Ethics and Safety: It means to avoid the social problems that the participants might be exposed to. A committee is assigned to monitor the competitions. It prohibits contact between the pupils.

The result of social upliftment: The game is an interesting example of prosperity that may represent positive contribution to social problems.

Interactive Fiction: The games and competitions are composed on the way of filling-gap of the fiction tradition when the audience can fill imaginatively what follows. It is a process of event development that's only completed through one of arithmetic process. Through comparing the scores, the competition is put on a hell of zeal to go on the game which means more skills of math that are going to practiced and mastered.

Human Recourses Issues: The program is held by skilful tutors who can follow-up pupils and develop the Java-centred Mxit. So, the task is so hard. Two tutors in one place are put to meet the complicated needs of the hugely increasing numbers of pupils on spare time.

Things to be done: 1) More professionally of well qualified developers. 2) A website should be devoted to these games. 3) Using Mxit as a teaching aid [8].

#### **4-6 Dr Math gets MUDDY: The “Dirt” on How to Attract Teenagers to Mathematics and Science by Using Multi-User Dungeon Games over Mxit on Cell Phones**

Those who use Mxit, the contact on cell phones, are called many things due to their close correlation with

their cell phones: thumb tribe, games, etc. This paper shows a project of multi-user dungeon games is triggered among pupils to increase and enhance their practicing math and science skills. It is done on 93% of first year university students in South Africa who have limited knowledge of math. The idea is that institutes adopt Mxit to create a reach-line between their weak students and tutors who can help them improve their math skills and to help with their homework using Mxit (a text-based chat system).

What is MXIT? It is software that takes advantage of the low cost of data packets over GPRS (General packet radio service).

What is a MUD? A MUD is (short for Multi User Dungeon) refers to a virtual social environment. They are computer programs, which accept multi-player connection.

Technology Description: Information from the pupils on their cell phones would link onto the cell phone network in order to reach the Mxit server which entire communicate allowing massive messages to be sent or received to Dr Math. The server being the synchronous axis is for the state update of each player. During the run-time, the server saves the XML in a folder.

Interpreting Mxit “lingo” or slang: Using of divers technology media has led to use language differently. It became a slang style or variety. Whether it is bad or good language variety, this is the means of interaction among users of the new era generation.

Results: 1) Mud was attempted in educational field. 2) Interface with Mud is weak. 3) Users do not play regularly. 4) They face difficulties navigate the interface [12].

#### **4-7 Math on Mxit: Using Mxit as a Medium for Mathematics Education**

This paper examines a math club or math help system which is being run throughout Mxit, the famous swift messaging system running on cell phones and extremely popular with young students. A contact between the learners and a tutor is held in durations stated formerly. The tutor is linked synchronously with players using an additional computer and keyboard. None of the students meant uses his name in the program.

The paper is based on the idea of exploiting an instant messaging system that is normally used to enhance education in a distance learning environment. It is unique program for it uses cell phones to implement the games.

Mxit is software used in South Africa which enables people to easily communicate with each other with text-based typed messages like SMS on cell phones. It uses only the phone number to access the game group. The router in this software is the tutor himself. The program conversations are what represent its essence and practice. Opera Mini is the browser for finding the program clubbings.

Of course some difficulties encounter such a program of them is drawing triangles and graphs. Yet highly supported photos and images are sent via this program. Dr Math is held in English, for the tutors are English speaker. However, HNM aims to hold in Arabic, for the pupils using Arabic.

Ethical bias is diminished through using nicknames. Socially speaking, learners establish a virtual linkage with Dr Math. Dr Math takes the chance to encourage learners play games on spare times. It is clear that students enjoy playing and using Dr Math. They react saying that the program is a great success.

The dark side of using Dr Math is that some students misuse the messages sending some bad sexual images or remarks. However, there are no bad effects in using HNM in the future.

It is proved that the program is successful in helping learners with their math homework's in the afternoons. The cost is minimal. As a result, Dr Math influences properly on student's different class tests [13].

## **V. CONCLUSIONS**

This paper has presented an overview of literature about mobile mathematics assistant software for pupils which will be of assistant to development of HessApp Numerals Model. The paper presented the current technologies use basic mathematical skills via games and competitions over cell phones. The paper also presented expected solutions such as Arithmetic competition application software uses Arabic Hindi Numerals and to improve the mathematics skills of primary school pupils. However, it is noted that this is a research project and the outcomes are not known beforehand.

This research aims at seeking for an easy and simple way that can help pupils do math task. It proposes a cell-phone-based approach depending on participant's competition of Arabic Hindi Numerals accounting. Hence, this smart application is expected to interpersonally link the target population in one server under the monitoring of a restated tutor who presents the math questions or quizzes for his pupils via separate emails. It is clear that mobile handhelds help students in many areas such as South Africa. Unlikely, this has not yet been done in Arabic/Hindi numerals. Finally, this paper expected to achieve its long-run aims provided the sample should be trained before the experiment.

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